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AIM AND SCOPE

Journal of Education and Research in Nursing (J Educ Res Nurs) is an international, scientific, open access, online-only periodical published in accordance with independent, unbiased, and double-blinded peer-review principles. The journal is the official publication of Koç University Semahat Arsel Nursing Education, Practice and Research Center (SANERC), published quarterly in March, June, September, and December. The publication language of the journal is English and the journal accepts English manuscripts only.

All expenses of the journal are covered by SANERC. Processing and publication are free of charge with the journal. No fees are requested from the authors at any point throughout the evaluation and publication process. All manuscripts must be submitted via the online submission system, which is available at http://jer-nursing.org/. The journal guidelines, technical information, and the required forms are available on the journal's web page.

Journal of Education and Research in Nursing aims to share the experience and the knowledge from Türkiye and different cultures through original studies in nursing and healthcare as well as protect and improve the public health and strengthen the nursing profession by providing the opportunity to transfer current knowledge into practice. The journal contributes to the literature by publishing manuscripts at the highest scientific and clinical value in nursing research, practice, and education. The journal publishes original articles, reviews, case reports, and letters to the editors that are prepared in accordance with ethical guidelines. The journal also welcomes contributions from other healthcare professionals on issues that have a direct impact on nursing practice.

The target audience of the journal is primarily researchers, practitioners, educators and executive nurses as well as other healthcare professionals, policy makers and students of nursing and health.

Journal of Education and Research in Nursing currently indexed in GALE (2010), Tubitak Ulakbim Medicine (2012), EBSCO (2017), CINAHL (2017), DOAJ (2021), Research4Life (2021), Hinari (2021), SCILIT (2021), OUCI (2021), CNKI (2022), MIAR (2024), SUDOC (2024), Zeitschriften Datenbank (2024), Electronic Journal Library (2024), and EmCare (2025).

The editorial and publication processes of the journal are shaped in accordance with the guidelines of the International Committee of Medical Journal Editors (ICMJE), World Association of Medical Editors (WAME), Council of Science Editors (CSE), Committee on Publication Ethics (COPE), European Association of Science Editors (EASE), and National Information Standards Organization (NISO). The journal is in conformity with the Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

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Journal of Education and Research in Nursing can publish advertisement images in the journal's website upon the approval of the Editor in Chief. Potential advertisers should contact the Editorial Office. Advertisers have no effect on the editorial decisions or advertising policies.

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INSTRUCTIONS TO AUTHORS

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All expenses of the journal are covered by SANERC. Processing and publication are free of charge with the journal. No fees are requested from the authors at any point throughout the evaluation and publication process. All manuscripts must be submitted via the online submission system, which is available at http://jer-nursing.org. The journal guidelines, technical information, and the required forms are available on the journal's web page.

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EDITORIAL AND PUBLICATION PROCESS

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Originality, high scientific quality, and citation potential are the most important criteria for a manuscript to be accepted for publication. Manuscripts submitted for evaluation should not have been previously presented or already published in an electronic or printed medium. The journal should be informed of manuscripts that have been submitted to another journal for evaluation and rejected for publication. The submission of previous reviewer reports will expedite the evaluation process. Manuscripts that have been presented in a meeting should be submitted with detailed information on the organization, including the name, date, and location of the organization.

PEER REVIEW PROCESS

Manuscripts submitted to Journal of Education and Research in Nursing will go through a double-blind peer-review process. Each submission will be reviewed by at least two external, independent peer reviewers who are experts in their fields in order to ensure an unbiased evaluation process. The editorial board will invite an external and independent editor to manage the evaluation processes of manuscripts submitted by editors or by the editorial board members of the journal. The Editor in Chief is the final authority in the decision-making process for all submissions. Reviewers who seek assistance from a trainee or colleague in the performance of a review should acknowledge these individuals' contributions in the written comments submitted to the editor. Reviewers must maintain the confidentiality of the manuscript, which may prohibit the uploading of the manuscript to software or other AI technologies where confidentiality cannot be assured. Reviewers must request permission from the journal prior to using AI technology to facilitate their review.

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At submission, the journal should require authors to disclose whether they used artificial intelligence (AI)– assisted technologies (such as Large Language Models [LLMs], chatbots, or image creators) in the production of submitted work. Authors who use such technology should describe, in both the cover letter and the submitted work, how they used it. Use of AI for writing assistance should be reported in the acknowledgment section. Authors who used AI technology to conduct the study should describe its use in the methods section in sufficient detail to enable replication to the approach, including the tool used, version, and prompts where applicable. Chatbots (such as ChatGPT) should not be listed as authors because they cannot be responsible for the accuracy, integrity, and originality of the work, and these responsibilities are required for authorship. Therefore, humans are responsible for any submitted material that included the use of AI-assisted technologies. Authors should carefully review and edit the result because AI can generate authoritative-sounding output that can be incorrect, incomplete, or biased. Authors should not list AI and Alassisted technologies as an author or co-author, nor cite AI as an author. Authors should be able to assert that there is no plagiarism in their paper, including in text and images produced by the AI. Humans must ensure there is appropriate attribution of all quoted material, including full citations.

ETHICAL GUIDELINES

An approval of research protocols by the Ethics Committee in accordance with international agreements (World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects," amended in October 2013, www.wma.net) is required for experimental, clinical, and drug studies and for some case reports. If required, ethics committee reports, or an equivalent official document will be requested from the authors. Submissions which do not have ethical approval will be reviewed according to COPE's Research, Audit and Service Evaluations guideline.

Such manuscripts can be rejected after editorial review due to the lack of ethics committee approval.

For manuscripts concerning experimental research on humans, a statement should be included that written informed consent of patients and volunteers was obtained following a detailed explanation of the procedures that they may undergo.

It is the authors' responsibility to protect the patients' anonymity carefully. For photographs that may reveal the identity of the patients, signed releases of the patient or their legal representative should be enclosed, and the publication approval must be provided in the Methods section.

For studies carried out on animals, an approval research protocols by the Ethics Committee in accordance with international agreements (Guide for the care and use of laboratory animals, 8th edition, 2011" and/or "Interna-

tional Guiding Principles for Biomedical Research Involving Animals, 2012") is required. Also, the measures taken to prevent pain and suffering of the animals should be stated clearly in such studies.

Information on patient consent, the name of the ethics committee, and the ethics committee approval number and date should also be stated in the Methods section of the manuscript.

PLAGIARISM AND ETHICAL MISCONDUCT

Journal of Education and Research in Nursing is extremely sensitive about plagiarism. All submissions are screened by a similarity detection software (iThenticate by Cross-Check) at any point during the peer-review and/or production process.

When you are discussing others' (or your own) previous work, please make sure that you cite the material correctly in every instance.

Authors are strongly recommended to avoid any form plagiarism and ethical misconduct that are exemplified below.

Self-plagiarism (text-recycling): Overlapping sections or sentences with the author's previous publications without citing them. Even if you are the author of the phrases or sentences, the text should not have unacceptable similarity with the previously published data.

Salami slicing: Using the same data of a research into several different articles. Reporting the same hypotheses, population, and methods of a study is into different papers is not acceptable.

Data Fabrication: It is the addition of data that never occurred during the gathering of data or the experiments. Results and their interpretation must be based on the complete data sets and reported accordingly.

Data Manipulation/Falsification: It means manipulating research data with the intention of giving a false impression. This includes manipulating images (e.g. micrographs, gels, radiological images), removing outliers or 'inconvenient' results, changing data points, etc.

In the event of alleged or suspected research misconduct, e.g., plagiarism, citation manipulation, and data falsification/fabrication, the Editorial Board will follow and act according to COPE flowcharts.

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Journal of Education and Research in Nursing does not consider preprint publications as prior publication. In other words, authors are allowed to present and discuss their findings on a non-commercial preprint server before submission to a journal.

Authors must provide the journal with the pre-print server deposition of their article accompanying its DOI during initial submission.

If the article is published in the Journal of Education and Research in Nursing, it is the responsibility of the authors to update the archived preprint and link it to the published version of the article.

AUTHORSHIP

Each person listed as an author should fulfill the authorship criteria recommended by the International Committee of Medical Journal Editors (ICMJE - www.icmje.org). The ICMJE recommends that authorship is based on the following four criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
2. Drafting the work or revising it critically for important intellectual content; AND
3. Final approval of the version to be published; AND
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

In addition to being accountable for the parts of the work he/she has done, an author should be able to identify which co-authors are responsible for specific other parts of the work. Also, authors should have confidence in the integrity of the contributions of their co-authors.

All those designated as authors should meet all four criteria for authorship, and all who meet the four criteria should be identified as authors. Those who do not meet all four criteria should be acknowledged in the title page of the manuscript.

Journal of Education and Research in Nursing requires corresponding authors to submit a signed and scanned version of the Copyright Agreement and Acknowledgement of Authorship form (available for download at http://jer-nursing.org) during the initial submission process to act appropriately on authorship rights and to prevent ghost or honorary authorship. If the editorial board suspects a case of "gift authorship," the submission will be rejected without further review. As part of the submission of the manuscript, the corresponding author should also send a short statement declaring that he/she accepts to undertake all the responsibility for authorship during the submission and review stages of the manuscript.

CHANGE OF AUTHORSHIP

Journal of Education and Research in Nursing reviews the authorship according to the author's declaration in the Title Page, thus it is the authors responsibility to send the final order of the complete author names. Requests in the change of authorship (e.g. removal/addition of the authors, change in the order etc) after submission are subject to editorial approval. Editorial Board will investigate this kind of cases and act following COPE flowcharts.

Change of authorship requests should be submitted to the Editorial Office with an official letter stating the reasons of the change. The letter must be signed by all authors and include their approval on the change in authorship. If the request is approved by the Editorial Board, authors need to submit a new Copyright Agreement Form according to the final order list.

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APPEALS AND COMPLAINT

The Editorial Board of the journal handles all appeal and complaint cases within the scope of COPE guidelines. In such cases, authors should get in direct contact with the editorial office regarding their appeals and com-

plaints. When needed, an ombudsperson may be assigned to resolve claims that cannot be resolved internally. The Editor in Chief is the final authority in the decision-making process for all appeals and complaints.

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Article Withdrawal Process

In accordance with the publication policies of the Journal of Education and Research in Nursing, the duties and responsibilities of the author(s) and the editorial board during the withdrawal of an article are given below.

Responsibilities of the Authors

The author(s) has an obligation to cooperate with the journal editor in the withdrawal process if he/she notices an error or mistake in the pre-checking stage of the manuscript or in a published work. Withdrawal requests will not be considered for a manuscript in the review process or in the publication phase. Author(s) who wish to withdraw their study outside of the review process or the publication phase are obliged to fill out and send the Withdrawal Form via e-mail at kare@karepb.com. The Editorial Board will review the withdrawal notification and respond within 15 days at the latest. Authors cannot submit their manuscripts to another journal for evaluation unless the editorial board approves the withdrawal request for manuscripts whose copyrights have been transferred to the Journal of Education and Research in Nursing at the submission stage.

Responsibilities of the Editorial Board

The editorial board of the Journal of Education and Research in Nursing has the obligation to initiate an investigation into any suspected copyright infringement, ethical statement violation, or plagiarism regarding studies that are published ahead of print, or under review. If the editorial board determines that there is a violation of copyright, ethical statement, or plagiarism in the work under evaluation, it withdraws the work from the evaluation and returns it to the authors by citing the detected situations in detail. In the event that copyright infringement or plagiarism is determined to have occurred in a published work or a work in early view, the Editorial Board may recommend to the publishers or editorial boards, of which study was previously published, to ensure the validity and reliability of the published studies or to withdraw them.

MANUSCRIPT PREPARATION

The manuscripts should be prepared in accordance with ICM-JE-Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals (updated in December 2018 - http://www.icmje.org/icmje-recommen-dations.pdf). Authors are required to prepare manuscripts in accordance with the CONSORT guidelines for randomized research studies, STROBE guidelines for observational original research studies, STARD guidelines for studies on diagnostic accuracy, PRISMA guidelines for systematic reviews and meta-analysis, ARRIVE guidelines for experimental animal studies, and TREND guidelines for non-randomized public behavior. To find the right guideline for your research, please complete the questionnaire by Equator Network here.

The style of the manuscripts should be prepared according to AMA Manual of Style 11th Edition.

Manuscripts can only be submitted through the journal's online manuscript submission and evaluation system, available at jern.manuscriptmanager.net. Manuscripts submitted via any other medium and submissions by anyone other than one of the authors will not be evaluated.

Manuscripts submitted to the journal will first go through a technical evaluation process where the editorial office staff will ensure that the manuscript has been prepared and submitted in accordance with the journal's guidelines. Submissions that do not conform to the journal's guidelines will be returned to the submitting author with technical correction requests.

Authors are required to submit the following:

- Copyright Agreement and Acknowledgement of Authorship Form, and
- ICMJE Potential Conflict of Interest Disclosure Form (should be filled in by all contributing authors) during the initial submission. These forms are available for download at http://jer-nursing.org.

Preparation of the Manuscript

Title page: A separate title page should be submitted with all submissions and this page should include:

- The full title of the manuscript as well as a short title (running head) of no more than 50 characters,
- Name(s), affiliations, highest academic degree(s), and ORCID IDs of the author(s),
- Grant information and detailed information on the other sources of support,
- Name, address, telephone (including the mobile phone number), and email address of the corresponding author,
- Acknowledgment of the individuals who contributed to the preparation of the manuscript but who do not fulfill the authorship criteria.

Abstract: An abstract should be submitted with all submissions except for Letters to the Editor. The abstract of Research Articles should be structured with subheadings (Background, Methods, Results, and Conclusion). Please check Table 1 below for word count specifications.

Keywords: Each submission must be accompanied by a minimum of three to a maximum of five keywords for subject indexing at the end of the abstract. The keywords should be listed in full without abbreviations. The keywords should be selected from the National Library of Medicine, Medical Subject Headings database (https://www.nlm.nih.gov/mesh/MBrowser.html).

Manuscript Types

Research Articles: This is the most important type of article since it provides new information based on original research.

Acceptance of original papers will be based upon the originality and importance of the investigation. The main text of original articles should be structured with Introduction, Material and Methods, Results, and Discussion subheadings. Please check Table 1 for the limitations for Original Articles.

Clinical Trials

Journal of Education and Research in Nursing adopts the ICMJE's clinical trial registration policy, which requires that clinical trials must be registered in a publicly accessible registry that is a primary register of the WHO International Trials Registry Platform (ICTRP) or in ClinicalTrials.gov.

Instructions for the clinical trials are listed below.

- Clinical trial registry is only required for the prospective research projects that study the relationship between a health-related intervention and an outcome by assigning people.
- To have their manuscript evaluated in the journal, author should register their research to a public registry at or before the time of first patient enrollment.
- Based on most up to date ICMJE recommendations, Journal of Education and Research in Nursing accepts public registries that include minimum acceptable 24-item trial registration dataset.
- Authors are required to state a data sharing plan for the clinical trial registration. Please see details under "Data Sharing" section.
- For further details, please check ICMJE Clinical Trial Policy at http://www.icmje.org/recommendations/browse/publishing-and-editorial-issues/clinical-trial-registration.html

Data Sharing

As of 1 January 2019, a data sharing statement is required for the registration of clinical trials. Authors are required to provide a data sharing statement for the articles that reports the results of a clinical trial. The data sharing statement should indicate the items below according to the ICMJE data sharing policy:

- Whether individual deidentified participant data will be shared,
- What data in particular will be shared,
- Whether additional, related documents will be available,
- When the data will be available and for how long,
- By what access criteria will be shared.

Authors are recommended to check the ICMJE data sharing examples at

http://www.icmje.org/recommendations/browse/publishing-and-editorial-issues/clinical-trial-registration.html

While submitting a clinical trial to Journal of Education and Research in Nursing,

- Authors are required to make registration to a publicly accessible registry according to ICMJE recommendations and the instructions above.
- The name of the registry and the registration number should be provided in the Title Page during the initial submission.
- Data sharing statement should also be stated in the Title Page even the authors do not plan to share it.

Clinical trial and data sharing policy of the journal will be valid for the articles submitted from 1 March 2021.

Reporting Statistical Analysis

Statistical analysis to support conclusions is usually necessary. Statistical analyses must be conducted in accordance with international statistical reporting standards (Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributors to medical journals. Br Med J 1983: 7; 1489-93). Information on statistical analyses should be provided with a separate subheading under the Materials and Methods section and the statistical software that was used during the process must be specified.

Values for reporting statistical data, such as p values and CIs should be presented and rounded appropriately. P values should be expressed to 2 digits to the right of the decimal point unless the first 2 digits are zeros, in which case 3 digits to the right of the decimal place should be provided (eg, instead of $p<0.01$, report as $p=0.002$). However, values close to 0.05 may be reported to 3 decimal places because the 0.05 is an arbitrary cut point for statistical significance (eg, $p=0.053$). P values less than 0.001 should be designated as $p<0.001$ rather than exact values (eg, $p=0.000006$).

Units should be prepared in accordance with the International System of Units (SI).

Editorial Comments: Invited brief editorial comments on selected articles are published in the Journal of Education and Research in Nursing. Editorials should not be longer than 1000 words excluding references. Editorial comments aim to provide a brief critical commentary by reviewers with expertise or with high reputation in the topic of the research article published in the journal. Authors are selected and invited by the journal to provide such comments. Abstract, Keywords, and Tables, Figures, Images, and other media are not included.

Review Articles: Reviews prepared by authors who have extensive knowledge on a particular field and whose scientific background has been translated into a high volume of publications with a high citation potential are welcomed. These authors may even be invited by the journal. Reviews should describe, discuss, and evaluate the current level of knowledge of a topic in clinical practice and should guide future studies. The subheadings of the review articles should be planned by the authors. However, each review article should include an "Introduction" and a "Conclusion" section. Please check Table 1 for the limitations for Review Articles.

Case Reports: There is limited space for case reports in the journal and reports on rare cases or conditions that constitute challenges in diagnosis and treatment, those offering new therapies or revealing knowledge not included in the literature, and interesting and educative case reports are accepted for publication. The text should include Introduction, Case Presentation, and Discussion with an unstructured abstract. Please check Table 1 for the limitations for Case Reports.

Letters to the Editor: This type of manuscript discusses important parts, overlooked aspects, or lacking parts of a previously published article. Articles on subjects within the scope of the journal that might attract the readers' attention, particularly educative cases, may also be submitted in the form of a "Letter to the Editor." Readers can also present their comments on the published manuscripts in the form of a "Letter to the Editor." Abstract, Keywords, and Tables, Figures, Images, and other media should not be included. The text should be unstructured. The manuscript that is being commented on must be properly cited within this manuscript.

Table 1. Limitations for each manuscript type

Type of manuscript	Word limit*	Abstract word limit	Reference limit	Table limit	Figure limit
Research Article	4000	250 (Structured)	35	5	10
Review Article	5000	250	50	5	10
Case Report	1200	200	15	No tables	5
Letter to the Editor	400	No abstract	5	No tables	No media

*: Word limit should not include the abstract, references, tables, and figure legends.

Tables

Tables should be included in the main document, presented after the reference list, and they should be numbered consecutively in the order they are referred to within the main text. A descriptive title must be placed above the tables. Abbreviations used in the tables should be defined below the tables by footnotes (even if they are defined within the main text). Tables should be created using the "insert table" command of the word processing software and they should be arranged clearly to provide easy reading. Data presented in the tables should not be a repetition of the data presented within the main text but should be supporting the main text.

Figures and Figure Legends

Figures, graphics, and photographs should be submitted as separate files (in TIFF or JPEG format) through the submission system. The files should not be embedded in a Word document or the main document. When there are figure subunits, the subunits should not be merged to form a single image. Each subunit should be submitted separately through the submission system. Images should not be labeled (a, b, c, etc.) to indicate figure subunits. Thick and thin arrows, arrowheads, stars, asterisks, and similar marks can be used on the images to support figure legends. Like the rest of the submission, the figures too should be blind. Any information within the images that may indicate an individual or institution should be blinded. The minimum resolution of each submitted figure should be 300 DPI. To prevent delays in the evaluation process, all submitted figures should be clear in resolution and large in size (minimum dimensions: 100 × 100 mm). Figure legends should be listed at the end of the main document.

All acronyms and abbreviations used in the manuscript should be defined at first use, both in the abstract and in the main text. The abbreviation should be provided in parentheses following the definition.

When a drug, product, hardware, or software program is mentioned within the main text, product information, including the name of the product, the producer of the product, and city and the country of the company (including the state if in USA), should be provided in parentheses in the following format: "Discovery St PET/CT scanner (General Electric, Milwaukee, WI, USA)"

All references, tables, and figures should be referred to within the main text, and they should be numbered consecutively in the order they are referred to within the main text.

Limitations, drawbacks, and the shortcomings of original articles should be mentioned in the Discussion section before the conclusion paragraph.

References

Both in-text citations and the references must be prepared according to the AMA Manual of Style 11th Edition.

While citing publications, preference should be given to the latest, most up-to-date publications. Authors are responsible for the accuracy of references If an ahead-of-print publication is cited, the DOI number should be provided. Journal titles should be abbreviated in accordance with the journal abbreviations in Index Medicus/MEDLINE/PubMed. When there are six or fewer authors, all authors should be listed. If there are seven or more authors, the first three authors should be listed followed by "et al." In the main text of the manuscript, references should be cited in superscript after punctuation. The reference styles for different types of publications are presented in the following examples.

Journal Article: Campbell MR, Fisher J, Anderson L, Kreppel E. Implementation of early exercise and progressive mobility: Step to success. Crit Care Nurse. 2015;35(1):82-88.

Book Section: Fikremariam D, Serafini M. Multidisciplinary approach to pain management. In: Vadivelu N, Urman RD, Hines RL, eds. Essentials of Pain Management. New York, NY: Springer New York; 2011:17-28.

Books with a Single Author: Patterson JW. Weedon's Skin Pathology. 4th ed. Churchill Livingstone; 2016.

Editor(s) as Author: Etzel RA, Balk SJ, eds. Pediatric Environmental Health. American Academy of Pediatrics; 2011.

Conference Proceedings: Morales M, Zhou X. Health practices of immigrant women: indigenous knowledge in an urban environment. Paper presented at: 78th Association for Information Science and Technology Annual Meeting; November 6-10; 2015; St Louis, MO. Accessed March 15, 2016. https://www.asist.org/files/meetings/am15/proceedings/openpage15.html

Thesis: Maiti N. Association Between Behaviours, Health Characteristics and Injuries Among Adolescents in the United States. Dissertation. Palo Alto University; 2010.

Online Journal Articles: Tamburini S, Shen N, Chih Wu H, Clemente KC. The microbiome in early life: implications for health outcomes. Nat Med. Published online July 7, 2016. doi:10.1038/nm4142

Websites: International Society for Infectious Diseases. ProMed-mail. Accessed February 10, 2016. http://www. promedmail.org

Epub Ahead of Print Articles: Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging. Diagn Interv Radiol. 2016 Feb 24. doi: 10.5152/dir.2016.15323. [Epub ahead of print].

REVISIONS

When submitting a revised version of a paper, the author must submit a detailed "Response to the reviewers" that states point by point how each issue raised by the reviewers has been covered and where it can be found (each reviewer's comment, followed by the author's reply and line numbers where the changes have been made) as well as an annotated copy of the main document. Revised manuscripts must be submitted within 30 days from the date of the decision letter. If the revised version of the manuscript is not submitted within the allocated time, the revision option may be canceled. If the submitting author(s) believe that additional time is required, they should request this extension before the initial 30-day period is over.

Accepted manuscripts are copy-edited for grammar, punctuation, and format. Once the publication process of a manuscript is completed, it is published online on the journal's webpage as an ahead-of-print publication before it is included in its scheduled issue. A PDF proof of the accepted manuscript is sent to the corresponding author and their publication approval is requested within 2 days of their receipt of the proof.

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CONTENTS

JERN Journal of Education and Research in Nursing

EDITORIAL

Dear Readers,

We are pleased to share with you the 2025 Issue 3 (Volume 22, Issue 3, September 2025) of the Journal of Education and Research in Nursing.

The nursing profession is increasingly recognized as a discipline that requires not only strong clinical knowledge and technical competence but also advanced cognitive and decision-making skills. Among these, critical thinking is an essential competency in nursing, serving as the foundation for safe, effective, and evidence-based care. Beyond technical skills, nurses must be able to evaluate complex situations, make sound clinical judgments, and act with professional autonomy. In nursing education, fostering critical thinking prepares students for the realities of modern healthcare, while in practice, it enhances patient safety and care quality. For this reason, both academic and clinical settings must prioritize strategies that strengthen these skills. I believe that research focusing on the cultivation of critical thinking will make a valuable contribution to nursing scholarship and practice, guiding the professional growth of nurses and the advancement of healthcare worldwide.

I am pleased to announce that our journal is indexed in the databases of GALE (2010), Tubitak Ulakbim Medicine (2012), EBSCO (2017), CINAHL (2017), DOAJ (2021), Research4Life (2021), Hinari (2021), SCILIT (2021), OUCI (2021), CNKI (2022), MIAR (2024), SUDOC (2024), Zeitschriften Datenbank (2024), Electronic Journal Library (2024), and EmCare (2025), and we are working to publish our journal within the framework of international academic publishing standards. The studies with a high level of evidence from you have been instrumental in achieving these goals, and we know how important the valuable contributions of our journal's stakeholders–our readers, editors, managing director, and advisory board members–are.

As for our September 2025 issue, a total of nine valuable original studies is presented in this issue. The titles of the articles are as follows:

The original articles are titled "Determining the relationship between compassion fatigue and emotion regulation skills in nurses," "A review of postgraduate theses on artificial intelligence in the field of nursing in Türkiye," "Assessing mothers' knowledge of childhood immunization," "Exploring nursing students' attitudes toward consanguineous marriage and factors influencing these attitudes: a descriptive and cross-sectional study," "The journey of cultivating critical thinking: exploring the development of critical thinking skills in nursing students," "Transformation of the Evidence-Based Practice Attitude Scale-36 into Turkish: An investigation of validity and reliability," "Clinical practice experiences from the perspective of senior nursing students: a phenomenological study," "The effect of crossword labs on knowledge and attitudes of nursing students in learning anatomical terms: a quasi-experimental study," and "Effects of authentic education based on Watson's theory of human care on care orientation in nursing students."

I would like to express my endless thanks to our authors who have contributed to presenting the updated information obtained from the results of their studies to our readers in order to provide quality and safe nursing care services to society, to the members of the editorial board who have contributed to the publication of our journal, and to the members of the advisory board who have carefully evaluated each article.

"Critical thinking is thinking about your thinking while you're thinking in order to make your thinking better."
Richard W. Paul

Kind regards,
Prof. Sevilay Şenol Çelik, PhD, RN

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Determining the Relationship Between Compassion Fatigue and Emotion Regulation Skills in Nurses

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Abstract

Background: Preventing or reducing compassion fatigue in nurses is essential for ensuring high-quality care and enhancing nurses' professional satisfaction.

Aim: This study aimed to determine the relationship between compassion fatigue and emotion regulation skills in nurses.

Methods: This was a cross-sectional, correlational study. Participants included 106 nurses working at a training and research hospital. Data were collected using a self-reported Personal Information Questionnaire that included sociodemographic variables, the Compassion Fatigue Short Scale (CF-SS), and the Emotion Regulation Skills Questionnaire (ERSQ). Data were analyzed using one-way analysis of variance (ANOVA), independent samples t-test, and Pearson's correlation.

Results: The mean age of the nurses was 34.92±8.63 years, and the average duration of professional experience was 12.3±9.19 years. Significant differences were found in compassion fatigue based on marital status, love of the profession, and intention to change profession. A weak negative correlation was observed between age, years of experience, and compassion fatigue. Additionally, significant differences in emotion regulation skills were found based on love of the profession and intention to change profession. A strong negative correlation was identified between compassion fatigue and emotion regulation skills.

Conclusion: Given the negative relationship between compassion fatigue and emotion regulation skills, it can be concluded that enhancing nurses' emotion regulation abilities may help reduce compassion fatigue. It is essential to provide training programs focused on developing emotion regulation skills. In-service training programs should incorporate components that help reduce compassion fatigue, including the develop- ment of emotion regulation skills.

Keywords: Compassion fatigue, emotion regulation skills, nurses

Introduction

In patient care, nurses apply both their human emotions and their professional knowledge and skills. Patient care cannot be separated from human emotions, and compassion plays a critical role as nurses often approach patients with compassion. While compassion and empathy benefit both patients and healthcare providers, they can also become burdensome for caregivers.[1] This emotional burden is referred to as compassion fatigue, which arises when caring for patients who are experiencing intense emotional and physical distress. In nurses, compassion fatigue can result in physical, emotional, and spiritual exhaustion.[2] A qualitative study found that the majority of intensive care nurses experienced compassion fatigue and, as a coping mechanism, reduced their empathy toward patients and their families.[3]

It is critical to prevent or reduce compassion fatigue in nurses to ensure they can provide high-quality patient care while also enhancing their professional satisfaction. Compassion fatigue can be alleviated by developing emotion regulation skills. Emotion regulation is a concept that describes how individuals experience and express their emotions. It also refers to the active efforts individuals make to manage their emotional states, including attempts to influence the type of emotion experienced, its intensity, duration, and related psychological processes such as memory and social interaction.[4] Emotions can be expressed both verbally or nonverbally, and effective emotion regulation improves both physical and psychological well-being. Emotion regulation skills are known to be important in maintaining mental health and fostering healthy interpersonal relationships.[5] These skills are also essential for nurses, as they can have a considerable impact on nurses' mental health and the quality of patient care. Studies report that the emotion regulation skills of nurses and nursing students are generally at a moderate level. Although emotion regulation is an important skill for nurses, there appears to be a limited number of studies on nurses' emotion regulation skills in the national literature.[6,7]

Compassion fatigue levels are known to be high among nurses and have negative effects on their well-being.[2,3] To maintain the quality of care, it is essential to prevent or reduce the compassion fatigue experienced by nurses. At this point, emotion regulation skills are considered important in preventing the development of compassion fatigue. One of the first steps in managing compassion fatigue in nurses is to evaluate the relationship

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between compassion fatigue and emotion regulation skills. However, our review found no studies in the literature that examine this relationship in nurses. From this perspective, the present study is expected to contribute to the national literature and guide future research on the topic. The aim of the study was to determine the relationship between compassion fatigue and emotion regulation skills in nurses.

Study Question

1. Is there a relationship between compassion fatigue and emotion regulation skills in nurses?

Materials and Methods

Sample and Study Design

This study employed a descriptive, cross-sectional, correlational design. It included all nurses working at KARABÜK University Training and Research Hospital who met the sampling criteria. The sample size was determined using G*Power. The hospital employs a total of 475 nurses. The sample size was established through an a priori power analysis. According to the power analysis, a minimum of 164 nurses was required to achieve 80% power at a 5% margin of error. Nurses were eligible for the sample if they agreed to participate in the study, were employed as nurses at the specified hospital, were not on leave or under medical report during the study period, and completed the data collection tools fully and without errors. Participants were recruited between June and July 2021. The study was completed with 106 nurses. Since the data collection took place during the Coronavirus Disease 2019 (COVID-19) pandemic, participation was low due to nurses experiencing a busy and stressful period.

Data Collection Tools

Data were collected using a self-reported Personal Information Questionnaire, which included sociodemographic variables, the Compassion Fatigue Short Scale (CF-SS), and the Emotion Regulation Skills Questionnaire (ERSQ).

Personal Information Questionnaire

This form collected demographic information about participants, including age, gender, marital status, work unit, years of professional experience, and whether they reported enjoying the nursing profession.

Compassion Fatigue Short Scale (CF-SS)

The scale was developed by Adams et al.[8] in 2006. It is a self-report assessment tool in which participants indicate how much each scale item reflects their experiences. The scale uses a 10-point Likert format ranging from 1 (rarely/never) to 10 (very often). The scale consists of two sub-dimensions: secondary trauma and occupational burnout. Items "c, e, h, j, l" assess secondary trauma, while items "a, b, d, f, g, i, k, m" measure occupational burnout. Cronbach's alpha coefficients for the subdimensions of the scale range from 0.80 to 0.90, indicating adequate internal reliability. The scale does not include a specific scoring algorithm or cut-off point. Total scores range from a minimum of 13 to a maximum of 130 points. Higher scores indicate higher levels of compassion fatigue.[8]

Dinç and Ekinci[9] in 2019 conducted the Turkish validity and reliability study of the scale, and the Turkish version was found to be a valid and reliable tool for assessing compassion fatigue. The Turkish version of the CF-SS was used in this study.[9] The Cronbach's alpha value for the scale in the current study was 0.968.

Emotion Regulation Skills Questionnaire (ERSQ)

The questionnaire was developed by Berking and Znoj[10] in 2008. It is a self-report assessment tool consisting of 27 items, measured on a five-point Likert scale (0=never to 4=almost always). The ERSQ includes nine subdimensions: awareness/attention, body sensations, clarity, understanding, acceptance, tolerance, confrontation preparation, self-support, and change. Additionally, the Difficulties in Emotion Regulation Behavior Scale (DDBS) can be compared with the overall mean score. The internal consistency coefficient (Cronbach's alpha) for the total score is 0.93, and for the subscales, it ranges from 0.62 to 0.83.[10] Vatan and Oruçlular Kahya[11] in 2018 conducted the Turkish validity and reliability study of the questionnaire, and the Turkish version was found to be a valid and reliable assessment tool. The Turkish version of the ERSQ was used in the study. The scale's Cronbach's alpha value in this study was 0.981.

Data Collection Procedures

Data were collected between June and July 2021. The data were gathered online via Google Forms. The study link was shared in the nurses' WhatsApp group after they were informed about the study's goals and scope. All participants checked a box indicating their consent to participate in the study before answering the questions online.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software (IBM Statistical Package for the Social Sciences Inc., version 23.0, PA, USA). Means and standard deviations were used to describe continuous variables, while frequencies and percentages were used for categorical variables. One-way analysis of variance (ANOVA) was used to assess differences in compassion fatigue and emotion regulation skills across groups with different characteristics (e.g., marital status). An independent samples t-test was used to compare means between two groups (e.g., gender). Pearson's correlation coefficient was used to evaluate the relationship between compassion fatigue and emotion regulation skills. The significance level was set at $p<0.05$.

Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from Karabük University Non-interventional Clinical Research Ethics Committee (Approval Number: E-77192459-050.99-32628, Date: 01.06.2021). All participants provided informed consent by checking the agreement box before completing the online questionnaire.

Results

Sociodemographic Variables

The mean age of the nurses was 34.92±8.63 years (min: 23; max: 54), and the average number of working years was 12.3±9.19 years (min: 1; max: 34). Most of the nurses were female (79.2%), married (58.5%), and working in shifts (83.0%). The proportion of those who chose their profession willingly was 59.4%. Among the participants, 43.4% reported that they did not like their profession, and 38.7% stated that they had considered changing it. Additionally, 93.4% of the nurses reported experiencing a negative life event, and 66.0% had encountered a traumatic event within the past two years.

