Original Article

Emotional intelligence and critical thinking disposition as predictors of caring behaviors among nursing students

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Article info

Article history:
Received 23 Mar. 2025
Accepted 25 Jun. 2025
Published 13 Jul. 2025

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How to cite this article:
Aslani F, Asadizaker B, Ahmadi M, Gheibizadeh M, Aslani MM. Emotional intelligence and critical thinking disposition as predictors of caring behaviors among nursing students . J Med Edu Dev. 2025; 18(2):49-58.
http://dx.doi.org/10.61882/edcj.18.2.65

Abstract

Background & Objective: Given the significance of caring in the nursing profession, it is essential to assess the caring behaviors of nursing students and the factors that may influence these behaviors. This study aimed to explore the relationship between emotional intelligence, critical thinking disposition, and caring behaviors among a sample of Iranian nursing students.

Materials & Methods: This descriptive-correlational study was conducted on 203 nursing students. Participants were selected using a census method. The data were collected from 7 April 2024 to 29 June 2024 using a demographic checklist, Watson and Lea's Caring Behaviors Questionnaire, Wang and Law's Emotional Intelligence Questionnaire, and Ricketts's Critical Thinking Disposition Questionnaire. Data were analyzed using an independent t-test, one-way ANOVA, Pearson's correlation coefficient, and multiple linear regression in SPSS-25.

Results: The present study showed a positive and significant correlation between caring behaviors and emotional intelligence ($p < 0.001$, $r = 0.34$), as well as critical thinking disposition ($p < 0.001$, $r = 0.56$). Multiple linear regression analysis showed that critical thinking disposition ($\beta = 0.49$, $p < 0.001$) was the strongest predictor of caring behaviors, followed by academic year ($\beta = -0.14$, $p = 0.01$) and emotional intelligence ($\beta = 0.14$, $p = 0.01$). These variables accounted for 34% of the variance in caring behaviors.

Conclusion: The results of the study showed that increasing emotional intelligence and critical thinking disposition leads to improved caring behaviors while increasing the academic years leads to a decrease in caring behaviors. Therefore, nursing colleges and instructors should consider integrating critical thinking and emotional intelligence training into internships as potential intervention strategies to enhance students' caring behaviors. In addition, the pressures associated with academic years must be effectively managed.

Keywords: nursing care, emotional intelligence, critical thinking disposition, nursing students

Introduction

Nurses, as the primary providers of healthcare, play a vital role in delivering healthcare services [1]. Nursing practice is rapidly evolving, and nursing education must progress in alignment to train competent nurses [2]. Care is considered the essence and core of nursing actions, manifesting as a continuous process reflected in caring behaviors [3]. Caring behaviors encompass a combination of intentional nursing actions and attitudes that alleviate patient discomfort and meet their anticipated needs [4]. Evidence suggests that a reduction in caring behaviors can lead to diminished trust from patients and families, decreased perceived quality of care, reduced patient well-being and health, and increased patient dissatisfaction [5, 6]. In contrast, enhancing caring behaviors is associated with improved quality of services provided to patients, better treatment outcomes, and higher levels of patient satisfaction [6]. Studies have shown that only half of nurses demonstrate appropriate caring behaviors [5]. The development of caring behaviors begins with nursing education, where

[DOI: 10.61882/edcj.18.2.65]

students acquire these behaviors during clinical training and apply them in their clinical practice after graduation [7]. Therefore, nursing educators should consider the development of caring behaviors as a significant component of nursing education [8]. However, evidence suggests that the development of caring behaviors among nursing students is insufficient. Students often concentrate more on therapeutic caring behaviors while paying less attention to other important aspects [7, 9]. To enhance nursing students' caring behaviors, nursing educators must identify the educational and skill needs of students and address areas requiring improvement [9]. Therefore, it is crucial to identify the factors that influence caring behaviors.

Studies have shown that the enhancement of caring behaviors is influenced by various factors, including modeling from clinical instructors and professional nurses, the establishment of a supportive clinical learning environment, professional attitudes [10], and the acquisition of various skills such as effective communication [7], self-efficacy [11], emotional intelligence [12], and critical thinking [13].

