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Turkish adaptation and validation of the ethical decision-making competence scale

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Abstract

Background Nursing students often encounter ethical dilemmas throughout their professional training, which can pose challenges to their development. These dilemmas may lead to questioning professional values, hesitation during clinical practice, and even emotional fatigue. Therefore, reliable and valid tools are essential to assess and enhance their ethical decision-making abilities.

Methods Conducted as a methodological study, this research involved 233 nursing students from Manisa Celal Bayar University during November and December 2024. Data collection tools included the Ethical Decision-Making Competence Scale and the Inclination to Ethical Values Scale. Structural validity was analyzed using principal component analysis and confirmatory factor analysis, while internal consistency was assessed with Cronbach's alpha.

Results The scale demonstrated acceptable model fit indices [$\chi2$ (129) = 234.701, $\chi2$/df = 3.295, GFI = 0.841, CFI = 0.900, IFI = 0.901, RMSEA = 0.096 (0.087–0.105)], with all factor loadings exceeding 0.4 and achieving statistical significance. Cronbach's alpha values for the four dimensions were 0.865, 0.867, 0.868, and 0.886, indicating strong internal consistency. Furthermore, the test-retest analysis confirmed the scale's stability over time, validating its use for repeated measurements.

Conclusion Given its psychometric strengths, this tool can be effectively employed in future studies focusing on ethical decision-making competencies in nursing education.

Clinical trial number Not applicable.

Keywords Turkish version of the ethical decision-making competence scale, Factor analysis, Instrument psychometric evaluation, Methodological study, Validation studies

Introduction

Scientific and technological advancements in the healthcare sector, coupled with the diversification of treatment options, have increasingly been integrated into clinical practice, complicating the provision of multidisciplinary healthcare services [1, 2]. Healthcare professionals often face complex and critical situations, such as the withdrawal of life support, cardiopulmonary resuscitation, treatment refusal, aging, and end-of-life care [1, 3]. In nursing practice, the growing complexity of healthcare services, the necessity to prioritize patient benefit, and the risks in interventions contribute to the challenges

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encountered in ethical decision-making processes [4–9]. Decisions related to medical interventions carry significant responsibilities, requiring nurses to conduct accurate analyses and act in accordance with ethical principles [6, 10]. Ethical issues often involve dilemmas, conflicts, and difficult choices, which necessitate a systematic ethical decision-making process [5, 11]. This process requires arriving at the most ethical decision systematically and rationally when faced with conflicting circumstances [2, 12].

Ethical decision-making is a complex process that encompasses various components, such as ethical sensitivity, judgment, and decision-making. It is therefore crucial for nurses to develop competence in these areas [11–13]. Ethical competence entails the ability to identify ethical challenges and their dimensions, reason through conflicting values, make informed decisions, and effectively implement those decisions [14]. Nurses can achieve this competence by developing the knowledge, skills, and attitudes necessary to properly address ethical issues [15–17].

The ethical decision-making process comprises several components: ethical sensitivity, knowledge, reasoning, decision-making, action, and behavior [13, 18]. Rest (1986) outlined the ethical decision-making process through four fundamental competencies: ethical judgment, sensitivity, motivation, and action [19, 20]. Ethical judgment refers to the capacity to evaluate actions as right or wrong, while ethical sensitivity involves recognizing ethical issues [20]. Ethical motivation emphasizes prioritizing ethical values, taking personal responsibility, and demonstrating a willingness to act accordingly [21, 22]. Ethical action pertains to the actual execution of ethical behaviors. In nursing, ethical decision-making is defined as the ability to make appropriate decisions based on ethical principles, professional values, and ethical reasoning [23]. Strengthening this competence significantly contributes to improving the quality of patient care.

The existing literature highlights that nursing students frequently encounter ethical conflicts and dilemmas during clinical training [24–26]. Consequently, educational programs aim to strengthen students' ethical decision-making skills by fostering ethical sensitivity, identifying ethical issues, and resolving them effectively as part of their ethical education [27].

Research has shown that ethical education increases awareness of patient-centered care, ethical challenges, and decision-making capabilities [28, 29]. To further improve the training provided to nursing students in developing ethical decision-making competence, measurement tools are needed to evaluate their abilities in this area. However, to evaluate the effectiveness of such educational initiatives, it is essential to use measurement tools that can comprehensively assess students'

competence across the key components of ethical decision-making. The Ethical Decision-Making Competence Scale (EDM-CS), developed by Pai and Hwu (2024), is grounded in Rest's four-component model and has demonstrated strong psychometric properties [13]. Its use enables the systematic evaluation of nursing students' ethical decision-making abilities in clinical contexts, making it highly valuable for both educational and research purposes.

