**International Journal of Evaluation and Research in Education (IJERE)**
Vol. 15, No. 5, October 2026, pp. 4220~4231
ISSN: 2252-8822, DOI: 10.11591/ijere.v15i5.39879 

# Interprofessional attitudes, empathy, communication skills, and patient safety competency in traditional Korean medicine and nursing students

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**Article Info**

***Article history:***

Received Apr 10, 2026
Revised Sep 3, 2026
Accepted Sep 8, 2026

***Keywords:***

Communication skills
Empathy
Interprofessional attitudes
Korean medicine students
Nursing students
Patient safety competency

**ABSTRACT**

Patient safety competency is an essential part of health professions education and may be influenced by learners' interprofessional attitudes, empathy, and communication skills. This study investigated the relationships among these variables and identified factors influencing patient safety competency among traditional Korean medicine and nursing students. A cross-sectional correlational study was conducted among 238 students at a university in South Korea, consisting of 150 nursing students and 88 traditional Korean medicine students. Data were collected using questionnaires assessing interprofessional attitudes, empathy, communication skills, and patient safety competency. Data were analyzed using descriptive statistics, t-tests, analysis of variance (ANOVA), Pearson's correlation coefficients, and multiple regression analysis. Patient safety competency varied by academic year, patient safety education (PSE) experience, college life satisfaction, and major satisfaction. Students with clinical practicum (CP) experience demonstrated significantly higher interprofessional attitudes and patient safety competency than those without practicum experience. Patient safety competency was positively associated with interprofessional attitudes, empathy, and communication skills. Furthermore, PSE experience, major satisfaction, interprofessional attitudes, empathy, and communication skills were significant predictors of patient safety competency, with interprofessional attitudes identified as the strongest predictor. Patient safety competency among traditional Korean medicine and nursing students was influenced more by modifiable educational and interpersonal factors than by fixed background characteristics. These findings support the development of interprofessional, communication-centered, and empathy-informed patient safety curricula to enhance collaborative readiness and safe practice prior to entry into clinical settings.



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## 1. INTRODUCTION

Patient safety is a fundamental aspect of healthcare quality and is recognized as a system-wide priority aimed at minimizing preventable harm. The World Health Organization (WHO), through the global patient safety action plan 2021–2030, advocates for coordinated efforts to enhance policy, education, and frontline implementation. Achieving sustainable improvement in safety requires the development of

sociocultural capabilities, including teamwork, effective communication, safety culture, and proactive risk management across healthcare systems [1]. This approach underscores that patient safety is not limited to individual clinical expertise but is shaped by professionals' interdependence in sharing information, coordinating decisions, recognizing errors, and responding to evolving risks within complex clinical systems [2], [3]. Communication is consistently identified as a central safety mechanism, facilitating shared mental models, timely escalation, and coordinated action across professional boundaries [4]. Studies have directly associated poor communication with patient safety incidents, estimating that it contributes to approximately one-quarter of incidents when considered alongside other factors [5], [6]. Consequently, health professions education should ensure that learners enter practice with an understanding of patient safety as a team-based competency rather than an individual attribute.

Patient safety competency is a critical educational outcome for health professions students because safe care depends not only on individual clinical knowledge but also on teamwork, communication, empathy, and collaborative decision-making. In South Korea, nursing students and traditional Korean medicine students may encounter increasingly collaborative and integrative healthcare environments after graduation. Therefore, it is important to understand which educational and interpersonal factors are associated with patient safety competency before students enter full professional practice.

Patient safety competency encompasses the integrated knowledge, skills, and attitudes necessary to prevent avoidable harm, identify and manage safety risks, and respond effectively to adverse events [1], [7]. In this study, patient safety competency is defined to include domains such as interprofessional teamwork, effective communication, risk management, understanding human and environmental factors, recognizing and responding to adverse events, and fostering a culture of safety [7], [8]. The Health Professional Education in Patient Safety Survey (H-PEPSS) was designed to assess these competency areas, with a particular emphasis on the sociocultural dimensions of safety competency, at or near entry to practice [9]. Recent empirical research indicates that learners' self-reported patient safety competencies frequently remain at a moderate level, and perceived competence may vary between classroom and clinical practice settings [10]. These discrepancies underscore persistent theory-practice gaps and emphasize the need for enhanced curricula, including structured patient safety education (PSE) and simulation, to support the transfer of safety competency to clinical learning environments [11], [12].