Comparisons of Compassion Fatigue Across Different Variables

The nurses had an average compassion fatigue score of 91.89 (standard deviation, SD=24.01). According to ANOVA results, there were significant differences in compassion fatigue based on marital status, love for the profession, and thoughts about changing profession. Further analysis revealed that divorced nurses had higher levels of compassion fatigue ($p<0.05$). Nurses who reported not loving their profession and those considering changing professions had significantly higher compassion fatigue scores ($p<0.001$ and $p<0.01$, respectively).

It was also determined that nurses who did not choose their profession voluntarily had a statistically significantly higher mean score for compassion fatigue than those who did ($p=0.009$). However, there was no significant difference in compassion fatigue among nurses based on gender, work shift, clinical unit, or experiences of a negative life or traumatic life event in the past two years ($p>0.05$) (Tables 1, 2).

A weak negative correlation was found between age ($r=-0.323$; $p=0.001$), years of experience ($r=-0.332$; $p=0.001$), and compassion fatigue (Table 3).

Comparisons of Emotion Regulation Skills Across Different Variables

The nurses had an average score of 50.49 (SD=20.28) for emotion regulation skills. Nurses who did not choose their profession voluntarily had a statistically significantly lower mean score for emotion regulation skills compared to those who chose it voluntarily ($p=0.001$). According to the ANOVA results, there were significant differences in emotion regulation skills based on participants' love for their profession and their consideration of changing it. Further analysis revealed that nurses who reported loving their profession had a statistically significantly higher mean score for emotion regulation skills ($p<0.01$). Additionally nurses who had considered changing their profession had statistically significantly lower mean scores for emotion regula-

Table 1. Comparison of compassion fatigue and emotion regulation skills by demographic variables (n=106)

		Compassion fatigue short scale (CF-SS)				Emotion regulation skills questionnaire (ERSQ)			
Variable	**n**	**Mean±SD**	**t**	**df**	**p**	**Mean±SD**	**t**	**df**	**p**
Gender									
Female	84	91.11±24.01	-0.644	32.516	0.524	50.84±20.18	0.445	104	0.65
Male	22	94.86±24.35				48.77±21.04			
Work shift									
Daytime	18	82.50±23.62	-1.842	104	0.068	57.05±17.41	1.516	104	0.132
Night shift	88	93.81±23.77				49.14±20.65			
Chose nursing profession voluntarily									
Yes	63	86.90±19.99	-2.6464	104	0.009	55.71±18.43	3.363	104	0.001
No	43	99.20±27.55				42.83±20.63			
Experienced a negative life event in the past two years									
Yes	99	92.37±22.04	0.414	6.198	0.693	49.92±19.84	-1.072	104	0.286
No	7	85.14±45.82				58.42±26.28			
Experienced a traumatic event in the past two years									
Yes	70	90.42±22.84	-0.876	104	0.383	50.94±18.56	0.296	57.967	0.769
No	36	94.75±26.24				49.61±23.53			

SD: Standard deviation, df: Degrees of freedom.

Table 2. Comparison of compassion fatigue and emotion regulation skills across demographic variables (n=106)

		Compassion fatigue short scale (CF-SS)			Emotion regulation skills questionnaire (ERSQ)		
Variable	**n**	**Mean±SD**	**F**	**p**	**Mean±SD**	**F**	**p**
Marital status							
Married	62	86.32±23.45	4.386	0.01	52.11±18.47	0.608	0.546
Single	41	99.31±23.06			46.63±23.27		
Divorced	3	105.66±22.05			42.33±9.86		
Clinical unit							
Emergency	16	98.18±19.86	1.721	0.151	51.25±22.89	0.771	0.547
Internal medicine	27	99.14±16.91			47.81±20.88		
Surgical clinic	25	89.68±27.66			47.48±19.43		
Critical care unit	18	83.38±30.33			57.33±21.00		
Outpatient clinics	20	87.50±24.01			51.10±17.91		
Love for profession							
Yes	11	61.90±24.50	31.169	0.000	74.09±15.64	20.701	0.000
No	46	106.86±14.81			39.86±16.57		
Partially	49	84.57±21.33			55.16±18.25		
Consideration of changing profession							
Yes	41	104.02±20.44	12.180	0.000	42.02±18.88	9.542	0.000
No	17	75.52±24.85			65.05±17.70		
Partially	48	87.33±24.01			52.56±19.11		

tion skills (p<0.05). However, no significant differences in emotion regulation skills were found based on gender, marital status, work shift, clinical unit, or experiences of a negative or traumatic event within the past two years (p>0.05) (Tables 1, 2). Furthermore, no correlation was found between age, years of work experience, and emotion regulation skills (p>0.05).

Correlation Between Compassion Fatigue and Emotion Regulation Skills

A strong negative correlation was found between compassion fatigue and emotion regulation skills (r=-0.643; p=0.000) (Table 3).

Table 3. Correlation between age, years of experience, Emotion Regulation Skills Questionnaire (ERSQ), and Compassion Fatigue Short Scale (CF-SS)

Variable	**CF-SS**	
	r	**p**
Age	-0.323	0.001
Years of experience	-0.332	0.001
ERSQ	-0.643	0.000

Discussion

This study identified a significant, strong negative correlation between compassion fatigue and emotion regulation skills among nurses. Emotional regulation abilities are known to predict resilience, and there is a significant positive correlation between psychological resilience and emotional regulation characteristics.[12] Although the benefits of emotion regulation for mental health are well established, it is important to recognize that emotion regulation skills among healthcare workers are often not at the desired level, and they may struggle to manage their emotions effectively. Sarıkaya et al.[13] in 2021 reported that nursing students were often unable to recognize their emotional reactions, and their emotion regulation skills were insufficient to mitigate the impact of painful emotions.[13] Inadequate emotion regulation skills in healthcare professionals can lead to mental health issues such as compassion fatigue, burnout, stress, and anxiety. It has been reported that as levels of depression and burnout increase in healthcare workers, their cognitive emotion regulation desreases.[14] Additionally, there is a strong positive correlation between compassion fatigue and burnout.[15] Emotion regulation skills may play a critical role in the compassion fatigue experienced by healthcare professionals.[16] Training in emotion regulation, along other interventions, appears essential for ensuring quality care and preventing the development of compassion fatigue.[17] Emotional resilience, which enhances self-care, is also considered a protective factor against compassion fatigue.[18] Kharatzadeh et al.[19] in 2020 reported that although emotion regulation training did not result in a statistically significant reduction in compassion fatigue, it did improve cognitive coping strategies in the experimental group compared to the control group. The same study also found reductions in depression, anxiety, and stress.[19] It is anticipated that nurses' mental health may be adversely affected, considering our research findings on high compassion fatigue and insufficient emotion regulation skills, when evaluated in the context of the literature.

Human emotions such as empathy and compassion play a central role in nurses' interactions with the patients they care for. Long-term exposure to patients' traumatic experiences and pain creates an emotional burden that can lead to significant emotional, behavioral, and cognitive symptoms in nurses. This burden, commonly referred to in the literature as compassion fatigue, is prevalent among nurses.[20,21] When evaluating the average compassion fatigue scores of nurses in this study, it can be stated that they experience high levels of compassion fatigue. Similarly, Oktay and Öztürk[22] in 2021 reported that nearly all nurses experienced low to moderate levels of compassion fatigue. A systematic review and meta-analysis also found that compassion fatigue among nurses is at a moderate level.[23] These findings are consistent with the existing literature.

According to the literature, marital status is not a significant predictor of compassion fatigue.[24–27] However, in contrast to previous studies, this study found that divorced nurses experienced higher levels of compassion fatigue compared to other participants in the study. Individuals need access to social support systems to cope with the stressors in their lives. While these systems can act as a buffer against stress, divorced nurses may lack adequate support in this regard. Moreover, when occupational stress is compounded by the emotional challenges of divorce, one of life's major stressors, nurses may struggle to cope effectively. They may also have difficulty regulating their emotions. For all of these reasons, divorced nurses may be more vulnerable to compassion fatigue.

Choosing the nursing profession willingly, having a love for the profession, and thoughts about changing the profession were among the variables that influenced nurses' compassion fatigue and emotion regulation skills in this study. It was determined that those who did not choose the profession voluntarily, expressed dissatisfaction with their profession, and were considering changing it had significantly higher compassion fatigue mean scores and significantly lower emotion regulation mean scores compared to other groups. The fact that individuals choose a career they enjoy has the potential to enhance many aspects of their lives. However, various factors may prevent people from pursuing careers that align with their interests and aspirations.[28] The decision to voluntarily choose a profession also shapes one's attitude toward it. Zencir and Eşer[29] in 2016 reported that individuals who willingly choose the nursing profession tend to have a more positive attitude toward it. Nurses who did not choose the profession voluntarily or who hold negative attitudes toward it may struggle to use effective coping strategies when faced with professional difficulties. This may hinder their ability to regulate intense emotions they experience while providing patient care, ultimately contributing to higher levels of compassion fatigue.

In this study, a weak negative correlation was found between age, years of experience, and compassion fatigue. In another study of healthcare workers, age was identified as a significant variable: workers between the ages of 24–29 experienced significantly higher levels of compassion fatigue, while those with 21 or more years of experience also showed elevated levels of compassion fatigue.[24] Similarly, another study reported that nurses aged 20–25 years experienced significantly higher levels of compassion fatigue, and compassion fatigue was again found to be significantly higher among nurses with more than 21 years of experience.[22] A study involving obstetricians and gynecologists found that compassion fatigue was significantly higher among those with 11–15 years of experience, although no significant relationship was found between age and compassion fatigue.[23] Other studies have also shown no significant relationship between age, years of experience, and the level of compassion fatigue.[26–27,30] However, professional experience was identified as a protective factor against compassion fatigue and burnout in a qualitative study of pediatric emergency physicians.[16] Overall, the literature presents varying results regarding the effect of age and years of professional experience on compassion fatigue. The sample group used in the studies may account for this discrepancy. Additionally, the results could be influenced by the institutional and cultural context in which the research was conducted. Older nurses and those who have been in the profession for a long time are likely to have cared for more patients over the course of their careers. Prolonged exposure to patients who have experienced traumatic events or pain may lead to the development of compassion fatigue. On the other hand, extended professional experience may also lead to the development of more effective coping strategies for managing difficulties and negative emotions. The negative correlation found in this study between age, year of experience, and compassion fatigue suggests that with more experience, nurses may develop stronger coping skills over time.

Based on the evaluation of the study results, it is believed that the pandemic process may be an important factor influencing nurses' levels of compassion fatigue and emotion regulation skills. Nurses, who strive to provide the best healthcare during difficult periods such as the pandemic, were significantly affected both physically and psychosocially. It is possible that the emotional burden caused by the pandemic made it more difficult for nurses to regulate their emotions. Therefore, the impact of the pandemic should be taken into account when interpreting the study's findings.

Limitations

This study has some limitations. It was conducted with nurses working at a single research and training hospital in KARABÜK, which limits the generalizability of the findings. The small sample size of the study should also be considered as a limitation. Additionally, the study was carried out during the COVID-19 pandemic, a period marked by high levels of stress, which may have affected the nurses' well-being.

Conclusion

In conclusion, given the negative relationship between compassion fatigue and emotion regulation skills, it can be inferred that improving nurses' emotion regulation skills can help reduce compassion fatigue. In this context, it is essential to provide training programs focused on developing emotion regulation skills. Interventions such as Emotion regulation training and mindfulness-based cognitive therapy may enhance emotion regulation while reducing emotional difficulties in nurses.[6,31]

It is recommended that institutions periodically assess the levels of compassion fatigue experienced by nurses. In parallel, in-service training programs should incorporate components that help reduce compassion fatigue, including the development of emotion regulation skills.

Ethics Committee Approval: The study was approved by the Karabük University Non-interventional Clinical Research Ethics Committee (Approval Number: E-77192459-050.99-32628, Date: 01.06.2021).

Informed Consent: All participants provided informed consent by ticking the agreement box before completing the online questionnaire.

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A Review of Postgraduate Theses on Artificial Intelligence in the Field of Nursing in Türkiye

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Abstract

Background: Artificial intelligence is becoming increasingly relevant in nursing, yet academic research in Türkiye remains limited. This study aims to systematically review postgraduate theses to identify current research trends and highlight future directions.

Aim: This study aimed to review postgraduate theses on the use of AI in the field of nursing in Türkiye.

Methods: This descriptive study involved a comprehensive review and analysis of relevant postgraduate theses. The theses were systematically screened between 10 May and 15 May 2025, with no restriction on publication year. Researchers used the National Thesis Center database of the Council of Higher Education (CoHE Thesis) to identify all postgraduate theses related to AI in the medical field. A total of 6,623 registered theses were accessed in the CoHE database, and seven were selected based on inclusion and exclusion criteria.

Results: The first identified thesis on AI in the field of nursing was conducted in 2022, with the remaining theses completed in 2023. Most of the theses (71.4%) were doctoral dissertations. The reviewed theses were predominantly qualitative studies (42.9%), with two employing quasi-experimental and experimental designs. The majority were affiliated with the Department of Nursing (42.9%).

Conclusion: It can be asserted that AI has emerged as a novel and significant concept in nursing practice in recent years; however, the number of studies on AI in the field of nursing is limited. Increasing the level of knowledge and the number of studies on AI in nursing could enhance the utilization of AI-supported applications and guide future researchers.

Keywords: Artificial intelligence, machine intelligence, nursing, theses

Introduction

Artificial intelligence (AI) is a technology that models thinking and brain principles by imitating human intelligence through computer systems and is utilized in several fields.[1] The basic principle of AI is that machines perform certain operations by utilizing prior knowledge, perceiving, communicating, and learning.[2] AI encompasses various domains such as deep learning, artificial neural networks, machine learning, image processing, and mixed reality.[3] It is applied across numerous disciplines, including psychology, mathematics, computer science, art, architecture, and linguistics.[4] AI also has a widespread range of applications in the healthcare sector.[5]

AI is utilized in medical practice for many purposes, such as making accurate clinical decisions, enabling early diagnosis and treatment, and interpreting and classifying diseases.[6] One of the first examples of AI use in the medical field occurred in 1976, when Dr. Gunn[7] diagnosed a patient's abdominal pain using computer analysis. A previous study reported that an AI algorithm developed for patient triage helped physicians establish appropriate diagnoses by achieving a high level of performance.[8] A study in radiology revealed that AI was successful in conducting cancer screenings and identifying suspicious lesions.[9] Another study showed that an AI algorithm could diagnose skin cancer and differentiate malignant lesions.[10]

Nursing is a profession that requires a wide range of knowledge and qualifications to improve the health of individuals and society. It continuously evolves by incorporating evidence-based science and technology[11] With increasing workloads and technological advancements, nurses are expected to use AI applications more intensively.[12] In addition to its medical applications, AI is also used in nursing practice for various purposes, such as preparing medications, creating treatment plans, implementing clinical decision support systems and early warning systems, applying advanced data analytics techniques, and enhancing comprehensive staff and student training programs.[13] A robot called Cody, developed under the leadership of the University of Georgia, brings convenience to nurses in clinical practice by helping patients dress, bathe, and undergo rehabilitation.[14] Another robot, Veebot, assists nurses in selecting vascular access during nursing procedures.[15] Moxi is a robot that delivers necessary materials to nurses during patient care, while Robear is used for transferring patients and reducing the physical workload of nurses.[16] Similarly, the Arna robot monitors patients' vital signs and reports deviations to nurses, allowing for early intervention.[16] In recent years, clinical decision support systems (CDSS) in nursing have been facilitating nurses' decision-making processes and enhancing the quality of care through advanced technologies. These systems guide nurses in critical areas such as drug interactions, telephone triage, patient assessments, and ventilator-associated pneumonia by enabling faster and more effective interventions. Additionally,

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applications designed to prevent hospital admissions have been developed, helping nurses base their clinical decisions on more solid foundations.[17,18] At Yale New Haven Hospital, an AI algorithm analyzes patients' electronic health records to assess clinical status and identify the need for early intervention. This approach supports the timely, effective, and patient-centered delivery of nursing care.[5] AI has also been effectively utilized in nursing education, particularly in enhancing training on clinical simulations and communication skills. By offering students realistic patient care experiences, it contributes to improving their educational process.[19,20]

In light of these promising developments, it is considered that the integration of AI technologies into nursing practice and education is still at an early stage and faces significant challenges. Although AI applications in nursing have the potential to enhance patient care and alleviate nurses' workload, the number of studies in this area remains limited, and the widespread adoption of these technologies encounters several barriers.[21,22] Primarily, the integration of AI and robotic technologies into the nursing profession is hindered by ethical debates and concerns regarding patient privacy, which raise significant obstacles to their use.[23] Furthermore, factors such as the lack of human interaction, the limited ability of AI to interpret patient needs comprehensively, and its restricted capacity to manage complex clinical situations contribute to resistance against AI adoption in nursing practice.[24] Additionally, the high cost of implementing AI-supported systems and inadequate technological infrastructure further impede their integration into healthcare services. In this context, addressing the ethical, technical, and economic challenges associated with AI in nursing and conducting further research in this field are crucial for broader adoption of AI.[25,26]

The integration of AI into healthcare, particularly nursing, has gained importance in recent years. AI has transformed clinical decision-making, improved patient outcomes, and enhanced nursing efficiency by reducing routine tasks and promoting patient-centered care. However, a comprehensive understanding of AI's role in nursing research and practice in Türkiye remains limited. There is a lack of systematic reviews or in-depth analyses of AI applications in the field of nursing in Türkiye. This gap makes it difficult for researchers and policymakers to assess current knowledge, identify trends, and pinpoint areas requiring further investigation.

Although the number of scientific studies on the use of AI in nursing has been gradually increasing, the number of theses on this subject in Türkiye is limited. This is a notable issue. AI-supported studies generally require advanced technology and strong data infrastructure. The lack of adequate technical equipment at universities and health institutions may be a barrier to conducting such studies. The 2019 workshop report by the Turkish Informatics Association further supports this view.[27] Since AI projects are often costly, access to such technologies may be restricted in thesis studies. AI research typically requires collaboration between computer engineering, data science, and health sciences. However, the lack of sufficient multidisciplinary cooperation between these fields in Türkiye may limit the scope of AI studies in nursing.[28] Moreover, the level of knowledge and awareness regarding the use of AI in nursing may not be sufficiently developed. Academicians and students may face difficulties in conducting related research due to the limited number of courses on AI and digital health technologies in nursing education curricula.[29]

This study aims to bridge this gap by systematically reviewing postgraduate theses on AI in the field of nursing in Türkiye. By analyzing these academic works, the review also aims to identify research trends, methodological approaches, areas of focus, and existing deficiencies. The findings of this study are expected to serve as a key reference for future research, guide nursing education and practice, and contribute to the body of evidence necessary for the effective integration of AI technologies into nursing.

The researchers sought to answer the following research questions based on the reviewed theses:

1. What are the subjects of postgraduate theses on AI in the field of nursing?
2. What are the objectives, study types, sample sizes, data collection tools, and research outcomes of the postgraduate theses on AI in the field of nursing?

Materials and Methods

Study Design

This descriptive study involved a comprehensive review and analysis of postgraduate theses, conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

Data Source and Search Strategy

The data source for this study was the National Thesis Center of the Council of Higher Education (CoHE Thesis Center) database of the Republic of Türkiye. The search was performed manually across all available theses, without any restriction on the year of publication, using the official online database (https://tez.yok.gov.tr/UlusalTezMerkezi/). The search process was conducted between 10–15 May 2025.

No restrictions were applied regarding thesis type (master's or doctoral) or university. Keywords used in the search were identified based on a preliminary literature review and selected from common Turkish expressions used in academic texts related to AI and associated technologies. The keywords included:

"yapay zeka (artificial intelligence),"
"yapay zekâ (artificial intelligence),"
"akıllı makineler (smart machines),"
"akıllı makine (smart machine),"
"akıllı makinalar (smart machines),"
"akıllı makina (smart machine),"
"makine öğrenmesi (machine learning),"
"makine öğrenme (machine learning),"
"makina öğrenmesi (machine learning),"
"makina öğrenme (machine learning),"
"makine öğrenimi (machine learning),"
"yapay sinir ağı (artificial neural network),"
"yapay sinir ağları (artificial neural networks),"
"örüntü tanıma (pattern recognition),"
"genetik algoritma (genetic algorithm),"
"genetik algoritmalar (genetic algorithms),"
"görüntü işleme (image processing),"
"bulanık mantık (fuzzy logic),"
"derin öğrenme (deep learning),"

and/or various combinations of these keywords. Boolean operators (AND/OR) were used to combine the terms (e.g., "yapay zeka AND hemşirelik") to ensure broader, more inclusive results.

Inclusion Criteria

- Conducted in the field of nursing,
- Written in English or Turkish,
- Full text available with authorized access (open access),
- No restrictions on the year of publication.

Exclusion Criteria

- Conducted by disciplines other than nursing,
- Duplicate (repeated) theses.

Selection Process

A total of 6,623 registered theses were reviewed during the screening process. In the first stage, an initial evaluation was conducted based on the titles and abstracts of the theses. In the second stage, full-text access was obtained to allow for a more detailed assessment. During the title and abstract screening, theses that were clearly unrelated to nursing or did not involve AI in a substantial way were excluded. In the full-text review stage, theses were carefully examined to determine whether AI methods or technologies were integrated into the research design or analysis. Theses that failed to meet this criterion were excluded.

Theses that did not meet the inclusion criteria and met any of the exclusion criteria were removed from the study. As a result of this multi-step screening process, seven theses that directly integrated AI into nursing practice or education and fulfilled all inclusion criteria were included in the final analysis. These theses were thoroughly examined and analyzed (Fig. 1).

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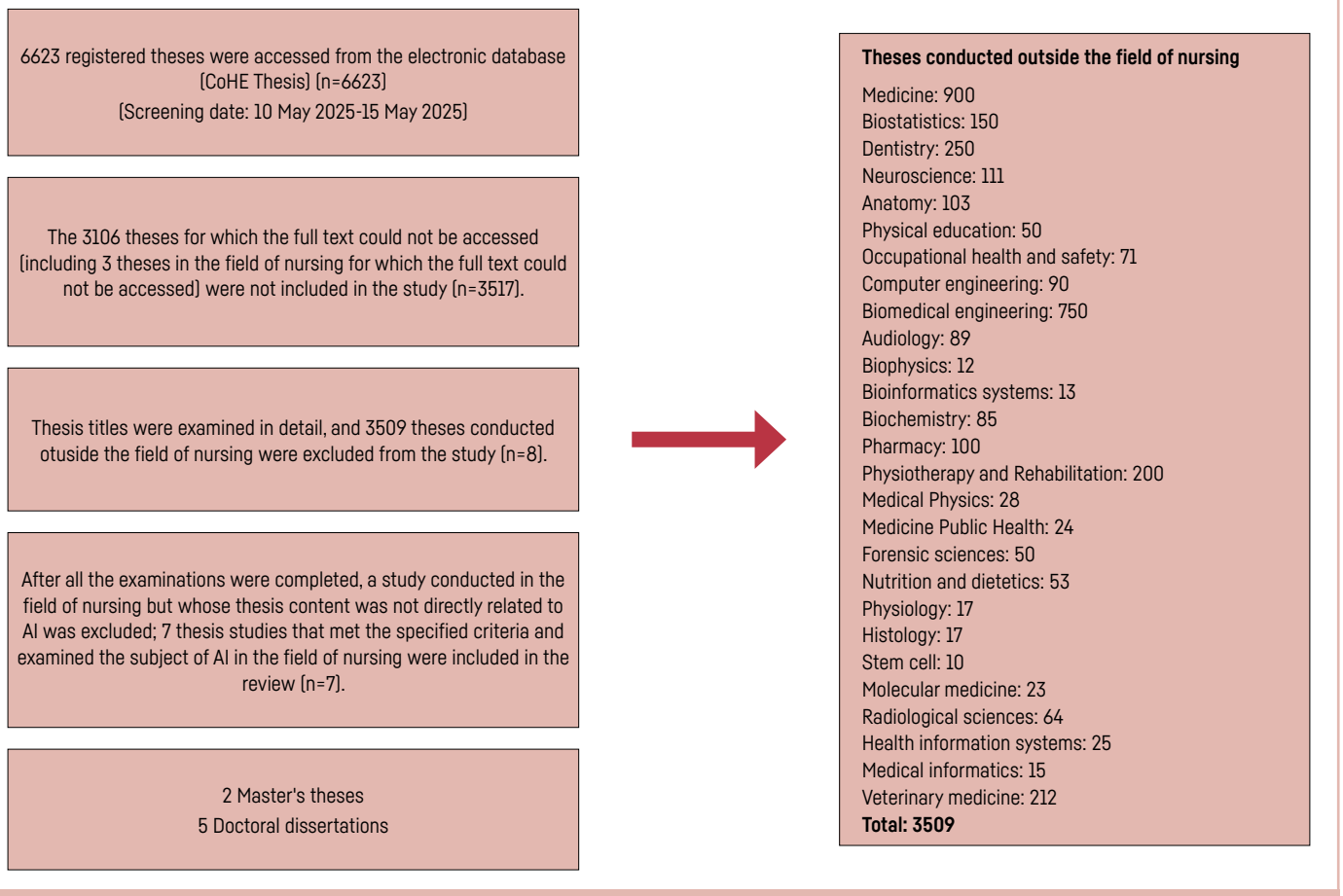

Figure 1. PRISMA flowchart of the analyzed theses.

CoHE:Council of higher education.

Data Collection and Analysis Process

The selected theses were systematically evaluated using content analysis. Key features such as the publication year, university, type of AI application (e.g., machine learning, deep learning, artificial neural networks), the medical field in which the study was conducted, and the outcomes were coded. A thematic analysis approach was then applied to classify findings and identify key patterns, areas of application, and emerging trends regarding the use of AI in nursing.

Results

In this study, seven postgraduate theses focusing on AI in the field of nursing were reviewed, and their distribution according to specific characteristics is presented (Table 1). The first thesis in this field was published in 2022, while the remaining studies were completed in 2023. Of the total theses, five (71.4%) were doctoral dissertations and two (28.6%) were master's theses. Among the master's theses, one thesis was retrospective and the other was qualitative, while the doctoral dissertations included qualitative (40%), retrospective (20%), quasi-experimental (20%), and experimental (20%) designs.

In terms of sample size, most of the studies involved fewer than 200 participants, with 42.9% of the theses including 200 participants or more. The study by Vicir[30] in 2023 had the largest sample (n=304),[31] while the smallest sample was found in the qualitative doctoral dissertation by Gündoğdu[32] in 2022, which included 19 participants.

Regarding departments, the theses were conducted across various nursing fields, including the Department of Nursing (42.9%), Department of Internal Medicine Nursing (14.3%), Department of Surgical Diseases Nursing (14.3%), Department of Nursing Management (14.3%), and Department of Fundamentals of Nursing (14.3%). The sample groups also varied: three theses included patients (42.9%), two included students (28.6%), one focused on nurses (14.3%), and one involved a mixed group of physicians, nurses, and patients (14.3%).

When examining subject characteristics (Table 2), the majority of the theses (57.1%) aimed to determine the success rate of AI algorithms in patient evaluation and nursing practice. The others focused on healthcare professionals' and patients' perceptions of AI and robot nurses (28.5%), and the effectiveness of AI-integrated advanced life support training (14.3%).

Table 3 presents methodological characteristics of the theses. According to the findings, the earliest thesis on AI in nursing was Gündoğdu's[32] doctoral dissertation in 2022 from the Department of Nursing, while the most recent was a doctoral dissertation by Polat[31] in 2023 in the Department of Internal Medicine Nursing. Overall, the results of these theses suggest that AI technologies are increasingly being integrated into nursing research and practice, with the potential to enhance care quality, support clinical decision-making, and improve educational outcomes.

Discussion

This study, which examined postgraduate theses on AI in the field of nursing, is discussed under three main headings:

1. Determination of the Success Rate of AI Algorithms in the Evaluation of Patients and Their Use in Nursing Practice

There are four postgraduate theses in the field of nursing that analyzed the success rate of AI algorithms in patient evaluation and their application in nursing practice. The study by Vicir[30] reported that the AI algorithm made 17 nursing diagnoses for gy-

Table 1. Distribution of postgraduate theses according to selected characteristics

	Master's thesis		Doctoral dissertation		Total	
	n	%	n	%	n	%
Research type						
Qualitative	1	50	2	40	3	42.9
Retrospective	1	50	1	20	2	28.6
Quasi-experimental	0	0	1	20	1	14.3
Experimental	0	0	1	20	1	14.3
Total	2	100.0	5	100.0	7	100.0
Sample size						
n<50	0	0	2	40	2	28.6
50≤n≤100	0	0	1	20	1	14.3
100<n<200	0	0	1	20	1	14.3
200≤n	2	100.0	1	20	3	42.9
Total	2	100.0	5	100.0	7	100.0
Year of publication						
2022	0	0	2	40	2	28.6
2023	2	100.0	3	60	5	71.4
Total	2	100.0	5	100.0	7	100.0
Department						
Surgical diseases nursing	0	0	1	20	1	14.3
Internal medicine nursing	0	0	1	20	1	14.3
(General) nursing	1	50	2	40	3	42.9
Nursing management	0	0	1	20	1	14.3
Fundamentals of nursing	1	50	0	0	1	14.3
Total	2	100.0	5	100.0	7	100.0
Sample group						
Patients	1	50	2	40	3	42.9
Students	1	50	1	20	2	28.6
Nurses	0	0	1	20	1	14.3
Physicians, nurses, and patients	0	0	1	20	1	14.3
Total	2	100.0	5	100.0	7	100.0

Table 2. Distribution of theses on artificial intelligence (AI) according to subject focus

Subject focus	n	%
Evaluation of the success rate of AI algorithms in patient assessment and their use in nursing practice	4	57.1
Evaluation of healthcare professionals' and patients' opinions on the impact of AI and robot nurses in healthcare	2	28.5
Assessment of the effectiveness and sustainability of an advanced life support training model integrated with AI	1	14.3

necological cancer patients, with an accuracy rate of 98%, helping to relieve nurses' workload and ensure appropriate patient care. The experimental study by Polat[31] indicated that the AI-supported mobile virtual assistant used by diabetic patients reduced the rates of hospitalization, hypoglycemia, self-care errors, and overall healthcare costs within one year. This was achieved by enabling patients to easily access nutritional information for diabetes, take medications on time through blood glucose prediction, and receive reminders for annual check-ups. In the study by Gündoğdu,[32] it was concluded that the AI algorithm supported nurses by accurately classifying patients' pressure sores, thereby saving time and contributing to the delivery of appropriate care. In the study by Yiğit,[33] an AI-supported system was developed to evaluate the comfort behavior levels of newborns. The study aimed to assess the effectiveness of AI in identifying and interpreting behavioral indicators of comfort in neonatal care. Yiğit's study[33] indicated that AI-supported behavioral assessment systems in neonatal care were effective in reducing nurses' workload by supporting clinical decision-making. The results showed that the AI-supported evaluation method provided faster, more consistent, and more objective measurements compared to traditional observational methods. Moreover, it contributed to enhancing the quality of individualized care in neonatal intensive care units, supported nurses in clinical decision-making, and reduced subjectivity in behavioral assessments. The common finding across these three theses is that the use of AI algorithms in nursing had positive effects on patient care and evaluation. The studies revealed that AI algorithms improved patient treatment processes, reduced hospital admissions, increased survival rates, and were effective in preventing pressure ulcers.[34,35] In one study, it was determined that the AI algorithm used in evaluating diabetic wounds in 28 patients provided more accurate and reliable measurements compared to traditional evaluations performed by an expert wound care nurse.[36] Another study reported that LOVOT, an AI-supported social robot, was widely adopted by individuals with dementia, providing support in daily life by encouraging communication and social interaction. It was evaluated by healthcare professionals as an innovative tool in dementia care.[37] In another study, the usability of an AI-supported system in the postoperative follow-up of orthopedic patients was examined. It was found that the system facilitated patient monitoring, improved communication between patients

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Table 3. Distribution of postgraduate theses included in the study by objective, study type, sample group, and outcomes

Author/ year/ USA	Objective	Type of study	Sample size	Data collection tools used	Outcome
Gümüş, 2023 Department of Nursing Management	To determine the views of healthcare professionals and patients on the use of artificial intelligence (AI) and robot nurses in the field of healthcare. Doctoral Dissertation	Qualitative	A total of 45 participants, including 13 physicians, 17 nurses, and 15 patients.	• Semi-structured In-Depth Individual Interview Form for Healthcare Professionals • Semi-structured In-Depth Individual Interview Form for Patients	Interviews with healthcare professionals and patients revealed that participants were only beginning to become familiar with AI and robotic technologies and had limited knowledge of them. Most participants favored the use of robots in supportive roles but opposed their placement in managerial positions. They believed that such technologies could help reduce workloads, save time, and enhance healthcare delivery. However, concerns were raised about data privacy and the inability of robots to replicate human emotions in healthcare interactions.
Çelikbürk Doruker,[49] 2023 Department of Surgical Diseases Nursing	To assess the effects of an advanced life support training model integrated with AI on the acquisition of knowledge and skills, and to evaluate the retention of these gains over time. Doctoral Dissertation	Quasi-experimental design The control group received training using a low-tech simulation and intubation model with a standard scenario. The AI group received skills training on the same models, but with individualized scenarios generated through a supervised machine learning technique. This technique created tailored scenarios by identifying the specific steps in which student nurses in the AI group were deficient in advanced cardiac life support skills and needed improvement. The knowledge and skill scores of both groups were assessed before the training, immediately after, and again at three and six months post-training.	The sample group consisted of 80 fourth-year nursing students, including 40 in the control group and 40 in the AI group.	• Descriptive Information Form • Advanced Cardiac Life Support Information Form • Advanced Cardiac Life Support Skills Checklist	Results of the study showed that the student nurses in both the control and AI groups had inadequate levels of knowledge and skill before the Advanced Cardiac Life Support (ACLS) training. After the training, both groups showed higher knowledge and skill scores for ACLS. The AI group had a higher mean knowledge score than the control group immediately after the training. The training provided with low-tech simulation models, accompanied by individualized scenarios and the supervised machine learning technique, was found to be more effective than the standard scenario training. The AI group achieved higher mean skill scores than the control group, sustained even six months after the training. It was concluded that AI-supported educational models can potentially enhance students' knowledge and skill acquisition.
Cankara,[40] 2023 Fundamentals of Nursing Department	To examine nursing students' views on robot nurses and artificial intelligence applications Master's Thesis	Qualitative	The sample consisted of 206 third- and fourth-year nursing students	• Personal Information Form • Opinion Form on Robot Nurses and Artificial Intelligence Applications	The majority of students viewed robot nurses positively as supportive tools in health services. However, they noted that robots may be insufficient in terms of human contact, empathy, and emotional interaction. Although artificial intelligence applications are considered to have the potential to improve the quality of nursing care, various concerns were expressed regarding adherence to ethical principles and the protection of professional roles.
Yiğit,[33] 2023 Department of Nursing	To evaluate newborns' comfort levels using artificial intelligence techniques Doctoral Dissertation	Retrospective	A total of 52 newborns were monitored in the neonatal intensive care unit	• Image processing techniques (using deep learning-based AI algorithms) • Neonatal Comfort Behavior Form • Nurse Evaluation Forms	It was determined that AI techniques provided a high level of accuracy in assessing the comfort levels of newborns by analyzing their facial expressions, body movements, and vocal responses. A significant and strong correlation was found between the results obtained from AI algorithms and the clinical evaluations conducted by nurses. The findings indicated that AI-supported systems can serve as valuable tools to support nurses' decision-making processes in neonatal care.