Emotional Intelligence (EI) is defined as the ability to understand, manage, and effectively direct one's own emotions as well as those of others. It plays a crucial role in enhancing both physical and mental well-being [14]. EI encompasses several key components, including self-awareness, self-regulation, motivation, empathy, and social skills. These components are essential for nurses as they navigate the complexities of patient care, particularly in emotionally charged environments. By fostering EI, nurses can enhance their ability to deliver compassionate, patient-centered care, ultimately leading to improved health outcomes and increased patient satisfaction [12, 15-17]. Critical thinking is defined as a process of judgment and self-regulation that encompasses interpretation, analysis, evaluation, and inference [18].

In nursing education, critical thinking is recognized as an essential component of professional responsibility and high-quality nursing care. This skill enhances nurses' metacognitive abilities, which are vital for clinical reasoning, decision-making, and problem-solving [13]. However, studies indicate that the inclination toward critical thinking among medical students is moderate, with only a few students demonstrating a strong propensity for this skill [19]. Furthermore, critical thinking is not adequately emphasized in the educational system as a fundamental component of nursing education during students' academic journeys, as it should be [20].

In numerous previous studies, greater emphasis has been placed on physical and technical factors in nursing education [7, 8, 21]. At the same time, less attention has been devoted to the role of psychological skills, such as critical thinking and EI, in promoting caring behaviors. Despite the crucial importance of decision-making skills in enhancing the quality of care and facilitating effective interactions with patients, research on the direct relationship between these factors and caring behaviors has been limited. Additionally, there has been a lack of simultaneous examination of these variables among nursing students. This lack of information underscores the need for a more detailed and comprehensive investigation of these relationships to develop training strategies that emphasize soft and personality-based skills within nursing education programs, ultimately promoting caring behaviors among nursing students. Therefore, the present study aims to investigate the relationship between caring behaviors, EI, and critical thinking disposition in nursing students.

Materials & Methods

Design and setting(s)

This study is cross-sectional, descriptive-correlational research conducted from 7 April 2024 to 29 June 2024 at the nursing faculty of Ahvaz Jundishapur University of Medical Sciences.

Participants and sampling

Out of 258 eligible nursing students, 55 declined to participate. Consequently, the sample consisted of 203 nursing students who voluntarily participated in the study. The inclusion criteria required participants to have completed at least two semesters of undergraduate nursing. This period involves mastering fundamental care concepts and beginning their hospital internship. Additionally, participants were required to provide consent to participate in the study.

Tools/Instruments

Demographic Information Questionnaire: This included the students' age, gender, marital status, academic year, Grade Point Average (GPA), and interest in the nursing field. The Nursing Caring Behaviors Questionnaire (CDI-25), designed by Watson and Lea [22], consists of 25 items and 5 dimensions: psychosocial (10 items), technical (11 items), professional (one item), inappropriate (1 item), and unnecessary (2 items) activities. The questionnaire uses a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The overall score of the questionnaire ranges from 25 to 125,

[DOI: 10.61882/edcj.18.2.65]

with a higher score indicating better caring behaviors among nursing students. The score of the scale is categorized into three levels: weak caring behaviors (25-58), moderate caring behaviors (58-91), and high caring behaviors (91-125). Salimi et al. [23] have assessed the reliability and validity of this questionnaire. In the present study, the internal consistency of the questionnaire was evaluated and confirmed using Cronbach's alpha, which yielded a value of 0.83. The Wang and Law Emotional Intelligence Scale includes 16 items and evaluates four components: self-emotion appraisals (4 items), others' emotion appraisals (4 items), regulation of emotion (4 items), and use of emotion (4 items). Each item was answered using a five-point Likert scale, where scores ranged from 5 (strongly agree) to 1 (strongly disagree). The total scores for the questionnaire ranged from 16 to 80 [24]. A score between 16-32 indicates low EI, 32-48 indicates average EI, and 48-80 indicates good EI. Ali Babaei et al. [25] have assessed the reliability and validity of this questionnaire. In the present study, the internal consistency of the questionnaire was evaluated and confirmed with a Cronbach's alpha of 0.90. Ricketts' Critical Thinking Disposition Questionnaire is a self-report questionnaire that evaluates individuals' inclination toward critical thinking, consisting of 33 statements and 3 subscales: creativity (11 items), perfectionism (9 items), and commitment (13 items). Responses are scored on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), with reverse scoring for certain items [26]. The scores range from 33 to 165, where scores between 33-66 indicate weak critical thinking disposition, 66-99 indicate average critical thinking disposition, and scores above 99 indicate strong critical thinking disposition. Pakmehr et al. [27] have established the validity and reliability of this tool in Iran. In the present study, the internal consistency of the questionnaire was evaluated and confirmed with a Cronbach's alpha of 0.85.