This study is grounded in the interprofessional education (IPE) framework, which posits that learners from different professions learn with, from, and about one another to improve collaboration and quality of care [13]. From this perspective, collaborative attitudes, communication, and empathy jointly contribute to patient safety competency because safe practice is developed through relational, communicative, and collaborative learning processes. The H-PEPSS-based patient safety competency framework further supports this view by emphasizing the sociocultural dimensions of patient safety, including teamwork, effective communication, risk management, human and environmental factors, and safety culture [9]. Building on this framework, IPE is a key educational strategy for strengthening patient safety competency. IPE supports patient safety mechanisms such as shared situational awareness, coordinated decision-making, and effective handoffs [14], [15]. Recent evidence indicates that IPE interventions, particularly simulation-based and patient-safety-focused programs, can improve learners' patient-safety-related knowledge, attitudes, motivation, and perceived competencies [14], [16], [17]. Consistent with this evidence, patient-safety-focused IPE programs in Korea, including those using medical error scenarios, have reported increased patient safety motivation and improved interprofessional learning attitudes among undergraduate learners [16]. However, previous studies have also noted limitations, including reliance on subjective outcomes and insufficient assessment of teamwork performance [17].

Effective interprofessional collaboration depends not only on skills training but also on learners' underlying interprofessional attitudes. These attitudes encompass respect for other professions, valuing teamwork, and maintaining a patient-centered orientation, all of which can affect willingness to collaborate and participate in shared problem-solving [18], [19]. Recent research in undergraduate medical education continues to investigate variability in interprofessional attitudes, their determinants, and evolution of these attitudes during training, emphasizing the importance of assessing and intentionally developing attitudinal foundations alongside technical skills [18].

At the same time, patient safety relies not only on collaborative intent but also on interpersonal capabilities, particularly empathy and communication skills, which facilitate information sharing and speaking up in situations of uncertainty [5], [20], [21]. Empathy supports patient-centered care and fosters psychologically safe team environments where concerns can be raised and addressed constructively [22], [23]. In patient safety contexts, speaking up is widely recognized as a critical safety behavior influenced by motivation, learning experiences, and relational dynamics [23], [24]. An integrated review of nursing students indicates that authentic learning experiences and supportive environments encourage students to speak up for safety during work-integrated learning [25]. Communication skills serve as the practical mechanism for enacting safety, encompassing timely information exchange, escalation of concerns,

structured handoffs, and coordination in dynamic situations [4], [5]. Shared mental models and team situation awareness help prevent breakdowns and maintain performance in high-risk care, highlighting the necessity of treating communication and teamwork as essential safety infrastructure [4].

In Korea, traditional Korean medicine and nursing frequently intersect in clinical and community-based care settings, especially as integrated, patient-centered care gains prominence. Examining patient safety competency among both traditional Korean medicine students and nursing students provides insight into how differences in professional culture, educational socialization, and communication patterns influence safety competency [14]. Including both groups enables comparison of patient safety competency levels and assessment of whether interprofessional attitudes, empathy, and communication contribute similarly or differently to safety competency across disciplines. This approach can generate evidence to inform interprofessional, patient-safety-oriented curricula that emphasize attitudinal and interpersonal foundations tailored to each professional group [15], [19].

Previous studies have shown that PSE and IPE can improve students' safety-related knowledge, attitudes, and perceived competencies. However, much of the existing literature has examined these educational factors separately or has focused mainly on nursing or medical students. Less attention has been paid to how interprofessional attitudes, empathy, and communication skills jointly contribute to patient safety competency among both traditional Korean medicine and nursing students. This gap limits the development of integrated educational strategies that address the collaborative and interpersonal dimensions of patient safety. Addressing this gap may provide useful evidence for designing interprofessional, communication-centered, and empathy-informed patient safety curricula. This study matters because identifying modifiable educational and interpersonal factors associated with patient safety competency can help educators design more effective patient safety curricula before students enter professional practice. Therefore, this study aims to examine the influence of interprofessional attitudes, empathy, and communication skills on patient safety competency among traditional Korean medicine students and nursing students. By identifying key contributors to patient safety competency in these learners, this study seeks to provide empirical evidence to inform curriculum development. The findings will also support the design of IPE-based PSE that enhances collaborative readiness and interpersonal capability prior to entry into clinical practice.

## 2. METHOD

### 2.1. Research design

A cross-sectional correlational design was used to examine the relationships among interprofessional attitudes, empathy, communication skills, and patient safety competency among traditional Korean medicine and nursing students at a university in South Korea. This design was appropriate for identifying associations and factors related to patient safety competency at a single point in time. However, because the data were collected cross-sectionally, causal relationships among the study variables cannot be inferred.