Table 3. Cont.

Author/ year/ USA	Objective	Type of study	Sample size	Data collection tools used	Outcome
Vicir,[30] 2023 Department of Nursing	To make accurate and appropriate nursing diagnoses using AI algorithms in gynecological cancer patients Master's Thesis	Retrospective	The sample consisted of 304 patients diagnosed with gynecological cancer	• AI algorithm called Weka • Multilayer Perceptron and the J48 database	The algorithm developed using artificial neural networks made 17 nursing diagnoses for gynecological cancer patients based on the North American Nursing Diagnosis Association (NANDA) nursing diagnoses, achieving an accuracy rate of 98%. The study demonstrated that AI algorithms are an effective tool for nurses to make nursing diagnoses using machine learning and artificial neural networks.
Polat,[31] 2023 Department of Internal Medicine Nursing	To examine the effect of a mobile virtual assistant developed with an AI algorithm on hospitalization rate, cost, self-care, and hypoglycemia in individuals with diabetes Doctoral Dissertation	Randomized, controlled experimental study A randomized controlled trial was conducted. The control group received standard diabetes care and training (including foot care, insulin administration, and medical nutrition therapy). The experimental group received the same training along with instruction on how to use an "AI-supported Android Assistant" mobile application on their phones. This application predicts the user's blood glucose levels at 5, 10, and 15-minute intervals using an AI-based prediction algorithm. The hypoglycemia scale, self-care scale, and data from the cost table of the intervention group were recorded at the first, sixth, and twelfth months.	A total of 120 patients diagnosed with diabetes: 60 in the experimental group and 60 in the control group	• Individual Information Form • Diabetes Self-Care Scale • Hypoglycemic Confidence Scale • Opinion Form on the Mobile Application • Cost Table of Interventions for Diabetes and Its Complications	The AI-supported mobile virtual assistant application had a more positive effect on hospitalization rates, hypoglycemia, self-care, and cost-effectiveness in the experimental group compared to the control group, which received standard diabetes education.
Gündoğdu,[32] 2022 Department of Nursing	To develop an intelligent classification system for the assessment of pressure sores and to evaluate this system with nurses. Doctoral Dissertation	Qualitative	19 volunteer nurses were interviewed	• Individual Descriptive Characteristics Form • Attitude Towards Technology Scale • Semi-structured Interview Form • Zoom and WhatsApp (online interview platforms)	The AI algorithm developed to classify pressure sores correctly staged the sores. Nurses who used the system reported that the application was simple and comprehensible. They stated it supported them during care, saved time, and helped guide their decision-making.

and healthcare professionals, and positively contributed to the follow-up process.[38] Additionally, one study reported that the AI algorithm used during nursing care in the postoperative period improved the efficiency and quality of care by 6.9%.[39] The findings of the reviewed postgraduate theses concerning AI applications closely align with those in both national and international literature. Given that the results of similar studies in the literature are consistent with each other, AI algorithms can be effectively used in nursing practice and can provide significant benefits in patient care.

2. Determination of the Views of Healthcare Professionals and Patients on the Effect of AI and Robot Nurses on Health Services

Two postgraduate theses addressed the opinions of healthcare professionals and patients regarding AI and robot use in the field of nursing. The study by Gümüş revealed that participants were only beginning to recognize AI technologies and robot nurses and had limited knowledge about them. In that study, participants did not support the idea of robots in managerial roles but preferred their use in auxiliary positions. They believed that these technologies could reduce workload, save time, and improve healthcare practices.[32] The thesis by Cankara,[40] conducted in the Department of Fundamentals of Nursing, examined nursing students' views on robot nurses and AI applications. Cankara's study[40] emphasized students' generally positive attitudes toward technology and highlighted the need for ethical education, suggesting that AI integration should be supported by educational initiatives in the future. The findings showed that, while students were aware of the growing importance of technology in healthcare, they emphasized the need for education and ethical guidelines, along with a positive attitude toward the integration of AI and robotic systems into nursing practice. Overall, the study investigating the views of healthcare professionals and patients on the integration of AI and robot nurses into healthcare services revealed that, while participants positively evaluated the potential of these technologies to enhance service quality, they also emphasized that factors such as ease of use, hygiene, and the effectiveness of human-robot interaction are critical for successful implementation.[41] A systematic review reported that AI has transformed nurses' roles by automating routine tasks, thus enabling them to focus more on clinical decision-making and patient-oriented care. As a result, the quality of patient care improved, and nurses' job satisfaction increased.[42] In another study, it was found that nurses accepted service robots at a moderate level, while patients showed lower acceptance. The main factors affecting acceptance included robots' capacity for interaction and emotional responsiveness, reliability in care, job security, ease of use, and the role of robots in healthcare. These findings emphasize the importance of education and confidence-building measures for both healthcare professionals and patients in the integration of AI and robot nurses into healthcare services.[43] A study conducted in Canada reported that while 52% of participants had knowledge about AI, most had positive views about its use in healthcare and expressed interest in using AI in their careers.[44] The findings regarding knowledge levels and attitudes toward AI from the reviewed thesis are consistent with both national and international literature. The studies reported that a significant majority of participants were knowledgeable about AI and believed its application in healthcare would help reduce nurses' workload. Participants also expressed positive opinions about the potential benefits of robots in the nursing profession. Additionally, healthcare professionals stated that AI applications could accelerate healthcare processes and showed a desire to incorporate such technologies into their careers.[45–48] Most studies indicated that participants believed AI would improve nursing practice and reduce workload. Based on these findings, the more widespread and effective use of AI and robots in nursing practice may contribute to the more efficient and higher-quality delivery of nursing care and services.

3. Studies Evaluating the Use and Effect of AI-supported Educational Models in Nursing and Healthcare

There is only one postgraduate thesis that evaluated AI-supported training in the field of nursing. The study by Çeliktürk Doruker[49] reported that training provided to students using low-tech simulation models, accompanied by individualized scenarios and the supervised machine learning technique, was more effective and produced more lasting results than standard training provided without the use of AI. The study focused specifically on advanced life support training integrated with AI. Additional studies indicated that AI-supported simulation training had a significant positive effect on participants' learning outcomes. For example, a study conducted in Canada reported that AI-supported simulation training provided to nurses increased their knowledge levels, and the effect lasted for up to three months. It was found that the use of AI in simulation not only enhanced nurses' knowledge immediately after training but also ensured retention of that knowledge for up to three months, demonstrating both the effectiveness and durability of AI-supported educational methods.[50–52] Another study revealed that AI-supported case analysis improved students' case management performance. Moreover, it was found to be as effective as traditional instructor-led case analysis in terms of satisfaction, focus, and interest in the case.[53] Another study investigated the effect of an immersive virtual reality (IVR) application on improving nursing students' indwelling urinary catheter placement skills. It demonstrated that students practiced using both IVR and traditional methods, and that the use of IVR increased learning satisfaction and positively supported skill acquisition.[54] In a separate study, a mobile chatbot-supported educational method was implemented to enhance the learning achievement and self-efficacy of nursing students. The experimental results revealed that students who received education through the chatbot experienced significant and substantial improvements in both academic achievement and self-confidence compared to those who received traditional instruction.[55] The findings of the AI-supported training in the reviewed postgraduate thesis are consistent with those of other studies in the literature. The results indicate that AI-supported simulation training in nursing is an effective learning method. For example, studies involving virtual reality and AI in nursing education have reported similar improvements in clinical decision-making and procedural skills. Such training methods yield more effective and longer-lasting outcomes compared to traditional standard training. Studies that examined attitudes toward AI also found that the majority of participants believe AI applications should be integrated into nursing education. These studies emphasized the importance of incorporating AI into nursing curricula and highlighted its potential for enhancing student learning experiences.[44,46] Therefore, it is considered that the more widespread use of AI-supported simulations in nursing education and their integration into nursing curricula may be an important step toward increasing students' knowledge and improving their practical skills.

Limitations

The limitation of this study is that it only examines postgraduate theses conducted in Türkiye.

Conclusion

This review highlights the emerging, yet still underexplored, role of artificial intelligence in postgraduate nursing research in Türkiye. Despite the limited number of studies, the existing theses demonstrate a growing academic interest in the integration of AI into nursing practice and education. The findings emphasize the need for broader and more methodologically diverse research, particularly in experimental and training-based studies. Expanding research efforts in this area could help improve patient care, advance nursing education, and address current gaps in the literature.

According to the results of reviewed theses:

- AI should be integrated into nursing education, used to facilitate nursing practice, and applied in disease management.
- Ethical issues such as data privacy and the inability of AI to feel human emotions should not be overlooked.
- Regular training and awareness-raising activities should be organized to address these concerns.
- It is recommended that AI-supported simulation training be incorporated into nursing curricula to enhance students' knowledge and practical skills.

AI-supported educational studies and clinical evaluations are expected to contribute to care quality and guide future applications in both educational and clinical nursing settings. Further studies on AI should be added to the literature.

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Assessing Mothers' Knowledge of Childhood Immunization

Abstract

Background: Despite global efforts, 108 million infants (84%) received three doses of the diphtheria, tetanus, and pertussis (DTP3) vaccine in 2023. However, in Yemen, millions of children missed routine immunizations, and only 30% of children under the age of three were fully immunized during the same year.

Aim: This study aimed to assess mothers' knowledge of childhood immunization for children under five years of age at Jiblah University Hospital, Ibb, Yemen.

Methods: A descriptive, community-based cross-sectional study was conducted between September 2023 and March 2024. The study included 300 mothers attending the maternal care and vaccination units at Jiblah University Hospital. Data were analyzed using descriptive statistics and the chi-square test.

Results: More than three-fifths of the mothers (62%) were over 25 years of age, and 48.3% had one to two children under five. The overall maternal knowledge score regarding childhood immunization was 77.7%. A statistically significant association was found between mothers' age and education level and their total knowledge score (p=0.044 and p=0.028, respectively). Notably, the majority of mothers aged 25 years or older (82.3%) and literate mothers (80%) demonstrated good knowledge.

Conclusion: Most mothers recognized the importance of vaccination in preventing disease and reducing infant mortality. However, gaps were identified in their understanding of vaccine side effects and immunization schedules.

Keywords: Child, knowledge, mothers, vaccine

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Introduction

Vaccination is one of the most effective and cost-efficient public health interventions for reducing diseases that contribute to child morbidity and mortality. However, ensuring that children are vaccinated against life-threatening yet preventable diseases remains a significant challenge—particularly in low- and middle-income countries—despite the availability of vaccines.[1] Several factors contribute to low vaccination rates, including widespread poverty, ongoing internal conflict, limited access to healthcare services, and vaccine hesitancy. These issues have led to the resurgence of many preventable diseases.[2] Parents play a vital role in protecting their families and safeguarding their children's health. A mother's knowledge of childhood vaccination significantly influences her behavior and plays a critical role in ensuring that her child receives complete immunization.[3] Various factors are associated with higher maternal knowledge of vaccination, including age, occupation, place of residence, family income, and educational level.[4]

According to the 2024 World Health Organization (WHO) report, approximately 14.5 million infants worldwide did not receive the first dose of the diphtheria, tetanus, and pertussis (DTP) vaccine, and 6.5 million received only partial vaccination due to limited access to immunization programs and essential health services. Notably, 60% of these under-vaccinated children live in just 10 countries, including Yemen.[5] Yemen continues to lag behind in vaccination coverage, placing the country at increased risk of disease outbreaks due to low immunization rates among infants and young children.[6] For example, only 30% of children under the age of three were fully immunized. Reports indicate that coverage for the measles, polio, and DTP vaccines was 41%, 46%, and 55%, respectively.[7] Therefore, this study aims to evaluate mothers' knowledge of childhood vaccination for children under the age of five at Jiblah University Hospital in Ibb, Yemen.

Research Questions

1. What is the current level of knowledge among mothers regarding the vaccination of children under five?
2. How do sociodemographic factors—such as age, education, number of children, and place of residence—influence mothers' knowledge about childhood vaccinations?

Materials and Methods

Study Design

This descriptive, community-based study employed a cross-sectional design. It targeted mothers who sought services at primary health care units (maternal care and vaccination rooms) of Jiblah University Hospital, located in Ibb Governorate, Yemen.

Population and Sample

During the study period, a total of 1,018 mothers attended the maternal care and vaccination units at the primary healthcare facility of Jiblah University Hospital to receive routine healthcare services. Mothers with

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at least one child under the age of five were eligible for inclusion in the study, while those who were pregnant for the first time or did not have children under five were excluded. Of the total, 901 mothers met the inclusion criteria, as they had children under the age of five. The required sample size was calculated using the SurveyMonkey sample size calculator (https://www.surveymonkey.com/), which indicated a minimum of 270 participants. To enhance the robustness of the study, 20 mothers who participated in a pilot test were included, along with an additional 10 participants to compensate for potential missing or incomplete data. As a result, the final sample comprised 300 mothers. Participants were recruited using a convenience sampling method.

Data Collection Tools

The questionnaire consisted of two sections. The first section included seven sociodemographic items: the mother's age, number of children under five, place of residence, marital status, level of education, employment status, and monthly household income. The second section included 16 True-False questions aimed at assessing the mother's knowledge of childhood vaccination. A scoring system was applied to each question to evaluate the level of knowledge. Respondents who scored below 50% were classified as having a poor level of knowledge, those scoring between 50% and 75% were considered to have a fair level of knowledge, and those scoring above 75% were regarded as having a good level of knowledge.

Reliability and Validity

The content validity of the questionnaire was assessed by a panel of five experts from the Faculties of Nursing and Midwifery at Jiblah University for Medical and Health Sciences. Additionally, a pilot study was conducted involving 20 mothers—approximately 15% of the total sample—who were subsequently included in the final study. The questionnaire demonstrated high internal consistency, with a Cronbach's alpha coefficient of 0.89. The instrument used to assess maternal knowledge was developed based on the findings of a previous study.[8]

Data Collection

Co-researchers conducted individual face-to-face interviews with participating mothers in a private setting to ensure confidentiality and privacy. Approximately 10 to 11 interviews were conducted per week, with each session lasting between 20 and 25 minutes. Data collection was carried out from September 2023 to March 2024. Participants were informed of their right to withdraw from the study at any time during the interview process.

Table 1. Sociodemographic characteristics of mothers (n=300)

Variable	Category	Frequency	%
Age	Less than 25 years	114	38
	25 years or older	186	62
	Mean±SD: 30.4±8.7, Range: 43		
Number of children	1–2	145	48.3
(<5 years)	3–5	119	39.7
	More than 5	36	12
Place of residence	Urban	177	59
	Rural	123	41
Marital status	Married	279	93
	Divorced	11	3.7
	Widowed	10	3.3
Educational level	Illiterate	40	13.3
	Literate	260	86.7
Employment status	Employed	40	13.3
	Unemployed	260	86.7
Monthly family income (YRs)	Less than 60,000	56	18.7
	61,000–90000	187	62.3
	More than 90,000	57	19

SD: Standard deviation

Ethical Considerations

This study was conducted following approval from the Research Ethics Committee of Jiblah University for Medical and Health Sciences, Faculty of Nursing (Approval Number: 2024.2.5, Date: 08.09.2024). Verbal consent was obtained from all participating mothers prior to data collection. Participants were informed that their participation was voluntary and that they had the right to withdraw at any point during the interview. To ensure anonymity and confidentiality, participants' names were not recorded on the questionnaire. The study adhered to the ethical principles outlined in the Declaration of Helsinki, safeguarding the rights, dignity, and well-being of all participants throughout the research process.

Data Analysis

Data collected in this study were analyzed using the Statistical Package for the Social Sciences (SPSS), version 26.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics—including frequencies, percentages, means, and standard deviations—were used to summarize the data. The Chi-square test was applied to assess associations between mothers' knowledge and various sociodemographic variables. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1 presents the distribution of participants according to various sociodemographic characteristics, including age, number of children, place of residence, marital status, educational level, employment status, and monthly family income. The participants' ages ranged from 19 to 43 years, with a mean age of 30.4±8.7 years. The majority of mothers (62%) were aged 25 years or older. In terms of the number of children, 48.3% of mothers had one to two children, 39.7% had three to five children, and 12% had more than five children. Regarding place of residence, 59% of the participants lived in urban areas, while 41% resided in rural areas. Most of the mothers (93%) were married, while 3.7% were divorced and 3.3% were widowed. In terms of educational attainment, 86.7% of the mothers were literate, and 13.3% were illiterate. Concerning employment status, 86.7% were housewives, while 13.3% were employed outside the home.

As shown in Table 2, the frequencies and percentages related to mothers' knowledge of childhood vaccination are presented. The majority of mothers (92%) reported that their

Table 2. Mothers' knowledge about childhood vaccination (n=300)

No.	Knowledge item	Correct responses	
		n	%
1	Has your child received the mandatory vaccines?	277	92.0
2	Is vaccination important for children from the first month of birth?	273	90.7
3	Does vaccination protect your children from infectious diseases?	284	94.4
4	Does vaccination reduce infant mortality and disability?	277	92.0
5	Can vaccination help keep your children healthy?	287	95.4
6	Do some vaccines cause fever and pain?	285	94.7
7	Does vaccination cause cramps and rashes in children?	62	20.6
8	Can diphtheria, tetanus, and pertussis be controlled by vaccination?	256	85.1
9	Can childhood vaccination prevent the emergence of measles?	264	87.7
10	Can hepatitis B infection be prevented through vaccination?	234	77.7
11	Does your child need vaccination even when healthy?	285	94.7
12	Do you still vaccinate your child in cases of fever and diarrhea?	167	55.5
13	Have you ever been late in vaccinating your child?	86	28.6
14	Has your child received all the necessary vaccines?	274	91.03
15	Have you received maternal vaccines to protect your child from diseases?	203	67.4
16	Have you attended any health education campaign or course about vaccination?	186	61.8

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children had received the mandatory vaccinations, while 8% indicated that they had not ensured this type of immunization. Additionally, 90.7% of mothers recognized the importance of initiating vaccination on the first day of birth, whereas 9.3% were unaware of this recommendation. Regarding disease prevention and control, most mothers believed that vaccination protects children from infectious diseases (94.4%) and contributes to reducing both infant mortality and disability rates (92%). Furthermore, 85.1% of mothers reported that vaccination is effective in controlling diphtheria, tetanus, and pertussis, while 87.7% recognized its effectiveness against measles. Additionally, 77.7% of mothers indicated that hepatitis B virus infection can be prevented through vaccination.

Finally, 94.7% of mothers acknowledged that fever and pain are common side effects associated with vaccination. A smaller proportion (20.6%) believed that vaccination causes cramps and rashes, whereas the majority (79.4%) reported not observing these symptoms in their children following vaccination. These responses reflect the mothers' knowledge as well as their personal experiences regarding potential vaccine-related complications. Furthermore, the vast majority of mothers (94.7%) affirmed that vaccination is essential for maintaining child health. Slightly more than two-thirds (67.4%) believed that maternal vaccination plays a crucial role in protecting children from diseases, while 32.6% considered it to be unimportant. Additionally, over three-fifths of mothers (61.8%) reported having attended health education sessions on vaccination.

Figure 1 illustrates the overall knowledge scores of mothers regarding childhood vaccination. The results show that more than three-quarters of the mothers (77.7%) demonstrated a good level of knowledge, 17.7% had a fair level of knowledge, and only 4.6% exhibited poor knowledge regarding childhood vaccination.

Table 3 presents the association between various sociodemographic characteristics and the overall knowledge scores of mothers regarding childhood vaccination. The analysis revealed statistically significant differences in knowledge scores based on maternal age and educational level. Specifically, 82.3% of mothers aged over 25 years demonstrated good knowledge, compared to 70.2% of those aged 25 years

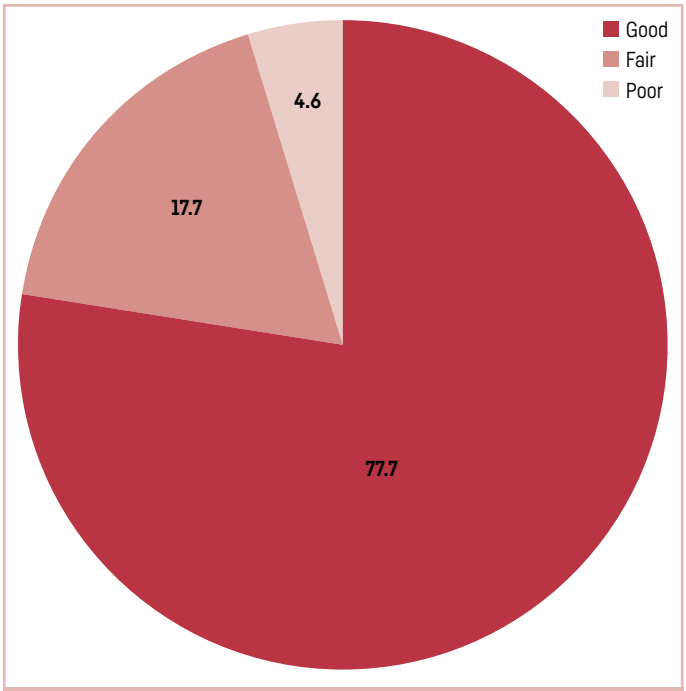

Figure 1. Distribution of mothers' total knowledge about childhood vaccination.

Table 3. Association between sociodemographic characteristics and mothers' total knowledge scores about childhood vaccination (n=300)

Variable	Mothers' knowledge of childhood vaccination						Statistical analysis	
	Poor (n=14)		Fair (n=53)		Good (n=233)		Chi-square	p
	n	%	n	%	n	%		
Age								
Less than 25 years (n=114)	8	7	26	22.8	80	70.2	6.256	0.044
Over 25 years (n=186)	6	3.2	27	14.5	153	82.3		
Number of children								
Less than 2 children (n=145)	8	5.5	30	20.7	107	73.8	5.786	0.216
3–5 children (n=119)	5	4.2	14	11.8	100	84.0		
More than 5 children (n=36)	1	2.8	9	25	26	72.2		
Place of residence								
Urban (n=177)	8	4.5	31	17.5	138	78.0	0.031	0.985
Rural (n=123)	6	4.9	22	17.9	95	77.2		
Marital status								
Married (n=279)	13	4.7	48	17.2	218	78.1	1.861	0.761
Divorced (n=11)	1	9.1	3	27.3	7	63.6		
Widowed (n=10)	0	0.0	2	2.0	8	80.0		
Educational level								
Illiterate (n=40)	2	5	13	32.5	25	62.5	7.126	0.028
Literate (n=260)	12	4.6	40	15.4	208	80.0		
Employment status								
Employed (n=40)	1	2.5	6	15.0	33	82.5	0.789	0.674
Unemployed (n=260)	13	5	47	18.1	200	76.9		
Monthly income (YRs)								
Less than 60,000 YRs (n=56)	5	8.9	9	16.1	42	75.0	3.308	0.508
60001–90000 YRs (n=187)	7	3.7	32	17.1	148	79.1		
Over 90,000 YRs (n=57)	2	3.5	12	21.1	43	75.4		

or younger, a difference that was statistically significant (p=0.044). Similarly, 80% of literate mothers exhibited good knowledge, a proportion significantly higher than that of illiterate mothers (p=0.028). Additionally, the data showed that 84% of mothers with three to five children demonstrated good knowledge, compared to 73.8% of those with one to two children and 72.2% of mothers with more than five children. Regarding place of residence, the majority of mothers from both urban (78%) and rural areas (77.2%) demonstrated good knowledge about childhood vaccination.

Discussion

Immunization programs have been instrumental in preventing a wide range of infectious diseases, particularly among children under five years of age.[8] To improve the effectiveness of childhood immunization initiatives, it is essential to raise awareness and enhance knowledge among parents, especially mothers and primary caregivers.[9] This study focused on mothers in Yemen, a country where ongoing conflict, worsening health conditions, and limited access to quality healthcare services create significant barriers to immunization.[10,11] According to a 2024 UNICEF (United Nations Children's Fund) report, vaccination coverage in Yemen remains critically low.[12] Furthermore, only one relevant study was identified, conducted in 2018 in Al-Mukalla, Yemen, titled "*Knowledge and Attitude towards Childhood Immunization among Parents in Al-Mukalla, Yemen*."[13] The results of that study revealed that parents possessed a moderate level of knowledge regarding childhood immunization. This highlights the urgent need for updated research and targeted interventions to address knowledge gaps and improve immunization coverage in Yemen's current sociopolitical context. Therefore, the present study is important for understanding mothers' knowledge of vaccination in Ibb Governorate, Yemen.

In the current study, more than three-fifths of the mothers were over 25 years of age, with a mean age of 30.4±8.7 years. These findings differ from those reported in a previous study conducted in Yemen.[10] The discrepancy between the two studies may be attributed to the fact that the current research was conducted in a healthcare facility, where nearly three-fifths of the mothers lived in urban areas and the majority were literate.

The findings also indicated that most mothers were aware that children should receive mandatory vaccinations. This is consistent with the results of a similar study conducted in Saudi Arabia.[14] Vaccinations should begin at birth to prevent and protect children from common communicable diseases.[15] Furthermore, the current study revealed that the majority of mothers recognized the importance of initiating vaccinations on the first day of birth, an observation also reported in a study conducted in Erbil, Iraq.[16] These findings suggest a foundational level of awareness among mothers regarding vaccination schedules, which can be leveraged to design more effective educational campaigns and promote timely immunization uptake in Ibb Governorate.

Additionally, all recommendations issued by the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC) regarding the prevention and control of tetanus, diphtheria, and pertussis in the United States were followed.[17] In the current study, most mothers identified vaccination as a preventive measure against infectious diseases and as a means of controlling diphtheria, tetanus, pertussis, and measles. These findings are consistent with those of previous studies.[18] While vaccination can lead to local side effects such as swelling, redness, and pain at the injection site, as well as systemic reactions including fever and rash,[19] the majority of mothers in this study reported being aware of those side effects, particularly fever and pain. Notably, the level of awareness in this study was higher than that reported in a study conducted in Türkiye, where the awareness rate was 88.5%.[20] This elevated awareness of vaccine side effects among mothers participating in this study may contribute to better management of post-vaccination symptoms and help reduce vaccine hesitancy, thereby supporting higher immunization rates within the community.

In cases where vaccination poses an increased risk of serious adverse reactions in children, immunization should be postponed; however, most contraindications are temporary in nature.[21] Once the contraindicating condition resolves, the child may safely receive the scheduled vaccines.[22] In the present study, more than half of the mothers correctly reported that malnutrition, mild fever, and diarrhea are not valid contraindications to vaccination. These findings are consistent with those reported in a previous study.[23] The results from our study indicate a relatively good understanding among mothers regarding vaccination safety, which is crucial for minimizing unnecessary delays and ensuring the timely immunization of children, particularly through the implementation of health education sessions targeting the Yemeni population.

The overall assessment of mothers' knowledge regarding childhood vaccination showed that more than three-quarters demonstrated a good level of knowledge. This proportion is significantly higher than that reported in a study conducted in Nigeria, where only 44.8% of mothers exhibited good knowledge.[24] These findings suggest that educational efforts in the study area may be more effective, highlighting the potential to further improve immunization rates by building on this existing knowledge base. This can be achieved by ensuring vaccine availability, improving access to vaccination services, and increasing awareness among both healthcare workers and parents.

A statistically significant association was observed between mothers' total knowledge scores and their age groups; specifically, the majority of mothers over the age of 25 demonstrated good knowledge. This result is consistent with findings from a study conducted in the Sandakan District, Sabah, which also reported a statistically significant relationship.[25] Additionally, a significant association was found between knowledge scores and mothers' educational levels, with approximately four-fifths of literate mothers displaying good knowledge. This finding corroborates the results of a similar study.[26] These associations highlight the importance of tailoring educational interventions to younger and less-educated mothers to close knowledge gaps and enhance childhood immunization coverage.

Limitations of the Study

This study has several limitations that should be considered when interpreting the findings. The cross-sectional design limits the ability to infer causality between mothers' knowledge and their vaccination practices. Additionally, the study was conducted in a single governorate (Ibb), which may limit the generalizability of the results to other regions of Yemen or similar contexts. Limited access to remote or conflict-affected areas may have excluded certain populations, potentially affecting the representativeness of the sample. Future research should consider using longitudinal designs and broader geographic coverage to validate and expand upon these findings.

Conclusion

The findings of this study highlight that the majority of mothers possess good knowledge regarding childhood vaccinations. Sociodemographic factors, particularly maternal age and level of education, were found to significantly influence their knowledge. Furthermore, most mothers recognized the critical role of vaccines in preventing infectious diseases and reducing infant mortality. However, approximately one-third of the mothers demonstrated insufficient knowledge, indicating the need for targeted educational interventions to enhance awareness and understanding of childhood immunization. Based on the findings of this study, several recommendations are proposed. Future research should be carried out in primary healthcare units to assess the knowledge of healthcare staff especially nurses regarding childhood vaccinations. Health facility decision-makers should prioritize the implementation of awareness programs, such as video-based educational sessions, to enhance public understanding of vaccinations. Mothers who visit primary healthcare units for routine immunizations should be provided with structured educational information about vaccinations, delivered by nursing staff. Additionally, further studies are recommended in rural areas to evaluate the vaccination-related knowledge of both mothers and healthcare providers.

Ethics Committee Approval: The study was approved by the Jiblah University for Medical and Health Sciences, Faculty of Nursing Research Ethics Committee (Approval Number: 2024.2.5,, Date: 08.09.2024).

Informed Consent: Verbal consent was obtained from all participating mothers prior to data collection.

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Exploring Nursing Students' Attitudes Toward Consanguineous Marriage and Factors Influencing These Attitudes: A Descriptive and Cross-sectional Study

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Abstract

Background: Consanguineous marriage is a risk factor for certain hereditary diseases, highlighting the importance of continuous public awareness efforts aimed at its prevention. Public health nurses play a key role in leading such initiatives. Therefore, understanding the attitudes of nursing students, who are future healthcare professionals, is essential.

Aim: This study aims to explore nursing students' attitudes toward consanguineous marriage and the factors influencing these attitudes.

Methods: This descriptive and cross-sectional study was conducted with 585 nursing students. Data were collected using a Personal Information Form and the Endogamy Marriage Attitude Scale. Independent Samples t-test and one-way analysis of variance (ANOVA) were used to compare scale scores based on individual characteristics. Among the multiple comparison tests, Duncan's test was applied. Multiple linear regression analysis was conducted to identify factors influencing attitudes toward consanguineous marriage.

Results: The study found that 28.4% of participants had parents in a consanguineous marriage, with 41.6% of those being first-degree cousin marriages. Additionally, 94.7% of students disapproved of consanguineous marriage, while 5.3% saw no issues with it. Multiple regression analysis revealed that being male (B=2.405, p=0.044), having parents in a consanguineous marriage (B=5.315, p=0.000), not objecting to consanguineous marriage (B=23.443, p=0.000), growing up in a village (B=3.523, p=0.021), and being raised in the Southeastern Anatolia region (B=3.147, p=0.040) were significant predictors of favorable attitudes toward consanguineous marriage.

Conclusion: It can be stated that only a small proportion of nursing students exhibit positive attitudes toward consanguineous marriage. Furthermore, it can be concluded that nursing students' attitudes toward consanguineous marriage are influenced by sociocultural characteristics. Including the topic of consanguineous marriage as a detailed subject in the content of certain courses in the nursing education.

Keywords: Attitude, consanguineous marriage, culture, nursing students

Introduction

Consanguineous marriage refers to the union between individuals who are closely related by first- or second-degree blood relations.[1] It is commonly practiced in societies where Islam is the predominant religion, particularly in Asian and African countries. The most frequent form involves first-degree cousin marriages, whether on the maternal or paternal side.[2] The prevalence of consanguineous marriage varies by region. It is approximately 0.5% in Western and European countries, 9.9% in India, and ranges from 40% to 60% in Arab Gulf countries and Pakistan, where the majority of the population is Muslim. In Saudi Arabia, the prevalence ranges from 42% to 67%.[3] In Türkiye, the frequency of consanguineous marriage is reported to be between 20% and 25%.[4] Moreover, an analysis of marriage trends over generations in Türkiye revealed a decline in the prevalence of consanguineous marriage from 27% to 24% over the past 50 years. The proportion of first-degree cousin marriages, which accounted for 85% of all consanguineous unions in 1968, dropped to 46% by 2018.[5]

Consanguineous marriage, defined as a union between individuals with a high degree of genetic similarity, poses significant public health risks. This type of marriage facilitates the intergenerational transmission of various genetic disorders, particularly autosomal recessive conditions. The literature indicates that consanguineous unions increase the risk of congenital anomalies, intellectual disabilities, sensory impairments, and several multifactorial diseases, such as obesity, cardiovascular disorders, and diabetes.[1,6] In countries like Türkiye, where the prevalence of consanguineous marriage is relatively high, this issue leads to serious health problems not only at the individual level but also at the societal level, placing a long-term burden on the healthcare system. For instance, studies conducted in certain rural regions have revealed high rates of intellectual disability, congenital deafness, blindness, and skeletal pathologies, clearly illustrating the impact of consanguineous marriage on public health.[7,8]

Consanguineous marriage is influenced by a variety of social, economic, and cultural factors.[9] Motivations such as strengthening family ties, preserving property and land ownership within the family, preventing outsiders from entering the family unit, avoiding the migration of family members to unfamiliar environments, easing communication, fostering trust, and, at times, promoting autonomous decision-making also contribute to the continuation of this practice.[10,11]

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Additionally, it can be argued that the absence of a prohibition against consanguineous marriage in the Islamic faith has contributed to its prevalence in communities adhering to this religion. In the Qur'an, first-degree cousin marriages are considered permissible.[12] According to Islamic law, kinship is divided into three categories, with close relatives defined as one's children and siblings, and more distant relatives including the children of uncles, aunts, nephews, and nieces.[12] It is well established that religion influences culture, thereby shaping customs and traditions. Marriage selection and decision-making involve a complex interplay of various social and cultural norms and behaviors.[10] A systematic review concluded that a woman's educational level significantly influences marriage choices, with lower levels of education being associated with a higher likelihood of consanguineous marriage. However, the same study also noted that some findings suggest consanguineous marriage can occur independently of education level. This may reflect deep-rooted social and cultural beliefs in these societies.[13] In this context, consanguineous marriage can be understood as a culturally driven practice.

Culture is learned.[14] Therefore, the cultural environment in which individuals are raised is important. If a person grows up in a society where consanguineous marriage is normalized, such marriages may appear natural to them, increasing the likelihood of adopting the same behavior. In these societies, public health nurses play a crucial role in changing this attitude by educating the community about the disadvantages of consanguineous marriage. However, the nurse's own attitude toward consanguineous marriage is also important. If the nurse holds a favorable view of such marriages, it is unlikely that effective health education can be delivered on this topic. Consequently, the attitudes of nursing students toward consanguineous marriage are important, as they will enter the nursing profession in the future. The attitude of nurses on this issue is also critical. If a nurse holds a positive view of consanguineous marriage, it may hinder the delivery of effective health education. In nursing education in Türkiye, this topic is addressed in some course content; however, students' attitudes toward consanguineous marriage is largely unknown. To date, no national or international studies have been found that examine nursing students' attitudes toward consanguineous marriage and the factors influencing these attitudes. Therefore, this study aims to investigate nursing students' attitudes toward consanguineous marriage and identify the factors that shape these views.

