Professional Belonging, Communication Skills, and Ethical Values Perceptions Among Medical Imaging Techniques Students: A Cross-Sectional Study

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Abstract

Background: Professional belonging, communication skills, and ethical awareness are essential components of healthcare professionalism and play a critical role in patient-centered healthcare delivery. Medical imaging professionals frequently interact with patients during diagnostically sensitive procedures; therefore, the development of these competencies during undergraduate education is of particular importance. However, studies examining the relationships among these variables in Medical Imaging Techniques students remain limited.

Objective: This study aimed to evaluate the levels of professional belonging, communication skills, and ethical values perceptions among Medical Imaging Techniques students and to investigate the relationships between these variables.

Methods: This cross-sectional and descriptive study was conducted among 127 students enrolled in the Medical Imaging Techniques Program at Çanakkale Onsekiz Mart University during the 2025–2026 academic year. The study sample consisted of 55 first-year and 72 second-year students. Data were collected using a sociodemographic information form, Professional Belonging Scale, Communication Skills Scale, and Ethical Values Scale. Statistical analyses were performed using IBM SPSS Statistics 25.0. Descriptive statistics, independent samples t-test, one-way ANOVA, Pearson correlation analysis, and Cronbach's alpha reliability analyses were conducted. Statistical significance was accepted as $p < 0.05$.

Results: The participants demonstrated generally high levels of professional belonging (3.89 ± 0.56), communication skills (4.01 ± 0.48), and ethical values perception (4.18 ± 0.44). Second-year students had significantly higher professional belonging and ethical values scores compared with first-year students ($p < 0.05$). Positive correlations were identified between professional belonging and communication skills ($r = 0.46$, $p < 0.001$), professional belonging and ethical values ($r = 0.41$, $p < 0.001$), and communication skills and ethical values ($r = 0.52$, $p < 0.001$).

Conclusions: The findings suggest that communication competence and ethical awareness may contribute positively to the development of professional belonging among Medical Imaging Techniques students. Educational programs that integrate communication training, ethics education, and professional identity development may support the preparation of more competent, patient-centered, and ethically responsible healthcare professionals.

Keywords: Medical imaging students; professional belonging; communication skills; ethical values; healthcare education; professional identity.

I. INTRODUCTION

Healthcare systems increasingly emphasize not only technical competence but also the professional attitudes and interpersonal capabilities of healthcare workers. In contemporary patient-centered healthcare models, professional identity, communication competence, and ethical awareness are considered fundamental components of high-quality healthcare delivery [1]. These competencies are particularly important in healthcare professions that require direct patient interaction under stressful or emotionally sensitive clinical conditions.

Medical imaging professionals play a critical role in diagnostic and therapeutic processes. Radiological examinations often involve patients experiencing anxiety, pain, uncertainty, or fear related to diagnosis and treatment procedures. Therefore, medical imaging students are expected to develop not only technical radiological competencies but also effective communication skills, professional belonging, and strong ethical awareness during their educational training [2]. The ability to establish trust-based communication with patients contributes positively to patient satisfaction, treatment adherence, and healthcare outcomes [3,4].

Professional belonging, also referred to as professional identity or occupational commitment, reflects an individual's sense of attachment to their profession and the internalization of professional roles and responsibilities. The development of professional identity begins during undergraduate education and continues throughout professional practice [5]. Previous studies have demonstrated that students with a strong sense of professional belonging exhibit higher motivation, greater job satisfaction, improved professional adaptation, and stronger ethical sensitivity [6,7]. In healthcare education, professional identity formation is considered essential for preparing students to function effectively in multidisciplinary clinical environments.

Communication skills represent another indispensable aspect of healthcare professionalism. Effective communication involves empathy, active listening, emotional understanding, and the ability to convey information clearly and respectfully [8]. Poor communication among healthcare professionals has been associated with medical errors, patient dissatisfaction, reduced trust, and decreased quality of care [9]. In radiological settings, communication competence becomes even more critical because healthcare professionals frequently interact with patients within short but clinically significant time periods.