### 2.2. Participants and procedure

A total of 238 undergraduate students from a university in South Korea, participated in the study, comprising 150 nursing students (63.0%) and 88 Korean medicine students (37.0%). Eligibility criteria required enrollment in either major, comprehension of the study purpose, and provision of voluntary informed consent. The required sample size was determined a priori using G*Power 3.1.9 (University of Düsseldorf, Düsseldorf, Germany) for multiple regression, with parameters set at $\alpha$=.05, $f^2$=.15, power=.95, and 13 independent variables, resulting in a minimum sample size of 189. After accounting for an estimated 20% attrition, the final sample size (n=238) was deemed sufficient.

Data were collected using convenience sampling through an online self-administered questionnaire between September 8 and October 31, 2025. Participants were recruited via departmental announcements distributed to eligible nursing and Korean medicine students. Convenience sampling was used because it was practical for recruiting students from the two relevant majors within the university setting. However, no randomization was applied, which may limit the representativeness of the sample and the generalizability of the findings. The survey required approximately 10–15 minutes to complete. The questionnaire assessed interprofessional attitudes, empathy, communication skills, patient safety competency, and general demographic characteristics.

### 2.3. Measures

Interprofessional attitudes were assessed using the Korean-validated interprofessional attitudes scale (IPAS) by Park *et al.* [19], originally developed by Norris *et al*. [26]. This scale comprises 20 items across four subdomains: teamwork, patient-centeredness, respect for cultural diversity, and community-centeredness. Responses are recorded on a 5-point Likert scale (1=strongly disagree to 5=strongly agree), with higher

scores reflecting more positive attitudes toward interprofessional healthcare practice. The Korean validation study reported an overall Cronbach's α of .93 [19], while the present study yielded a Cronbach's α of .95.

Empathy was assessed using the Korean-validated interpersonal reactivity index (IRI) [27], which is based on the original instrument developed by Davis [28]. The IRI employs a multidimensional framework to assess empathy across cognitive and affective dimensions. Cognitive empathy is evaluated through the perspective-taking and fantasy subscales, while affective empathy is assessed via the empathic concern and personal distress subscales. The IRI consists of 28 items, with 7 items per subscale. Responses are provided on a 5-point Likert scale (1=not at all true to 5=very true), with higher scores denoting greater empathy in each domain. The Korean version demonstrated a Cronbach's α of .80 [27], and the present study reported a Cronbach's α of .71.

Communication skills were evaluated using the primary communication inventory, originally developed by Navran [29] and subsequently revised and adapted for Korean student populations by Eun-Yeon [30]. This instrument comprises 25 items, including 20 items on verbal communication and 5 items on nonverbal communication. Responses are recorded on a 5-point Likert scale (1=not at all true to 5=always true), with higher scores reflecting greater communication skills. Eun-Yeon [30] reported a Cronbach's α of .84, while the present study found a Cronbach's α of .89.

Patient safety competency was assessed using the H-PEPSS, which was originally developed by Ginsburg *et al*. [9] and translated into Korean by Son *et al*. [31]. The instrument comprises 16 items distributed across six subdomains: teamwork with other healthcare professionals (3 items), effective communication (3 items), managing safety risks (3 items), understanding human and environmental factors (2 items), recognizing and responding to adverse events (2 items), and safety culture (3 items). Responses are recorded on a 5-point Likert scale ranging from 1 (not at all true) to 5 (very true), with higher scores reflecting greater patient safety competency. Cronbach's α was .91 in the Korean validation study and .95 in the present study [31].

Participants' general characteristics were collected using a self-administered questionnaire. These characteristics included gender, age, major, and academic year. Additional information was obtained on experience with PSE, satisfaction with college life, major satisfaction, personality, and academic performance.

### 2.4. Data analysis

Data analysis was conducted using IBM SPSS Statistics 28.0 (IBM Corp., Armonk, NY, USA). General characteristics of participants were summarized as frequencies and percentages. The main study variables, including interprofessional attitudes, empathy, communication skills, and patient safety competency, were presented as means and standard deviations (SD). Differences in patient safety competency by participant characteristics were examined using independent-samples t-tests and one-way analysis of variance (ANOVA). When ANOVA results were significant, Scheffé post hoc tests identified group differences. Additional independent-samples t-tests were performed to compare main study variables by major (nursing vs. traditional Korean medicine) and by clinical practicum (CP) experience. Pearson's correlation coefficients assessed relationships among interprofessional attitudes, empathy, communication skills, and patient safety competency. Finally, multiple regression analysis identified factors associated with patient safety competency. Assumptions of normality, linearity, and homoscedasticity were examined prior to regression analysis.