Study Questions

The following research questions were addressed in this study:

RQ1: What is the level of nursing students' attitudes toward consanguineous marriage?

RQ2: Do nursing students' attitudes toward consanguineous marriage differ based on their demographic characteristics (e.g., age, gender, year of study) and their familial and socio-cultural backgrounds (e.g., family history of consanguineous marriage, rural/urban origin, geographic region of upbringing)?

RQ3: What are the factors that predict nursing students' attitudes toward consanguineous marriage?

Materials and Methods

Design

This descriptive and cross-sectional study was conducted between October 16, 2023 and December 1, 2023 in the Nursing Departments of the Faculty of Health Sciences Afyonkarahisar Health Sciences University and Çankırı Karatekin University located in the Western and Central Anatolia regions of Türkiye.

Study Sample

The research population consisted of first-, second-, third-, and fourth-year students enrolled in the Nursing Departments of the Faculty of Health Sciences. A total of 860 nursing students were enrolled in these two faculties. Non-Turkish national students were excluded from the study. Since the study aimed to include all eligible students in the population, no sample size calculation was performed. A total of 605 students were administered the scale. However, due to incomplete or erroneous data, the responses of 20 students were excluded from the analysis. Thus, data from 585 students were included in the final analysis. Following the completion of the study, the effect size (f^2=0.28) was calculated using the R^2 (coefficient of determination) value obtained from the regression analysis. Based on this, a post-hoc power analysis indicated that the statistical power was 1.00.

Data Collection Instruments

Data were collected using the Personal Information Form and the Endogamy Marriage Attitude Scale.

Personal Information Form

This form, developed by the researchers, was designed to capture personal characteristics such as age, gender, year of study, parents' education level, whether the student's parents were in a consanguineous marriage. The form consisted of 12 multiple-choice questions.

Endogamy Marriage Scale

The scale was developed by Alp and Şen[15] in 2020 and is structured as a 5-point Likert scale. It consists of six subscales: *Acceptive Attitude* (items 1, 2, 3, 4, 5, 6, and 7), *Social Values* (items 8, 9, 10, 11, 12, 14, and 15), *Social Pressure* (items 13, 16, 17, and 18), *Risk Perception* (items 19, 20, and 21), *Health Perception* (items 22, 23, and 24), and *Legitimating Myths* (items 25, 26, 27, 28, 29, and 30). Items 2, 16, 19, 20, 21, 27, and 29 are reverse-coded. The Cronbach's alpha coefficient for the original scale is 0.87. The minimum possible score on the scale is 30, and the maximum is 150. A higher score indicates a more positive attitude toward consanguineous marriage. In the present study, Cronbach's alpha coefficient was found to be 0.86.

Data Collection Process

The data collection forms were administered to students by the researchers just before the start of their classes. First, students were informed about the aim of the study, and their consent was obtained. It was clearly communicated that participation was entirely voluntary and that they were free to choose whether or not to take part. It was emphasized that their decision to participate would not affect their course grades or their relationship with the instructor in any way. In this manner, it was ensured that students participated in the study on a fully voluntary basis. Then, the data collection forms were distributed to the students who agreed to participate in the study, and they were asked to complete them. The average time required to complete the forms was approximately 15 minutes.

Ethical Considerations

Ethical approval for the study was obtained from the Afyonkarahisar Health Sciences University Clinical Research Ethics Committee (Approval Number: 2023/384, Date: 01.09.2023). Informed consent was obtained from all students prior to participation. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Data Analysis

Data analysis was performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Skewness-kurtosis values and the Kolmogorov-Smirnov test were used to assess the normality of the data distribution. Frequencies and percentages were calculated to describe the distribution of students according to their individual characteristics and their responses to the scale items. Descriptive statistics for the scale included means and standard deviations. Independent samples t-tests and one-way analysis of variance (ANOVA) were used to compare consanguineous marriage attitude scores based on selected individual characteristics of the students. Duncan's test was used for multiple comparisons. Multiple regression analysis was conducted to identify the predictors of attitudes toward consanguineous marriage. A significance level of $p<0.05$ was considered for all analyses.

Results

Descriptive Characteristics

The students had a mean age of 20.40±1.66 years, and 77.3% of the participants were female. Among the students, 31.3% were in their first year of study, and 29.1% were from the Aegean region of Türkiye. It was found that 48.7% grew up in urban areas, 50.8% had mothers with a primary school education, and 34.4% had fathers who had completed high school. Additionally, 28.4% of the students reported that their parents were in a consanguineous marriage, and 41.6% of these were first-degree cousin marriages. It was also determined that 14.7% of students had a disabled child in the family due to a consanguineous marriage. While 94.7% of students perceived consanguineous marriage as problematic, 5.3% did not see any issues with it (Table 1). The mean score obtained by the students on the Endogamy Marriage Attitude Scale was 59.88±13.55 (Min: 34; Max: 110).

Table 1. Comparison of scale scores by individual characteristics of students (n=585)

Individual characteristic	n	%	Total scale score Mean±SD
Gender			
Female	452	77.3	58.95±12.48
Male	133	22.7	63.02±13.36
t/p			**-3.062/0.002**
Year of study			
1st year	183	31.3	60.56±13.42
2nd year	112	19.1	58.35±13.54
3rd year	144	24.6	60.09±12.57
4th year	146	25.0	59.98±14.65
F/p			0.643/0.588
Region where student grew up			
Aegean	170	29.1	56.24[a]±11.34
Central Anatolia	152	26	60.94[ab]±13.43
Mediterranean	109	18.6	59.91[ab]±13.82
Southeastern Anatolia	71	12.1	64.73[b]±14.13
Marmara	31	5.3	60.77[ab]±17.38
Black Sea	30	5.1	59.97[ab]±12.36
Eastern Anatolia	22	3.8	63.41[b]±16.55
F/p			**4.124/0.000**
Type of place where student grew up			
City	285	48.7	59.60[a]±13.61
District	202	34.5	58.99[a]±13.63
Village	72	12.3	65.08[b]±13.13
Town	26	4.4	55.35[a]±9.57
F/p			**4.940/0.002**
Mother's education level			
Illiterate	8	1.4	70.63[b]±16.18
Primary School	297	50.8	61.08[a]±13.18
Middle School	135	23.1	59.50[a]±15.38
High School	103	17.6	57.27[a]±12.00
University	42	7.2	56.90[a]±11.19
F/p			**3.383/0.009**
Father's education level			
Primary School	158	27.0	61.10±13.87
Middle School	120	20.5	61.74±14.26
High School	201	34.4	58.32±12.92
University	106	18.1	58.91±13.18
F/p			2.258/0.081
Are your parents related by kinship?			
Yes	166	28.4	64.20±13.62
No	419	71.6	58.16±13.15
t/p			**4.955/0.000**
Is there anyone in your family who has practiced consanguineous marriage and has a child with a disability?			
Yes	86	14.7	60.21±12.71
No	499	85.3	59.82±13.70
t/p			0.247/0.805
Do you think consanguineous marriage is harmful?			
Yes	554	94.7	58.55±12.32
No	31	5.3	83.55±12.80
t/p			**-10.971/0.000**

[a,b]: Means with different superscript letters differ significantly. SD: Standard deviation, t: Independent samples t-test, F: One-way analysis of variance (ANOVA).

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J Educ Res Nurs. 2025;22(3):185-191

Comparison of Scale Scores by Individual Characteristics

When the scale scores were compared by gender, male students had higher consanguineous marriage attitude scores than female students (t=-3.062; p=0.002). Students who grew up in the Southeastern Anatolia and Eastern Anatolia regions had higher attitude scores compared to those from the Aegean region (F= 4.124; p=0.000). It was also found that students who grew up in villages had higher scores than those who grew up in towns, districts, or provincial centers. While the attitude scores did not differ according to the father's education level (F=2.258; p=0.081), they did vary according to the mother's education level (F=3.383; p=0.009). Students whose mothers were illiterate had higher scores than those whose mothers had higher levels of education. Additionally, students whose parents had a consanguineous marriage (t=4955; p=0.000) had higher attitude scores than those whose parents did not, as well as higher scores than students who did not perceive any problems with consanguineous marriage (t=-10.971; p=0.000). Furthermore, it was found that Endogamy Marriage Attitude Scale scores did not differ based on students' grade level (F=0.643; p=0.588) or the presence of a disabled child in the family due to consanguineous marriage (t=0.247; p=0.805) (Table 1).

Students' Responses to Scale Items

When students' responses to the scale items were examined, it was found that 3.8% approved of consanguineous marriage, and 5.2% found first-degree cousin marriages acceptable. Additionally, 8.2% of students disagreed with the idea that the risk of having a disabled child increases in consanguineous marriages, and 6.3% disagreed with the notion that hereditary diseases are more common in such marriages. Moreover, 4.3% of students believed that consanguineous marriage does not affect women's health, 2.7% believed it does not affect child health, and 3.5% believed it does not impact family health. Furthermore, 11.3% of students agreed with the statement "Divorce is less common in couples who practice consanguineous marriage," and 35.8% agreed with the statement "I approve of consanguineous marriage in couples who choose it themselves" (Table 2).

Predictors of Attitudes Toward Consanguineous Marriage

A model was constructed with gender, parents' consanguineous marriage status, perception of consanguineous marriage, place of upbringing, and region of upbringing as independent variables, and the attitude score toward consanguineous marriage as the dependent variable. Dummy variables were created for the categorical independent variables included in the model. Female gender, a "no" response for parents' consanguineous marriage status, a "yes" response indicating a negative perception of consanguineous marriage, "provincial center" as the place of upbringing, and the "Aegean region" as the region of upbringing were used as reference variables. These independent variables were entered into the model, and a multiple regression analysis was conducted. The generated regression model was found to be statistically significant (F=34.180; p=0.000) (Table 3). These independent variables collectively explained 22.1% of the variance in attitudes toward consanguineous marriage.

According to the results of the multiple regression analysis, male gender (B=2.405, p=0.044) (Table 3), having parents who practiced consanguineous marriage (B=5.315; p=0.000) (Table 3), and not perceiving any risk associated with consanguineous marriage (B=23.443; p=0.000) were found to be positive predictors of a favorable attitude toward consanguineous marriage. Additionally, growing up in a village (B=3.523; p=0.021) (Table 3) and in the Southeastern Anatolia region (B=3.147; p=0.040) (Table 3) were also identified as positive predictors of a favorable attitude toward consanguineous marriage. Specifically, male gender was associated with a 2.405-point increase in consanguineous marriage attitude score compared to female gender; having consanguineous parents was associated with a 5.315-point increase compared to those with non-consanguineous parents; and not perceiving any problems with consanguineous marriage was associated with a 23.443-point increase compared to those who viewed it negatively. Furthermore, growing up in a village was associated with an increase of 3.523 points in consanguineous marriage attitude scores compared to growing up in a provincial center, and growing up in the Southeastern Anatolia region was associated with an increase of 3.147 points compared to growing up in the Aegean region.

Discussion

Although the frequency of consanguineous marriage in Türkiye has decreased compared to previous years, such marriages still persist in certain regions.[5] In this context, it is important to sustain awareness-raising campaigns about the risks associated with consanguineous marriage. Nurses play a key role in these efforts. The attitudes of nursing students, who are future nurses, crucial to the effectiveness of such campaigns. This study aimed to examine nursing students' attitudes toward consanguineous marriage and the factors influencing these attitudes. However, no national or international studies were found on this specific topic that would allow researchers to compare and interpret the findings. Therefore, the results were evaluated in light of related studies with comparable findings.

The study revealed that about one-third of the students had consanguineous parents. When the degree of consanguineous marriage was examined, it was found that nearly half of these were first-degree cousin marriages. These two rates are consistent with the general population data for Türkiye,[5] indicating that the sample reflects national trends.

When the overall mean scores of nursing students on the Consanguineous Marriage Attitude Scale were analyzed, it was evident that their attitudes toward such marriages were generally negative. The mean scores were below the median value of 75.5. However, when students' responses to individual questionnaire items were examined, some findings reflected positive attitudes toward consanguineous marriage. A small portion of students considered first-degree cousin marriages acceptable and disagreed with the idea that consanguineous marriage increases the risk of having a child with disabilities or that hereditary diseases are more common in such marriages. Approximately one-third of the students agreed with the statement, "I approve of consanguineous marriage if it is the couple's own choice." Additionally, the students were asked, "Do you think consanguineous marriage is harmful?" on the personal identification form. Although few in number, some students responded "no" to this question. While these percentages are relatively low, they may still reflect the presence of positive attitudes among certain students. Despite the inclusion of information on the negative effects of consanguineous marriage in some nursing course content, these responses may be influenced by students' family backgrounds and the cultural norms of the regions where they were raised. These findings highlight the need for more comprehensive coverage of consanguineous marriage in nursing education curricula in Türkiye.

This study revealed that male students have more positive attitudes toward consanguineous marriage compared to female students. A study conducted by Bakry et al.[16] in 2023 also found that men tend to hold more favorable views of consanguineous marriage. Although their findings were not specific to nursing students, they are similar to the current study in terms of gender-based differences in attitudes. This difference between genders may be attributed to characteristics commonly associated with women. Given that consanguineous marriage is linked to certain health risks, women may be more sensitive and detailed-oriented in their approach to health-related issues, which could explain this result.[17–19]

Türkiye is divided into seven geographical regions, each differing in terms of development levels. The Southeastern Anatolia and Eastern Anatolia regions have the lowest levels of development, while the Aegean, Marmara, and Mediterranean regions have the highest.[20] Additionally, the Southeastern Anatolia region is geographically very close to the Middle East. In this study, it was found that students who grew up in the Southeastern Anatolia region had more positive attitudes toward consanguineous marriage compared to those raised in the western region of Türkiye, specifically the Aegean region, which is more highly developed. Furthermore, growing up in the Southeastern Anatolia region was identified as a positive predictor of favorable attitudes toward consanguineous marriage. The Southeastern Anatolia region is predominantly characterized by clan culture. Although this lifestyle has lost some of its significance with modernization, its influence still persists. A clan is a community of families sharing the same bloodline, functioning as a form of social organization. In other words, a clan is a political union formed by the merging of families, often through marriage-based kinship ties.[21] Clans share a common culture, and marriage practices within these communities are largely shaped by clan and kinship systems. As a result, cousin marriages, particularly those on the paternal side, are prevalent in these communities.[22–24] Therefore, it can be expected that students raised in such cultural settings would have more

Table 2. Distribution of students' responses to scale items

	Strongly disagree		Disagree		Undecided		Agree		Strongly agree	
	n	%	n	%	n	%	n	%	n	%
1. I approve of consanguineous marriage.	367	62.7	116	19.8	80	13.7	**18**	**3.1**	**4**	**0.7**
2. I do not approve of consanguineous marriage.	**13**	**2.2**	**19**	**3.2**	70	12	125	21.4	358	61.2
3. There is no harm in practicing consanguineous marriage.	383	65.5	135	23.1	39	6.7	20	3.4	8	1.4
4. There is no harm in my son/daughter practicing consanguineous marriage.	385	65.8	123	21	37	6.3	25	4.3	15	2.6
5. There is no harm in my sibling practicing consanguineous marriage.	388	66.3	117	20	45	7.7	22	3.8	13	2.2
6. I find first-degree consanguineous marriage appropriate (cousins).	421	72	102	17.4	32	5.5	**15**	**2.6**	**15**	**2.6**
7. I find second-degree consanguineous marriage appropriate (nephews/nieces).	303	51.8	126	21.5	101	17.3	42	7.2	13	2.2
8. Consanguineous marriage contributes to improving economic status.	383	65.5	130	22.2	54	9.2	10	1.7	8	1.4
9. Family ties are stronger in consanguineous marriage.	352	60.2	116	19.8	75	12.8	35	6	7	1.2
10. Consanguineous marriage preserves a woman's honor.	496	84.8	70	12	6	1	7	1.2	6	1
11. Consanguineous marriage is practiced to preserve societal morality.	400	68.4	109	18.6	52	8.9	20	3.4	4	0.7
12. Consanguineous marriage is practiced to preserve cultural customs and traditions.	398	68	101	17.3	59	10.1	23	3.9	4	0.7
13. Consanguineous marriage is common due to societal pressure.	81	13.8	70	12	164	28	191	32.6	79	13.5
14. Consanguineous marriage is in accordance with traditions, customs, and norms.	324	55.4	128	21.9	96	16.4	28	4.8	9	1.5
15. Consanguineous marriage is practiced to secure a better future.	407	69.6	116	19.8	51	8.7	8	1.4	3	0.5
16. Women/men are pressured into consanguineous marriage.	101	17.3	88	15	178	30.4	146	25	72	12.3
17. Consanguineous marriage is practiced to prevent outsiders from entering the family.	150	25.6	89	15.2	157	26.8	148	25.3	41	7
18. Consanguineous marriage is practiced to prevent family members from marrying outsiders.	144	24.6	82	14	148	25.3	167	28.5	44	7.5
19. Risk of having a child with disability increases with consanguineous marriage.	**32**	**5.5**	**16**	**2.7**	13	2.2	121	20.7	403	68.9
20. Hereditary (familial) diseases are more common in consanguineous marriages.	**24**	**4.1**	**13**	**2.2**	16	2.7	158	27	374	63.9
21. Couples in kinship marriages have more disagreements.	49	8.4	54	9.2	267	45.6	106	18.1	109	18.6
22. Consanguineous marriage does not affect women's health.	307	52.5	156	26.7	97	16.6	**15**	**2.6**	**10**	**1.7**
23. Consanguineous marriage does not affect children's health.	397	67.9	139	23.8	33	5.6	**10**	**1.7**	**6**	**1**
24. Consanguineous marriage does not affect family health.	347	59.3	152	26	66	11.3	**12**	**2.1**	**8**	**1.4**
25. Couples in consanguineous marriages are happier.	285	48.7	120	20.5	166	28.4	8	1.4	6	1
26. Divorces are less common in consanguineous marriages.	236	40.3	121	20.7	162	27.7	49	8.4	17	2.9
27. Consanguineous marriage is often preferred because families encourage it.	54	9.2	54	9.2	176	30.1	209	35.7	92	15.7
28. I approve of couples choosing consanguineous marriage based on their own preference.	145	24.8	70	12	161	27.5	**156**	**26.7**	**53**	**9.1**
29. Consanguineous marriage is more common among individuals with lower educational levels.	73	12.5	62	10.6	127	21.7	190	32.5	133	22.7
30. Individuals' decisions to enter consanguineous marriage vary based on their cultural background.	37	6.3	30	5.1	121	20.7	263	45	134	22.9

Table 3. Regression analysis of predictors of students' attitudes toward consanguineous marriage

Stepwise method	B (95% CI)	Beta	t	p	Zero-order	Partial	Part	VIF
Constant	55.762 (54.438–57.087)		82.701	**0.000**				
Gender (male)	2.405 (0.070–4.741)	0.074	2.023	**0.044**	0.126	0.084	0.074	1.016
Parental consanguineous marriage (yes)	5.315 (3.143–7.488)	0.177	4.805	**0.000**	0.201	0.196	0.175	1.018
Perception: "Nothing wrong with consanguineous marriage"	23.443 (19.054–27.832)	0.388	10.491	**0.000**	0.414	0.400	0.383	1.025
Place the person grew up in								
Village	3.523 (0.541–6.506)	0.086	2.32	**0.021**	0.144	0.096	0.085	1.018
Region the person grew up in								
Southeastern Anatolia	3.147 (0.142–6.153)	0.076	2.057	**0.040**	0.133	0.085	0.075	1.022

F=34.180; p<0.001. Adjusted R^2= 0.221, SEE=11.956, Durbin-Watson=2.016, B: Non-standardized coefficient, CI: Confidence interval, Beta: Standardized coefficient, t: Student t test, VIF: Variance inflation factor.

positive attitudes toward consanguineous marriage. Changing the attitudes of these students during their nursing education is an important issue.

The findings of this study also indicate that students who grew up in villages have more positive attitudes towards consanguineous marriage compared to those raised in urban areas. Additionally, growing up in a village was identified as a positive predictor of favorable attitudes toward consanguineous marriage. It is well known that the frequency of consanguineous marriage is higher in rural areas.[6,25,26] Therefore, it can be concluded that students raised in villages exhibit more positive attitudes toward consanguineous marriage due to its prevalence in their communities.

Nursing students' attitude scores also varied based on their mothers' educational levels. Students whose mothers were illiterate had higher attitude scores compared to those whose mothers had higher levels of education. Thus, it can be said that students with illiterate mothers tend to have more positive attitudes toward consanguineous marriage. However, students' attitude scores did not differ based on their fathers' educational level. Many studies examining the relationship between consanguineous marriage and women's education show that these marriages are more common among women with lower educational attainment.[1,27,28] As the frequency of consanguineous marriage tends to increase with lower education levels, children raised in communities where such marriages are common may also develop more favorable attitudes toward them. Therefore, the findings of this study suggest that this may be due to the normalization of consanguineous marriage resulting from its high frequency. İnandı et al.[11] in 2016 found that parental education level was negatively associated with the frequency of consanguineous marriage. Although this finding may not directly relate to attitudes, it supports the present study in demonstrating the influence of maternal education on the acceptance of consanguineous marriage. However, in this study, students' attitude did not vary according to their fathers' educational levels. Further scientific studies in different cultural contexts are needed to better understand the reasons for this discrepancy.

The results of the current study indicated that students whose parents were relatives had more positive attitudes toward consanguineous marriage. Moreover, parental kinship status was found to be a positive predictor of students' attitudes. Since culture is a learned concept, it is rarely questioned by members of a society.[14,29] Consanguineous marriage is also a culturally learned form of marriage, and when it is widely practiced within a culture, it can become normalized for individuals. In this context, it is not surprising that students raised in such environments would hold more favorable attitudes toward consanguineous marriage.

In this study, students who did not perceive any problems with consanguineous marriage exhibited more positive attitudes than those who did. Additionally, the absence of perceived problems in consanguineous marriage was identified as a positive predictor of attitudes toward consanguineous marriage. Individuals are continuously shaped by interactions within their social environments. According to symbolic interactionist theory, individuals interpret situations they encounter during social interactions and behave based on the conclusions they draw.[30,31] In line with this theoretical approach, it can be inferred that students' belief that there is nothing wrong with consanguineous marriage contributes to their more positive attitudes toward it. Moreover, it is noteworthy that despite receiving nursing education, some students still do not perceive any problems with consanguineous marriage, which can only be explained by the strong influence of culture.

Limitations

This study employed a non-probabilistic sampling method, which represents a limitation. Since the research was conducted with students from only two faculties, the findings cannot be generalized. Additionally, the researcher being a faculty member in the participating departments may have introduced social desirability bias in student responses. However, this potential bias was minimized by ensuring voluntary participation and maintaining strict confidentiality. Moreover, the limited number of studies examining nursing students' attitudes toward consanguineous marriage restricted the scope of the discussion.

Conclusion

It can be inferred that a small portion of nursing students hold slightly positive attitudes toward consanguineous marriage. Factors such as gender, parental kinship, rural upbringing, the belief that there are no problems with consanguineous marriage, and growing up in a less developed region where consanguineous marriages are common may influence these attitudes. Consanguineous marriage continues to persist in many Muslim countries. However, these marriages lead to the birth of disadvantaged generations due to increased health risks. Therefore, public education about the risks of consanguineous marriage is of paramount importance. Nurses play an important role in delivering such education. For these efforts to be effective, it is essential that nurses themselves do not hold positive attitudes toward consanguineous marriage. In this context, understanding the attitudes of nursing students, who represent the future nursing workforce, is crucial. This study offers insights into nursing students' attitudes toward consanguineous marriage and the factors influencing them. In societies where consanguineous marriage is common, integrating detailed content on this topic into nursing curricula is important. Such education could potentially shift the attitudes of students from families practicing consanguineous marriage and empower them to contribute positively to society through their future nursing roles. Additionally, targeted intervention programs could be developed for students who hold positive attitudes toward consanguineous marriage.

Ethics Committee Approval: The study was approved by the Afyonkarahisar Health Sciences University Clinical Research Ethics Committee (Approval Number: 2023/384, Date: 01.09.2023).

Informed Consent: Informed consent was obtained from all students prior to participation.

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The Journey of Cultivating Critical Thinking: Exploring the Development of Critical Thinking Skills in Nursing Students

Abstract

Background: Critical thinking is essential in nursing education as it equips students with the skills needed to make informed and effective clinical decisions. Understanding how these skills develop in real educational and clinical contexts is crucial for designing effective teaching strategies.

Aim: This study aims to explore the development of critical thinking skills in nursing students.

Methods: A grounded theory approach was employed in 2024. A total of 22 nursing students and faculty members were involved. Data were collected through in-depth semi-structured interviews and field notes until data saturation was achieved. Data analysis was conducted using the Corbin and Strauss method in 1998.

Results: The data analysis revealed one core theme (the journey of cultivating critical thinking) and four subthemes: self-preparedness, exposure to situations, action/reaction, and encountering the unexpected. In the process of developing critical thinking skills, both instructors and students engage in self-preparation. Instructors review relevant materials, while students familiarize themselves with the ward's objectives. This is followed by exposure to clinical situations, where both groups gain insights into the learning environment and reflect on expectations and goals. In the action/reaction phase, instructors model professional thinking, provide feedback, and employ various teaching strategies to assess and guide students. Unexpected situations then challenge both instructors and students to adapt and respond effectively, reinforcing the importance of critical thinking in nursing education.

Conclusion: This study highlights the essential role of developing critical thinking skills in nursing students. The findings emphasize the importance of creating an adaptive learning environment that fosters the cultivation of these skills within nursing education.

Keywords: Critical thinking, education, grounded theory, nursing students

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Introduction

The rapid advancement of technology, the continuous evolution of healthcare knowledge, and the increasing complexity of clinical environments have significantly heightened the demand for nurses to provide care that is not only safe and effective but also grounded in the most current and reliable scientific evidence.[1–4] In response to these challenges, nursing education has assumed a critical role in preparing highly qualified graduates capable of accurately assessing and addressing the diverse and often complex needs of patients. This ensures that they are well-equipped to deliver optimal care in an ever-evolving healthcare landscape.[5,6]

This growing demand underscores the vital importance of critical thinking (CT) as a core competency for nurses. CT enables nurses to engage in logical and creative problem-solving, which are essential for making well-informed, sound decisions in unpredictable and high-pressure clinical situations. As a result, fostering and developing CT skills has become a central objective in nursing education worldwide, directly impacting nurses' ability to navigate complex clinical challenges and provide the highest standard of patient care.[7,8]

Critical thinking is deeply rooted in the fundamental principles of the nursing process, scientific reasoning, and problem-solving. It involves a combination of logical analysis, innovative strategies, and creative thinking, all of which are cultivated through a blend of theoretical knowledge and practical experience.[9] CT requires ongoing assessment, self-reflection, and a continuous commitment to both personal and professional development. This process enhances nurses' decision-making capabilities and enables them to adapt to the dynamic nature of healthcare. As a result, CT has become a hallmark of advanced professional education and is recognized as a primary goal in nursing curricula worldwide. The American Nursing Association (ANA) has emphasized the importance of CT, identifying it as a critical criterion for nursing school graduation. Similarly, the International Council of Nurses (ICN) recognizes CT as a core professional competency essential for delivering safe, effective, and ethical nursing care in complex healthcare environments.[10] In line with global trends, promoting and developing CT is also a central objective in nursing education programs in Iran. This underscores its significance in preparing nursing graduates to manage complex clinical situations and provide high-quality patient care.[11,12]

Despite these efforts, the development of CT skills among nursing students remains a challenge. Research indicates inconsistencies in the progression of CT skills throughout academic training. For instance, some studies have reported no significant difference in CT abilities between first-year and final-year students in

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nursing and related disciplines. This stagnation has been attributed to traditional teaching methods and an insufficient emphasis on CT within the curriculum.[13] Conversely, other studies have found higher CT scores among upper-year students, particularly in areas such as deductive and inductive reasoning. These mixed findings underscore the need for innovative teaching strategies to effectively foster CT skill development.[14]

Critical thinking is actively integrated into nursing education through a variety of teaching and learning approaches. Effective CT education requires nursing instructors to adopt novel strategies, deliver engaging content, and create interactive learning environments. Methods such as problem-based learning, self-directed learning, and evidence-based practice have demonstrated potential in enhancing CT skills. Nursing programs frequently utilize Problem-Based Learning (PBL), simulation exercises, case studies, clinical practicums, and reflective journaling to immerse students in real-life scenarios that demand critical analysis and decision-making.[15–18] However, several barriers hinder the effective implementation of these strategies. These include a shortage of adequately trained instructors, insufficient time for strategy development, and students' preference for traditional lecture-based learning formats.[1,19,20]

Despite its recognized importance, the development of CT skills remains inadequately understood, particularly within the context of Iranian nursing education. Previous research suggests that CT skills are often underdeveloped among medical science students across all levels of education.[7,21] While alternative teaching methods such as problem-solving, workshops, and evidence-based learning have shown promising outcomes, there is still debate about the most effective approach to teaching CT.[1]

Given the complexity of CT education and the challenges associated with it, gaining a deeper understanding of how these skills develop is essential. Understanding the development of CT in real educational and clinical contexts is crucial for designing effective teaching strategies. Qualitative methodologies, such as grounded theory, provide valuable insights into the underlying dynamics and barriers. According to Corbin and Strauss,[22] grounded theory facilitates the exploration of phenomena, enabling researchers to uncover processes and generate actionable knowledge to address challenges. Therefore, this study aims to explore the development of critical thinking skills in nursing students within the Iranian context.

Study Question

What are the experiences of nursing students in developing critical thinking skills throughout their nursing education?

Materials and Methods

Design

This study adopted a qualitative research design based on grounded theory methodology, as developed by Strauss and Corbin in 1998.[22–24] Grounded theory, originally rooted in sociology, particularly within the framework of Symbolic Interactionism, draws on the social tradition of American Pragmatism. The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist was used to document the data collection and reporting process.

Study Sample

The study was conducted in 2024 at the Faculty of Nursing, Shiraz University of Medical Sciences. A purposive sampling method was employed. After obtaining national ethical approval, participants were selected based on their relevance to the research topic. Eligibility criteria included: nursing instructors with a minimum of one year of teaching experience, and senior nursing students in their final academic year who possessed relevant knowledge in the subject. All participants were required to have an interest in the subject and the ability to discuss it meaningfully. A total of 22 participants were included in the study: five clinical instructors (PhD-qualified nurses supervising students in clinical settings), 12 full-time faculty members (PhD-level academics employed permanently by the nursing school), and five senior nursing students in their 7th and 8th semesters (Table 1).

Data Collection Tool

The semi-structured questionnaire included the following questions:

> *"How do you incorporate the development of critical thinking skills into your teaching practices, both in the classroom and clinical settings?"*

> *"What challenges do you face when trying to help students develop critical thinking skills?"*

Questions for students included:

> *"Can you describe a situation during your education where you felt you used or improved your critical thinking skills?"*

> *"What teaching methods or experiences helped you the most in learning to think critically?"*

> *"What factors influence your learning of critical thinking?"*

To elicit more detailed responses and clarify participants' answers, probing questions such as "*Please describe more*," "*Can you give an example?*" and "*What is your feeling about it?*" were also used. At the end of each interview, participants were invited to share any additional comments or ask questions. Additional follow-up questions were asked during interviews based on participants' initial responses and emerging themes relevant to the research objectives.

Data Collection

Verbal and written informed consent were obtained from all participants prior to the interviews. Semi-structured interviews were conducted in a quiet setting within the Nursing School. With participants' permission, all interviews were audio-recorded. The only exclusion criterion was unwillingness to participate; however, all selected individuals agreed to take part. Sampling was conducted using purposive and theoretical methods. New participants were selected based on the analysis of earlier interviews. The data collection process continued until all key concepts were defined, categories were developed, and a grounded theory emerged, at which point no new information was being added.[23,25] Each interview lasted approximately 30 to 60 minutes, depending on the depth of the participant's responses. All interviews were conducted in a quiet room within the School of Nursing to ensure privacy and minimize distractions, providing a comfortable and confidential environment for participants. The interviews were conducted by the primary researcher, who is experienced in qualitative interviewing and well-acquainted with the context of nursing education.

Rigor

Trustworthiness in qualitative research was ensured using Lincoln and Guba's criteria, which include credibility, dependability, confirmability, and transferability.[26] Internal validity is achieved when the accuracy of both the data and the researchers' interpretation can be trusted. In other words, the data must be meaningful and valid not only for the participants but also for the readers.[26] In this study, validity was enhanced by using data from multiple sources (i.e., different participants), conducting member checks by sharing data with participants, and incorporating their feedback through. Auditability and quality control refer to the consistency of data over time and across various conditions. These are established when the data's validity is confirmed, raising the broader question of how reliable the study's findings are.[22] To ensure dependability, the researcher submitted the

Table 1. Summary of participant demographics (n=22)

Group	n	%	Sex (% female)	Age (years) mean±SD (min–max)	Certification (% within group)	Working history (years) Mean±SD (min–max)
Faculty members	12	54.5	100.0	43.2±3.3 (38–48)	PhD: 100.0	19.1±3.0 (14.0–24.0)
Instructors	5	22.7	100.0	38.0±5.7 (32–44)	MSc.: 80.0 PhD student: 20.0	15.0±5.6 (8.0–20.0)
Students	5	22.7	60.0	20.2±0.8 (19–21)	BSc. student: 100.0	–

SD: Standard deviation

data to an external observer for auditing. Confirmability was achieved through this auditing process. Transferability, also known as external validity or fittingness, addresses whether the study's findings can be applied to other contexts. This was supported by ensuring a sufficient number of participants, promoting diversity within the sample, and using a purposive sampling method. Participant qualifications were established through the attainment of data saturation, with consideration given to ensuring diversity within the sample. Purposive sampling further reinforced the transferability of the results. However, the researchers acknowledge that while they can offer a detailed description of the study's context and processes, the responsibility for determining the transferability of the findings to other settings ultimately rests with the reader, not the researchers.[22,25] Therefore, the researcher aimed to provide a detailed description to facilitate transferability for the reader. To ensure transparency in the data analysis process, an example is provided to illustrate how primary codes were developed and organized into broader categories and themes. For instance, the codes "*Engaging with current literature*," "*Updating teaching content with evidence*," and "*Ongoing academic preparation*" were grouped under the category Self-preparedness of Instructor. Similarly, the codes "*Ongoing self-improvement*," "*Balancing learning and self-assurance*," "*Strengthening existing competencies*," and "*Confidence in current abilities*" were categorized under Self-preparedness of Student. These two categories shared a common focus on individual readiness and professional growth and were thus combined under the subtheme *Self-preparedness*. This subtheme contributed to the development of the corresponding main theme within the framework of critical thinking education. The stepwise analytical process—from raw data to codes, then to categories, subthemes, and overarching themes—reflects the inductive nature of the qualitative analysis employed in this study.