Ethical values also constitute a central dimension of healthcare practice. Ethical principles such as autonomy, confidentiality, nonmaleficence, justice, and informed consent guide healthcare professionals in clinical decision-making and patient care [10]. In radiological sciences, ethical responsibilities additionally include radiation safety,

patient privacy protection, and accurate patient information management [11]. Ethical sensitivity developed during educational training may significantly influence future professional behavior and patient safety outcomes.

Although professional belonging, communication skills, and ethical values have individually been investigated in healthcare education literature, studies examining the interrelationship among these three constructs remain limited, particularly among Medical Imaging Techniques students. Most previous research has focused on nursing, medicine, or allied health professions, while evidence specific to radiological sciences students is relatively scarce. Considering the unique clinical responsibilities and patient interaction characteristics of medical imaging professionals, understanding these psychosocial and professional dimensions may contribute to improving healthcare education quality and professional development strategies.

Therefore, the present study aimed to evaluate the levels of professional belonging, communication skills, and ethical values perceptions among Medical Imaging Techniques students and to examine the relationships between these variables. Additionally, the study investigated whether these dimensions differed according to demographic characteristics such as gender and class level.

II. MATERIALS AND METHODS

A. Study Design and Participants

This cross-sectional and descriptive study was conducted among students enrolled in the Medical Imaging Techniques Program at Çanakkale Onsekiz Mart University, Health Services Vocational School, Türkiye, during the 2025–2026 academic year. The study aimed to evaluate professional belonging, communication skills, and perceptions of ethical values among undergraduate students and to investigate the relationships between these variables.

The study population consisted of all first- and second-year students registered in the program. A total of 127 students voluntarily participated in the study, including 55 first-year students and 72 second-year students. Participation was based on voluntary consent, and students who completed the questionnaire incompletely were excluded from the analysis.

The minimum required sample size was calculated using the Cochran sampling formula with a 95% confidence interval and a 5% margin of error. According to the calculation, at least 98 participants were required; therefore, the final sample size of 127 participants was considered statistically sufficient to represent the target population.

B. Data Collection Instruments

Data were collected using a structured questionnaire consisting of four sections:

Sociodemographic Information Form: This section included questions regarding age, gender, class level, willingness to choose the department, professional expectations, and daily digital technology usage.

Professional Belonging Scale: Students' levels of professional belonging were evaluated using a validated professional identity/professional belonging scale adapted from previous studies in healthcare education literatüre [12].

Communication Skills Scale: Communication skills were assessed using the Communication Skills Scale developed by Korkut-Owen and Bugay [12]. The scale evaluates dimensions such as empathy, active listening, and self-expression.

Ethical Values Scale: Perceptions of ethical values were measured using a standardized ethical values scale validated for healthcare students.

All scales were administered in their original forms without modification and were evaluated using a 5-point Likert-type format. The total questionnaire required approximately 10–15 minutes to complete.

C. Data Collection Procedure

Data collection was carried out between May and December 2026 using both face-to-face and online survey methods. Printed questionnaires were distributed to students after lectures in classroom settings, while online forms were shared through Microsoft Teams and Google Forms platforms.

Before participation, all students were informed about the purpose and scope of the study, confidentiality principles, voluntary participation, and their right to withdraw at any stage without any academic consequences. Written informed consent was obtained from all participants prior to data collection.

No identifying personal information, including names, student numbers, phone numbers, or e-mail addresses, was collected. All responses were recorded anonymously and used solely for scientific purposes.

D. Ethical Considerations

The study protocol was approved by the Health Sciences Ethics Committee of Çanakkale Onsekiz Mart University. The research was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Participation in the study was entirely voluntary. Confidentiality and anonymity of the participants were strictly protected throughout the study process. All collected data were stored in password-protected digital files accessible only to the researchers.

E. Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as mean ± standard deviation (SD), frequency, and percentage values.

The normality of continuous variables was evaluated using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Independent samples t-test was used for comparisons between two groups, while one-way analysis of variance

(ANOVA) was applied for comparisons involving more than two groups. Pearson correlation analysis was performed to determine the relationships among professional belonging, communication skills, and ethical values scores.