In Türkiye, several scales are available for assessing ethical sensitivity and attitudes, including Byrd's Ethical Sensitivity Test for Nurses (BHEDT) [30], the Ethical Principles Attitude Scale (EİTÖ) [31], the Ethical Sensitivity Questionnaire for Nurses (ESQ-N) [32], the Ethical Sensitivity Questionnaire for Nursing students (ESQ-NS) [33], the Healthcare Professionals Ethical Codes Scale (HPECS) [34], the Ethical Evaluation Questionnaire (EEQ) [35] and the Ethical Decision Bias Scale (EDBS) [36]. However, there is currently no scale in Türkiye specifically designed to evaluate the ethical decision-making competence of nursing students. These existing instruments each focus on a particular aspect of ethical awareness or professional values. The BHEDT evaluate situational ethical sensitivity using scenario-based items [30], while EİTÖ measures nurses' attitudes toward fundamental ethical principles such as justice and autonomy [31]. The ESQ-N and ESQ-NS assess awareness of patient rights and justice but does not assess behavioral competence in the face of ethical dilemmas [32, 33]. The HPECS examines healthcare professionals' attitudes toward ethical codes without addressing their ethical decision-making abilities [34]. The EEQ investigates personal ethical orientations such as religiosity, utilitarianism and Machiavellianism [35]. The EDBS identifies cognitive biases that can impair ethical reasoning, yet it does not assess the ability to actively participate in ethical decision-making processes [36]. In contrast, the EDM-CS, grounded in Rest's Four-Component Model (1986), is the first tool adapted into Turkish that comprehensively evaluates both the cognitive and behavioral aspects of ethical decision-making among nursing students. It measures four interrelated domains: ethical judgment, ethical sensitivity, ethical motivation and ethical action, providing a theory-based and holistic assessment that aligns with the complex and multifaceted nature of ethical practice in nursing education.

Methods

Aim of the study

The aim of this study was to assess the validity and reliability of the Turkish adaptation of the Ethical Decision-Making Competence Scale (EDM-CS) for use among nursing students.

Design, sample, and setting

This methodological study employed a convenience sample of nursing students attending Manisa Celal Bayar University. Data collection was conducted between November and December 2024.

In Türkiye, the undergraduate nursing program is a four-year (eight-semester) curriculum. Starting from the second semester, students attend professional courses that include clinical practice. The Ethic in Nursing course is formally integrated into the curriculum during the fourth semester. Therefore, only third- and fourth-year nursing students who had completed this course were included in the study, as they had the necessary clinical experience, educational background, and foundational knowledge of ethics to meaningfully assess ethical decision-making competence.

A total of 233 third- and fourth-year nursing students who voluntarily agreed to participate were included. The inclusion criteria were as follows: (a) being actively third- and fourth-year nursing students; (b) having adequate Turkish language proficiency to complete the EDM-CS; and (c) providing informed consent to participate in the study. According to recommendations for scale adaptation studies, the sample size should be at least five to 10 times the total number of items in the scale [37]. As the scale used in this study contains 18 items, the minimum required sample size was calculated to be 180 based on the 10-times rule. Moreover, Çapık et al. (2018) suggested that the sample size should not fall below 200. To ensure the representativeness of the results, a total of 233 students were included in the current study [38].

Instruments

Data for this study were gathered by the researchers through an online survey. The survey included a student information form, the EDM-CS, and the Inclination to Ethical Values Scale (IEVS). Participants provided informed consent by selecting a statement affirming their voluntary participation.

Student information form

This form contained five questions aimed at gathering sociodemographic details, including the students' age, gender, educational background, and career preferences.

Ethical Decision-Making Competence Scale (EDM-CS)

The EDM-CS is a measurement tool designed to help nursing students evaluate their competence in providing ethical nursing care. It was originally developed by Pai and Hwu in 2024 and is based on Rest's four core ethical competencies. The scale contains 18 items that assess ethical decision-making competence across four dimensions: ethical judgment, ethical sensitivity, ethical motivation, and ethical action. Ethical decision-making competence is defined as the ability to choose and implement actions aligned with ethical principles and values when confronted with moral dilemmas or ethical challenges. This competence integrates the ability to apply comprehensive judgment, demonstrate sensitivity, and use motivational skills to make informed and responsible decisions in ethically complex situations [13]. The scale consists of four subscales, with scoring ranging from 0 (strongly disagree) to 4 (strongly agree). Ethical judgment comprises five items (items 1–5) with a score range of 0–20. Ethical sensitivity includes five items (items 6–10) with a score range of 0–20. Ethical motivation consists of four items (items 11–14) with a score range of 0–16. Ethical action consists of four items (items 15–18) with a score range of 0–16. The total score for the scale ranges between 0 and 72. Higher scores on the EDM-CS correspond to greater ethical decision-making competence, whereas lower scores indicate a diminished level of competence in this domain. In the original scale, the overall Cronbach's alpha coefficient was 0.90, indicating high internal consistency. Reliability coefficients for the subscales were reported to be 0.82 for ethical judgment, 0.79 for ethical sensitivity, 0.73 for ethical motivation, and 0.82 for ethical action. Correlation analyses demonstrated significant results, and the second-order confirmatory factor analysis (CFA) confirmed the extraction of common factors. Pearson correlation coefficients ranged from 0.46 to 0.62 ($p < 0.01$), supporting the construct validity of the scale [13].