Data Analysis

In qualitative research involving contextual theory, data analysis is conducted concurrently with data collection.25,26 This study employed the method developed by Strauss and Corbin, which consists of three main phases: open coding, axial coding, and selective coding. During the open coding phase, the data were broken down into smaller components and examined for similarities and differences. Similar actions, events, and experiences were grouped into abstract concepts. The primary categorization of the data was established during the axial coding phase. In this stage, the researcher worked to connect the codes using both analogical and inductive reasoning. A process of constant comparison was employed, in which the codes and categories generated during open coding were compared with one another. Related categories were grouped together, and similar codes were integrated into broader conceptual themes. The categories developed during axial coding were further refined during the selective coding phase to construct the emerging theory. The purpose of selective coding was to identify the central category and establish connections among all categories, thereby revealing the foundational framework of the theory. In this phase, the main variable or key process identified in the data, along with its stages and consequences, were clearly defined.[22,26] It is important to note that the researcher employed memoing throughout the data analysis process. Memoing played a crucial role in the analysis, enabling the researcher to document emerging ideas and potential relationships during both data collection and analysis. These memos were recorded promptly to capture thoughts and insights as they arose. MaxQDA 10 software was used to analyze the data.

Ethical Consideration

Ethical considerations in this study included ensuring informed consent, confidentiality, and the voluntary participation of all participants. Prior to data collection, all nursing instructors and students received detailed information about the study's purpose, procedures, and potential risks. Participants were informed of their right to withdraw from the study at any time without penalty. Confidentiality was maintained by anonymizing all collected data and ensuring that no personal identifiers were linked to participants' responses. The study adhered to established ethical guidelines for research involving human subjects, prioritizing participants' rights, dignity, and well-being throughout the research process. Prior to the commencement of the study, ethical approval was obtained from Ethics Committee of Shiraz University of Medical Sciences (Approval Number: IR.SUMS.REC.1398.920, Date: 09.10.2019). The research was conducted in accordance with the principles outlined in the Declaration of Helsinki.

Results

Data analysis revealed one central theme (*the journey of cultivating critical thinking*) along with four major themes: *self-preparedness, exposure to situations, action/reaction*, and *encountering the unexpected*. These themes are described in detail in the following sections (Table 2).

Main Theme 1: The Journey of Cultivating Critical Thinking

Subtheme 1: Self-preparedness

The subtheme of self-preparedness includes two key categories: the *self-preparedness of instructors*, which involves background review and engagement with literature; and the *self-preparedness of students*, which encompasses their motivation for improvement and confidence in their existing knowledge. At the beginning of the CT skill development process, both instructors and students engage in self-preparation. Instructors take an active role by reviewing relevant background information and scientific literature. They assess the learning objectives and the conditions necessary to achieve them, evaluate their own ability to guide students toward these goals, reflect on their conclusions, and take actions based on these insights, such as referring students to credible scientific sources and designing optimal learning scenarios. One instructor described their self-preparation process:

> *"I prepare myself whenever I teach by getting involved with the environment, connecting with the head nurse and ward staff, visiting patients, and selecting learning topics based on the goals. Then, I reflect on how students can achieve those targets."*

Similarly, self-directed students prepare for new situations by reviewing theoretical lessons and reliable sources. They familiarize themselves with the ward's learning objectives, their instructors, and the expectations placed upon them. However, some students engage in the learning process without prior preparation, relying solely on their previous knowledge. As one student shared:

> *"Instructors told us about CT... In general, I learned that I shouldn't do anything without thinking first. Their focus is on thoughtful action based on the nursing process. When I enter a new ward, I review the theoretical lessons so that I can think critically and perform the nursing process effectively."*

Subtheme 2: Exposure to Situation

The subtheme *exposure to situations* consists of two main categories: orientation and adaptation. Orientation involves recognizing and aligning with the student's existing knowledge, clearly communicating expectations and goals, and activating the learner. Adaptation focuses on tailoring the educational environment to the learner's needs and placing them in appropriate contexts for learning. In this stage of CT skill development, both orientation and adaptation take place as instructors and students are exposed to the clinical or educational environment. Through this exposure, they gain a comprehensive understanding of the context. This process enables the instructors to recognize the student's abilities and track their learning progress. At the same time, cognitive engagement is stimulated through initial assessments. The student is introduced to expectations and goals and begins participating in learning activities with an emphasis on thoughtful reflection. As one instructor explained:

> *"I conduct an orientation session, administer a pretest, and outline the goals and learning objectives. In the first few days, I focus on understanding the types of students I'm working with... not all of them are the same. For some, I have to think about how to create a situation that helps them meet their goals and ensures they don't fall behind the others."*

After the instructor gains insight into the student's abilities, the learning situation is adapted, and an educational scenario is designed to align with the student's capabilities. The student then begins to engage actively, using constructive reflection to enhance the experience and develop greater awareness of their own learning progress. As one student noted:

> *"The orientation programs planned by the instructor are really helpful in understanding the expectations in the ward. With this knowledge, we are able to study and enter the ward with better preparation."*

Table 2. Hierarchical structure of themes: from primary codes to main themes in critical thinking development

Main theme	Subthemes	Categories	Primary codes
The journey of cultivating critical thinking	Self-preparedness	Self-preparedness of instructor	Engaging with current literature
			Updating teaching content with evidence
			Ongoing academic preparation
		Self-preparedness of student	Ongoing self-improvement
			Balancing learning and self-assurance
			Strengthening existing competencies
			Confidence in current abilities
	Exposure to situations	Orientation	Recognizing student potential
			Setting personalized goals
			Facilitating active student participation
			Goal-oriented student engagement
			Empowering learners through expectations
		Adaptation	Individualized learning adaptation
			Contextualizing education based on learner ability
			Matching teaching strategies to student readiness
			Creating appropriate learning conditions
	Action/reaction	Modeling	Instructor as primary role model
			Skilled staff as professional examples
			Peer learning from experienced classmates
			Modeling professional behavior through diverse role models
		Situation performance	Ongoing assessment of cognitive and practical skills
			Providing formative feedback to guide learning
			Monitoring student thinking and behavior
			Using feedback to improve learning outcomes
		Changing demonstration	Explicitly demonstrating reasoning processes
			Encouraging thinking through verbal expression
			Requesting feedback to refine thought processes
			Promoting reflective practice and continuous improvement
	Encountering unexpected situations	Management of different student	Personalizing instruction based on student diversity
			Providing responsive teaching to meet individual needs
			Using differentiated instruction techniques
			Addressing diverse learning styles and capabilities
		Management of unexpected background events	Managing unpredictable classroom dynamics
			Responding to situational disruptions
			Using adaptive problem-solving strategies during teaching
			Maintaining learning continuity during unexpected events
		Management of communication issues	Managing communication challenges across professional boundaries
			Promoting collaboration across healthcare teams
			Ensuring clear communication with patients and families
			Strengthening intra- and interprofessional communication skills

Subtheme 3: Action/Reaction

The subtheme action/reaction comprises three categories:

1. *Modeling*, which involves the instructor serving as a role model, supported by skilled staff as comprehensive examples, and experienced classmates as additional role models;
2. *Situation performance*, which entails assessing the student's actions and providing continuous feedback; and
3. *Changing demonstration*, which focuses on illustrating thought processes with evidence, developing demonstrations of critical thinking, and encouraging students to seek and respond to feedback.

The *action/reaction* phase represents a critical stage in the process of teaching professional thinking to nursing students.

Professional thinking in nursing education encompasses more than isolated clinical reasoning. While clinical reasoning centers on decision-making in patient care, and reflective judgment focuses on learning from experience, professional thinking integrates these elements with ethical practice, the formation of professional identity, and long-term responsibility in care delivery. It requires the ability to think critically, anticipate consequences, make context-sensitive decisions, and uphold professional standards. Thus, professional thinking can be conceptualized as the integration of cognitive, ethical, and experiential knowledge that guides nursing students toward becoming competent, autonomous professionals. In this phase, the instructor demonstrates their own thinking strategies as a model for students and also highlights other suitable role models, such as ward nurses or self-directed peers. The instructor evaluates each student's progress, poses thought-provoking questions, guides their responses, and provides constructive feedback. To support this process, instructors use a variety of teaching techniques tailored to the student's learning needs, such as simulation, ev-

idence-based practice, and problem-solving approaches. Active students show engagement by asking more questions and taking initiative in completing tasks. However, when a student is less active, the instructor continues to monitor and support them until the desired level of performance is achieved. One faculty member explained their approach to modeling:

> *"I show the student what to do to help them think professionally. For example, when I take care of a patient, I think through each step of the nursing process–diagnosis, planning, and intervention. This approach helps the student understand how to think and act systematically."*

Another faculty member shared:

> *"I pose questions that the student can't easily answer. They must use their prior knowledge and search the texts. This search process helps them think, act, and learn continuously. We teach them to be independent, rather than just providing them with the answers."*

Subtheme 4: Encountering Unexpected Situations

The subtheme *encountering unexpected* situations includes three key categories:

1. *Management of different students*, which involves recognizing individual differences and tailoring the learning environment to meet each student's needs;
2. *Management of unexpected background situations*; and
3. *Management of communication problems*, which encompasses interdisciplinary and intra-disciplinary communication, as well as managing relationships with patients and their families.

In the process of teaching CT to nursing students, *encountering unexpected situations* holds particular significance. Unanticipated events in clinical settings can disrupt the systematic thinking and actions of both instructors and students. Effectively recognizing and managing these situations is essential for meaningful learning. One instructor shared an experience:

> *"I can't always plan everything perfectly because unexpected situations arise. For instance, I assigned a patient in stable condition to a student, but the patient's condition worsened suddenly. The student became anxious. I expected him to respond thoughtfully, but he froze, and I had to change his patient."*

A faculty member also highlighted the challenges associated with communication management:

> *"It's challenging to maintain communication with everyone. Often, the ward isn't receptive to nursing students or instructors. Communication issues arise, and we must handle them effectively to ensure there are no disruptions for students or instructors. If we fail to manage these situations, we won't be able to support the students, especially in developing critical thinking, which is a crucial aspect of professional nursing education."*

The process of modifying and adjusting to such situations begins with recognizing them. The educational environment is dynamic and continuously evolving, requiring careful management to effectively support CT education and learning. In such settings, managing interdisciplinary and intra-disciplinary communication, as well as interactions with patients and their families, is essential. One student shared:

> *"When the instructor criticizes me in front of others, I feel anxious and can't think, let alone focus on CT... Some instructors' relationships with students are really poor..."*

The core variable emerged after identifying the main concerns expressed by participants. This variable serves as the central theme that connects all categories to the primary challenge of CT skill development. The findings indicated that instructors focus on creating an optimal learning environment by designing it thoughtfully, modeling professional thinking, assessing students' cognitive and behavioral development, and managing negative factors that hinder learning. As a result, the central variable–*the journey of cultivating critical thinking*–was identified as the essential process in teaching CT skills.

Discussion

This study highlights the importance of establishing an effective learning environment to foster CT skills in nursing students. Key to this process is the role of instructors in modeling professional thinking and managing various challenges that arise during teaching. However, the concept of professional thinking remains somewhat ambiguous, underscoring the need for clearer definitions and improved instructional strategies. Scholars have noted that the identity of CT is fluid and subject to interpretation. As a result, attempts to define it may lead to misconceptions. Hence, some experts suggest that educators should remain in a state of ongoing inquiry. Nursing educators often face difficulties in teaching CT due to their limited or contradictory interpretations of this concept.[1]

Our results indicate that the self-preparation phase is crucial for both instructors and students in the development of CT skills. Instructors actively engage in preparation by reflecting on learning objectives and designing appropriate educational scenarios. Similarly, some students demonstrate initiative by reviewing theoretical knowledge to better adapt to new clinical environments. However, variability in student preparedness underscores the need to promote consistent, self-directed learning strategies to enhance CT skills and ensure readiness for real-world clinical situations. The primary goal of educational institutions should be to equip students with the ability to develop reflective and critical thinking skills. In this context, instructors are encouraged to adopt reflective and critical perspectives on their own teaching practices while fostering an educational environment that encourages students to engage with the world around them with compassion, understanding, and fairness.[27] One study found that students' self-directed learning skills ranged from poor to average, with a high level of dependency on instructors to engage in the learning process. It was also reported that students had insufficient knowledge about self-directed learning and CT. Nevertheless, final-year students exhibited a more positive disposition toward CT, which was attributed to their increased clinical experience.[28]

The *exposure to situation* phase emphasizes the importance of orientation and adaptation in fostering a deeper understanding of the learning environment. As both instructors and students become familiar with the context, instructors can tailor their teaching strategies to meet the diverse needs of students. By adapting the learning scenario to match students' capabilities and providing clear guidance, instructors promote greater student engagement and reflection, enhancing both the learning experience and preparation for real-world clinical situations. The rethinking process used by instructors involves questioning their own performance and examining assumptions about both their own actions and those of their students. This habit of reflective thinking leads to more informed action, adds meaning to the educational experience, and fosters the creation of a dynamic and inclusive classroom environment.[27] Given that students' levels of CT vary,[29,30] instructors should tailor educational situations to match students' individual abilities, enabling them to acquire and further develop essential skills.

The *action/reaction* phase is pivotal in teaching professional thinking, as it involves modeling critical thinking processes and guiding students through active problem-solving. By demonstrating systematic thinking and encouraging self-directed learning, instructors help students develop their own analytical skills. The use of diverse teaching methods, such as simulation and evidence-based approaches, further supports students in engaging deeply with the material and enhances their ability to think independently, promoting continuous learning and professional growth. Raymond et al.[31] in 2018 emphasize that critical thinking is a key factor in student learning and an essential component of undergraduate nursing education. They highlight fundamental aspects of nursing instruction, including fostering strong instructor-student relationships, modeling CT, integrating educational resources, and managing the various factors that influence CT development among nursing instructors. It is important to note that if CT is applied in a rigid or dogmatic manner, it may not effectively support the nursing process. Instead, nursing instructors are responsible for creating a comprehensive clinical education framework that actively stimulates CT.[32] Research further indicates that effective teaching methods play a crucial role in CT development. For example, Poodineh Moghadam et al.[5] found that evidence-based education is a powerful tool for enhancing CT skills in nursing students, as it actively engages learners in the learning process.

The findings of this study parallel several established international strategies used to foster critical thinking in nursing education. A strong body of evidence supports PBL as an effective method; one meta-analysis of 19 studies involving 1,996 nursing students reported a significant improvement in critical thinking skills.[33] Additionally, blended learning, which integrates online instruction with face to face clinical activities, has been shown to substantially enhance critical thinking ability. A recent systematic review and meta-analysis of 26 studies (2,823 students) found a large effect size for critical thinking improvements achieved through blended learning compared to traditional methods.[34] In contrast, our study emphasizes strategies such as instructor modeling, situational exposure, tailored feedback, and adaptive responses to unexpected events within the Iranian context. These findings suggest that while global pedagogies like PBL and blended learning are indeed effective, the integration of culturally grounded educational strategies—such as hands-on instructor involvement and real-world adaptability—may provide more robust frameworks for developing critical thinking. Future research should therefore explore how these international methodologies might be harmonized with localized practices to foster critical thinking across diverse settings.

The *encountering unexpected situations* phase is crucial in developing CT skills, as clinical environments often present unanticipated challenges that can disrupt planned learning. Instructors must support students in managing these disruptions, encouraging thoughtful responses while preventing anxiety. Communication breakdowns between instructors, students, and ward staff can further complicate the situation, requiring careful management to maintain a positive learning environment. Students' reactions to unpredictable scenarios highlight the importance of supportive relationships and effective communication in fostering the development of reflective and adaptive critical thinking skills. To effectively implement CT development strategies, the promotion of instructor qualifications and the management of existing barriers must be addressed. Instructors should consider various obstacles to CT learning, including those related to the instructor, student, education system, and the overall learning environment. Assessment of strategies, barriers, and facilitating factors is essential for improving CT education. For example, a student's cultural context can act as both a facilitator and a barrier to CT development. Additionally, low self-esteem and student anxiety negatively affect CT learning.[35] It is also evident that educator characteristics and contextual factors, such as teaching difficulties and lack of managerial support, are recognized barriers to CT development among instructors.[36]

While this study highlights a generally positive process for developing critical thinking, some participants noted challenges, such as managing unexpected situations and communication barriers. Some students also reported anxiety related to instructional methods, which may hinder the development of critical thinking. These differences reflect the complexity of clinical teaching and the influence of contextual factors. We also acknowledge the potential for researcher bias. Strategies such as peer review were used to reduce its impact; however, future studies may benefit from incorporating external analysis.

The central theme identified in this study, "*the journey of cultivating critical thinking*," underscores the crucial role of instructors in shaping the learning environment and fostering CT skills in nursing students. Instructors are not only responsible for creating optimal learning situations but also for modeling professional thinking and evaluating students' cognitive development. However, the ambiguity surrounding the definition of professional thinking reveals a gap in its conceptualization and instructional methods. This uncertainty highlights the need for greater clarity and instructor training to effectively integrate professional thinking into CT education, ensuring that students develop the skills necessary for reflective and systematic decision-making in clinical practice.

Limitations

While this study provides valuable insights into the development of critical thinking skills within the Iranian nursing education context, certain limitations should be acknowledged. First, although the inclusion of five senior nursing students enriched the data and complemented the perspectives of educators, the small sample size may limit the depth of student experiences captured. Second, the cultural and institutional context of Iranian nursing education may influence the transferability of the findings. While several core processes—such as self-preparedness, situational exposure, and reflective engagement—are relevant across educational settings, further research in different cultural or institutional contexts is recommended to enhance generalizability. Additionally, while this study highlights positive aspects of critical thinking development, most participant views were affirming, which may reflect desirability bias. Educators might have emphasized ideal practices, and senior students may have been reluctant to critique faculty or teaching methods. Alternative perspectives, such as challenges or barriers, were less frequently expressed, possibly due to hierarchical dynamics within academic and clinical settings. Future research should aim to include a more diverse participant pool and encourage critical viewpoints to provide a more comprehensive understanding.

Conclusion

In conclusion, this study highlights the importance of creating an effective learning environment and providing strong instructional support to foster CT skills among nursing students. The core theme, "*the journey of cultivating critical thinking*," underscores the vital role of instructors in modeling professional thinking, assessing students' progress, and managing challenges that may hinder learning. While the process includes key stages, such as self-preparation, exposure to situations, action/reaction, and encountering unexpected situations, the study also reveals that the concept of professional thinking remains somewhat unclear for some instructors. This indicates a need for further clarification and the development of more effective teaching strategies. To enhance the teaching of CT, it is essential for educators to address these uncertainties and continue adapting their instructional approaches to support students in becoming independent, reflective practitioners. The findings of this study have significant implications for nursing education practice. Instructors should prioritize creating a supportive and adaptable learning environment that fosters CT by modeling professional thinking, employing varied teaching strategies, and effectively addressing unexpected situations. By continuously assessing students' progress and providing constructive feedback, educators can guide students in developing both their professional thinking and CT skills. Additionally, clear definitions of professional thinking should be established, and instructors must refine their teaching methods to help students effectively bridge theory and practice in real-world clinical settings. This approach will better prepare nursing students to navigate complex clinical situations, ultimately leading to improved patient care outcomes.

Ethics Committee Approval: The study was approved by the Shiraz University of Medical Sciences Ethics Committee (Approval Number: IR.SUMS.REC.1398.920, Date: 09.10.2019).

Informed Consent: Verbal and written informed consent was obtained from all participants prior to the interviews.

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Transformation of the Evidence-based Practice Attitude Scale-36 into Turkish: An Investigation of Validity and Reliability

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Abstract

Background: Evidence-based practice (EBP) is essential for ensuring healthcare quality, patient safety, and effective clinical decision-making. As nurses and physicians play a key role in implementing EBP, assessing their attitudes toward it is important. Although tools exist to measure nurses' attitudes in Türkiye, no scale currently evaluates both nurses and physicians.

Aim: This study aimed to evaluate the validity and reliability of the *Evidence-Based Practice Attitude Scale-36* (EBPAS-36), originally developed by Rye et al., for adaptation into the Turkish context.

Methods: Data were collected from 205 nurses and physicians working in the surgical clinics of two hospitals in Izmir between October 2019 and December 2021. The EBPAS-36 and an 18-item descriptive questionnaire developed by the researcher were used. Statistical analyses included means, percentages, standard deviations, and significance testing at the 0.05 level. Validity was assessed through linguistic, content, construct, and face validity, while reliability was evaluated using test-retest analysis and Cronbach's alpha.

Results: Of the participants, 71.2% were female, with a mean age of 32.15±7.88 years (range: 22-58). Nurses comprised 76.1% of the sample, while physicians made up 23.9%. The content validity index of the EBPAS-36 was 0.68, exceeding the minimum acceptable threshold. Construct validity analysis yielded a Kaiser-Meyer-Olkin (KMO) value of 0.80. Confirmatory factor analysis supported a ten-factor structure for the Turkish version, which differed from the original scale. The 10 sub-dimensions explained 58.714% of the total variance. The scale demonstrated strong reliability, with a Cronbach's alpha coefficient of 0.828 and a McDonald's omega coefficient of 0.859.

Conclusion: The analyses indicated that the EBPAS-36 possesses linguistic and content validity, structural integrity, face validity, Cronbach's alpha internal consistency, and test-retest reliability. Based on these findings, the scale is valid and reliable for healthcare professionals, particularly physicians and nurses, within the Turkish cultural context.

Keywords: Attitude, evidence-based practice, nursing, scale, validity and reliability

Introduction

Evidence-based practice, as defined in the existing literature,[1–9] integrates scientifically grounded research, patient preferences, and clinical expertise. Similarly, evidence-based nursing (EBN), as discussed by various researchers,[5,6,9–13] is an approach to nursing care that utilizes the best available evidence derived from scientific research, clinical experience, and patient preferences. As nursing education continues to progress, there is an increasing shift from traditional methods toward evidence-based care. Over the past 50 years, nurse researchers have advocated for clinical practices to be guided by research findings, that is, scientific evidence.[12] Efforts such as the publication of books and guidelines on EBN, the organization of scientific congresses, and the establishment of EBN centers are actively contributing to this transformation. The term "Evidence-Based Nursing" was first introduced in a pivotal publication by Kara and Babadağ,[14] building upon a concept initially proposed by Platin in 2000. This early work focused on addressing the challenges associated with implementing evidence-based practice in Türkiye. It provided foundational insights into the subject, as cited by Kara et al.[14] and Kocaman.[12] Following 2006, there was a notable increase in initiatives related to EBN. A key component of the evidence-based practice (EBP) framework is its emphasis on the practitioner's experience and the context in which they practice. The integration of current research evidence with the clinician's tacit knowledge plays a critical role in bridging the gap between theory and practice.[15] Despite ongoing efforts and frequent discussion of EBN in academic literature, conferences, and within the context of quality nursing care, research shows that EBP remains difficult to implement in clinical settings.[14,16]

The International Council of Nurses (ICN) has highlighted the need for nurses to develop the skills necessary to identify, appraise, and apply the most effective evidence in their clinical decision-making.[17,18] This process must also consider patient preferences, specific circumstances, and the clinician's expertise. According to *Article 6 of the Nursing Regulation*, issued in March,[8,10,19,20] nurses are responsible for assessing the health needs of individuals, families, and communities, and for planning, implementing, and evaluating nursing care based on evidence, within the framework of nursing diagnoses. Implementing evidence-based nursing practices is critical for improving care outcomes, standardizing interventions, and bridging the theory-practice gap.[8,11,20]

However, several studies have highlighted that healthcare professionals' attitudes and perceptions remain significant barriers to the adoption of EBP.[6,10,21] Individual factors (e.g., gender, clinical experience) and organizational factors (e.g., leadership, institutional support, financial resources, and policies) are known to in-

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fluence these attitudes.[6,21] Rye et al.[21] observed that less experienced clinical staff tend to be more receptive to adopting innovative practices. Therefore, assessing the attitudes of nurses and physicians toward EBP is essential for designing effective strategies to promote its integration.[8,16]

Numerous studies in Türkiye have examined nurses' attitudes toward EBP, often using the *Evidence-Based Attitude Scale Toward Nursing*, which was translated into Turkish by Ayhan et al.[10] However, quality healthcare services can only be delivered through interdisciplinary collaboration.[2,22–24] As such, it is vital for all members of the healthcare team to adopt evidence-based methods when implementing EBP. When creating plans to incorporate EBP into the clinical setting, it is essential to understand the emotions, opinions, and perspectives of individuals toward EBP.[10,12,25] There is a need for instruments that assess the attitudes of nurses as well as other healthcare professionals on this matter. A review of the existing literature reveals a variety of studies investigating public attitudes toward evidence-based practice in our country. However, these studies indicate that no reliable measurement tool currently exists that can be used by all healthcare professionals. This study aimed to adapt the *Evidence-Based Practice Attitude Scale-36*, originally developed by Rye et al.,[26] into Turkish, with the objective of evaluating its validity and reliability.

Research Questions

1. Is the Turkish adaptation of the *Evidence-Based Practice Attitude Scale-36* (EBPAS-36) reliable?
2. Is the Turkish adaptation of the EBPAS-36 a reliable assessment tool?
3. Is the Turkish version of the *Evidence-Based Practice Attitude Scale-36* (EBPAS-36) valid?
4. Is the Turkish version of the EBPAS-36 reliable?

Materials and Methods

Study Design

This study was designed as a methodological study to assess the validity and reliability of the *Evidence-Based Practice Attitude Scale-36*.

Study Sample

The study population consisted of nurses and physicians working in surgical clinics, including intensive care units, wards, and operating rooms, at a university hospital and a training and research hospital in Izmir, between October 2019 and December 2021. In methodological studies, the sample size is typically determined based on the number of items in the scale. A sample size of 5 to 10 times the total number of items is often recommended.[27] The objective was to recruit between 180 and 360 physicians and nurses for participation. A total of 205 nurses and physicians who met the inclusion criteria (i.e., working in surgical units or operating rooms, not on leave during data collection, and voluntarily participating in the study) were included.

Data Collection Tools

The research data were collected using two components. The first part was a questionnaire that gathered descriptive information, while the second part consisted of *Evidence-Based Practice Attitude Scale-36*.

Characteristics Survey Questionnaire

This form comprised 18 questions related to personal characteristics (e.g., age, gender, education level, and profession) and knowledge of evidence-based practices (e.g., familiarity with evidence-based practice, training received, and publication/journal subscriptions).

Evidence-Based Practice Attitude Scale-36 (EBPAS-36)

The original EBPAS scale was developed by Gregory A. in 2004, consisting of 15 items across four sub-dimensions.[28] In 2012, Aarons et al.[29] expanded upon this work by adding 35 new items, resulting in a 50-item version of the EBPAS with 12 sub-dimensions. The EBPAS-36 was later developed in 2017 by Rye et al.,[26] maintaining the same 12 sub-dimensions from the original version: Requirements, Appeal, Openness, Divergence, Limitations, Fit, Monitoring, Balance, Burden, Job Security, Organizational Support, and Feedback. The EBPAS-36 is a five-point Likert-type scale consisting of 36 items. Each item is rated on a scale from "0 (Strongly Disagree)", "1 (Somewhat Agree)", "2 (Partially Agree)", "3 (Very Agree)", to "4 (Strongly Agree)". Each sub-dimension includes three items. The total score is calculated by reversing the scores of the following sub-dimensions: 4. Divergence, 5. Limitations, 7. Monitoring, 8. Balance, and 9. Burden. The total score ranges from 0 to 144, with higher scores indicating a more positive attitude toward adopting EBP. The original scale reported a total Cronbach's alpha coefficient of 0.79.[26]

Data Collection and Analysis

Validity and Reliability of the Evidence-Based Practice Attitude Scale-36

Examination of the Psycholinguistic Properties of the Scale/Language Adaptation

At this stage, the scale items were translated from their original language into the target language for adaptation. The cultural adaptation process followed the guidelines established by the World Health Organization (WHO.[30] The language adaptation process included the following steps: forward translation, expert panel review, backward translation, pre-testing and cognitive interviewing, and finalization.

The forward translation, which involved translating it from English into Turkish, was conducted by a professional interpreter/translator. The language and structure of the scale were found to be consistent in both the forward translation and expert reviews, resulting in a unified consensus. A back-translation into English was then performed by a native English-speaking linguist to compare with the original scale.

A pilot test was carried out during the pre-test and cognitive interview phase with a group of 10 physicians and nurses who were not included in the main study sample. The results of the pilot test, along with the expert panel's feedback, were reviewed and analyzed. Based on the findings from all stages of the adaptation process, the researchers finalized the Turkish version of the measurement tool.

Examination of the Psychometric Properties of the Scale

The psychometric assessment followed WHO guidelines and included the following steps to evaluate the scale's validity and reliability.

Validity of the Scale

Content Validity

An assessment of the scale's content validity was carried out using expert evaluations. Content Validity Ratios (CVR) for each item in the Turkish adaptation and the Content Validity Index (CVI) for the entire scale were calculated. The *Expert Evaluation Form* was sent to 15 experts, who submitted their feedback via email after giving their consent. The form asked experts to evaluate each scale item based on its appropriateness for measuring the intended feature, its readability and clarity, and its effectiveness in assessing attitudes toward evidence-based practice. Experts were instructed to rate each item as either: "Appropriate" (the item is suitable and can be used without modification), "Changeable" (the item is suitable but needs revision), or "Not Appropriate" (the item does not reflect the intended characteristic and should be removed).

Following the feedback from all subject matter experts, the content validity ratio for each item was calculated using the Lawshe method. The average CVI was then determined by taking the mean of the CVR values for all items.

Construct Validity

The construct validity of the scale was evaluated to identify the dimensions measured by the *Evidence-Based Practice Attitude Scale-36* and to interpret the meaning of the scores obtained. Exploratory Factor Analysis (EFA) was used to assess the construct validity. To determine the suitability of the data for factor analysis, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test were applied.

Surface and Face Validity

The face validity of the scale items was assessed to determine their clarity, appropriateness, and ability to measure the intended concept, as well as to ensure they were easy to understand. Researchers reviewed each item of the *Evidence-Based Practice Attitude Scale-36* for clarity and made adjustments based on expert feedback. A preliminary evaluation was conducted with 10 healthcare professionals, including physicians and nurses, who were similar to those in the study sample.

Reliability of the Scale

Internal consistency and reliability were assessed by calculating Cronbach's alpha coefficient for the scale. The scale was re-administered to a randomly selected group of participants from the original sample four weeks after the initial assessment.

Data Collection

Data were collected from nurses and physicians working in surgical clinics, including intensive care units, wards, and operating theaters, at a university hospital and a training and research hospital in Izmir between October 2019 and December 2021. Face-to-face interviews were conducted, each lasting approximately 15 to 20 minutes.

Statistical Analysis

Statistical analyses were performed using IBM SPSS (Statistical Package for the Social Sciences) Statistics for Windows, version 24.0; AMOS (Analysis of Moment Structures), version 24.0 (IBM Corporation, NY, USA); and Jamovi Statistics, version 2.2.2 (Sydney, Australia). Descriptive statistics were presented as number of cases, mean±standard deviation, percentages, minimum and maximum values, as well as median and percentile values.

Cronbach's alpha and McDonald's omega coefficients were used to assess the internal consistency of the scale and its subdimensions. Pearson correlation analysis and split-half analysis were employed to evaluate item-total score correlations for the scale and its subdimensions. Hotelling's T-square test was applied to assess response bias in the scale. For the test-retest analysis, a t-test was conducted for dependent groups. Exploratory Factor Analysis was used to determine the association between items and factors. The principal axis factoring estimation method was chosen based on the recommendation of the original scale developer, and the Tomakomai rotation technique was applied as the rotation method. An eigenvalue of one was used as the criterion for this factor. A factor loading coefficient of 0.30 was considered the threshold for determining an item's sub-dimension. The extent to which the scale items and subdimensions reflected the original structure was assessed using Confirmatory Factor Analysis (CFA). Prior to conducting CFA, a multiple correlation analysis was performed, which revealed no multicollinearity among the items. The correlation matrix was used for the Exploratory Factor Analysis, while the covariance matrix was used for the Confirmatory Factor Analysis. The margin of error for data analysis was set at 0.05 (5%).

Ethical Considerations

This research was conducted in accordance with the principles of the Declaration of Helsinki. Permission to adapt the scale into Turkish was obtained via email from the original developer. Ethical approval was granted by the Ege University Medical Research Ethics Committee (Approval Number: 20-1.1T/19, Date: 22.01.2020). Additionally, institutional approval was obtained from the participating hospitals. Physicians and nurses were first given verbal information about the study, after which written informed consent was obtained from those who agreed to participate.

Results

Sociodemographic Characteristics of Participants

Of the participants, 71.2% were female and 28.8% were male. The mean age was 32.15±7.88 years, with a range of 22 to 58 years. Among the participants, 76.1% were nurses and 23.9% were physicians. In terms of institutional affiliation, 42.9% were employed at a university hospital and 57.1% at a training and research hospital. Regarding work settings, 3.2% of the nurses were employed in operating rooms, 20.5% in intensive care units, and the majority (76.3%) were working in general clinics.

Participants' Knowledge of Evidence-Based Practices

The analysis revealed that 24.4% of participants regularly read professional journals, while 38% followed them selectively. Additionally, 62.4% reported attending at least one scientific conference within the past two years. Among those attendees, 78.5% participated as listeners, 12.6% presented papers, and 8.9% gave oral presentations. It was found that 24.9% of participants had submitted their own work, consisting of 46.4% research articles, 17.4% compilations, and 36.2% case reports. The results also showed that 61.5% of participants had knowledge of EBP, while 36.1% had received training on the subject. Furthermore, 46.8% reported using EBP in their current departments.

Validity and Reliability Evaluation of the Evidence-based Practice Attitude Scale-36 (EBPAS-36)

Findings from the Validity Analysis of the EBPAS-36

Content validity

The CVR and CVI values are presented in Table 1, based on evaluations from 15 experts regarding the scale items. The statistical significance of these ratios was

Table 1. Expert opinions and content validity results for the *Evidence-Based Practice Attitude Scale-36*

Scale item	Appropriate/ keep	Modifiable/ suggestion for correction	Not appropriate/ remove	CVR	Scale item	Appropriate/ keep	Modifiable/ suggestion for correction	Not appropriate/ remove	CVR
Item 1	12	3	0	0.60	Item 21	8	7	0	**0.06**
Item 2	14	1	0	0.86	Item 22	10	5	0	**0.33**
Item 3	14	1	0	0.86	Item 23	12	3	0	0.60
Item 4	15	0	0	1.00	Item 24	12	3	0	0.60
Item 5	15	0	0	1.00	Item 25	15	0	0	1.00
Item 6	12	3	0	0.60	Item 26	15	0	0	1.00
Item 7	13	2	0	0.73	Item 27	12	3	0	0.60
Item 8	13	2	0	0.73	Item 28	11	4	0	**0.46**
Item 9	13	2	0	0.73	Item 29	12	3	0	0.60
Item 10	13	2	0	0.73	Item 30	11	4	0	**0.46**
Item 11	14	1	0	0.86	Item 31	11	4	0	**0.46**
Item 12	14	1	0	0.86	Item 32	11	4	0	**0.46**
Item 13	12	3	0	0.60	Item 33	11	4	0	**0.46**
Item 14	12	3	0	0.60	Item 34	15	0	0	1.00
Item 15	14	1	0	0.86	Item 35	13	2	0	0.73
Item 16	15	0	0	1.00	Item 36	12	3	0	0.60
Item 17	14	1	0	0.86	Number of experts		15		
Item 18	13	2	0	0.73	Content validity criterion		0.49		
Item 19	14	1	0	0.86	CVI		0.68		
Item 20	9	6	0	**0.20**					

CVR: Content validity ratio, CVI: Content validity index.