Data collection methods

To collect data, the researcher obtained written permission and made the necessary arrangements to be present at the research site for three months, from April to June 2024. She introduced herself and explained the purpose of the research to the students who met the inclusion criteria. After securing their written consent, she completed the questionnaires with them.

Data analysis

The analysis was performed using SPSS software version 22. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were utilized to analyze the data. The study employed independent t-tests and one-way ANOVA to compare the mean scores of EI, critical thinking disposition, and caring behaviors based on different demographic variables. Significant demographic variables, along with EI and critical thinking disposition, were considered independent variables in the regression model. The relationships between the outcome variables (EI, critical thinking disposition, and caring behaviors) were evaluated using Pearson's correlation coefficients in correlation matrices before conducting the regression analysis. A stepwise multiple linear regression analysis was conducted to identify predictors of caring behaviors. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were utilized to analyze the data.

Results

A total of 203 nursing students from Jundishapur University of Medical Sciences in Ahvaz participated in the current study. The mean age of the students was 22.15 ± 2.39 years. Among the participants, 97 (47.8%) were male and 106 (52.2%) were female. Other demographic information is presented in **Table 1**.

The mean scores for caring behaviors, EI, and critical thinking disposition among students were 103.64 ± 10.44, 62.46 ± 7.56, and 123.38 ± 14.14, respectively. The majority of students (86.2%) reported that their caring behaviors were at a high level, while 13.8% reported them at an average level. Concerning EI and critical thinking disposition, 98% and 95.1% of students, respectively, reported high levels of competence in these areas (**Table 2**). Before conducting regression analysis, the relationships between variables were examined using independent t-tests, one-way ANOVA, and correlation matrices.

The results of these analyses are reported in **Tables 1** and **3**. When comparing caring behaviors and EI across demographic characteristics using the t-test, a significant statistical difference was observed in interest in the nursing field. Students with a greater interest in nursing reported better caring behaviors ($p = 0.03$) and higher EI ($p < 0.001$).

Additionally, the findings showed a significant difference in EI by gender, with male students reporting higher EI ($p = 0.03$). There were no significant differences in the total scores of caring behaviors, EI, and critical thinking disposition across other demographic variables (**Table 1**).

[DOI: 10.61882/edcj.18.2.65]

Table 1. Demographic variables of nursing students and their relationship with emotional intelligence, critical thinking, and caring behaviors