## 3. RESULTS

### 3.1. Participants' characteristics and differences in patient safety competency

Table 1 presents the characteristics of the participants and group differences in patient safety competency. The sample consisted of 238 students, comprising 150 nursing students (63.0%) and 88 Korean medicine students (37.0%). Of these, 159 participants (66.8%) were female and 79 (33.2%) were male. The overall mean age was 23.46 years (SD=5.20), with nursing students averaging 22.09 years and Korean medicine students averaging 25.81 years. The largest proportions of students were in the 2nd year (33.2%) and 4th year (30.7%), followed by the 1st year (16.4%), 6th year (11.8%), and 5th year (8.0%). Most participants (70.2%) reported having PSE experience, including 76.0% of nursing students and 60.2% of Korean medicine students. Additionally, more than half of the participants reported satisfaction with college life (54.6%) and with their major (64.3%).

Patient safety competency varied significantly across academic years (F=2.46, p=.046) although Scheffé post hoc comparisons did not reach significance. Students with PSE experience demonstrated higher patient safety competency compared to those without such experience (t=4.10, p<.001). Significant differences in patient safety competency were also observed based on college life satisfaction (F=6.79, p=.001), with the satisfied group scoring higher than the moderate group. Similarly, major satisfaction was

associated with significant differences (F=12.19, p<.001), as the satisfied group scored higher than both the unsatisfied and moderate groups. No significant differences in patient safety competency were observed according to gender, major, personality, or academic performance.

Table 1. Differences in patient safety competency by general characteristics (n=238)

| Characteristics | Categories | Nursing students | Korean medicine students | All students | Patient safety competency | | |
|---|---|---|---|---|---|---|---|
| | | n (%) or M±SD | | | M±SD | *t* or F | *p* |
| Gender | Female | 113(75.3) | 46(52.3) | 159(66.8) | 3.93±.61 | .69 | .489 |
| | Male | 37(24.7) | 42(47.7) | 79(33.2) | 3.87±.73 | | |
| Age (year) | - | 22.09±4.13 | 25.81±5.98 | 23.46±5.20 | | | |
| Major | Nursing | 150(63.0) | - | 238(100) | 3.89±.63 | .54 | .590 |
| | Korean medicine | - | 88(37.0) | | 3.94±.70 | | |
| Academic year | 1st | 0(.0) | 39(44.3) | 39(16.4) | 3.78±.58 | 2.46 | .046 |
| | 2nd | 77(51.3) | 2(2.3) | 79(33.2) | 3.81±.68 | | ns† |
| | 4th | 73(48.7) | 0(.0) | 73(30.7) | 3.96±.58 | | |
| | 5th | - | 19(21.6) | 19(8.0) | 3.98±.79 | | |
| | 6th | - | 28(31.8) | 28(11.8) | 4.20±.68 | | |
| PSE experience | Yes | 114(76.0) | 53(60.2) | 167(70.2) | 4.02±.61 | 4.10 | <.001 |
| | No | 36(24.0) | 35(39.8) | 71(29.8) | 3.66±.70 | | |
| College life satisfaction | Unsatisfied [a] | 4(2.7) | 7(8.0) | 11(4.6) | 3.66±.71 | 6.79 | .001 |
| | Moderate [b] | 66(44.0) | 31(35.2) | 97(40.8) | 3.75±.59 | | b<c† |
| | Satisfied [c] | 80(53.3) | 50(56.8) | 139(54.6) | 4.05±.67 | | |
| Major satisfaction | Unsatisfied [a] | 6(4.0) | 2(2.3) | 8(3.4) | 3.38±.40 | 12.19 | <.001 |
| | Moderate [b] | 61(40.7) | 16(18.2) | 77(32.4) | 3.68±.68 | | a, b<c† |
| | Satisfied [c] | 83(55.3) | 70(79.5) | 153(64.3) | 4.05±.60 | | |
| Personality | More introverted | 104(69.3) | 60(68.2) | 164(68.9) | 3.94±.67 | 1.11 | .268 |
| | More extraverted | 46(30.7) | 28(31.8) | 74(31.1) | 3.84±.61 | | |
| Academic performance | Low [a] | 16(10.7) | 13(14.8) | 29(12.2) | 3.91±.68 | .64 | .528 |
| | Moderate [b] | 101(67.3) | 47(53.4) | 148(62.2) | 3.88±.65 | | |
| | High [c] | 33(22.0) | 28(31.8) | 61(25.6) | 3.99±.67 | | |

M=mean; a–c denotes group categories used for Scheffé post hoc comparisons; †Scheffé test.