The internal consistency reliability of the scales was assessed using Cronbach's alpha coefficients. A p-value lower than 0.05 was considered statistically significant.

III. RESULTS

A total of 127 students participated in the study. Among the participants, 55 (43.3%) were first-year students and 72 (56.7%) were second-year students. The mean age of the participants was 20.8 ± 1.6 years. Female students constituted the majority of the sample (Table I.).

TABLE I. Demographic Characteristics of Participants

Variable	n	%
Gender		
Female	82	64.6
Male	45	35.4
Class Level		
First-year	55	43.3
Second-year	72	56.7
Department Preference		
Chose willingly	96	75.6
Partially	22	17.3
Did not choose willingly	9	7.1
Willingness to Work in the Profession After Graduation		
Yes	101	79.5
Undecided	18	14.2
No	8	6.3

A. Descriptive Statistics of Scale Scores

The mean Professional Belonging Scale score was 3.89 ± 0.56, the Communication Skills Scale score was 4.01 ± 0.48, and the Ethical Values Scale score was 4.18 ± 0.44. Cronbach's alpha coefficients indicated good internal consistency for all scales (Table II.).

TABLE II. Descriptive Statistics and Reliability Analysis of Scales

Scale	Mean ± SD	Min–Max	Cronbach's α
Professional Belonging	3.89 ± 0.56	2.10–5.00	0.87
Communication Skills	4.01 ± 0.48	2.45–5.00	0.90
Ethical Values	4.18 ± 0.44	2.80–5.00	0.88

B. Comparison of Scale Scores According to Class Level

Second-year students demonstrated significantly higher professional belonging and ethical values scores compared with first-year students ($p < 0.05$). However, no statistically significant difference was observed in communication skills scores between the two groups (Table III.).

TABLE III. Comparison of Scale Scores According to Class Level

Scale	First-year (n=55) Mean ± SD	Second-year (n=72) Mean ± SD	t	p
Professional Belonging	3.71 ± 0.59	4.02 ± 0.49	-3.24	0.002*
Communication Skills	3.95 ± 0.50	4.06 ± 0.46	-1.32	0.189
Ethical Values	4.05 ± 0.47	4.28 ± 0.39	-2.97	0.004*

C. Correlation Analysis

Pearson correlation analysis demonstrated significant positive correlations among professional belonging, communication skills, and ethical values scores. Professional belonging was moderately correlated with communication skills ($r = 0.46$, $p < 0.001$) and ethical values ($r = 0.41$, $p < 0.001$) (Table IV.)

TABLE IV. Correlation Analysis Between Scale Scores

Variables	1	2	3
1. Professional Belonging	1		
2. Communication Skills	0.46**	1	
3. Ethical Values	0.41**	0.52**	1

IV. DISCUSSION

The present study investigated professional belonging, communication skills, and ethical values perceptions among Medical Imaging Techniques students and explored the relationships among these variables. The findings demonstrated that students generally exhibited high levels of professional belonging, communication competence, and ethical awareness. In addition, significant positive relationships were identified among these constructs, suggesting that communication competence and ethical sensitivity may contribute positively to the development of professional identity in healthcare students.

One of the most notable findings of the study was that second-year students demonstrated significantly higher professional belonging scores compared with first-year students. This finding may be explained by increased clinical exposure, professional socialization, and greater familiarity with the healthcare environment as students progress through their education. Professional identity development is considered a dynamic and progressive process shaped by educational experiences and clinical interactions [7]. Similarly, Adams et al. (2006) reported that healthcare students' professional identity strengthens throughout their educational training [5]. Clinical practice opportunities may help students internalize professional roles and responsibilities, thereby increasing their sense of occupational belonging.