Variables			Number (%)	Total Emotional intelligence (Mean ± SD)	Total Critical thinking (Mean ± SD)	Total Caring behaviors (Mean ± SD)
Age	< 22		136 (67)	62.44 ± 7.51	122.97 ± 14.22	103.69 ± 10.30
	22 ≥		67 (33)	62.52 ± 7.71	124.20 ± 14.04	103.53 ± 10.79
		p-value		0.943	0.561	0.922
Sex	Male		97 (47.8)	63.63 ± 7.34	124.37 ± 14.27	103.58 ± 10.93
	Female		106 (52.2)	61.39 ± 7.64	122.48 ± 14.03	103.68 ± 10.02
		p-value		0.035	0.343	0.945
Marital status	Single		188 (92.6)	62.48 ± 7.59	123.19 ± 14.02	103.45 ± 10.27
	Married		15 (7.4)	62.26 ± 7.36	125.80 ± 15.85	105.93 ± 12.55
		p-value		0.915	0.493	0.378
Academic year	Second-year		81 (39.9)	62.09 ± 7.28	123.98 ± 12.19	105.55 ± 10.57
	Third-year		65 (32)	63.15 ± 8.02	123.20 ± 13.67	103.12 ± 9.14
	Fourth-year		57 (28.1)	62.21 ± 7.48	122.73 ± 17.16	101.50 ± 11.31
		p-value		0.675	0.871	0.072
Interest in the field of nursing	Yes		160 (78.8)	63.50 ± 7.28	124.08 ± 13.65	104.43 ± 10.27
	No		43 (21.2)	58.62 ± 7.42	120.79 ± 15.73	100.67 ± 10.64
		p-value		< 0.001	0.176	0.036
Type of residence	Living in dorms		103 (50.7)	61.90 ± 7.50	123.91 ± 13.08	103.54 ± 10.74
	Living with family		100 (49.3)	63.05 ± 7.62	122.84 ± 15.20	103.74 ± 10.17
		p-value		0.281	0.590	0.894
GPA average	17-20		54 (26.6)	61.88 ± 7.84	121.22 ± 14.06	101.31 ± 9.76
	14-17		117 (57.6)	62.50 ± 7.65	123.86 ± 13.85	104.50 ± 10.11
	11-14		32 (15.8)	63.31 ± 6.86	125.28 ± 15.29	104.40 ± 12.33
		p-value		0.700	0.375	0.161

Note: T-test and one-way ANOVA were used to compare participants based on quantitative demographic variables (n = 203).
Abbreviations: SD, standard deviation; %, percentage; GPA, grade point average; p-value, probability-value; n, number of participants.

Table 2. Mean scores and ranges of emotional intelligence, critical thinking, and caring behaviors in nursing students

Outcome variables	Mean ± SD	Range in the Scales
Self-emotion appraisals	16.04 ± 2.31	4-20
Others' emotion appraisals	15.61 ± 2.34	4-20
Use of emotion	16.54 ± 2.52	4-20
Regulation of emotion	14.26 ± 3.35	4-20
Total Emotional intelligence	62.46 ± 7.56	16-80
Creativity	43.02 ± 6.57	11-55
Perfectionism	32.55 ± 3.99	9-45
Commitment	47.80 ± 5.52	13-65
Total Critical thinking	123.38 ± 14.14	33-165
Technical physical behaviors	47.12 ± 4.95	11-55
Inappropriate behaviors	5.69 ± 1.64	2-10
Psychosocial behaviors	41.78 ± 4.38	10-50
Professional behaviors	4.68 ± 0.47	1-5
Unnecessary activities	4.33 ± 0.71	1-5
Total Caring behaviors	103.64 ± 10.44	25-125

Note: n = 203.
Abbreviations: SD, standard deviation.

The results of this study demonstrated a significant negative correlation between academic year and caring behaviors. Specifically, with an increase in the academic year, students' caring behaviors significantly decreased

[DOI: 10.61882/edcj.18.2.65]

(**Table 3**). Additionally, the results showed a significant positive correlation between EI and critical thinking disposition, as well as caring behaviors. This suggests that as EI and critical thinking disposition increase, the level of caring behaviors improves significantly. Additionally, an increase in students' EI significantly enhances their critical thinking disposition (**Table 3**).

The results of the multiple linear regression analysis indicated that critical thinking disposition, academic year, and EI were significant predictors of students' caring behaviors. Specifically, an increase in critical thinking disposition and EI was associated with respective increases of 0.36 and 0.20 units in caring behaviors. Additionally, the regression results revealed that caring behaviors decreased by 1.83 units for each advancing academic year. These factors accounted for 34% of the variance in caring behaviors (**Table 4**).