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Table 2. Item analysis results of the *Evidence-Based Practice Attitude Scale-36* (EBPAS-36) Questionnaire (n=205)

Item no.	Variance explained (%)	α value when item is deleted	Corrected item-total score correlation (r)*	Corrected item-subscale total score correlation (r)*	Cronbach's alpha	McDonald's omega	Mean±SD	Factor loading
1. Subdimension	22.434				0.878	0.886	2.77±0.78	
Item 28		0.832	0.090	0.591			1.46±1.23	0.484
Item 31		0.827	0.220	0.672			2.56±1.26	0.550
Item 32		0.819	0.520	0.770			2.76±0.96	0.776
Item 33		0.822	0.388	0.805			2.37±1.18	0.764
Item 34		0.819	0.514	0.720			2.81±0.99	0.854
Item 35		0.817	0.554	0.703			2.92±1.00	0.841
Item 36		0.823	0.353	0.416			2.49±1.07	0.492
2. Subdimension	10.545				0.892	0.897	2.13±0.97	
Item 8		0.819	0.529	0.773			3.01±0.93	0.828
Item 9		0.831	0.129	0.870			2.29±1.26	0.960
Item 10		0.829	0.176	0.777			2.20±1.36	0.863
Item 11		0.830	0.150	0.638			1.71±1.21	0.608
3. Subdimension	7.098				0.859	0.866	2.97±0.82	
Item 7		0.820	0.487	0.563			3.19±0.96	0.537
Item 12		0.842	-0.274	0.649			1.16+1.14	0.580
Item 13		0.824	0.311	0.751			2.80±1.21	0.881
Item 14		0.830	0.152	0.692			2.27±1.27	0.859
Item 15		0.821	0.401	0.751			2.34±1.15	0.628
4. Subdimension	4.756				0.753	0.758	2.69±0.89	
Item 18		0.818	0.548	0.437			2.95±0.99	0.351
Item 25		0.818	0.530	0.524			2.90±2.90	0.577
Item 26		0.824	0.311	0.667			3.03±0.98	0.935
Item 27		0.822	0.386	0.581			3.10±0.96	0.635
5. Subdimension	3.156				0.877	0.878	3.10±0.87	
Item 1		0.818	0.536	0.739			3.27±0.98	0.640
Item 2		0.820	0.481	0.778			3.04±0.94	0.829
Item 3		0.831	0.085	0.776			2.24±1.11	0.894
6. Subdimension	2.719				0.681	0.688	1.79±0.99	
Item 19		0.818	0.548	0.458			2.98±1.01	0.515
Item 20		0.825	0.289	0.540			3.39±1.03	0.685
Item 21		0.826	0.263	0.492			3.13±1.13	0.635
7. Subdimension	2.441				0.834	0.834	2.36±1.08	
Item 29		0.835	-0.002	0.716			2.11±1.28	0.699
Item 30		0.828	0.173	0.716			2.03±1.11	0.766
8. Subdimension	2.108				0.527	0.592	1.77±0.85	
Item 22		0.827	0.205	0.405			2.00±1.10	0.671
Item 23		0.824	0.311	0.303			2.03±1.18	0.419
Item 24		0.818	0.507	0.281			2.99±1.06	0.515
9. Subdimension	1.888				0.570	0.584	2.93±0.80	
Item 4		0.824	0.318	0.386			2.72±1.14	0.687
Item 5		0.825	0.296	0.320			2.08±1.09	0.406
Item 6		0.823	0.349	0.438			2.39±1.11	0.557
10. Subdimension	1.567				0.461	0.472	2.66±0.91	
Item 16		0.820	0.435	0.309			2.56±1.18	0.508
Item 17		0.817	0.577	0.309			2.85±0.95	0.397
Total	58.714				0.828	0.859	2.56±0.41	
KMO	**0.800**							
Bartlett χ^2 (p)	4015.780 (0.000)							

*: Significant at p<0.001. SD: Standard deviation, KMO: Kaiser-Meyer-Olkin.

determined by comparing the CVR values to the minimum acceptable threshold of 0.49, as recommended for 15 expert evaluations by Lawshe and Yeşilyurt et al.[31] The CVI for the entire scale was found to be statistically significant, exceeding the Content Validity Criterion of 0.49, with a final CVI value of 0.68, as shown in Table 1. All scale items were agreed upon by the experts, and revisions were made in accordance with their feedback.

Table 3. Confirmatory factor analysis (CFA) model fit indices

	χ^2/df	RMSEA	GFI	CFI	IFI	NNFI	NFI
Ten-factor model	2.050	0.072	0.78	0.84	0.85	0.82	0.74

χ^2/df: Chi-square/degrees of freedom ratio, RMSEA: Root mean square error of approximation, GFI: Goodness of fit index, CFI: Comparative fit index, IFI: Incremental fit index, NNFI: Non-normed fit index, NFI: Normed fit index.

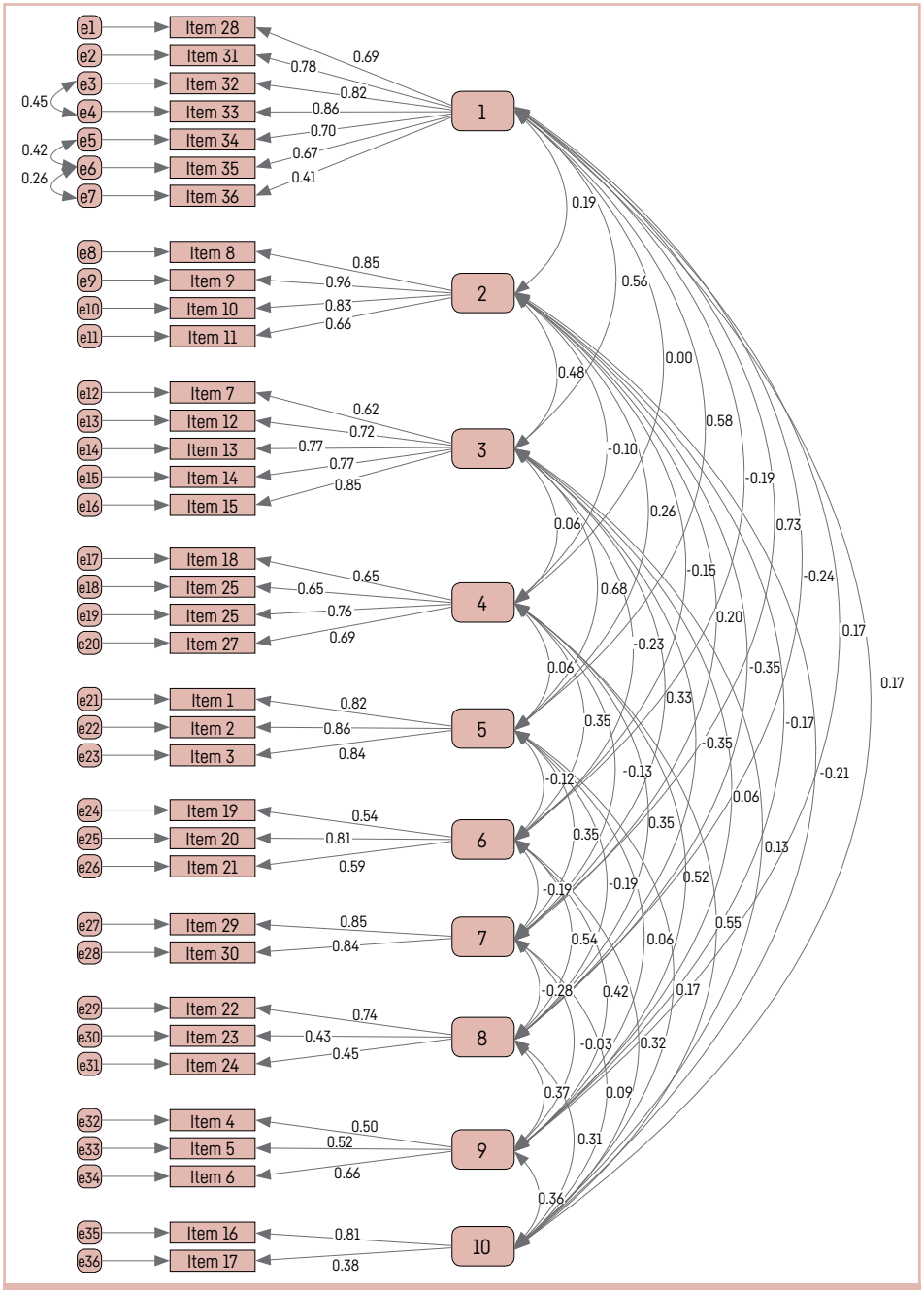

Figure 1. Confirmatory factor analysis.

Construct validity

To assess the adequacy of the sample, the KMO and Bartlett's tests were conducted prior to evaluating the construct validity of the scale. The KMO coefficient was found to be 0.800, while Bartlett's test produced a χ^2 value of 4015.780 with a p-value of 0.000 (Table 2). These results indicate that the data were suitable for factor analysis.[32] The factor loadings for the scale's sub-dimensions, as determined by the EFA, are presented in Table 2. The 10 sub-dimensions accounted for 58.714% of the total variance (Table 2).

Table 4. Test-retest analysis results of the first and second applications of the scale

	First application Mean±SD	Second application Mean±SD	t	p	r	p
Scale total	2.52±0.409	2.48±0.396	1.524	0.132	0.805	0.000
1. Subdimension	2.32±0.700	2.84±0.832	**7.559**	**0.000**	0.731	0.000
2. Subdimension	2.11±0.996	2.22±0.994	1.367	0.176	0.761	0.000
3. Subdimension	3.06±0.815	3.05±0.835	0.208	0.836	0.840	0.000
4. Subdimension	2.61±0.893	2.37±0.892	**3.467**	**0.001**	0.803	0.000
5. Subdimension	3.04±0.943	3.03±0.927	0.155	0.877	0.845	0.000
6. Subdimension	1.55±0.902	1.43±0.989	1.287	0.203	0.659	0.000
7. Subdimension	2.55±1.030	2.64±1.123	0.960	0.340	0.756	0.000
8. Subdimension	1.67±0.782	1.66±0.792	0.122	0.903	0.645	0.000
9. Subdimension	2.86±0.814	2.37±0.941	**4.444**	**0.000**	0.461	0.000
10. Subdimension	2.62±1.019	2.48±1.132	1.456	0.148	0.738	0.000

P<0.05. SD: Standard deviation, t: T-test for dependent groups, r: Pearson correlation coefficient.

Model fit was evaluated using various fit indices. The calculated χ^2/df ratio for the ten-factor model was 2.050, as shown in Table 3. Additional fit indices are also listed in Table 3. A CFA was performed to validate the construct previously assessed through EFA. The factor loadings for the subdimensions identified by the Confirmatory Factor Analysis are illustrated in Figure 1.

A systematic analysis of the EBPAS-36 was conducted.

Internal consistency analysis

The Cronbach's alpha coefficient for the overall scale was calculated to be 0.828. Cronbach's alpha and McDonald's omega reliability coefficients for each of the ten subdimensions are presented in Table 2.

A Cronbach's alpha value of 0.653 was calculated for the first half of the scale, and 0.707 for the second half, based on the split-half analysis. The correlation coefficient between the two halves was 0.831. The Spearman-Brown coefficient was calculated as 0.908, and the Guttman split-half coefficient was 0.907. Hotelling's T-square value for the scale was calculated as 926.510, with an F-statistic of 22.06 and a p-value of 0.000. These results indicate that there was no response bias in the scale. Correlations between individual scale items and the total scale score, as well as with subdimension scores, are presented in Table 2. The removal of any item did not lead to a significant increase in the overall Cronbach's alpha value.

Invariance (Test-retest reliability)

The test-retest reliability of the scale and its subdimensions was evaluated over a period of time by examining the Pearson correlation coefficient, in order to assess the consistency of the scale's results (Table 4).

No statistically significant difference was found between the total scores of the first and second administrations, nor between the mean scores of the second, third, fifth, sixth, seventh, eighth, and tenth subdimensions (p>0.005). However, a significant and strong correlation was observed between the scores from the first and second measurements (p<0.05). A statistically significant difference was observed in the scores from the initial and subsequent applications for the first, fourth, and ninth subdimensions, with a p-value of 0.05. While a correlation was found between the scores of the initial and fourth subdimensions, as well as with the first application overall, the correlation between the scores from the first and second applications for the ninth subdimension was negligible, as shown in Table 4.

Discussion

Investigating the perspectives of nurses and physicians on EBP may support the development of tailored strategies to encourage its broader adoption. In this study, the initial assessment focused on the instrument's language validity. After translation, expert opinions were gathered, and item modifications were made based on the results of a preliminary trial. Content validity is assessed to ensure that a scale comprehensively measures the intended concept and excludes unrelated elements beyond its scope.[31,33,34] The CVR is influenced by the number of experts consulted.[33–35] The study compared the calculated Content Validity Ratio for each item with the overall Content Validity Index of the scale, as determined by expert feedback, against a predefined content validity criterion of 0.49. Items that did not initially meet the CVR threshold were revised based on expert comments and suggestions; however, none were removed from the scale. Given the context, it is reasonable to conclude that the scale components adequately represent the intended characteristic and that the scale has a clear and easily understandable linguistic structure and content.

The construct validity of a measurement tool determines what concept or attribute it assesses and the extent to which it reflects the underlying theoretical framework. To compare the factor structure of the original scale with that of the culturally adapted version and to identify areas of difference and similarity, the use of CFA is recommended.[33,35] Since the KMO coefficient and Bartlett's test of sphericity yielded statistically significant results, it can be inferred that the dataset is highly suitable for factor analysis.

The threshold value for exploratory factor analysis, which was used to evaluate the factor loadings of the scale items within their respective dimensions, was set at 0.30, as recommended by Ercan and Kan.[33] The analysis revealed that all factor loadings exceeded 0.30, and no items were removed from the scale. A ten-factor structure emerged, supporting the scale's strong construct validity.

The 10-factor, 36-item structure of the scale was validated through CFA. Commonly used model fit indices in research include the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI), and Goodness of Fit Index (GFI), as reported by Akgül.[36] According to Büyüköztürk,[37] a model is considered to have a good fit if the RMSEA value is 0.080 or lower and the p-value exceeds 0.05, indicating statistical significance; an RMSEA value of 0.10 or lower suggests a weak fit. Akgül[36] also stated that a CFI and NNFI value of 0.90 or higher indicates an acceptable fit, while Şimşek[38] noted that a GFI value of 0.90 or above signifies good model fit.

Examination of the fit indices obtained from the Confirmatory Factor Analysis revealed that the Goodness of Fit Index, Normed Fit Index, and NNFI values were relatively low. However, since the RMSEA value was below 0.080, the ten-factor structure of the scale was considered generally acceptable. A study by Rye et al.[26] in 2017 on the Norwegian version of the scale, which used a 12-factor model, reported a strong overall model fit (χ^2=1125.04, p<0.001, CFI=0.91). One of the fit indices, RMSEA, had a relatively low value of 0.052, as noted by Rye et al.[26]

The finalized Turkish version of the scale consists of 36 items and 10 factors, as illustrated in the path diagram, and it differs from the original scale.

The high accuracy of the measurement tool indicates that it functions effectively as intended. Evaluating scales in conjunction with their reliability is generally more appropriate than assessing validity alone, particularly as noted by Ercan and Kan,[33] Hançer,[34] and Yeşilyurt and Çapraz.[31] A reliability coefficient below 0.40

indicates that the scale is unreliable; values between 0.40 and 0.60 indicate low reliability; values from 0.60 to 0.80 suggest moderate reliability; and values between 0.80 and 1.00 indicate high reliability.[33,34] The study found that the first, second, third, fifth, and seventh subdimensions of the scale demonstrated high reliability based on these criteria. The overall Cronbach's alpha coefficient of 0.828 indicates a strong level of reliability. In comparison, the original scale, as reported in Rye et al.'s[26] study, had a total Cronbach's alpha coefficient of 0.79. The Cronbach's alpha coefficients for the subdimensions of the original scale, which comprises 12 sub-dimensions, were found to be high. However, the overall Cronbach's alpha coefficient of 0.79 reported in the original scale26 was lower than the 0.828 obtained in this study, which included 16 subdimensions.

According to studies by Ayhan et al.,[10] Çapık et al.,[35] and Ercan and Kan,[33] a minimum interval of four to six weeks should be maintained between two measurements to ensure a reliable test-retest analysis. Furthermore, research by Ayhan et al.,[10] Çay and Daşbaş,[39] and Ercan and Kan[33] indicates that the test procedure should involve at least 30 participants. In this study, the test-retest was administered to 68 participants (33% of the total sample), with a four-week interval between assessments. The closer the correlation coefficient is to 1.00, the more reliable the scale is considered over time. Literature recommends a minimum correlation coefficient of 0.70 for acceptable reliability35. This study found that only three sub-dimensions had correlation coefficients below 0.70. Overall, the scale demonstrated consistent reliability and stability.

Limitations

Data collection was conducted during the Coronavirus Disease 2019 (COVID-19) pandemic, which limited the participation of healthcare professionals in hospitals. Additionally, the study's findings are based solely on data collected from medical professionals working in two hospitals in the city of İzmir.

Conclusion

The EBPAS-36 is a valid and reliable instrument for healthcare professionals, including physicians and registered nurses, and can be effectively used to evaluate their attitudes toward evidence-based practices, within the Turkish context. The findings showed that the 36 items of the scale, structured within 10 factors, accurately reflect the intended concept, effectively assess the relevant domains, and yield consistent results over time. Further research is recommended to explore its influence on clinical practice. The scale can be effectively used in studies evaluating physicians' and nurses' attitudes toward evidence-based practices. Further research is recommended to explore its influence on clinical practice.

Ethics Committee Approval: The study was approved by the Ege University Medical Research Ethics Committee (Approval Number: 20-1.1T/19, Date: 22.01.2020).

Informed Consent: Written informed consent was obtained from those who agreed to participate.

Conflict of Interest: The authors have no conflicts of interest to declare.

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Clinical Practice Experiences from the Perspective of Senior Nursing Students: A Phenomenological Study

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Abstract

Background: Clinical practice plays an important role in the professional development of nursing students and their preparation for the nursing profession.

Aim: The purpose of this study is to explore the perspectives of senior nursing students regarding their clinical practice experiences.

Methods: This qualitative study was conducted with fourth-year nursing students using a purposive sampling method. Face-to-face, in-depth individual interviews were conducted with 23 senior nursing students who agreed to participate in the study. Interviews continued until data saturation was reached. All interviews were recorded using a quick note-taking technique. Data were analyzed using thematic analysis. The study was conducted and reported in accordance with the COREQ (Consolidated Criteria for Reporting Qualitative Research) checklist.

Results: Data analysis revealed three main themes: feelings and thoughts regarding clinical practice, the contribution of clinical practice to professional development, and experiences related to clinical practice. Six sub-themes were also identified: feelings, thoughts, contributions to knowledge, contributions to professional adaptation, experiences related to professional practice, and experiences related to verbal communication and interaction.

Conclusion: Clinical practice experience is an important component in the development of professional awareness. This study highlights nursing students' clinical practice experiences in a comprehensive manner.

Keywords: Clinical practice, intern student, nursing, qualitative study

Introduction

There is an urgent need to improve the quality of the nursing profession and strengthen professional development, due to the growing importance of health services and the increasing demand for a better quality of life.[1] Strengthening professional development and ensuring patient safety at the highest level depend on an adequate integration of both clinical and theoretical teaching during nursing education.[2]

Nursing students require a diverse range of attitudes, knowledge, and skills to become clinically competent in healthcare settings.[3] Nursing education programs aim to provide students with high-quality clinical learning experiences, enabling them to deliver safe and effective nursing care.[4] Theoretical and practical education supports learning in the affective, cognitive, and psychomotor domains, offering students the opportunity to develop decision-making and problem-solving skills, acquire the competencies necessary for the nursing profession, and grow professionally.[5] In this context, clinical practice is considered the cornerstone of nursing education.[6]

However, students may encounter various difficulties or problems during clinical practice that can negatively affect their learning.[7] The goal of clinical teaching is not only to equip students with the ability to overcome these difficulties using the knowledge they have acquired, but also to prepare them to perform effectively in professional practice.[8] Papathanasiou et al.[9] reported that significant discrepancies exist between students' expectations and the actual clinical practice environment, often leading to problems for students during their clinical experience.

Studies on the subject have generally focused on the problems that intern students face in the clinical environment.[7] Işkın and Abay[10] suggest that qualitative research conducted with intern students can be useful in identifying the difficulties related to the implementation of the nursing process. Identifying these challenges is crucial; otherwise, issues such as decreased job satisfaction, a diminished perceived value of the nursing profession among nurses and nursing students, over-dependence on physicians, unquestioning obedience, reliance on routine actions without critical thinking, and an overall decline in care quality may occur.[11] In this context, unlike quantitative research, qualitative research offers researchers greater opportunities to uncover and explain the complexities of the clinical setting. It provides a deeper understanding of the challenging aspects of teaching the nursing process and offers insight into the actual dynamics in practice. Furthermore, qualitative research contributes to improving clinical practice by serving as a valuable model for evaluating and enhancing existing processes.[12]

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The aim of this study is to understand the perspectives of final-year nursing students regarding their clinical practice experiences. It is anticipated that the findings will help identify deficiencies or problems in clinical practice and highlight both strengths and weaknesses. Additionally, the results are expected to inform efforts to strengthen clinical education, improve learning environments, address existing challenges, and guide all planning related to clinical teaching.

Research Questions

1. What are the clinical practice experiences of nursing students?
2. What are the problems encountered by nursing students during clinical practice?

Materials and Methods

Type of Research

This study was conducted using a phenomenological research design, one of the qualitative research approaches. Throughout the study, the authors followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) and reported the findings accordingly.[13]

Population and Sample of the Study

The study population consisted of students from the Nursing Department of the Faculty of Health Sciences at a university located in northern Türkiye. Participants were selected using purposive sampling. This method ensures the intentional selection of participants who are most relevant to the research purpose and capable of providing rich data.[14] In this study, fourth-year nursing students who were willing to share their clinical practice experiences and agreed to participate in interviews were selected. Diversity was sought by considering demographic characteristics and clinical practice experiences to capture a range of perspectives. A total of 23 students who met the inclusion criteria formed the study sample. Data were collected between June 15 and 20, 2024.

Research Team and Reflexivity

Both members of the research team are active faculty members at nursing schools and hold PhDs in psychiatric nursing. They have experience working as clinical nurses and have received training in qualitative research methods. In-depth individual interviews were conducted with 23 fourth-year nursing students who met the inclusion criteria and agreed to participate in the study. The inclusion criteria were: (a) being a fourth-year nursing student, (b) being open to communication, and (c) agreeing to participate in the study. The exclusion criteria included: (a) having a language, speech, or hearing impairment that would hinder communication, (b) being a first-, second-, or third-year nursing student, and (c) not agreeing to participate in the study.

Data Collection

A semi-structured interview form was developed by the researchers based on the relevant literature. The form consisted of two parts. The first part included questions about demographic and background information, such as students' age, gender, economic status, reason for choosing the nursing profession, whether they like the profession, and the clinical areas in which they had practiced. The second part consisted of five basic open-ended questions designed for the semi-structured interviews. During the interviews, students were asked to describe their clinical practice experiences through open-ended questions. Probing questions such as "Can you explain your answer a little more?" and "What do you mean by this?" were used to gain deeper insights. All interviews were conducted by the first author. The privacy and confidentiality of all students in the study were carefully protected. Interviews were conducted in private, quiet with only the researcher and participant present. Students' personal information was anonymized using codes. Transcripts were stored on encrypted computers accessible only to authorized researchers. Additionally, students were given detailed information about data confidentiality before the study began, and informed consent was obtained. Data were collected through face-to-face interviews using a rapid note-taking technique and were transcribed verbatim by the researcher. Once all interviews were completed, the data were prepared for analysis. Five main questions guided the interviews as follow:

1. When you evaluate your clinical practice process as a whole, what emotions do you generally feel? Can you describe them?
2. Can you talk about the contributions of the clinical practice process to your professional development?
3. What are your general experiences regarding the clinical practice process? Can you describe your experiences with patient care and the treatment process?
4. Did you experience any interpersonal problems (with hospital staff, nurses, other staff members, cleaning staff, teaching staff, patients, or fellow students) during clinical practice? Can you describe them?
5. Can you tell us about any inappropriate practices or approaches you experienced or observed during your clinical practice?

Data Analysis

Colaizzi's seven-stage phenomenological analysis method was used to analyze the qualitative data obtained from the interviews.[15] These seven stages were as follows:

1. **Transcription of Participant Interviews:** All interviews were transcribed verbatim. The researchers independently and repeatedly read the transcripts to gain a deep understanding of the data.
2. **Identification of Significant Statements:** Meaningful and relevant statements related to the phenomenon were extracted from the transcripts.
3. **Reorganization and Generalization of Significant Statements:** The selected statements were rephrased without altering their essence and were expressed in more general terms.
4. **Formulation of Meanings:** The researchers interpreted and analyzed the underlying meanings conveyed in the participants' statements.
5. **Development of Themes and Sub-themes:** The formulated meanings were grouped into main themes and sub-themes through discussion until consensus was reached.
6. **Validation of Findings with Participants (Member Checking):** The themes and findings were shared with participants to ensure their accuracy and credibility.
7. **Supporting Findings with Participant Quotes:** Direct quotes from participants were included to support the themes and allow readers to verify the interpretation and analysis of the data.

Validity/Certainty

In qualitative research, reliability refers to the consistency and transparency of the research process and the extent to which the findings reflect participants' real experiences.[16] In this context, reliability also implies that the research was conducted rigorously and that the results are as free as possible from researcher bias.[17] Lincoln and Guba (1985) developed the concept of "reliability" in qualitative research and explained it through four criteria: reliability, transferability, dependability, and confirmability. The credibility of the research (connectability) was ensured through peer review, prolonged engagement, the selection of participants with diverse experiences, and external evaluation. The first researcher's long-term interaction with participants helped build trust, which in turn allowed for a deeper understanding of the research setting and more reliable findings. To enhance the dependability of the data, all interviews were transcribed using a rapid note-taking technique, and the coding and data analysis processes were collaboratively evaluated by all members of the research team. Regarding confirmability, transcription began immediately after each interview. Rich descriptions were also provided to ensure that the research process was clearly understood, which supported the objectivity of the study and the data-driven nature of the findings. Transferability was strengthened by maximizing sample diversity, clearly identifying participants, and providing detailed information on the sampling method, as well as the timing and setting of data collection, thus allowing the findings to be applicable in similar contexts. In terms of authenticity, informed consent was obtained from all participants, a trusting relationship was established, and the research methodology was clearly communicated. Additionally, the research report was shared with the participants.

Ethical Considerations

This study was approved by the Giresun University Social Sciences Science and Engineering Sciences Research Ethics Committee (Approval Number: 06/05, Date: 05.06.2024). Prior to the study, institutional approval was obtained, and the study was conducted in accordance with institutional research procedures. Informed consent was obtained from all participants before the interviews began. Recordings and transcripts were stored on a password-protected device. The study was carried out in compliance with the Declaration of Helsinki and the ethical standards of the National Research Committee.

Table 1. Descriptive characteristics of students

Variable	Mean±SD (range)	n	%
Age (years)	22.70±0.82		
Gender			
Female		9	39.13
Male		14	60.87
Economic status			
Good		3	13.04
Middle		18	78.26
Low		2	8.70
Reason for coosing nursing			
Own will		12	52.17
Family influence		8	34.79
Other		3	13.04
Likes the profession			
Yes		11	47.82
No		3	13.04
Undecided		9	39.14
First rotation clinic			
Orthopedics service		3	13.05
Internal medicine service		3	13.05
Internal medicine ICU		2	8.69
Coronary ICU		2	8.69
Reanimation ICU		3	13.05
Neurology ICU		1	4.34
Operating room		3	13.05
Healty life center		1	4.34
Urology service		3	13.05
Cardiology servce		1	4.34
General surgery		1	4.34
Second rotation clinic			
Internal medicine neurology		3	13.05
General surgery service		2	8.69
Urology service		1	4.34
General ICU		4	17.39
Palliative service		3	13.05
Brain surgery service		3	13.05
Neurology service		3	13.05
Orthopedics service		2	8.69
Reanimation ICU		2	8.69

SD: Standard deviation, ICU: Intensive care unit.

Results

The students were aged between 22 and 25. It was found that 60.8% of the participants were male, 78.2% reported having an average economic status, 52.17% had voluntarily chosen the nursing profession, and 47.82% stated that they liked the profession. In terms of clinical placements, during the first rotation, students most frequently worked in intensive care units (eight students), surgical clinics (10 students), and internal medicine clinics (five students). In the second rotation, the distribution was as follows: intensive care units (nine students), surgical clinics (eight students), and internal medicine clinics (Table 1).

Within the scope of the research, three main themes were identified: feelings and thoughts regarding clinical practice, the contribution of clinical practice to professional development, and experiences related to clinical practice. Additionally, six sub-themes emerged: feelings, thoughts, contributions to knowledge, contributions to professional adaptation, experiences related to professional practice, and experiences related to verbal communication and interaction (Table 2).

Main Theme 1: Feelings and Thoughts Regarding Clinical Practice

Sub-theme 1: Feelings

Based on the data obtained from the interviews, students reported experiencing a range of both positive and negative emotions during the clinical practice process. These included feelings of excitement, joy, fun, happiness, satisfaction, anxiety, stress, sadness, fatigue, pride, and competence.

> "*When I first started, I was excited and cheerful, but now my excitement has diminished and my fatigue has started.*" (P1, male, 22 years old)

> "*It was good. I had the opportunity to learn new initiatives, and the nurses were instructive. I was able to get closer to the profession. It was the best internship of my student years.*" (P10, male, 23 years old)

> "*I was happy to apply the theoretical knowledge we learned at school here. Seeing the working environment, whether it was in intensive care or the operating room, helped me decide which field I want to work in in the future.*" (P12, male, 22 years old)

> "*When I first worked in intensive care, I felt deep sadness for the patients, but I got used to it as I continued.*" (P21, female, 22 years old)

Sub-theme 2: Thoughts

Students expressed various thoughts related to the clinical practice process, including that it was exhausting, variable, instructive, and contributed to self-confidence, professional satisfaction, and awareness.

> "*I saw up close that nursing is a difficult profession, both physically and psychologically. Intensive care, in particular, was very psychologically exhausting for me at first, but I got used to it over time.*" (P11, male, 24 years old)

> "*Since we were interns, we were able to take responsibility for invasive interventions. The practice was very useful in terms of learning. I feel more conscious, and when I look at the cases I encountered, I see that they affected me in a positive way.*" (P13, female, 24 years old)

> "*As interns, being seen more as colleagues than students helped us do our job more willingly. Although we were sometimes still treated as inexperienced, feeling like nurses in general increased my professional satisfaction.*" (P17, male, 22 years old)

Main Theme 2: The Contribution of Clinical Practice to Professional Development

Sub-theme 1: Contributions to the Level of Knowledge

Students reported that clinical practice contributed to their knowledge through learning new skills, integrating theoretical knowledge into practice, raising awareness, identifying deficiencies, building courage, and reinforcing what they had previously learned.

> "*The practice process was more useful than the theoretical and practical training in other courses. It gave me self-confidence, and my knowledge increased considerably.*" (P8, male, 23 years old)

> "*I learned to approach treatments more knowledgeably and consciously. That was the biggest contribution. Earlier practices weren't very productive because we were more passive.*" (P13, female, 24 years old)

> "*It enabled me to perform interventions more courageously and with more awareness. I can now perform procedures and treatments that I was hesitant to do at first more comfortably.*" (P17, male, 22 years old)

Sub-theme 2: Contributions to Professional Adaptation

Regarding professional adaptation, students made statements highlighting the value of hands-on practice, gaining clinical skills, adjusting to the professional envi-

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Table 2. Clinical practice experiences from the perspective of final-year nursing students

Themes	Sub-themes	Codes
1. Feelings and thoughts regarding clinical practice	A. Feelings	A.1. Excited A.2. Cheerful A.3. Fun A.4. Happy A.5. Enjoyable A.6. Agitated A.7. Anxious A.8. Stressed A.9. Sad A.10. Tired A.11. Proud A.12. Sense of self-efficacy
	B. Thoughts	B.1. Exhausting B.2. Variable B.3. Instructive B.4. Builds self-confidence B.5. Professional satisfaction B.6. Increased awareness
2. Contribution of clinical practice to professional development	C. Contributions to knowledge	C.1. Learning new things C.2. Integrating theory into practice C.3. Gaining awareness C.4. Recognizing deficiencies C.5. Becoming courageous C.6. Consolidating knowledge
	D. Contributions to professional adaptation	D.1. Hands-on practice D.2. Gaining clinical skills D.3. Adapting to the professional environment D.4. Orientation to clinical setting D.5. Improved professional competence D.6. Active participation D.7. Gaining experience D.8. Taking responsibility
3 Experiences related to clinical practice	E. Experiences related to professional practice	E.1. Exposure to advanced procedures E.2. Working with diverse patients E.3. Providing holistic care E.4. Team collaboration E.5. Observing out-of-scope practices E.6. Poor hygiene practices E.7. Lack of instructional support
	F. Experiences related to verbal communication/interaction	F.1. Communicating with patients and families F.2. Facilitating cooperation with patients and their families F.3. Lack of empathy toward patients and their families F.4. Insensitivity to patient needs F.5. Negative attitudes and behaviors toward patients F.6. Ignoring patient suffering

ronment, improving professional competence, orienting to clinical settings, actively participating in procedures, gaining experience, and taking responsibility.

> "*I made many professional advances, such as working directly with patients, gaining practical skills in diagnosis, treatment, planning, and implementation, improving communication skills, enhancing critical thinking and decision-making abilities, receiving feedback, and engaging in continuous learning*." (P4, male, 25 years old)

> "*Being active in practice gave me practical experience. It helped me learn tasks I will need in my professional life, such as completing and processing files early*." (P12, male, 22 years old)

> "*This process contributed significantly to my professional development. I gained experience and took responsibility for a patient on my own. I managed the follow-up and treatment*." (P15, female, 23 years old)

Main Theme 3: Experiences Related to Clinical Practice

Sub-theme 1: Experiences Related to Professional Practices

Students shared a variety of experiences related to professional practices, including opportunities to observe or perform advanced procedures, working with diverse patient populations, providing holistic care, and participating in teamwork.