Inclination to Ethical Values Scale (IEVS)

Originally developed in Turkish by Kaya (2015) the IEVS comprises 16 items designed to assess individuals' tendencies toward ethical values [39]. The scale is structured around three dimensions: love and respect, justice and honesty, and cooperation. It employs a five-point Likert format, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). Total scores range from 16 to 80, with higher scores indicating a stronger inclination toward ethical values. The Cronbach's alpha coefficients for the subscales were reported to be 0.88 for love and respect, 0.85 for justice and honesty, and 0.73 for cooperation, demonstrating high internal consistency. The scale has been validated as a reliable tool for evaluating ethical inclinations, where higher scores reflect greater adherence to ethical principles [39].

Data analysis

Data analysis was performed using IBM SPSS Statistics for Windows, version 25.0, and AMOS 24. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize the demographic characteristics of the participants and their scale scores. CVI was utilized to evaluate content validity, with

Üstündağ *et al. BMC Nursing*　　　(2025) 24:526

Page 4 of 10

I-CVI and S-CVI calculated based on expert evaluations to measure the level of agreement among experts.

Translation process

The scale was adapted into Turkish using the translation and back-translation method [40]. First, two academicians fluent in English translated the EDM-CS from English into Turkish. The linguistic validity and cultural relevance of the translated version were then reviewed by two experts in Turkish language and literature, and necessary revisions were made to finalize the Turkish version. Subsequently, two specialists in English language and literature re-translated the Turkish version back into English. The original scale and the back-translated version were compared by two experts, confirming their consistency. No items were removed during the adaptation process [41].

Psychometric testing

Content validity

Content validity was assessed using the Davis technique to ensure that the scale accurately measured the intended construct [42]. Content validity is a critical step in questionnaire development and is often evaluated through the content validity index (CVI), a widely used quantitative method. This process typically involves feedback from a panel of six to ten content experts [43, 44]. For this study, a panel of 10 experts, comprising two ethics specialists, four internal medicine nursing specialists, two psychiatric nursing specialists, and two fundamental nursing experts, evaluated the Turkish version of the EDM-CS. Each item on the scale was rated using a four-point scale: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant. Scores of 1 and 2 indicated insufficient relevance, while scores of 3 and 4 reflected adequate content relevance. The experts were also invited to provide additional comments on each item. Content validity was analyzed at two levels: item-level (I-CVI) and scale-level (S-CVI). The I-CVI was calculated by dividing the number of experts who rated an item as 3 or 4 by the total number of experts. The S-CVI/Ave, representing the average of all I-CVI values, was calculated by summing the I-CVI scores and dividing the result by the total number of items [45].

A pilot study was conducted with 30 nursing students, who were not included in the main sample, to evaluate the clarity and comprehensibility of the scale items. This process played a crucial role in assessing how clearly, appropriately, understandably, and sensitively the scale was perceived by the target population. In the literature, face validity is defined as the degree to which a measurement tool is perceived by its intended audience as clear, relevant, appropriately challenging, and sensitive [46].

Qualitative feedback provided by participants was used to evaluate and refine item wording.

Construct validity

Construct validity was assessed through exploratory factor analysis (EFA), conducted using principal component analysis with varimax rotation. The appropriateness of the dataset for factor analysis was confirmed by the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. CFA was then used to verify the factor structure identified in EFA, and model fit was assessed through the following indices: root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), comparative fit index (CFI), normed fit index (NFI), Tucker-Lewis index (TLI), incremental fit index (IFI), and relative fit index (RFI). Model fit was evaluated according to widely accepted cutoff criteria in structural equation modeling. RMSEA values between 0.00 and 0.05 indicate close fit, 0.05–0.08 indicate reasonable fit, 0.08–0.10 reflect mediocre fit, and values above 0.10 suggest poor fit [47]. GFI ≥ 0.85 [48] and CFI, IFI, TLI, and NFI ≥ 0.90 are considered indicators of acceptable model fit [49].