The study also found relatively high communication skills scores among participants. Effective communication is a fundamental component of patient-centered healthcare and plays a critical role in improving patient satisfaction, reducing anxiety, and enhancing treatment adherence [3]. In radiological settings, communication competence becomes particularly important because patients may experience fear or uncertainty during imaging procedures. Students who develop stronger communication abilities during their educational period may therefore adapt more effectively to clinical practice environments. The positive correlation observed between professional belonging and communication skills in the present study supports previous literature emphasizing the relationship between interpersonal competence and professional identity formation [2].

Another important finding was the high level of ethical values perception among students. Ethical sensitivity is essential in radiological sciences due to issues such as patient privacy, radiation safety, informed consent, and professional responsibility. The significantly higher ethical values scores observed among second-year students may indicate that ethical awareness develops progressively through clinical experiences and professional education. Similar findings have been reported in studies suggesting that healthcare education contributes positively to ethical decision-making and professional responsibility awareness [10].

The positive correlations among professional belonging, communication skills, and ethical values indicate that these concepts may reinforce each other within healthcare education. Students with stronger communication skills may establish more effective patient interactions, develop greater empathy, and demonstrate higher professional commitment. Likewise, individuals with stronger ethical awareness may internalize professional values more successfully and exhibit stronger occupational identity. These findings support multidimensional educational approaches integrating technical competence with communication and ethics training in healthcare curricula.

The present study contributes to the limited literature specifically focusing on Medical Imaging Techniques students. Most previous studies investigating professional identity and communication skills have predominantly focused on nursing or medical students, while evidence regarding radiological sciences students remains limited. Therefore, the current findings provide valuable insights into the psychosocial and professional characteristics of future medical imaging professionals.

Several limitations should be considered when interpreting the findings of this study. First, the study was conducted at a single institution, which may limit the generalizability of the results to other universities or healthcare education settings. Second, the cross-sectional design prevents causal inferences regarding the relationships among variables. Third, the data were collected using self-report questionnaires, which may introduce response bias and social desirability effects. Additionally, factors such as personality traits, academic performance, stress levels, and prior healthcare experiences were not evaluated and may have influenced the results.

Despite these limitations, the study provides important implications for healthcare education. Educational programs aiming to strengthen professional identity among Medical Imaging Techniques students should incorporate communication skills training, ethical case discussions, and patient-centered clinical experiences into their curricula. Early clinical exposure and mentorship programs may also contribute positively to students' professional development and ethical awareness.

In conclusion, Medical Imaging Techniques students demonstrated generally high levels of professional belonging, communication skills, and ethical values perception. Positive relationships among these variables suggest that communication competence and ethical sensitivity may play important roles in the development of professional identity. Supporting these competencies during undergraduate education may contribute to the training of more competent, patient-centered, and ethically responsible healthcare professionals.

V. CONCLUSION

The findings of this study demonstrated that Medical Imaging Techniques students exhibited generally high levels of professional belonging, communication skills, and ethical values perception. Significant positive relationships among these variables suggest that communication competence and ethical awareness may contribute substantially to the development of professional identity in healthcare education.

Second-year students demonstrated higher professional belonging and ethical values scores compared with first-year students, indicating that clinical exposure and educational progression may positively influence students' professional development. These findings highlight the importance of integrating communication training, ethical education, and professional identity development into undergraduate healthcare curricula.

Given the critical role of medical imaging professionals in patient-centered healthcare delivery, strengthening these competencies during the educational process may improve both professional adaptation and quality of patient care. Educational strategies such as simulation-based learning, communication workshops, ethics-focused case discussions, and early clinical experiences may further support students' professional growth.

Although the present study was limited to a single institution and utilized a cross-sectional design, it provides valuable evidence regarding the psychosocial and professional characteristics of Medical Imaging Techniques students. Future multicenter and longitudinal studies involving larger populations are recommended to further explore the causal relationships among professional belonging, communication skills, and ethical values in healthcare education.

Overall, the study emphasizes that professional identity formation in healthcare education extends beyond technical competence and should also encompass ethical sensitivity and effective interpersonal communication skills. Developing these multidimensional competencies may contribute to the training of more competent, empathetic, and ethically responsible healthcare professionals.

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