"*I saw different stages of pressure sores in patients. I hadn't seen pressure sores during previous clinical rotations, but I had the opportunity to see more in intensive care. I gained more experience there because the patient is cared for as a whole*." (P2, male, 22 years old)

"*Caring for intubated patients, performing CPR, inserting NG tunes and Foley catheters was very exciting. My clinical practice was very productive, I learned most of the medications. However, I also saw some issues: for example, some nurses take arterial blood gas samples even though it's not part of their job description, and some don't label IV fluids. Sometimes the follow-up of treatments is disrupted*." (P5, female, 23 years old)

"*Sometimes there are situations where patients are touched without gloves, hygiene rules aren't followed, or patients aren't treated politely*." (P10, male, 23 years old)

"*I performed all kinds of procedures under the supervision of nurses during clinical practice. Seeing some patients recover and others being discharged was good preparation for what I may face in the future. However, I also observed problems such as s lack of sterility during aspiration and starting care for a new patient without handwashing after moving from one patient to another.*" (P12, male 22 years old)

"*Since there are no male nurses in some wards, male cleaning staff sometimes administer enemas to male patients, or similar tasks are done by cleaning staff. Unfortunately, some nurses are a bit harsh with patients, and sometimes arguments occur*." (P15, female, 23 years old)

"*There can be confusion because nurses sometimes refer to patients by room and bed number instead of their names. Also, sometimes nurses can be verbally abusive to patients. In Clexane administration, air can be expelled. During aspiration, I observed a catheter being used in the mouth and then reused for lung aspiration without changing it*." (P22, female, 23 years old)

Sub-theme 2: Experiences Related to Verbal Communication/Interaction

Regarding verbal interaction, students shared experiences involving communication with patients and their families. These included establishing cooperation, showing empathy, and also witnessing a lack of empathy, insensitivity to patient requests, negative attitudes, and disregard for patients' pain or needs.

"*I learned to communicate effectively with patients and their families, such as listening to their concerns with empathy and giving clear, explanatory information ... It also allowed me to provide more holistic care by collaborating with different healthcare professionals and considering multiple perspectives*." (P4, male, 25 years old)

"*It is very important to empathize while caring for patients. We need to treat them as if they were our own family members, not just strangers. I had the opportunity to put my experiences and observations into practice. I realized that skills are learned through doing, not just observing. I also believe it was wrong for nurses to mistreat patients during morning care or to push them away suddenly. Some nurses ignored patients' wishes and pain*." (P7, male, 22 years old)

"*The nurse was giving mocking responses to a patient who kept shouting, 'Send me home!*" (P11, male, 24 years old)

"*I don't think it's right for nurses to speak harshly or shout at patients during care. The nurses did nothing when the caregiver spoke to the patient in a rude manner, and the patient ended up swearing at the caregiver*." (P21, female, 22 years old)

Discussion

Within the scope of this research, three main themes were identified regarding students' clinical practice experiences: (1) feelings and thoughts about clinical practice, (2) the contribution of clinical practice to professional development, and (3) experiences related to clinical practice. Each main theme is discussed separately below.

This study found that intern nursing students experienced a wide range of both positive and negative emotions during clinical practice. Previous research has reported that beginning the internship period and performing nursing tasks independently can be quite stressful for students.[18] Experiencing occupational stress during this phase of clinical education may lead to chronic stress,[19] which can negatively impact both learning efficiency and physical well-being.[20] Another study indicated that senior nursing students experience higher levels of stress compared to students in lower grades.[21] Similarly, other studies have reported that clinical practice can be overwhelming, increasing students' anxiety and stress, leading to burnout, and causing feelings of helplessness, especially when instructors are absent in the clinical setting.[22] The emotions expressed by the students in this study align with those findings. The mix of emotions can be associated with their ability to perform clinical tasks more independently while also taking on increased responsibility.

Another key finding of this study was that students described clinical practice as instructive, confidence-boosting, and professionally rewarding. However, some studies report that clinical teaching is not only exhausting but also highly instructive, particularly in terms of developing care and communication skills and supporting students' overall growth.[23] Nursing students may encounter challenging clinical situations such as interpersonal conflict, aggression, acute patient deterioration, cardiac arrest, and patient death. These experiences can contribute to psychological stress, burnout, and anxiety.[24] Although exposure to difficult clinical scenarios increases students' anxiety levels, it also appears to improve their command of clinical practices and provides them with opportunities to experience a variety of procedures. This can be associated with increased awareness, professional satisfaction, and self-confidence.

Regarding the contribution of clinical practice to their professional development, intern nursing students stated that they learned new things, addressed knowledge gaps, gained awareness, and successfully integrated theoretical knowledge into practice. In his study, Wallace reported that internship experiences helped students integrate clinical knowledge with critical thinking, improve prioritization and time management, and expand their communication skills within interprofessional teams.[25] Another study found that students tried to cope with the stress resulting from a lack of knowledge and skills by enhancing their professional comptencies.[26] Furthermore, it has been noted that clinical practice fosters awareness, self-reflection, and personal growth in nursing students.[27] It can be concluded that the internship process not only contributes significantly to students' professional development but also helps them recognize and address their own deficiencies.

Within the scope of the study, students reported that they adapted to the professional environment, increased their professional competencies, actively participated in clinical practices, gained experience, took responsibility, and engaged in hands-on practice. The literature emphasizes that nursing students must adapt to the clinical education environment to ensure effective learning.[18] Numerous studies report that clinical teaching enhances nursing students' professional competence, helps them feel more confident, competent, and prepared for the profession, increases their self-esteem, improves their caregiving skills, fosters a love for the profession, and supports personal development.[23] In a study examining the impact of the internship program on the self-efficacy and professional readiness of senior nursing students, it was found that students' general self-efficacy was at a moderate level. They felt ready for patient care, educating patients and their families, performing invasive procedures, and demonstrating ethical sensitivity.2 In other studies, nursing students' self-efficacy perceptions were reported to be at a high level.[28] It is noted that individuals with high self-efficacy are known to approach problems with resilience, maintaining their determination in the face of challenges encountered in both social and professional life.[29] Studies on this topic have found that consistently structured learning experiences in clinical settings contribute to the effective management of clinical practices and help develop the self-efficacy of nursing students.[30] Additionally, it has been reported that curricular changes in nursing education improve students' self-efficacy and leadership in patient care.[31] Fostering self-efficacy in nursing education nurtures students' adaptability and enhances their capacity to overcome the difficulties they may encounter during undergraduate education, while also reducing student attrition.[32] Although the findings obtained from this study are similar to the literature, it can be said that there is a need for further research specifically evaluating students' experiences in particular clinical settings (e.g., wards, intensive care units, operating theaters, etc.) during their clinical practice.

Within the scope of the study, intern nursing students shared various experiences related to professional practice. These included exposure to different and advanced procedures, working with diverse patient populations, providing holistic care, participating in teamwork, witnessing practices beyond the scope of job descriptions, observing occasional lapses in hygiene practices by nurses, and experiencing moments when nurses were not instructive.

Many studies in the literature have emphasized the importance of staff familiarity with the clinical topics being taught, as well as the effective supervision of students by clinical instructors.[33] Maintaining students' learning motivation under the guidance of clinical instructors and the active role of instructors in facilitating learning[34] have been shown to positively influence trainee nurses' experiences. These factors contribute to students developing a sense of belonging and feeling valued in the clinical environment. It has also been reported that contributing to the personal and professional development of nursing students through internships supports their learning processes.[35] Additionally, it has been noted that there are relatively few studies on students' perceptions of the quality of care provided by nurses. Regarding nursing care, students have observed factors such as task-oriented approaches, lack of communication with patients, and concerns primarily focused on documentation. These observations suggest that students may find it challenging to clearly define what constitutes good nursing care.[36] Previous studies have shown that nursing students often remain passive when they witness poor care practices. They tend to prioritize adapting to the clinical environment, avoid confrontation ("not making a mess"), and focus on successfully completing their clinical practice.[37] In this context, it can be said that while students are exposed to positive, instructive, and motivating clinical teaching practices that support their professional development, they may also occasionally witness inappropriate or unethical practices by clinical nurses. Therefore, there is a need for further research aimed at uncovering and analyzing examples of poor practice in clinical settings.

Within the scope of this study, intern nursing students also reported experiences related to verbal communication and interaction. These included being able to communicate effectively with patients and their families, fostering cooperation, observing a lack of empathy from nurses toward patients and their families, insensitivity to patient requests, negative attitudes and behaviors toward patients, and disregard for patients' pain. Many studies emphasize the importance of effective communication and interaction in clinical environments. These include the appropriate attitudes of clinical staff, showing respect for students, supporting them as part of the team, involving them in educational processes, and encouraging nurses to delegate clinical tasks to students.[33]

It has been reported that student satisfaction with training, positive attitudes toward them, individual supervision, mutual respect, and the supervisor's trust in the student all have a positive effect.[38] Support from nurses also plays a key role in enhancing the clinical experience of trainee nurses Althagafi et al.[39] reported that inappropriate behavior by healthcare personnel and the delegation of non-nursing tasks to students negatively affected the clinical performance of nursing interns. Another study stated that the most significant problems in internship programs were related to the clinical environment, supervision, and communication.[40] Similarly, Al Najjar and Rawas identified unfair treatment of clinical nurse interns, a hostile environment, feelings of restriction, and being ignored by instructors as key factors negatively affecting clinical learning.[27] These findings are similar to the results of our study. In this context, further research is needed to investigate the factors contributing to inappropriate communication and interaction by clinical nurses.

Limitations

This research is limited to the responses of the participants, and the results are dependent on the specific group and environment in which the study was conducted. The small sample size does not represent the entire student population.

Conclusion

As a result of this study, it was determined that intern nursing students gained a wide range of experiences during clinical practice. Clinical practice contributed significantly to their professional development; however, students were also disturbed by inappropriate nursing interventions they occasionally observed. This study is important in that it reveals students' clinical practice experiences in a comprehensive manner.

In this study, clear emphasis was placed on students' experiences and observations related to clinical practice. Students were encouraged to recognize examples of malpractice and reflect on them as part of their clinical learning. Thus, a secondary outcome of the study is the suggestion that certain nursing practices may need to be re-evaluated.

Based on the study's findings, it is essential to provide in-service training to promote positive communication and interaction between nursing students and healthcare professionals. It is also important to ensure that negative experiences and observations during clinical practice are properly reported, and that institutional policies aimed at preventing improper practices are reviewed, for the overall benefit of the healthcare team and patient safety.

Ethics Committee Approval: The study was approved by the Giresun University Social Sciences Science and Engineering Sciences Research Ethics Committee (Approval Number: 06/05, Date: 05.06.2024).

Informed Consent: Verbal and written informed consent was obtained from all participants.

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The Effect of Crossword Labs on Knowledge and Attitudes of Nursing Students in Learning Anatomical Terms: A Quasi-experimental Study

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Abstract

Background: The use of active learning methods in teaching anatomical terms is becoming increasingly widespread. Students often struggle with learning anatomical terms, but digital learning tools can make learning easier.

Aim: This study was carried out to determine the effect of Crossword Labs (CL) on the knowledge and attitudes of nursing students in learning anatomical terms.

Methods: A quasi-experimental pre-post test study was conducted with 99 first-year nursing students. The students were divided into traditional (n=47) and CL (n=52) groups according to whether the last digit of their student number was even or odd. Data were collected between December 2021 and January 2022. Students completed the *Descriptive Characteristics Form*, *Anatomical Terms Knowledge Test*, and *Anatomy Lesson Attitude Scale*. The CL exercises were prepared by the researchers using the "CL" program for terminology learning. Students in the CL group solved the exercises and shared their solutions on the "Padlet" platform with their peers and researchers. Wilcoxon and Mann-Whitney U tests were used to analyze the data.

Results: The CL group had a pre-knowledge score of 11 (10-13) and a post-knowledge score of 13 (12-15). A statistically significant difference was found between the post-knowledge scores of the CL and traditional groups (p=0.008). However, no statistically significant difference was found between the post-attitude scores of the two groups (p=0.961).

Conclusion: Students can be tutored outside the classroom at any time and place when learning anatomical concepts. It is recommended that active learning methods be incorporated into the curriculum to help ensure the retention of difficult-to-learn information.

Keywords: Anatomy, learning, nursing students

Introduction

Anatomy is a descriptive science that studies the structure of the body.[1,2] It requires the use of names to describe these structures. Many terms provide information about the shape, size, location, function, or relationship of a structure with other parts of the body.[1] The names in anatomical content constitute its terminology. Terminology comprises all the terms used specifically in an art, a science, or a technique.[3] It facilitates communication by providing a common language among healthcare professionals in clinical practice.[4] Anatomical terms used in both theoretical and practical fields ensure alignment with experts in international health. For nursing students, terminology plays an important role in enabling communication with colleagues and teammates, ensuring reliable and effective interaction, and defining nursing practices and interventions.[3] The terminology knowledge gained in anatomy courses can be applied to all areas of nursing practice. In this respect, using terminology correctly and appropriately requires frequent exposure in anatomy classes and reinforcement through repetition. Studies have shown that students often find anatomical terms difficult to learn, remember, and understand because they are derived from Latin and Greek.[5–7] As a result, students frequently resort to passive learning methods, such as memorization.[8] However, this approach can lead to difficulties in learning, boredom, and anxiety, ultimately preventing efficient learning.[9] To increase efficiency in anatomy education, research indicates that interactive and technological methods, such as computer-based animations and extracurricular online activities, when combined with traditional classroom approaches, enhance both academic success and knowledge retention.[10–13] For this reason, active teaching methods are recommended to improve the quality of education, increase student motivation, and facilitate learning. In the literature, Crossword Labs (CL) have been identified as one such active learning method.[14,15]

Crossword Labs are the most popular and common word games in the world, invented by Arthur Wynne in 1913.[8] They are defined as a way to keep the mind active and as a comfortable, fun method for individual or group teaching that can be used by students and nurses.[8,16] In addition, CL can serve as a valuable educational tool that promotes active learning, develops critical thinking, and increases vocabulary. Today, CL has begun to be used as an active learning method, especially in the education of medical, pharmacy, and nursing students.[8,17–20] CL allow learners to grasp new concepts through varied designs while having fun. In addition, they help achieve results learning outcomes while increasing students' motivation, interest, and self-confidence.[21] Studies in the literature have reported that CL are effective in improving nursing students' knowledge

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of epilepsy pharmacology, supporting correct spelling of antiepileptic drugs, and facilitating the understanding of terminology specific to forensic medicine, veterinary medicine, cardiac physiology, women's health, obstetrics, and neonatal nursing practices.[8,16–18] CL also provide students with the opportunity to learn anytime and anywhere by offering a fun and motivating online environment with extracurricular activities.[21] They positively influence students' attitudes toward courses, enhance critical thinking skills, support concept recall, and ensure the retention of learned information.[17,18,20–25] However, no study has yet examined the effect of CL on students' attitudes toward anatomy lessons.

In nursing education, students encounter terminology in anatomy courses during the first semester of their first year, often involving terms from languages other than their own. As a result, students face difficulties in learning these terms. In this study, to help students understand, comprehend, and use these terms when necessary, the CL method, which is one of the active learning approaches, different from classical methods, was used to enable students to learn anatomical terminology while having fun.

Aim

This study was conducted to determine the effect of CL on the knowledge and attitudes of nursing students, in addition to the traditional lesson, in teaching anatomical terms.

Study Hypotheses

H_1: CL significantly improves nursing students' knowledge and attitudes toward anatomical terms compared to traditional methods.

Materials and Methods

Design

This study was conducted as a quasi-experimental study with a pre-test/post-test design.

Sample

The research population consisted of 170 first-year nursing students enrolled in anatomy courses at a University's Department of Nursing. The sample included 99 students (traditional=47, CL=52) who agreed to participate in the research. A power analysis was carried out using G*Power 3.1. According to Zamani et al.[26] in 2021, the minimum sample size per group is 22 (effect size=0.74, power=95%, significance level=0.05). Thus, the sample consisted of 94 participants (Fig. 1).

The inclusion criteria were:

1. Taking the Anatomy course for the first time,
2. Having a smartphone or computer,
3. Having Internet access.

The exclusion criteria were:

1. Previous education in a health-related department,
2. Having taken the Anatomy course before,
3. Not completing the post-test.

Instruments

Data were collected using the Descriptive Characteristics Form, the Anatomical Terms Knowledge Test, and the Anatomy Lesson Attitude Scale.

The Descriptive Characteristics Form was prepared by the researchers based on the literature.[13,26,27] The form consists of five questions in total, including age, gender, difficulty of the anatomy course, and the importance of the anatomy course in professional life. Students answered the questions about the difficulty and importance of the anatomy course on a scale of 1 (not at all) to 5 (very difficult).

The Anatomical Terms Knowledge Test was prepared by the researcher, reviewed by three experts, and the final version was created. The final version of the test was administered to 82 second- and third-year nursing students. Item discrimination and item difficulty indexes were calculated based on the responses. As a result of the analysis, it was determined that 9 out of 25 questions had low item discrimination and difficulty indexes; therefore, these nine questions were excluded. The reliability of the remaining 16 questions was tested using KR-20 and KR-21, and the results indicated acceptable reliability (KR-20=0.65, KR-21=0.78). According to Thompson[28] in 2009, KR-20 values of 0.7 and above are sufficient for tests containing 20 or 50 items. Theoretically, KR-20 ranges from 0.0 to 1.0, with values closer to 1 indicating perfectly consistent measurement.[29] The Cronbach's Alpha value of the test was found to be 0.66. Following these analyses, a 16-question "knowledge test" was used in the implementation phase of the study. Correct answers were scored as "1 point" and incorrect answers as "0 points." The knowledge score was calculated out of 16 points.

The Anatomy Lesson Attitude Scale is an "attitude scale for anatomy and physiology lessons" developed by Kılıç and Güven in 2018.[27] The scale is a five-point Likert type, with items rated as "strongly agree=5," "agree=4," "undecided=3," "partially agree=2," and "disagree=1." The scale consists of 38 items in total. The highest score that can be obtained from the scale is 190, and the lowest score is 38. As the score obtained from the scale increases, it indicates that attitudes improve. The Cronbach's Alpha value of the test was calculated as 0.87. Each statement in the total of 38 items refers to both anatomy and physiology lessons. In this study, with the necessary permission of the scale owner, the words "physiology lesson" were removed from the sentence roots of the scale items, leaving only the expressions related to the "anatomy lesson." In this study, Cronbach's Alpha value was calculated as 0.72.

The preparation of CL was carried out by the researchers using the CL program, which can be accessed free of charge (Fig. 2). The prepared labs included terms covering basic knowledge and concepts in anatomy. Students were asked to write the answers to the given clues in the CL, filling the columns either upward or downward. If the answer was correct, the written term appeared in green; if incorrect, the term appeared in red. Students were then asked to post their answers on a virtual wall prepared by the researcher on the "Padlet" platform (Fig. 3). In addition, the terms in CL (https://wordart.com/) were displayed as word clouds using Word Art (Fig. 4).

Procedure

Data were collected between December 2021 and January 2022. Students who were taking the anatomy course for the first time and agreed to participate in the study were included. After the terminology topic of the anatomy course was explained by the researcher, students completed the *Descriptive Characteristics Form, Anatomical Terms Knowledge Test*, and *Anatomy Lesson Attitude Scale* via a Google

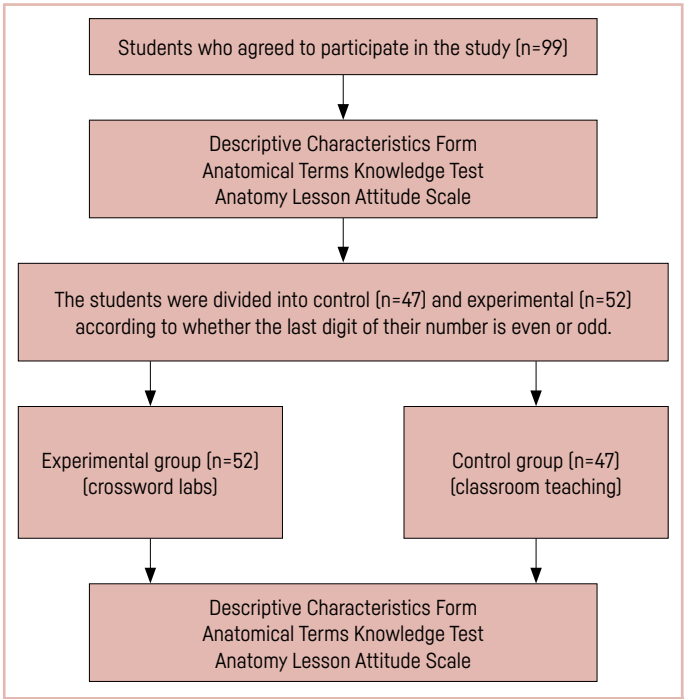

Figure 1. Crossword labs classroom and classroom teaching procedures.

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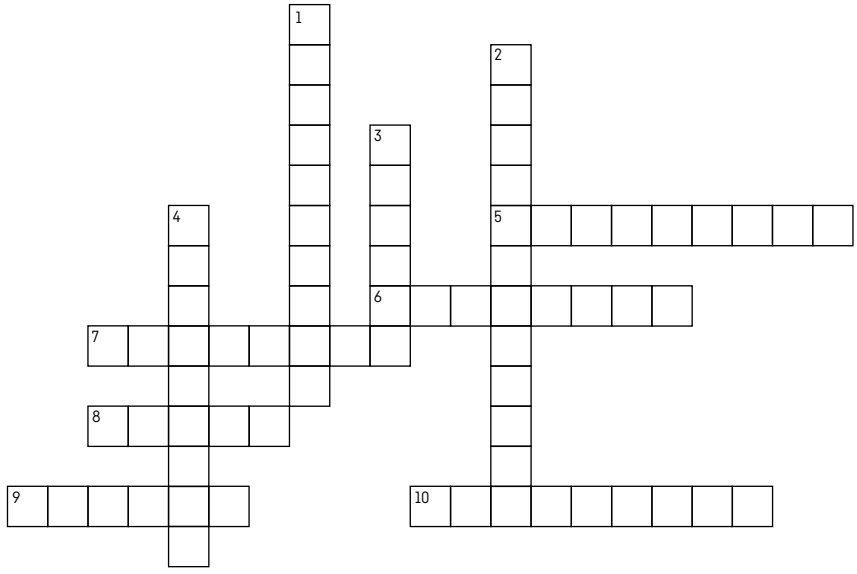

Across

5. Related to or pertaining to the sole of the foot
6. Located on or near the outside; closer to the body surface
7. Below or lower in position; beneath another structure
8. Hand
9. The part of the body between the head and the trunk
10. Located at or relating to the back side of the body

Down

1. Close to the trunk; nearest to the point of origin or attachment
2. Situated away from the center; on or near the surface or outer area
3. Located on or pertaining to the right side of the body
4. Situated farther from the body surface; internal

Figure 2. Crossword puzzles about terms.

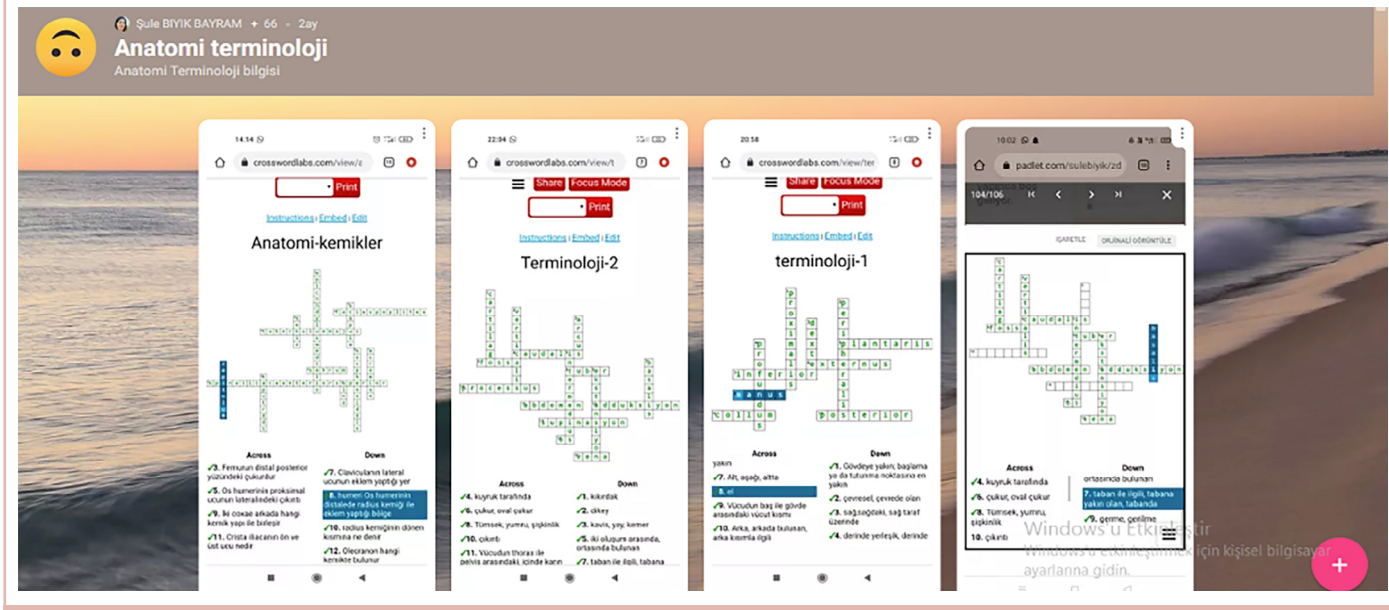

Figure 3. The virtual wall prepared on the "Padlet" platform.

questionnaire (pre-test). Students were divided into the labs group and the traditional group according to whether the last digit of their student number was even or odd. The CL links, prepared by the researchers using the CL program, were sent to the mobile phones of the students in the labs group. These students were asked to solve the CL exercises whenever and wherever they wished and then post their solutions on a virtual wall prepared by the researcher on the "Padlet" platform. Stu-

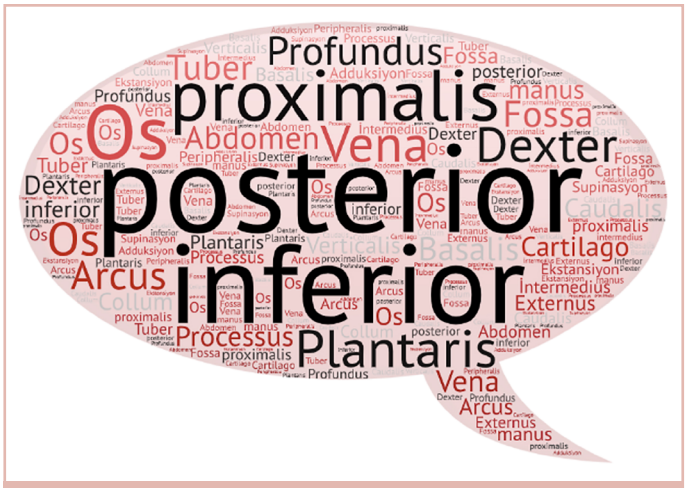

Figure 4. Terms in crossword puzzles.

dents who solved the labs shared their answers on the virtual wall, which was accessible only to the labs group (Fig. 2). Students accessed the virtual wall prepared on the "Padlet" platform using the link sent by the researchers. The researchers checked the students' lab solutions daily by logging into the virtual wall. Messages from the virtual wall were sent to those with missing or incorrect answers. Correct solutions were approved, and students were then allowed to view the answers. In addition, students could ask questions to their peers and the researchers on this wall. By talking to the labs group students, approval was obtained that they would not share information with other classmates. Students were informed that they would first work in the labs group and later in the traditional group. The students in the labs group solved the labs over the course of one week, until the next lesson. On the other hand, the students in the traditional group were not given any additional applications to study after the lesson, and their education continued only with the traditional method. One week later, all students completed the *Anatomical Terms Knowledge Test* and the *Anatomy Lesson Attitude Scale* (post-test) again. After the labs group application was completed and all the data were collected, the CL were also shared with the traditional group students.

Statistical Analysis

The data obtained from the research were evaluated using the SPSS 23.0 (Statistical Package for the Social Sciences, IBM, New York, USA) program. Mean, standard deviation, median, minimum, and maximum values of the measurement data were calculated. The suitability of the data for normal distribution was evaluated with the Kolmogorov-Smirnov test, which showed that the data did not follow a normal distribution. For dependent groups, the Wilcoxon test was used to determine the difference between the pre-test and post-test, and the Mann-Whitney U test was used to determine the difference between the labs and traditional groups. Eta-squared was used to calculate effect size. Data were evaluated at a significance level of $p<0.05$ with a 95% confidence interval.

Ethics Committee Approval

The study was approved by Karadeniz Technical University Faculty of Medicine Scientific Research Ethics Committee (Approval Number: 24237859-943, Date: 15.12.2021). Permission was also obtained from the university. All students were informed about their rights as well as the research purpose, procedure, and confidentiality. Written and verbal informed consent was obtained from all students participating in the study. The study adhered to the principles outlined in the Declaration of Helsinki and complied with established publication ethics guidelines. The authors affirm that no artificial intelligence-supported technology or chatbot was used in the production of this study.

Results

The mean age of the students was 19 years (range: 18–19), with 20.2% male and 79.8% female (Table 1).

Table 1. Descriptive characteristics of students

Descriptive characteristics	Labs group (n=52)		Traditional group (n=47)		Total	
Age: Median (Q_1–Q_3)	19 (18–19)		19 (18–19)		19 (18–19)	
	n	%	n	%	n	%
Gender						
Male	12	23.1	8	17.0	20	20.2
Female	40	76.9	39	83.0	79	79.8

In the labs group, the pre-knowledge score was 11 (range: 10–13), and the post-knowledge score was 13 (range: 12–15). There was a statistically significant difference between pre- and post-knowledge scores of the students in the lab group ($p<0.001$). In the traditional group, the pre-knowledge score was 13 (range: 10–13), and the post-knowledge score was 12 (range: 10–13). There was also a statistically significant difference between pre- and post-knowledge scores of the students in the traditional group ($p=0.042$).

While no statistically significant difference was found between the pre-knowledge scores of the labs and traditional groups ($p=0.061$), the post-knowledge scores were significantly different ($p=0.008$). In the labs group, the pre-attitude score was 111 (range: 106–115.75), and the post-attitude score was 110 (range: 107–115.75), with no statistically significant difference between them ($p=0.805$). In the traditional group, the pre-attitude score was 111 (range: 104–115), and the post-attitude score was 111 (range: 105–115), also with no statistically significant difference ($p=0.559$). It was determined that there was no statistically significant difference between the pre- and post-attitude scores in the labs and traditional groups ($p=0.679$ and $p=0.961$, respectively) (Table 2).

The pre-difficulty scores of the students in the labs group were 2 (range: 2–2.75), and the post-difficulty scores were 2 (range: 2–3). There was a statistically significant difference between the pre- and post-difficulty scores of the students in the labs group ($p=0.022$). The students in the traditional group had pre-difficulty scores of 2 (range: 2–3) and post-difficulty scores of 3 (range: 2–3). There was a statistically significant difference between the pre- and post-difficulty scores of the students in the traditional group ($p=0.010$). However, there was no statistically significant difference between the pre- and post-difficulty scores of the labs and traditional groups ($p=0.137$ and $p=0.060$, respectively). The pre-importance scores of the students in the labs group were 5 (range: 4–5), and the post-importance scores were 5 (range: 4–5). There was no statistically significant difference between the pre- and post-importance scores of the students in the labs group ($p=0.637$). The students in the traditional group had pre-importance scores of 5 (range: 4–5) and post-importance scores of 4 (range: 4–5). There was a statistically significant difference between the pre- and post-importance scores of the students in the labs group ($p=0.001$). There was no statistically significant difference between the pre-importance scores of the labs and traditional groups ($p=0.977$), but there was a statistically significant difference between the post-importance scores ($p=0.031$). The students in the labs group had a benefit score of 4 (range: 4–5), and those in the traditional group had a score of 4 (range: 3–5). There was no statistically significant difference between the labs and traditional group scores ($p=0.655$) (Table 3).

Discussion

This study's findings showed that the CL method used in teaching terminology knowledge in the context of an anatomy course increased the course success of nursing students. Studies in the literature have reported similar results.[8,14–16,18,30–34] The results of these studies indicated that students who studied with CL generally remembered the terms more quickly, found the application useful, increased their knowledge, enabled self-learning, and derived advantages from creative and fun environments.[14–20,28,31,32,35,36] Abuelo et al.[14] in 2016 reported that students found learning new terms boring and difficult, but those who learned with CL remembered the terms better in a shorter time than the rote-learning group, and described CL as useful and entertaining tools. Patrick et al.[15] in 2018 stated that the use of CL improves students' learning, enhances their skills and performance, and

Table 2. Comparison of students' knowledge and attitude scores

Terminology	Labs group (n=52) median (Q_1–Q_3)	Traditional group (n=47) median (Q_1–Q_3)	U	p*	Eta^2
Knowledge					
Pre	11 (10–13)	13 (10–13)	958.00	0.061	0.027
Post	13 (12–15)	12 (10–13)	846.50	0.008	0.092
p**	<0.001	0.042			
Z	3.995	2.029			
Anatomy course attitude					
Pre	111 (106–115.75)	111 (104–115)	1163.00	0.679	0.004
Post	110 (107–115.75)	111 (105–115)	1215.00	0.961	0.000
p**	0.805	0.559			
Z	0.247	0.585			

*: Mann-Whitney U test, **: Wilcoxon test.

Table 3. Comparison of importance, difficulty, and benefit levels of the anatomy course

Anatomy course	Labs group (n=52) Median (Q_1–Q_3)	Traditional group (n=47) Median (Q_1–Q_3)	U	p*	Eta^2
Difficulty					
Pre	2 (2–2.75)	2 (2–3)	1026.00	0.137	0.022
Post	2 (2–3)	3 (2–3)	968.50	0.060	0.001
p**	0.022	0.010			
Z	2.575	2.575			
Importance					
Pre	5 (4–5)	5 (4–5)	1218.50	0.977	0.032
Post	5 (4–5)	4 (4–5)	940.00	0.031	0.055
p**	0.637	0.001			
Z	0.471	3.186			
Benefit	4 (4–5)	4 (3–5)	0.454	0.655	0.003

*: Mann-Whitney U test, **: Wilcoxon test.

develops their cognitive/mental abilities. It has also been noted that this tool encourages students to learn independently and enables them to learn while having fun. Malini et al.[32] in 2019 reported that, based on student feedback, CL were considered creative and entertaining educational tools that helped them understand new words and concepts in physiology, and that such games were more engaging. The results of these studies suggest that CL, one of today's preferred active learning methods, allows students to learn while having fun, wherever and whenever they want, rather than through memorization. Incorporating CL-like practices into the course curriculum reinforces classroom learning, ensures knowledge retention, makes lessons more enjoyable, makes learning easier, increases students' motivation, and ensures the permanence of the information.

This study also found no statistically significant difference in students' attitudes toward the course between the labs and traditional groups. Similarly, Dolu et al.[23] in 2022 reported that the transfer of anatomy course content and learning methods using technological approaches suitable for distance education increased interest in the course, made it more attractive, and enhanced its importance as students' learning levels improved. As a result of this study, it can be said that although the use of extracurricular active learning methods affects students' attitudes toward the lesson, the CL method alone is insufficient for developing attitudes. It is thought that using more than one method, rather than a single method, may be more effective in improving students' attitudes toward difficult and rote-based lessons, since students have different learning styles. Alternative teaching methods that appeal to diverse learners can be offered, allowing students to study in ways that suit them best. Thus, they can access information in various ways and, at the same time, have the opportunity to review it. Students' interest and attitude toward the course significantly affect learning.