Table 3. Correlation matrix of emotional intelligence, critical thinking, and caring behaviors in nursing students

Variables	Technical physical behaviors	Inappropriate behaviors	Psychosocial behaviors	Professional behaviors	Unnecessary activities	Total Caring behaviors
Academic year	- 0.159*	- 0.067	- 0.101	- 0.193**	- 0.146*	- 0.147*
Self-emotion appraisals	0.315**	0.180**	0.217**	0.180*	0.258**	0.295**
Others' emotion appraisals	0.285**	0.117	0.219**	0.156*	0.200**	0.266**
Use of emotion	0.240**	0.111	0.189**	0.208**	0.182**	0.233**
Regulation of emotion	0.184**	0.217**	0.206**	0.099	0.098	0.219**
Total Emotional intelligence	0.347**	0.225**	0.289**	0.217**	0.246**	0.348**
Creativity	0.551**	0.306**	0.458**	0.236**	0.398**	0.540**
Perfectionism	0.491**	0.469**	0.440**	0.191**	0.443**	0.530**
Commitment	0.408**	0.314**	0.334**	0.148*	0.308**	0.411**
Total Critical thinking disposition	0.554**	0.397**	0.468**	0.222**	0.430**	0.561**

Note: Pearson correlation coefficients were used to assess relationships between variables. *p < 0.05; **p < 0.001.

Table 4. Multiple linear regression model for predictors of caring behaviors in nursing students

Model	R	R^2	AdjR^2	F	Independent variables	B	SE	β	t	p
Caring behaviors	0.59	0.35	0.34	36.17	Constant	49.16	6.24	-	7.87	< 0.001
					Critical thinking	0.36	0.04	0.49	7.93	< 0.001
					Academic year	- 1.83	0.72	- 0.14	- 2.52	0.010
					Emotional intelligence	0.20	0.08	0.14	2.36	0.010

Abbreviations: R^2, R square; AdjR^2, Adjust R square; SE, Standard Error ; B, Unstandardized coefficients; β, Standardized coefficients; p, probability value

Discussion

This study aimed to investigate the relationship between critical thinking disposition, emotional intelligence, and caring behaviors. Our research results indicated that the majority of nursing students reported their caring behaviors at a high level. These findings are consistent with the study conducted by Konuk and Tanyer, which assessed the caring behaviors of nursing students in Turkey [4]. A systematic review aimed at evaluating nursing students' understanding of caring behaviors also found that the level of caring behaviors among nursing students varied from medium to high. These variations were attributed to studies conducted across different nationalities and countries, as well as the use of diverse assessment tools [28]. Research has demonstrated that students' perceptions of caring behaviors can be influenced by their beliefs and attitudes, which are shaped by culture, environment, individual characteristics, and the educational system [29, 30]. Moreover, the caring behaviors demonstrated by educators have a significant impact on this aspect; when educators prioritize care, students' ability to demonstrate caring behaviors improves. Additionally, the diverse, caring environments that students encounter, along with the care of patients with varying health conditions, such as chronic, acute, and end-of-life care, require context-appropriate caring behaviors. This is contingent upon the students' exposure and the educational system in which they are trained [30]. Conversely, nursing students have not yet experienced the real-world conditions of the workplace, including time constraints and the challenges that nurses face in practice. They provide care for a limited number of patients under the supervision of their educators, which may influence how the participating students in our study perceive and assess caring behaviors. The results of the current study indicate that nursing students exhibit a high level of EI and a strong disposition toward critical thinking. Additionally, the