Convergent validity

Convergent validity was analyzed through Spearman correlation between the total and subscale scores of the IEVS and EDM-CS. The Inclination to IEVS was selected for this analysis because it measures internalized ethical values such as justice, honesty, cooperation, and respect constructs that are conceptually aligned with the motivational and behavioral dimensions of ethical decision-making competence. These analyses provided a comprehensive assessment of the scale's validity, reliability, and internal structure. Statistical significance was established at a 95% confidence level, with p-values < 0.05.

Reliability analysis

Reliability was evaluated by calculating Cronbach's alpha for the total scale and its subscales to assess internal consistency. Test-retest reliability was examined using Spearman correlation and the Wilcoxon signed-ranks test to evaluate the stability of the scale over time.

Results

Sample characteristics

The mean age of the students was 21.78 ± 1.80 years, with 58.4% being female ($n = 146$). Among the participants, 50.8% were in their fourth year of study ($n = 127$), 67.6% stated that their income and expenses were balanced ($n = 169$), and 93.2% reported that they were not employed ($n = 233$).

Results of validity analysis

Content validity

Prior to the pilot implementation of the scale, content validity was analyzed for both individual items and the overall scale based on feedback from 10 experts. The I-CVI values for the linguistic appropriateness of the EDM-CS items ranged between 0.88 and 1.00, with the overall S-CVI/Ave (calculated from the I-CVI values) being 0.97. Additionally, the translations of items 4, 8, 12, and 17 were revised based on expert suggestions to increase clarity and cultural relevance. Specifically, in item 4, the term "complex patients" was adapted as "patients with complex diseases (e.g., diabetes, cancer)" to enhance clarity. The phrase in item 8 referring to "maintaining harmonious relationships" was rephrased to better align with the interpersonal communication style observed in the Turkish healthcare context. Item 12 was revised to clearly convey the concept of "preventive ethics initiatives" in the local context. In item 17, the wording was refined to emphasise the timely and accurate application of ethical principles in care decisions. The purpose of these revisions was to enhance the comprehensibility of the items without compromising their conceptual integrity.

In addition, face validity was ensured through expert panel feedback and pilot testing with 30 nursing students to assess the clarity and comprehensibility of the items.

Construct validity

The construct validity of the Turkish version of the scale was assessed using both EFA and CFA. Prior to these analyses, the suitability of the dataset was confirmed using the KMO test and Bartlett's test of sphericity. The KMO value was found to be 0.923, indicating adequate sample size for EFA. Additionally, Bartlett's test of sphericity yielded statistically significant results (χ^2 = 3033.685; $p < 0.001$), confirming that the dataset met the assumption of equal variance required for factor analysis (Table 1).

CFA confirmed the model fit for the item-factor relationships identified through EFA. Model fit indices for the scale's four-factor structure were statistically significant (χ^2 = 3.295; $p < 0.01$). The model fit index values were as follows: RMSEA = 0.096, GFI = 0.841, CFI = 0.900, IFI = 0.901, RFI = 0.838, NFI = 0.864, and TLI = 0.882. These results provide strong support for the four-dimensional structure of the scale. Figure 1 illustrates the model fit and the relationships between the scale's factors.

Convergent validity

Convergent validity was established by analyzing the correlations between the IEVS and EDM-CS. A significant positive correlation was observed between the total IEVS score and the total EDM-CS score ($r = 0.395$, $p < 0.001$), indicating that a stronger inclination toward

Table 1 Results of the exploratory factor analysis of the Turkish version of the EDM-CS

Items		Subdimension
1.	I can analyze the barriers to decision-making faced by patients and their families.	0.706
2.	I can identify the barriers to decision-making faced by patients and their families.	0.755
3.	I can identify the potential risks and benefits of ethical dilemmas.	0.772
4.	I can identify ethical issues related to the care of complex patients.	0.796
5.	I can detect the conflict between patients and their families in their decision-making choices.	0.656
6.	I can listen to the decision-making issues faced by patients and their families.	0.727
7.	I can encourage patients and their families to speak out about the decision-making issues they face.	0.678
8.	I am able to maintain harmonious relationships with patients and families when decision-making dilemmas are in conflict.	0.608
9.	I understand the decision-making dilemmas and conflicts of patients and their families.	0.434
10.	I understand and guide patients and their families through the feelings of decision-making dilemmas.	0.444
11.	I can nurture and guide others to develop ethical practices in my work.	0.787
12.	I am able to participate inpreventive ethics initiatives to address ethical situations in my own area practice.	0.666
13.	I can describe my ethical care experience based on my professional knowledge.	0.686
14.	I am able to plan the choice of ethical priorities clinical practice.	0.563
15.	I can use clear and understandable words (or language) to discuss with patients and their families the choice of care best for them.	0.666
16.	I can use clear and understandable words (or language) to discuss health care options with patients and their families.	0.796
17.	I am able to apply ethical principles in a timely manner to inform care decisions for patients and their families.	0.816
18.	I am able to grasp ethical principles and provide references for patients and their families.	0.796
Total explained variance		71.247
KMO coefficient		0.923
Barlett's test of sphericity		3033.685; <0.001