### 3.2. Group differences in study variables

Table 2 presents comparisons of the key study variables between nursing students and Korean medicine students. No significant differences were observed between the two groups in the main study variables. Specifically, interprofessional attitudes, empathy, communication skills, or patient safety competency did not differ significantly between groups. However, as shown in Table 3, CP experience was associated with differences in selected variables. Students with practicum experience reported significantly higher interprofessional attitudes (t=2.97, p=.003) and patient safety competency (t=2.63, p=.009) compared to those without such experience. In contrast, empathy and communication skills did not differ significantly between groups.

Table 2. Comparison of study variables between nursing and Korean medicine students

| Variables | Nursing students (n=150) | Korean medicine students (n=88) | *t*(*p*) |
|---|---|---|---|
| | M±SD | | |
| Interprofessional attitudes | 4.27±.45 | 4.23±.56 | .61(.54) |
| Empathy | 3.48±.38 | 3.47±.42 | .21(.84) |
| Communication skills | 3.56±.43 | 3.50±.51 | 1.07(.29) |
| Patient safety competency | 3.89±.63 | 3.94±.70 | .54(.59) |

M=mean

Table 3. Comparison of study variables by CP experience (n=238)

| Variables | CP experience Yes (n=120) | CP experience No (n=118) | *t*(*p*) |
|---|---|---|---|
| | M±SD | | |
| Interprofessional attitudes | 4.35±.51 | 4.16±.45 | 2.97(.003) |
| Empathy | 3.49±.41 | 3.47±.37 | .45(.651) |
| Communication skills | 3.55±.49 | 3.53±.43 | .30(.766) |
| Patient safety competency | 4.02±.65 | 3.80±.65 | 2.63(.009) |

M=mean

### 3.3. Relationships among interprofessional attitudes, empathy, communication skills and PSE

Table 4 summarizes Pearson's correlation coefficients among interprofessional attitudes, empathy, communication skills, and patient safety competency. Interprofessional attitudes was positively correlated with empathy (r=.461, p<.001) and communication skills (r=.374, p<.001). Additionally, empathy demonstrated a positive association with communication skills (r=.520, p<.001).

Patient safety competency was positively correlated with all three variables. Specifically, it was positively associated with interprofessional attitudes (r=.546, p<.001), empathy (r=.518, p<.001), and communication skills (r=.524, p<.001). These findings reveal that higher interprofessional attitudes, empathy, and communication skills are associated with higher levels of patient safety competency in this sample.

Table 4. Pearson correlations between study variables (n=238)

| Variables | Interprofessional attitudes | Empathy | Communication skills | Patient safety competency |
|---|---|---|---|---|
| Interprofessional attitudes | — | | | |
| Empathy | .461*** | — | | |
| Communication skills | .374*** | .520*** | — | |
| Patient safety competency | .546*** | .518*** | .524*** | — |

***p<.001.

### 3.4. Factors associated with patient safety competency

A multiple regression analysis was conducted to identify factors influencing patient safety competency. Variables were entered into the regression model based on both theoretical relevance and empirical associations observed in the present study. Among the general characteristics, academic year, PSE experience, college life satisfaction, and major satisfaction were included based on their significant differences in patient safety competency. These variables were entered as dummy variables, with academic year (6th), no PSE experience, satisfaction with college life, and satisfaction with major serving as reference categories. Interprofessional attitudes, empathy, and communication skills were included as independent variables because patient safety and IPE frameworks suggest that collaborative orientation, relational sensitivity, and communication are central components of patient safety competency [13], and because these variables showed significant relationships with patient safety competency in the present study.

Prior to conducting the regression analysis, key model assumptions and multicollinearity diagnostics were evaluated. The Durbin–Watson statistic (1.953) indicated no evidence of autocorrelation. Tolerance values ranged from .335 to .759, all above the recommended minimum of .10, and variance inflation factor (VIF) values ranged from 1.318 to 2.987, remaining well below the conventional cutoff of 10. These results indicate that multicollinearity was not a concern.