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findings from Fereidouni et al. support these results, demonstrating that nursing students exhibit elevated levels of EI [12]. However, regarding critical thinking, Shirazi and Heidari reported that nursing students displayed a medium level of critical thinking, which contrasts with our findings [31]. One possible reason for this discrepancy is the variation in the instruments used. We utilized the Ricketts' Critical Thinking Disposition Scale, which assesses the propensity for critical thinking, whereas Shirazi and Heidari's study employed the California Critical Thinking Skills Questionnaire. However, it is essential to note that in an educational setting, multiple factors can influence students' perceptions of their EI and critical thinking skills. Key factors include an emphasis on practical skills, the diversity of patients and care conditions, support from educators, ongoing assessments, and a nurturing learning environment. These elements may contribute to a more favorable evaluation of students' actual skill levels. The observed differences may arise from a combination of factors, including individual experiences, training in emotional management and communication skills, work conditions, personality traits, and organizational culture [30, 31]. A significant difference was observed in caring behaviors and EI among nursing students based on their interest in the field. Students who expressed a genuine interest in their major reported higher levels of both caring behaviors and EI, and this difference was statistically significant. Additionally, regression analysis indicated that interest in the major is a predictor variable for caring behaviors, suggesting that an increase in interest correlates with an increase in caring behaviors. Studies noted that interest, by directing actions toward goals and serving as a motivator, plays a crucial role in influencing intelligence and learning outcomes [32]. Furthermore, individuals with high EI are more adept at demonstrating greater respect for their patients, increased empathy, and a more genuine concern for the well-being of those they care for [33]. Therefore, there is a direct relationship between interest in the field, enhanced EI, and caring behaviors. This relationship has a significant impact on the quality of healthcare services provided by professionals. The current study revealed a significant negative correlation between academic years and caring behaviors, indicating that as students progressed to higher semesters, their reported caring behaviors significantly decreased. This finding aligns with the results of Gözütok Konuk and Tanyer, which indicated that fourth-year students scored lower in their self-assessment of caring behaviors compared to their lower-year counterparts [34]. Several factors may contribute to the observed decline in nursing students' caring behaviors in their advanced years. Students in higher semesters often become more engaged in routine clinical tasks, resulting in less time for direct patient interaction [35]. The transition from being a supervised student in earlier semesters to a more independent nurse in later semesters may lead to a more critical evaluation of their skills. Furthermore, the increased patient load in higher semesters can limit the time available to address all aspects of patient care. In contrast, lower-semester students typically have more opportunities for patient interaction due to greater supervision from instructors and fewer assigned patients, fostering a supportive learning environment that may contribute to a more positive self-assessment of their skills [1, 35]. Furthermore, throughout their internships and higher education, students often focus more on using tools and techniques for patient care rather than on the ethical and emotional dimensions of nursing. This trend can likely be attributed to the educational system; as students' progress through their semesters, the nursing curriculum becomes more specialized and complex [34]. Consequently, students tend to concentrate on mastering advanced techniques and managing critical situations. Since physical and technical care is more tangible and measurable, this emphasis can lead students to prioritize these aspects over other dimensions of care. Additionally, as students advance in their studies, they face greater challenges that may hinder their ability to focus on caring behaviors. These challenges include increased workload demands, a heightened emphasis on exams and end-of-semester projects, and fewer opportunities for practical engagement with patients [34-36]. Moreover, the presence of instructors who model compassionate care and consider all aspects of patient care can support students and enhance their understanding of holistic care [35]. The present study demonstrated a positive and significant correlation between EI, critical thinking disposition, and caring behaviors among nursing students. Essentially, as EI and critical thinking disposition increase, the frequency of caring behaviors also rises. Additionally, linear regression analysis revealed that critical thinking disposition and EI are predictive factors of caring behaviors, indicating that higher levels of both critical thinking disposition and EI are associated with greater expressions of care. These findings align with previous studies [37-39]. Consistent with the results of the present study, Karaca et al. found a positive relationship between

[DOI: 10.61882/edcj.18.2.65]

nurses' critical thinking abilities and their caring roles [37]. Similarly, Taylan et al. further supported this by demonstrating a positive relationship between EI and caring behaviors, indicating that heightened awareness facilitated by increased EI enhances care practices [38]. According to Bandura's social learning theory, effective job performance can also be influenced by EI [40]. EI encompasses the ability to reason with emotions effectively. Individuals with high EI can utilize emotional information to enhance cognitive processes, such as problem solving and decision-making [38, 39]. By integrating feelings with logic, they can evaluate situations holistically, considering both rational and emotional factors. This integration leads to decisions that are not only logically sound but also emotionally sensitive and appropriate.

EI fosters empathy and communication, which are essential for building strong nurse-patient relationships. Additionally, it enables students to make informed decisions swiftly and to solve complex problems effectively, allowing them to adapt to the dynamic nature of healthcare environments [41]. Furthermore, critical thinking is closely linked to self-reflection, compassion, improved analytical skills, ethical considerations, and problem-solving abilities. It serves as the foundation for effective decision-making and problem-solving, ensuring safe and efficient care [42]. As critical thinking skills improve, students become more adept at identifying patients' problems, selecting appropriate care solutions, and evaluating the effectiveness of these interventions. This capability is vital in complex clinical situations that require deep thinking and rapid decision-making, ultimately leading to enhanced caregiving behaviors [2]. Furthermore, the findings of the present study indicate a significant positive correlation between EI and critical thinking disposition, which aligns with the results of the research conducted by Bagheri et al. Their study highlighted the potential connection between critical thinking and EI in nursing students, demonstrating that fostering EI can enhance critical thinking skills [41].