Note. EDM-CS: Ethical Decision-Making Competence Scale, KMO: Kaiser-Meyer Olkin
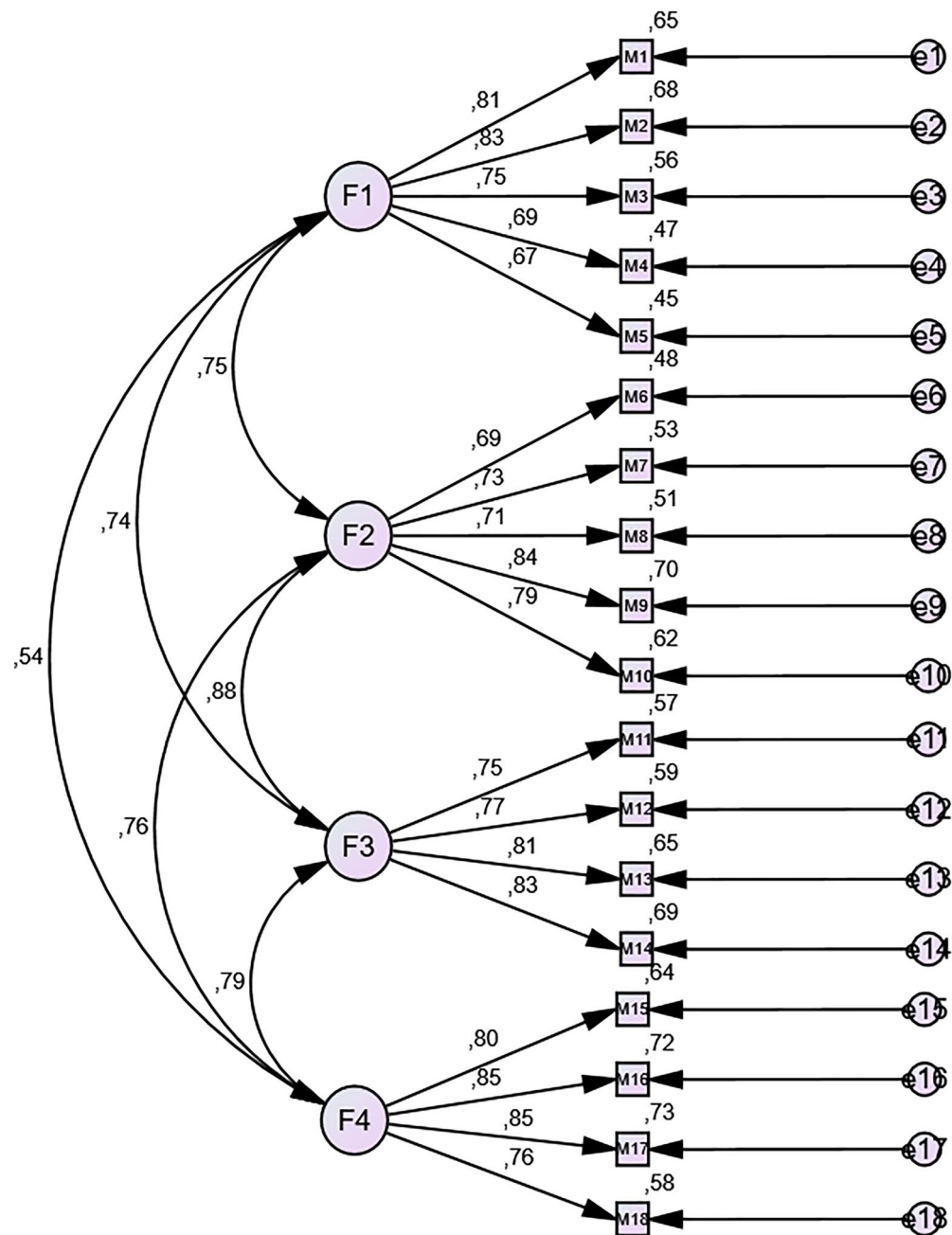
CMIN/df:3,295; AGFI:,790; GFI:,841; NFI:,864; CFI:,900; IFI:,901; TLI:,882; RMSEA:,096

Fig. 1 Path diagram of the four factors

ethical values was associated with higher competence in ethical decision-making. Among the IEVS subscales, love and respect exhibited the strongest correlations with the EDM-CS dimensions of ethical sensitivity ($r = 0.479$, $p < 0.001$) and ethical action ($r = 0.496$, $p < 0.001$), emphasizing its critical role in fostering ethical awareness and behavior. The justice and honesty subscale demonstrated moderate correlations, with the highest being with ethical sensitivity ($r = 0.292$, $p < 0.001$). Similarly, the cooperation subscale showed significant positive correlations with all EDM-CS dimensions, particularly ethical sensitivity ($r = 0.337$, $p < 0.001$) and ethical action ($r = 0.396$, $p < 0.001$) (Table 2).