This study found that the difficulty of the anatomy course increased significantly in the post-evaluation of both the labs and traditional groups. Bolatlı[13] in 2021 reported that students stated that there were too many foreign words to be memorized in the anatomy course, and that it was a difficult lesson in this respect. Uzun Bağcı et al.[31] in 2022 stated that students found the anatomy course important for its contribution to their profession, and that their awareness of the subject increased. It is thought that the increase in the difficulty of the students, the fact that they are learning terminology for the first time, their frequent encounters with Latin words during labs activities, and their efforts to solve them will make them realize the difficulty of the subject. The level of difficulty perceived by students regarding the course can also influence their perception of its importance.[13]

This study also found that students in the labs group rated the anatomy lesson as statistically more important than those in the traditional group, but the level of importance did not increase in parallel with the rise in the lesson's difficulty. This may be because students did not work with different alternative methods and their clinical knowledge was still insufficient. Terminology positively impacts team communication and the patient care process.[3] When students begin applying their anatomy knowledge in clinical practice, their perceptions of the importance of the course may change. Greater awareness of the course's importance also reinforces the view that it is advantageous. The student who begins to use theoretical knowledge in clinical practice succeeds in solving problems and adopts the view that the knowledge received is useful.

In this study, both the labs and traditional groups stated that the course was helpful. Similar to these results, in 2020 Serin and Zambak[30] reported in their study with physical education teachers, coaching education students, and nursing students that nurs-

ing students considered the anatomy course necessary and showed more positive attitudes than students in other departments. The results of this study suggest that awareness of the difficulty, importance, and benefit of the course can influence one another, and these factors may affect both success and attitudes toward the course.

Limitation of the Study

The study was conducted with nursing students at a single university. Only terminological expressions determined according to the nursing department anatomy course curriculum were used in the labs. Randomization was not applied in sample selection because there might have been interaction between students. Since this study was conducted at one university and only with first-year nursing students, the findings cannot be generalized to the entire population, which is a limitation of the study.

Conclusion

The use of CL in nursing education was found to significantly enhance students' knowledge acquisition, although it did not affect their attitudes toward the course or their perception of its importance. Interestingly, CL activities increased the perceived difficulty of the course, yet students still reported finding them beneficial. The early introduction of Latin anatomical terms contributes to the perception of anatomy as a challenging subject, reducing students' motivation and academic performance. Nevertheless, these terms remain essential for building a strong professional foundation. Incorporating CL activities more frequently and systematically throughout the semester, alongside traditional teaching methods, can help counteract negative perceptions, sustain student engagement, and foster deeper interest in the subject. Overall, CL supports students' academic development and professional preparation, though future studies with longer interventions and more diverse populations are needed to further evaluate its long-term effects.

Ethics Committee Approval: The study was approved by the Karadeniz Technical University Faculty of Medicine Scientific Research Ethics Committee (Approval Number: 24237859-943, Date: 15.12.2021).

Informed Consent: Written and verbal informed consent was obtained from all students participating in the study.

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Effects of Authentic Education Based on Watson's Theory of Human Care on Care Orientation in Nursing Students

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Abstract

Background: Nursing education is instructor-oriented and influenced by traditional medicine. Such an approach to teaching may make it difficult for nurses to develop a humanistic understanding of care.

Aim: This study explored how authentic education, rooted in Watson's Theory of Human Caring, impacts nursing students' care orientation and perceptions in a Caring Behaviors course.

Methods: This mixed-methods study included 74 students, divided into intervention and control groups. The intervention group received a semester of authentic learning based on Watson's Theory. Quantitative data were collected via a Personal Information Form and the Caring Nurse-Patient Interaction Scale. Qualitative data were obtained through reflective writing and focus group interviews with 15 participants from the intervention group. The chi-square test, Mann-Whitney U test, and paired samples test were used for data analysis.

Results: The median age of the students was 20 years, with 89.2% of the intervention group and 86.5% of the control group being female. There were no significant demographic or personal differences between the groups. Following the training, the intervention group showed significant improvements in care orientation and applicability scores. Qualitative interviews identified key themes such as humanism, altruism, awareness, and authenticity.

Conclusion: Integrating Watson's Human Care Theory with authentic learning methods in caring behavior courses enriches instruction, broadens nursing students' understanding of care beyond physical needs, and aligns with the theory's humanistic principles.

Keywords: Authentic learning, care, care orientation, caring behaviors, nursing, Watson's Human Care Theory

Introduction

Watson's Theory of Human Caring defines authenticity as recognizing reality, engaging in self-exploration, reaching personal potential, and taking autonomous action.[1,2] Authentic learning, rooted in the concept of authenticity, is ideal for teaching the theory through exploration, interaction, collaboration, reasoning, discussion, problem-solving, and fostering creativity.[3,4] Authentic learning is a learner-centered approach in which students co-construct knowledge by engaging in real-life tasks that require the higher-order thinking skills used by experts in their daily practice.[5] Authentic learning supports the holistic development of learners by enhancing their cognitive, psychomotor, and affective domains.[6] In this process, nursing students actively engage, giving meaning to knowledge for themselves, their patients, and the nursing profession.[7] Authentic learning in nursing education involves creating experiences that closely mirror the challenges and complexities of real clinical settings.[8] Therefore, students acquire sustainable skills such as decision-making, patience, flexibility, and the ability to think from different perspectives.[4] Preparing nursing students to meet the complex challenges of their professional careers is crucial. Traditional didactic teaching methods have limitations in providing students with a deep understanding of clinical contexts and the practical skills required for effective nursing practice. Authentic learning is of great importance as it addresses the widely acknowledged global challenge of bridging the gap between theoretical knowledge and clinical practice.[8] Watson emphasizes the importance of integrating care, nurturing relationships, relational ontology, holistic perspectives, love, and care awareness into education.[9] Watson's theory, when applied, focuses on nurses and patients in care, and on educators and students in education. Sitzman adapted the theory to authentic learning, centering educational improvement strategies.[10] Sitzman identifies key processes as altruism, respect, trust, authentic listening, problem-solving, accommodating needs, fostering a respectful environment, aligning care with needs, and believing in miracles. Watson emphasizes love and striving to know as essential for nursing fulfillment.[9] Authentic education, aligned with Watson's theory, integrates emotion and knowledge. The literature shows that nurses often focus on technical aspects while neglecting compassionate care.[11] Nurses frequently emphasize technical tasks such as monitoring medication effects, vital signs, clinical procedures, and doctor consultations.[12] At this point, the questions "What is the purpose of nursing education?" and "What should be the purpose of nursing education?" naturally arise. Collier-Sewell and Monteux, who explored this issue, stated that nursing education serves as a standard for nurses entering the profession to ensure the provision of safe and effective care.[13] In this context, incorporating perspectives from authentic education and Watson's theory into the

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educational process would foster care awareness in students. This study assumes that authentic learning supports the internalization of care practices to be applied in clinical settings. It is anticipated that students will both develop an awareness of the significance of care and reflect it in clinical practice by believing in its feasibility. This study aimed to assess how authentic education based on Watson's theory influences nursing students' care orientation and perceptions of caring behaviors.

Research Hypotheses

H0: There is no difference in care-oriented nurse-patient interaction between the training group who took the Caring Behaviors course and the control group.

H1: There is a difference in care-oriented nurse-patient interaction between the training group who took the Caring Behaviors course and the control group.

Research Question

How does authentic education based on Watson's Theory of Human Caring, implemented in the Caring Behaviors course, shape nursing students' experiences and perceptions of caring?

Materials and Methods

This study used both quantitative and qualitative methods to ensure comprehensive insights and minimize research bias.[14,15] The study's quantitative component was a quasi-experimental pretest-posttest design with a non-randomized control group, while the qualitative component employed phenomenology to explore students' perceptions.[16] The study group consisted of 74 volunteer students—37 who took the elective Caring Behaviors course and 37 who did not—selected from among 124 second-year nursing students at a large state university in northern Türkiye between October 2020 and January 2021. The sample size was determined using power analysis with the G*Power 3.1.9.7 program. The effect size assumption was based on Cohen's guideline values, and a large effect size (Cohen's d=0.80) was adopted.[17] In the analysis, the significance level was set at α=0.05, and the statistical power (1–β) at 0.90. Accordingly, with 37 participants in each group (74 total), the study was determined to have adequate statistical power based on the specified parameters. Inclusion criteria were second-year nursing students without psychiatric problems who were taking the course for the first time. Students who missed more than two weeks of classes or who did not wish to participate in the research were excluded. The Caring Behaviors course is an elective course designed to cover the concepts and caritas processes of Watson's Theory of Human Care, delivered in weekly two-hour sessions over 14 weeks. The course was conducted online, synchronously, throughout this period. The intervention group comprised 37 students who enrolled in the course, whereas the control group consisted of 37 students who did not participate. For the qualitative component, volunteers were purposely selected from the 37 students who took the course. Almost all students volunteered; however, due to the nature of qualitative research, the interviews were concluded after the second focus group, with a total of 15 students, at which point data saturation was achieved.

Data Collection Tools

This study used both qualitative and quantitative methods. Quantitative data were gathered using a *Personal Information Form* with six questions and the *Care-oriented Nurse-patient Interaction Scale*. Qualitative data were collected via a Semi-Structured Questionnaire.

Personal Information Form

This questionnaire consists of seven items, including age, gender, place of residence, voluntary admission to the department, hospitalization experience, presence of a major illness in the family, and personal definitions of care.

Caring Nurse-patient Interaction Scale (CNPI-70)

Developed by Cossette et al.[18] and validated in Turkish by Atar and Aştı[19] in 2012, this scale is based on Watson's theory. It includes 70 items across ten sub-dimensions, assessing attitudes and behaviors in clinical practice using a 5-point Likert scale. Scores range from 70 to 350, with higher scores indicating more positive attitudes towards care-oriented nurse-patient interaction. The Turkish version's Cronbach's alpha values are 0.99, 0.98, and 0.99 for importance, adequacy, and applicability, respectively. In this study, Cronbach's alpha values for importance and applicability were 0.98 and 0.99, respectively.

Semi-structured Questionnaire

This form consists of six open-ended questions designed by the researchers to explore nursing students' perceptions of authentic education based on Watson's Theory of Human Care. It was prepared under the guidance of an experienced researcher who has been teaching qualitative research and theory courses at the doctoral level for many years. Additionally, five faculty experts from various fields of nursing were consulted for their opinions. Example questions include: "What does 'being care-oriented' mean to you?" and "How have your views on 'being care-oriented' changed after this course?"

Procedures

The elective Caring Behaviors course was structured and conducted over one semester based on Watson's theory. This course was taught synchronously online during the 2020–2021 Fall Academic Semester, spanning 14 weeks and totaling 28 hours. At the beginning of the semester, 124 second-year students were interviewed. Of these, 40 enrolled in the elective Caring Behaviors course, while 84 chose other elective courses. A total of 74 students completed a voluntary informed consent form, including 37 students from the Caring Behaviors course and 37 from other electives. All volunteer students completed a pre-test before the courses began and a post-test at the end of the semester. At semester's end, the 37 students who had taken the Caring Behaviors course were reminded about the qualitative interviews and invited to volunteer again. All agreed to participate. However, as data saturation was achieved with 15 students over two sessions, the study was concluded. The research plan is presented in Figure 1. Qualitative interviews were conducted on the same day as two focus group sessions via the online platform used for the course. The first session included eight students and lasted 82 minutes; the second included seven students and lasted 66 minutes. Data were collected by a researcher who was not responsible for teaching the course. Students were coded to ensure confidentiality. The first researcher, who had attended various care courses, conducted the course itself. The other two researchers had no teaching responsibilities, and all data were collected by researchers not directly responsible for the course.

Intervention Group

The elective Caring Behaviors course was structured and conducted over one semester based on Watson's theory. It was taught synchronously online during the 2020–2021 Fall Academic Semester, spanning 14 weeks and totaling 28 hours. The course focused on the moment of care, call for care, healing processes, interpersonal care relationships, and examples of good care and caring behaviors. The relationship between students and the educator was shaped in line with authentic learning processes integrated into Watson's theory. These processes, outlined above, were used whenever a student interacted, both in and out of class, to create a culture of care and ensure that students reflected this humanistic relationship in their caring behaviors. Students participated in the course not as passive listeners but as active participants drawing on real-life experiences. In line with the nature of authentic learning, students were asked to prepare reflective writings and share real-life and personal experiences on the weekly topics before class, and all students actively participated by discussing these preparations during the lesson. Reflective writing, through the reading and responding to students' reflective narratives, facilitates the development of clinical reasoning. This is achieved by promoting mindfulness during clinical encounters, which includes exploring patient narratives and initiating diagnostic reasoning. The process also involves challenging existing assumptions, examining the emotional responses of both patients and students, and encouraging the consideration of alternative perspectives.[20] In this study, reflective writing was used to bring life experiences, an important component of authentic learning, into the classroom. Students were asked each week to write about their own, their families', or their loved ones' illness or hospitalization experiences and bring them to class. These real-life experiences were discussed by the whole class, with at least two writings tied to the weekly topic. The current situation was explored in depth, especially through "slowing down," a core element of reflective writing. First, the student who prepared the writing read it aloud to the whole class. Then, the rights and wrongs of the situation were discussed. Students whose ideas and feelings were most engaged were asked further questions, such as: "How would you want to be treated if you were this person?," "What would you do if you were caring for this person?," "What are

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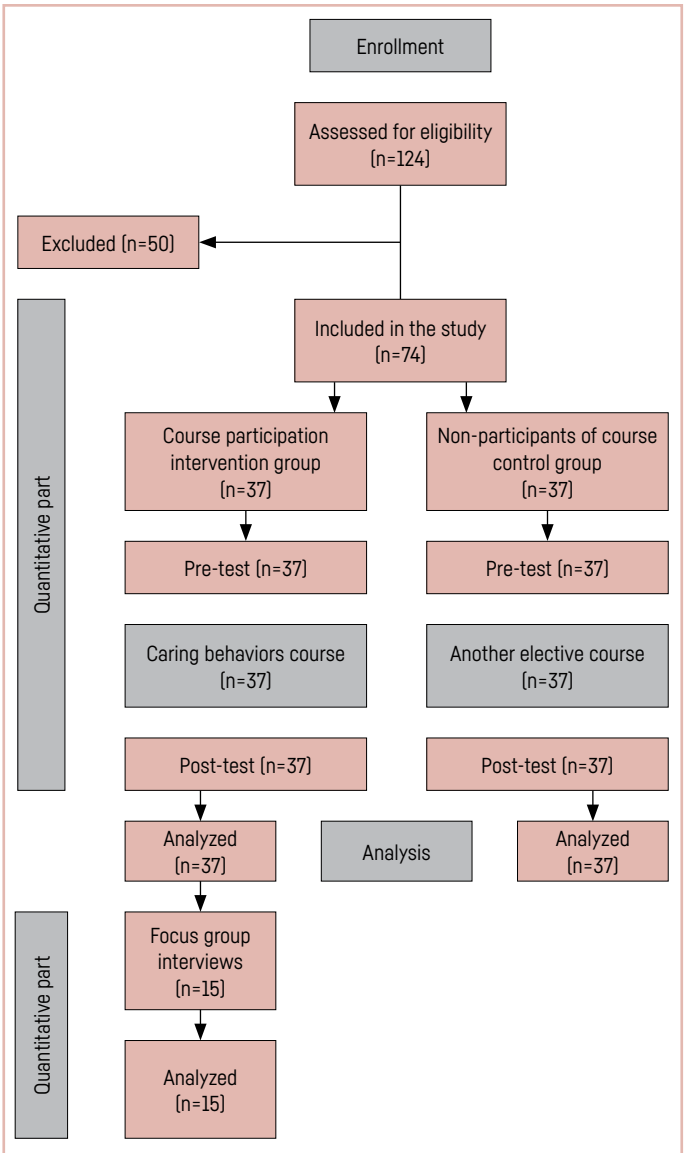

Figure 1. Research plan.

the essentials in caring for him/her?" and "What diagnoses would you consider, and what would you do?". They were then asked to write down their ideas and feelings. The writings were read aloud in class by volunteers. Reflective writings related to each dimension of the process were discussed weekly, and the training schedule is presented in Table 1.

Control Group

No intervention was applied to the control group; students in this group took other elective courses that did not include topics related to caring behaviors.

Ethical Dimension

Ethical approval (No. 2021/280) was granted by the Ethics Committee. Students were informed about the study at the outset, and it was conducted with those who consented to participate. To avoid bias, quantitative and qualitative data were collected by researchers who were not responsible for the course. No identifying information was requested to ensure anonymity. Qualitative data were labeled as S1, S2, and so on. The study was conducted in accordance with the Declaration of Helsinki principles. Artificial Intelligence (AI)-supported technologies were used to edit the translation of the manuscript from Turkish into English.

Data Analysis

Quantitative data were analyzed using IBM SPSS v.23 (IBM Corp., Armonk, NY, USA). Data were presented with descriptive statistics such as numbers, percentages, arithmetic mean, standard deviation, median, and minimum and maximum values. The conformity of the data to a normal distribution was examined. The chi-square test was used for categorical variables, and the Mann-Whitney U test for continuous variables, to verify differences in demographic and personal characteristics within and between groups. Caring Nurse-Patient Interaction Scale (CNPI-70) scores were compared between groups using the Mann-Whitney U test and within groups using the paired samples test. The statistical significance level was set at $p<0.05$.

Qualitative data were analyzed using Creswell's (2017) six-step thematic analysis: transcribing interviews, reading and noting data, categorizing and coding, creating themes, presenting themes, and interpreting data.[14]

Assignments were evaluated using content analysis following Strauss and Corbin's (1998) method: combining writings, analyzing them in detail, and integrating the results with focus group data.[21]

Validity and Reliability

Following Morse's[22] approach, validity and reliability were addressed throughout the entire research process, from design to interpretation, rather than only at the final stage. Before implementation, the semi-structured questions were reviewed by five experts. After the focus group discussions, data were analyzed separately by two researchers using Creswell's six-step qualitative data analysis approach. First, the audio data were transcribed, prepared, and organized for analysis. Then, all the data were read, coded, and analyzed to generate themes and explanations. These themes were subsequently transformed into narratives, and the findings were interpreted.14 The codes and themes generated by both researchers were compared, and similarities, overlaps, and differences were evaluated. The final version of the themes was determined through consensus on the differing points, with most themes showing a high degree of similarity and harmony. The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist was used to report the manuscript.[23]

Results

The median age of the students was 20, with 89.2% of the intervention group and 86.5% of the control group being female. In the intervention group, 59.5% of students reported that they had willingly chosen their department, compared with 54.1% in the control group. Most participants in both groups reported family health issues. There were no significant demographic or personal differences between the groups ($p>0.05$). The results are shown in Table 2.

Findings of the Care-focused Nurse-patient Interaction Scale

A statistically significant increase was observed in the CNPI-70 importance scores within the intervention group, accompanied by a notable difference in post-test scores between the intervention and control groups ($U=249.500$, $p=0.000$). A statistically significant difference was found between the pre-test and post-test scores within the intervention group, indicating the effectiveness of the intervention ($t=-3.778$, $p=0.001$). A statistically significant difference was also observed in post-test scores for the CNPI-70 applicability subscale, favoring the intervention group ($U=251.500$, $p=0.000$). Moreover, a significant within-group difference was observed in the intervention group ($t=-3.997$, $p=0.000$). In the intervention group, no significant differences were found in pre-test scores across the CNPI-70 sub-dimensions (humanism, hope, sensitivity, helping relationship, emotion, problem-solving, teaching, environment, needs, and spirituality) ($p>0.05$). However, post-test scores showed significant improvements ($p<0.01$). No statistically significant within-group differences were observed in the control group for the CNPI-70 overall importance, applicability, or its sub-dimensions ($p>0.05$) (Table 3).

Findings Related to Qualitative Data

Qualitative data included focus group interviews and reflective writing from 15 Caring Behaviors students (12 female and three male). Four themes emerged: (1) humanism, (2) altruism, (3) awareness, and (4) authenticity. The findings are summarized below.

Table 1. Watson's theory-based training program

Watson's theory-based subject headings	Concepts related to watson's care science curriculum (Hills et al.,[9] 2021)	Authentic learning methods used
Week 1 Concept of care	**Care:** Developing caring knowledge is a philosophical and epistemic process. Nursing educators should support students' growth into compassionate nurses, valuing relationships and fostering development.	Students were warmly welcomed, introduced, and engaged in setting classroom rules. The concept of care was discussed to raise their awareness.
Week 2 Human care theory – moment of care	**Relational Ontology:** Connecting students by sharing and respecting their experiences and interpretations with the educator.	Each student shared a proud memory, discussed positive emotions, and received appreciation to reinforce their caring memory and self-belief.
Week 3 Being present, offering presence, authentic listening	**Care Awareness:** Nurse educators must be consciously aware of their intention both to protect students' dignity in the classroom and to support them on their learning journey.	Students shared their answers to "Who is a nurse?" in class, promoting group synergy and enhancing professional awareness through reflective writing.
Week 4 Accepting the individual, being person-centered, providing comfort	**Integrity and Holism:** These concepts teach students to view individuals holistically, considering both their environment and physical dimensions. **Reflection:** This component involves recalling practice experiences to gain insight through reflection.	Students shared their personal care experiences and expectations through responses to questions about their hospital treatments.
Week 5 Eye contact, calling by name, smiling, touching	**Care Awareness:** Nurse educators must be consciously aware of their intention both to protect the dignity of students in the classroom and to support them on their learning journey.	Students were invited to share positive and negative nursing examples from the media in class and to express their feelings openly.
Week 6 Student presentations (on caring behaviors)	**Love:** In nursing education, this concept involves ethically supporting and inspiring students to enhance their learning and success.	Students presented and discussed their pre-prepared writings on caring behaviors, highlighting the concept of love and its role in nursing.
Week 7 Humanitarianism dedication, hope, and sensitivity	**Care:** Developing caring knowledge is both philosophical and epistemic. Educators guide students to become compassionate nurses, supporting their growth and valuing their relationships.	Sample care practices emphasizing the healing power of nursing were shared in articles, read by students before class, and discussed during the session.
Week 8 Help, trust relationship, expression of feelings	**Care Relationship:** Rooted in respect, dignity, and freedom, caring relationships with instructors help students form similar bonds with patients and colleagues.	Each student was asked to write about the type of nurse they would want to receive care from, and prominent concepts were discussed in class.
Week 9 Problem-solving, teaching, and learning	**Care Awareness:** Nurse educators must consciously protect students' dignity and support their learning journey.	Awareness was raised through videos on individualized learning and teaching.
Week 10 Improvement processes – recovery environment	**Integrity and Holism:** These concepts help students recognize that individuals are interconnected with their environment and cannot be understood solely through their physical dimensions.	Students drew and discussed pictures of caring behaviors, focusing on how the care environment impacts recovery.
Week 11 Healing processes –helping with physical, emotional, and spiritual needs	**Care Relationship:** Grounded in values like respect for life, dignity, and freedom, caring relationships with instructors help students form similar connections with patients and colleagues.	Students imagined their hospitalization experiences and shared their needs, helping them recognize expectations and support individualized care.
Week 12 Healing processes –spirituality	**Relational Ontology:** Students connect with the educator by sharing and reflecting on their experiences, respecting each other's ideas, beliefs, and stories.	A real example of good care experienced by the trainer was shared with the class and discussed as a real-life experience.
Week 13 Student presentations	**Reflection:** This component involves recalling key aspects of experiences to gain insight and reflect on reactions and feelings.	Students' top three care-related articles were selected by class vote and published on the nursing department's website.
Week 14 Evaluation	**Love:** This concept emphasizes ethical practice and inspiring students by contributing to their learning and success.	Students freely evaluated the educational process.

Theme 1. Humanism

Students who participated in the study reported that, before taking the course, they believed nursing focused only on the physiological aspects of the human being. After completing the course, they realized that nursing approaches the human being from a much broader perspective, viewing each person as a unique individual. They also came to understand the importance of recognizing, loving, and valuing the person while providing care. One student expressed the importance of understanding human beings in nursing care as follows:

> *"Care begins with understanding a person and their needs. Respect, love, and making them feel valued are crucial."* (S12)

Students expanded their understanding of nursing care from focusing solely on physiological needs to embracing universal caring behaviors. It is evident from one student's reflective writing that care extends beyond physiological needs:

> *"I used to think of care as taking blood pressure, oral care, or foot care... But after this course, I think care is not looking, it is seeing, protecting, tolerating, welcoming, feeling good, making them feel good, and understanding."* (S15)

Another student expressed a similar idea in their reflective essay, stating that two approaches to care exist:

> *"We have two ways of giving care: one is through routine tasks that are the same for everyone, and the other is through individualized care that we offer by bringing caring behaviors with us."*

Students emphasized the importance of accepting human beings as a whole and providing holistic care. They highlighted love and respect for people as essential components of nursing care:

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Table 2. Comparison of characteristics of intervention and control group

	Control group (n=37)		Intervention group (n=37)			
	Mean±SD		Mean±SD		t*	p
Age (mean±SD)	20.19±2.36		20.00±2.36		-0.403	0.927
	n	%	n	%	χ^2	p
Sex						
Female	32	86.5	33	89.2		
Male	5	13.5	4	10.8	0.126	0.722
Place of residence						
Province	20	54.1	14	37.8		
District	13	35.1	12	32.4		
Village	4	10.8	11	29.7	4.365	0.113
Willingness to come to the department						
Yes	20	54.1	22	59.5		
No	17	45.9	15	40.5	0.220	0.815
Previous hospitalization experience						
Yes	15	40.5	15	40.5		
No	22	59.5	22	59.5	0.000	1.000
A family member has a significant health problem						
Yes	22	59.5	23	62.2		
No	15	40.5	14	37.8	0.570	0.812

*: Independent samples t-test, χ^2: Pearson chi-square. SD: Standard deviation

Table 3. Distribution of intervention and control group students' Caring Nurse-Patient Interaction Scale (Short Form) (CNPI-S) importance and applicability total mean/median scores before and after training

CNPI	Control group (n=37)	Intervention group (n=37)	Test[a]	p
	Mean±SD/median (min-max)	Mean±SD/median (min-max)		
CNPI–importance total				
Pre-test	287.35±33.09/ 284 (210–348)	298.16±35.73/ 295 (216–349)	U=578.000	0.249
Post-test	290.62±31.53/ 283 (212–344)	327.16±27.95/ 344 (278–350)	U=249.500	**0.000**
Test[b]; p	t=-0.436; 0.665	t=-3.778; **0.001**		
CNPI–applicability total				
Pre-test	285.41±33.62/ 276 (190–345)	295.14±38.26/ 297 (205–345)	U=572.000	0.222
Post-test	288.11±39.58/ 280 (213–350)	326.89±27.40/ 344 (279–350)	U=251.500	**0.000**
Test[b]; p	t=-0.317; 0.753	t=-3.997; **0.000**		

[a]: Mann-Whitney U Test, [b]: Paired samples test. SD: Standard deviation

"We must first see the person as a whole, showing love and respect. Essential caring behaviors include establishing trust, smiling, helping, and keeping promises to make them feel genuinely supported."

Theme 2. Altruism

Most students reported changes in patient interactions and care orientation after the course, showing increased readiness to help, greater emphasis on altruism, and more enjoyment in helping relationships:

"We sense people's silent cries and rush to help. The feeling of touching a life and being a healer is indescribable. Their smiles and admiration make me feel like a hero." (S6)

In one assignment, another student described nurses are superheroes who appear in moments of danger and fear to provide support:

"In superhero movies, characters like Batman and Spider-Man are admired, but the real heroes are nurses. They show up in our most dangerous moments, thinking of patients at all times..."

Another student used a metaphor about care in their reflective writing:

> *"Care is about being the door that the individual trusts and making them feel that they can knock on that door at any time."*

Theme 3. Awareness

The findings identified two sub-themes: individual awareness and professional awareness. Most participants reported positive developments in both areas.

Subtheme 1: Individual Awareness

All participants stated that the course fostered greater self-awareness as nurse candidates. Some sample statements include:

> *"Knowing that you will be a nurse, knowing that you will help people you don't know, being aware that you will do something to help someone regain their health is a feeling that makes you very happy and makes you proud of yourself."* (S7)

Students also expressed that they realized they would be able to provide better care to patients after this course and felt proud of themselves:

> *"The basis of nursing is care. This course has been effective, as if completing a piece of the puzzle, and I do not doubt that we will be very good caring nurses in the future... I am proud of myself"* (S12)

Subtheme 2: Professional Awareness

In their responses, students stated that the Caring Behaviors course helped them develop professional awareness of nursing. Sample statements are presented below:

> *"I understood, heard, felt, grasped nursing, and reached all these thoughts thanks to this course."* (S15)

Many statements in the reflective writings emphasized professional awareness. Examples include:

> *"Nursing is an art. Just as an artist cares and values his art, a nurse approaches the individuals they care for with love and compassion... For many people, nursing is seen as a profession, a duty, but it is not just a duty; it is more than that."*

Theme 4. Authenticity

Students emphasized authenticity, noting that care should not consist of standard, robotic behaviors but should instead be offered naturally and sincerely:

> *"I think care should be natural; being contrived does not change anything in the other person. On the contrary, they feel that they are not taken care of, and they may suffer emotionally and physically."* (S5)

Some students spoke about the authenticity of caring behaviors, stressing that nurses acting like robots hinder good care, and highlighting the importance of authentic listening. Sample statements include:

> *"In my opinion, care... most importantly, even a smile can be giving care. If the nurse never smiles and acts like a robot, this is not an example of good care."* (S1)

> *"Authentic listening means that the more authentic and sincere a person is, the more natural and personalized the care that results."* (S8)

In another reflective writing, one student used the following statement:

> *"We are committed to healing through voice, touch, and expressions. Authenticity is crucial, as patients value genuine interactions."*

Discussion

Historically, nurses have emotionally distanced themselves, focusing on treatment rather than engaging in patients' life journeys.[24] Nurses must graduate with the ability to provide holistic care that addresses both the disease and the person.[25] Educators should understand care concepts, use appropriate models, and apply pedagogical methods reflecting these models. Watson's theory offers a framework for this, and the authentic learning method aligns with its philosophy.[9,26] The study found that combining Watson's theory with authentic learning improved students' care orientation. Quantitative results showed that students who took the course developed more positive attitudes toward care-oriented nurse-patient interaction. These students also recognized the importance and applicability of care in all sub-dimensions of the measurement tool derived from Watson's concepts. In the literature, studies on care orientation have generally focused on its quantitative dimension. One study reported that students' perception of caring behaviors improved as their academic year progressed.[27] The present study demonstrated that authentic education based on Watson's theory significantly improved care perception among the trained group compared to both pre-training and untrained groups, despite participants being second-year students with initially low care perception. Nursing students often prefer interactive, modern education over outdated, one-way didactic methods.[28] In this study, authentic learning methods replaced one-way knowledge transfer by incorporating weekly reflective writings, discussions of personal drawings, and sharing proud moments. These strategies enhanced students' real-life understanding, professional awareness, and care awareness. Writing clinical narratives has been shown to aid self-reflection and emotional expression.[24] The purpose of reflective writing in nursing is to help students organize their thoughts, reflect on experiences, and foster the growth of clinical judgment. Reflection enables students to better understand their patients' problems and prepare themselves for future patient encounters. Reflective writing assignments thus provide a structured platform for students to reflect on their clinical experiences.[29] This study suggests that reflective writing, an authentic learning method, is effective in broadening perceptions of care not only because it inherently supports clinical preparation but also because it is integrated into Watson's philosophy of care. In this context, Huang et al.[30] found that guided reflection-based education improved empathy, caring behaviors, and competence in first-year nursing students. Reflective writing allowed students to connect deeply with the concept of care through real-life experiences. In Norman et al.'s study,[24] a hospital where care is provided according to Watson's theory was examined. In this setting, nurses behaved authentically, guided by scientific articles reflecting examples of good care. They reported witnessing miracles through creating a healing environment and celebrated their compassionate hearts. Nurses in the same hospital were further motivated by receiving the "Compassionate Care Award," based on a patient's "thank you" letter.

Qualitative findings revealed themes of humanism, altruism, awareness, and authenticity. Watson claimed that reducing an individual to the status of an object is contrary to the philosophy, values, heritage, theories, and professional perspective of nursing.[9,31,32] This study found that students developed a broader understanding of care beyond a mechanistic perspective. While no other study has used authentic learning specifically based on Watson's theory, similar results are supported in the literature. Smith and Kennedy found that authentic learning in an evidence-based practice course enhanced in-depth learning and supported both collaborative and independent work.[33] Another study reported that an authentic learning environment reduced nursing students' stress while improving their altruism and emotional intelligence.[34] In an oncology nursing course, students watched six videos by Ann, a nursing professor with breast cancer, as an authentic learning activity. The videos covered diagnosis, surgery, treatment, and survival. Students reported increased awareness of humanistic care, particularly the importance of compassion in patient interactions.[35] Our study, based on Watson's theory, showed that students developed humanism, altruism, awareness, and authenticity in care. The literature indicates that patients prefer authentic nurses and find them more reliable.[1] Authentic care involves nurses understanding both patients' words and feelings.[24] The course fostered authenticity by encouraging students to freely express their feelings and thoughts. In this context, reflective writing proved effective. A qualitative meta-synthesis study reported that reflective writing fosters reflection and self-reflexivity, which in turn support skill development, professional growth, and adaptability to change, while also cultivating empathic attitudes and sensitivity toward one's own and others' feelings. The same study emphasized the importance of incorporating reflective writing into education.[28]

Nurse educators must also understand their own perceptions of care to effectively develop and enhance students' perceptions.[31,36] In this study, the researcher observed essential caring behaviors, such as using names, smiling, showing empathy, and expressing appreciation. Both educators and students practiced these behaviors, fostering a supportive learning environment. This affective climate helped students realize that caring behaviors are both important and applicable, while also allowing them to feel proud of themselves. Hills et al.[9] note that the caring interaction between students and educators closely resembles the caring interaction between patients and nurses. The concept of "Caritas" in Watson's healing processes

represents "loving, caring, appreciation, kindness, compassion, and generosity of spirit."[24,32] Caritas processes foster healing, honor, and humanity, with nurses viewing care as a calling rather than merely a job.[2,24] In this study, the caring interaction between students and educators, facilitated through authentic learning methods, enhanced students' perception of care. By engaging in authentic listening, showing empathy, and providing sincere responses, students recognized the value and applicability of caring behaviors, thereby promoting a person-centered, holistic approach.[9]

Limitations of the Study

The study's limitations include the small number of students due to the elective nature of the course, the online education necessitated by Coronavirus Disease 2019 (COVID-19), and its being conducted at a single institution, which limits generalizability.

Conclusion and Recommendations

The Caring Behaviors course, based on Watson's Theory and authentic education, increased nursing students' awareness of care orientation and broadened their focus to humanistic concepts such as humanism, altruism, authenticity, and awareness. It is recommended that these concepts and processes be integrated into the nursing curriculum early on through authentic and active learning methods, as demonstrated in our study.

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