Our results suggest that EI and critical thinking disposition contribute to caring behaviors both directly and indirectly through their interactions. Individuals with higher EI excel at integrating emotional insights into their critical thinking processes, thanks to their superior skills in emotional awareness, regulation, empathy, reasoning, and adaptability. These capabilities enable them to navigate complex decision-making scenarios more effectively, considering both logical and emotional aspects. Consequently, they are more likely to make context-sensitive, deliberate, and accurate decisions [39]. This interaction not only improves the quality of care provided but also enriches nurse-patient relationships, ultimately leading to the delivery of compassionate, high-quality care that meets patients' needs and expectations [39, 41]. To the best of our knowledge, few studies have explored the relationship between caring behaviors, EI, and critical thinking disposition in nursing students, which is one of the strengths of our research. However, our study also had several limitations. First, it concentrated on the effects of specific variables on caring behaviors, while other factors—such as clinical experience, organizational culture, and educational policies—that could influence these behaviors were not examined. Secondly, the measurement tool employed in this study was a self-report questionnaire, which may introduce bias in the results. Consequently, the findings may not fully reflect the actual level of caring behaviors among participants. It may be necessary to conduct observational studies to assess nursing students' caring behaviors more accurately. In addition, the current study utilized Ricketts' Critical Thinking Disposition Scale, which does not assess critical thinking skills. This limitation may have influenced the results. Finally, due to its cross-sectional design, this study was unable to track changes in variables over time, which limited our ability to establish causal relationships among the variables examined.

Conclusion

The results of the present study indicate that an increase in EI and critical thinking disposition leads to an improvement in caring behaviors. Conversely, an increase in an academic year is associated with a decline in these behaviors.

Based on these findings, educational strategies should be developed to enhance both critical thinking and EI while also addressing the pressures associated with advancing through the academic years. Educators should prioritize the cultivation of students' EI and critical thinking skills, which may include educational activities focused on problem-solving, stress management, interpersonal communication, and patient interaction.

Furthermore, creating more opportunities for practical experience and patient interaction can help students maintain and enhance their caregiving abilities through increased experience and knowledge. Overall, this study underscores the importance of a holistic approach to education in nursing programs, emphasizing the need to

[DOI: 10.61882/edcj.18.2.65]

balance academic progress with the development of essential skills and critical thinking abilities.

By addressing these findings, educators can establish a more effective and sustainable educational model that ultimately results in the training of nurses who are both academically proficient and practically competent in delivering high-quality patient care.

Ethical considerations

The ethics committee of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran, has approved this research (Ethical Code: IR.AJUMS.REC.1402.632). Ethical guidelines were strictly followed, which included obtaining approval from relevant authorities, clearly explaining the study's objectives to participants, ensuring data confidentiality, and securing verbal consent from all individuals involved.

Artificial intelligence utilization for article writing

We acknowledge the use of WORDVICE.AI (https://wordvice.ai/proofreading/6c21e242-4286-4ed0-93c7-ea479dd98f86) to proofread some sentences in this manuscript.

Acknowledgment

This study was extracted from a research proposal approved by the Student Research Committee, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran (NO: 02s84).

The researchers would like to express their appreciation to all staff members of the "Student Research Committee" and "Research & Technology Chancellor" at Ahvaz Jundishapur University of Medical Sciences for their financial support. Additionally, the researchers would like to express their gratitude to all the nursing students who participated in this study.

Conflict of interest statement

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

Author contributions

M.A. and F.A. contributed to the study's conception and design. M.A., F.A., B.A., M.Gh, and MM.A performed material preparation, data collection, and analysis. M.A. F.A. and B.A. wrote the first draft of the manuscript. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript. M.A., as principal investigator, supervised the project.

Funding

Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran (NO: 02s84)

Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request. For access to additional data, please reach out to the corresponding author.

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