Table 2 Correlations between the EDM-CS and IEVS

		Ethical judgment	Ethical sensitivity	Ethical motivation	Ethical action	EDM-CS total
Love and respect	r	0.360	0.479	0.448	0.496	0.429
	p	< 0.001*	< 0.001*	< 0.001*	< 0.001*	< 0.001*
Justice and honesty	r	0.280	0.292	0.260	0.317	0.253
	p	< 0.001*	< 0.001*	< 0.001*	< 0.001*	< 0.001*
Cooperation	r	0.394	0.337	0.327	0.396	0.285
	p	< 0.001*	< 0.001*	< 0.001*	< 0.001*	< 0.001*
IEVS total	r	0.402	0.451	0.419	0.485	0.395
	p	< 0.001*	< 0.001*	< 0.001*	< 0.001*	< 0.001*

Note.*Statistically significant at $p < 0.001$, r = Spearman correlation, $p < 0.001$; EDM-CS: Ethical Decision-Making Competence Scale; IEVS: Inclination to Ethical Values Scale

Table 3 Results of the reliability analysis of the Turkish version of the EDM-CS

Items	Cronbachα	X ± SD	Item-total score correlation	Factor-to-tal score correlation
Item 1	Ethical judg-ment = 0.865	3.10 ± 0.53	0.704	0.834
Item2		3.09 ± 0.54	0.720	
Item 3		3.03 ± 0.56	0.679	
Item 4		3.03 ± 0.54	0.620	
Item 5		3.01 ± 0.55	0.638	
Item 6	Ethical sensi-tivity = 0.867	3.22 ± 0.48	0.690	0.898
İtem7		3.23 ± 0.49	0.714	
Item 8		3.14 ± 0.50	0.694	
Item 9		3.16 ± 0.48	0.791	
Item 10		3.13 ± 0.43	0.751	
Item 11	Ethical moti-vation = 0.868	3.10 ± 0.46	0.717	0.887
Item 12		3.07 ± 0.56	0.735	
Item 13		3.10 ± 0.51	0.761	
Item 14		3.16 ± 0.50	0.796	
Item 15	Ethical action = 0.886	3.19 ± 0.48	0.705	0.807
Item 16		3.22 ± 0.49	0.696	
Item 17		3.17 ± 0.49	0.727	
Item 18		3.14 ± 0.51	0.660	
EDM-CS total Cronbachα = 0.942				

Note. EDM-CS: Ethical Decision-Making Competence Scale, X ± SD: mean ± standard deviation

Reliability analysis

The reliability of the scale was assessed through item-total correlation analysis and Cronbach's alpha coefficient. The Cronbach's alpha value for the overall scale was 0.942, demonstrating excellent internal consistency. The Cronbach's alpha values of the subscales were as follows: 0.865 for ethical judgment, 0.867 ethical sensitivity, 0.868 for ethical motivation, and 0.886 for ethical action. EFA identified four dimensions within the scale. Principal component analysis with varimax rotation was used to examine item loadings before and after rotation. The identified factor structure accounted for 71.24% of the total variance (Table 1).

The reliability analysis revealed excellent internal consistency for the scale, with an overall Cronbach's alpha of 0.942, indicating that the items collectively measured the intended construct with high reliability (Table 3). Each subscale demonstrated strong reliability, with Cronbach's alpha and factor-total score correlation values of 0.865 and 0.834, respectively, for ethical judgment; 0.867 and 0.898, respectively, for ethical sensitivity; 0.868 and 0.887, respectively, for ethical motivation; and 0.886 and 0.807, respectively, for ethical action. These findings suggest that each subscale provides a reliable assessment of its respective construct. At the item level, mean scores and standard deviations demonstrated consistent participant responses. Item-total score correlations, ranging from 0.620 to 0.796, confirmed that each item contributed significantly to the overall reliability of the scale (Table 3).

The test-retest analysis, summarized in Table 4, evaluated the consistency of scale scores across two time points. The Spearman correlation coefficient for the total scale was $r = 0.663$ ($p < 0.001$), indicating a statistically

Table 4 Mean test-retest scores obtained from the scale and their comparison ($n = 25$)

	Mean scale score		Analysis results			
	Pre-test X ± SD	Post-test X ± SD	Spearman correlation		Wilcoxon signed-ranks test	
			r	p	t	p
Ethical judgment	14.64 ± 1.91	14.84 ± 2.07	0.489	0.013	-0.287	0.774
Ethical sensitivity	15.20 ± 1.73	15.44 ± 2.36	0.507	0.010	-0.528	0.597
Ethical motivation	11.72 ± 1.72	11.76 ± 1.50	0.583	0.002	-0.269	0.788
Ethical action	12.60 ± 2.04	12.64 ± 1.77	0.464	0.019	-0.000	1.000
EDM-CS total	54.56 ± 5.67	54.68 ± 5.54	0.663	< 0.001	-0.107	0.915

Note. t = Wilcoxon signed-ranks test; r = Spearman correlation; X ± SD: mean ± standard deviation, EDM-CS: Ethical Decision-Making Competence Scale

significant positive correlation and strong test-retest reliability. The Wilcoxon signed-ranks test showed no significant differences between pre-test and post-test scores ($p = 0.915$), confirming the stability of the scale over time. For individual subscales, Spearman correlation coefficients ranged from $r = 0.464$ to $r = 0.583$, all of which were statistically significant ($p < 0.05$), indicating moderate reliability for each factor. Similarly, the Wilcoxon signed-ranks test revealed no significant differences between pre-test and post-test scores for any subscale ($p > 0.05$), further confirming consistent performance across multiple administrations (Table 4).

Discussion

The EDM-CS enables nursing students to self-assess their competencies in ethical decision-making. This study examined the validity and reliability of the Turkish adaptation of the EDM-CS. The results confirmed that the scale was a reliable and valid instrument for evaluating ethical decision-making competencies. Its four-dimensional structure, comprising ethical judgment, ethical sensitivity, ethical motivation, and ethical action, aligns with the original version of the scale [13].

Content validity requires input from a panel of at least six experts, with a recommended minimum CVI value of 0.83 [43, 44]. In this study, the CVI values for the EDM-CS, as evaluated by 10 experts, ranged from 0.88 to 1.00. According to Polit et al. (2007) a CVI value above 0.80 is sufficient to confirm content validity. These results provide strong evidence supporting the content validity of the Turkish version of the EDM-CS.

The linguistic validity of the Turkish version was ensured through expert evaluations and pilot testing. Particular emphasis was placed on maintaining the meaning and cultural relevance of the ethical motivation and ethical action dimensions during the adaptation process. This approach aligns with the best practices observed in similar scale adaptation studies and enhances the applicability of ethical decision-making scales in multicultural settings [29, 50].

The results of the EFA confirmed the adequacy of the sample size, as evidenced by a statistically significant Bartlett's test of sphericity value and a KMO value of ≥ 0.70 [51]. Factor loadings ranged from 0.434 to 0.816, exceeding the minimum interpretative threshold of 0.4 [52].Furthermore, the scale accounted for 71.247% of the total variance, which surpasses the commonly accepted range of 40–60% range in the literature [52, 53].

Internal consistency and temporal stability of the Turkish version of the EDM-CS were evaluated using Cronbach's alpha coefficient and test-retest reliability. The Cronbach's alpha value of the overall scale was calculated to be 0.942, while the subscale values ranged from 0.834 to 0.898. According to Hair et al. (2019) coefficients exceeding 0.7 are considered sufficient, confirming that the scale demonstrates strong internal consistency and homogeneity [54].

CFA was conducted to evaluate the fit of the conceptual structure identified through EFA. The fit indices, including χ^2, CFI, GFI, NFI, and RMSEA, satisfied the criteria established in the literature [47, 49, 55, 56]. The validity of the scale structure is further supported when compared to the CFA results of other ethical measurement tools previously validated in Türkiye [31, 32, 34]. While the RMSEA value of the EDM-CS is slightly higher than those of the other instruments, its CFI and IFI values are above the threshold of 0.90, demonstrating an acceptable model fit. These findings suggest that the EDM-CS is a theoretically grounded and statistically robust instrument and can be considered a reliable tool for evaluating ethical decision-making competence within the context of Turkish nursing education.

Additionally, the test-retest reliability coefficient was calculated to be $r = 0.663$. According to Dancey and Reidy (2020) correlation coefficients ranging from 0.4 to 0.7 indicate a moderate correlation, while coefficients between 0.7 and 0.9 signify a strong correlation. Thus, the obtained coefficient demonstrates the reliability of the measurement tool [57].

In addition to psychometric properties, the EDM-CS presents unique advantages when compared to other ethical evaluation instruments used in Türkiye [31, 32, 34]. While existing scales such as the ESQ, EPAS, or the IEVS primarily measure ethical awareness, attitudes, or value orientation, they do not provide a comprehensive evaluation of ethical decision-making competence in its cognitive and behavioral dimensions. Moreover, no prior tool adapted in Türkiye has simultaneously assessed all four components of ethical decision-making, especially within the context of clinical nursing practice. Furthermore, comparison with the original development study conducted in Taiwan revealed comparable reliability coefficients and factor structures, reinforcing the cross-cultural applicability of the EDM-CS. These parallels highlight the robustness and adaptability of the EDM-CS when applied across different sociocultural settings. In conclusion, the Turkish version of the EDM-CS provides a comprehensive, valid, and reliable tool for evaluating ethical decision-making competence in nursing students. It fills a significant gap in the existing literature by offering a multidimensional and theory based measure applicable to both educational assessment and clinical evaluation purposes.

Strengths and limitations

EDM-CS demonstrates a clear and comprehensible structure. The average completion time for the questionnaire is approximately 10 min, enhancing its practicality and

functionality for both clinical and educational settings. The scale's strong reliability and validity outcomes confirm its value as an effective tool for assessing the ethical decision-making competencies of nursing students. This assessment serves as a critical foundation for the development of ethical decision-making skills, the evaluation of the effectiveness of ethics education programs, and the guidance of practice-based interventions.

Nevertheless, certain limitations of this study should be acknowledged. Although the recommended sample size for scale validation studies was achieved, the participants were recruited from a single university. This sampling approach may restrict the generalizability of the findings to nursing students in other regions of Türkiye or to educational institutions with varying curricula. Moreover, due to institutional limitations in accessing the required software, advanced statistical analyses such as HTMT (Heterotrait-Monotrait Ratio) and AVE (Average Variance Extracted) could not be conducted. Future studies are encouraged to include these analyses using advanced structural equation modeling tools such as SmartPLS to further enhance construct validity. In addition, because of resource constraints and the limited number of eligible students, it was not feasible to divide the sample into separate groups for EFA and CFA. As a result, both analyses were conducted on the same sample. While this approach is acceptable for preliminary scale adaptation studies, future research should validate the scale using independent samples to increase generalizability.

Conclusion

The Turkish version of the EDM-CS was confirmed as a reliable and valid instrument for measuring the ethical decision-making competence of nursing students. This study contributes to the existing literature and establishes a foundation for future research aimed at strengthening ethical decision-making skills. Furthermore, this scale can be effectively utilized to evaluate the impact of educational programs designed to enhance ethical decision-making competence.

Abbreviations

EDM-CS	Ethical Decision-Making Competence Scale
IEVS	Inclination to Ethical Values Scale
BHEDT	Byrd's Ethical Sensitivity Test for Nurses
EİTÖ	the Ethical Principles Attitude Scale the
ESQ-N	Ethical Sensitivity Questionnaire for Nurses
ESQ-NS	Ethical Sensitivity Questionnaire for Nursing students
HPECS	Healthcare Professionals Ethical Codes Scale
EEQ	Ethical Evaluation Questionnaire
EDBS	Ethical Decision Bias Scale
CFA	Confirmatory Factor Analysis
EFA	Exploratory Factor Analysis
KMO	Kaiser-Meyer-Olkin
CVI	Content Validity Index
I-CVI	Item-Level Content Validity Index
S-CVI	Scale-Level Content Validity Index
S-CVI/Ave	Scale-Level Content Validity Index/Average
χ^2	Chi-Square
χ^2/df	Chi-Square divided by Degrees of Freedom
GFI	Goodness-of-Fit Index
AGFI	Adjusted Goodness-of-Fit Index
CFI	Comparative Fit Index
IFI	Incremental Fit Index
RFI	Relative Fit Index
NFI	Normed Fit Index
TLI	Tucker-Lewis Index
RMSEA	Root Mean Square Error of Approximation
SPSS	Statistical Package for the Social Sciences
AMOS	Analysis of Moment Structures

Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study was approved by the Ethics Committee of Manisa Celal Bayar University (approval date: November 27, 2024, approval number: 2735). Additionally, permission was obtained from the institutions where the research was conducted. This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Participants were informed about the study's purpose, procedures, and voluntary nature, and it was emphasized that all data would be kept confidential. Informed consent was collected via "Google Forms." The researcher also obtained permission for the Turkish adaptation and validation of the scale from Dr. Hsiang-Chu Pai, the original developer of the scale, through email communication on August 31, 2024.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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Üstündağ *et al. BMC Nursing*   (2025) 24:526

Page 10 of 10

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