The multiple regression results are presented in Table 5. PSE experience (β=.149, p=.007), moderate major satisfaction compared to satisfied (β=−.132, p=.047), interprofessional attitudes (β=.298, p<.001), empathy (β=.205, p<.001), and communication skills (β=.287, p<.001) were significantly associated with patient safety competency. In contrast, academic year and college life satisfaction were not significant after adjustment. The model was statistically significant (F=18.41, p<.001) and explained 46.9% of the variance in patient safety competency, with interprofessional attitudes being the strongest associated factor. These findings suggest that patient safety competency was associated not only with prior PSE but also with modifiable interpersonal and collaborative factors.

Table 5. Factors associated with patient safety competency (n=238)

| Variables | | B | SE | β | *t* | *p* |
|---|---|---|---|---|---|---|
| (Constant) | | –.399 | .381 | | –1.05 | .297 |
| Academic year | 1st | –.104 | .126 | –.059 | –.83 | .409 |
| | 2nd | –.191 | .114 | –.138 | –1.68 | .094 |
| | 4th | –.181 | .111 | –.128 | –1.63 | .104 |
| | 5th | –.167 | .144 | –.069 | –1.16 | .248 |
| PSE experience | Yes | .212 | .078 | .149 | 2.73 | .007 |
| College life satisfaction | Unsatisfied | –.114 | .172 | –.037 | –.66 | .508 |
| | Moderate | –.117 | .089 | –.088 | –1.33 | .187 |
| Major satisfaction | Unsatisfied | –.342 | .197 | –.094 | –1.73 | .085 |
| | Moderate | –.185 | .093 | –.132 | –1.99 | .047 |
| Interprofessional attitudes | | .399 | .079 | .298 | 5.06 | <.001 |
| Empathy | | .340 | .099 | .205 | 3.45 | <.001 |
| Communication skills | | .408 | .081 | .287 | 5.03 | <.001 |

$R^2$=.495, Adj. $R^2$=.469, F=18.41, *p*<.001
Reference of dummy variables: academic year (6th); PSE experience (no); college life satisfaction (satisfied); major satisfaction (satisfied).

## 4. DISCUSSION

This study examined patient safety competency among traditional Korean medicine students and nursing students, focusing on the roles of interprofessional attitudes, empathy, and communication skills. Patient safety competency was associated with prior PSE, CP experience, and satisfaction related to learning. Furthermore, interprofessional attitudes, empathy, and communication skills were positively interrelated, and each demonstrated a positive association with patient safety competency. Notably, interprofessional attitudes emerged as the strongest predictor of patient safety competency, followed by communication skills, empathy, and PSE experience.

Although an overall difference in patient safety competency was observed across academic years, the non-significant Scheffé post hoc results indicate that progression by year is limited or uneven rather than clearly stepwise. This finding warrants cautious interpretation, as recent studies indicate that year-level differences in patient safety competence are inconsistent and may depend on curricular sequencing, clinical exposure, and the integration of patient safety content in both classroom and clinical settings [10], [32]. Cross-sectional and review studies similarly report only moderate patient safety competence and persistent gaps between classroom learning and clinical practice, suggesting that curriculum progression alone may not ensure improved safety readiness [10], [32], [33]. In contrast, higher patient safety competency among students with prior PSE experience aligns with evidence that structured PSE enhances knowledge, attitudes, and competencies, particularly when delivered through active, practice-oriented methods such as simulation and longitudinal curricular integration [10], [11], [32].

Patient safety competency was higher among students who reported greater satisfaction with college life and their major, indicating that broader educational climate may influence patient safety competency in addition to formal instruction [33], [34]. Students who are more engaged with their learning environment may participate more actively in learning and derive greater benefit from safety-related educational experiences [34], [35]. This interpretation is supported by evidence that organizational culture and pedagogical context shape students' learning effectiveness in patient safety, and that positive perceptions of the clinical learning environment are associated with better academic adjustment [33], [35]. Furthermore, major satisfaction had a direct effect on patient safety performance in a recent path model study, while safety education experience demonstrated an indirect effect through safety control [36]. The absence of significant differences by gender or major suggests that patient safety competency is more likely a modifiable outcome of educational experience and learning environment than a fixed background characteristic [17], [33].

The absence of significant differences between nursing students and Korean medicine students suggests that academic major is not the primary determinant of interprofessional attitudes, empathy, communication skills, or patient safety competency in this sample. Unlike studies that focus primarily on nursing or medical students, the present study included both traditional Korean medicine and nursing students. This context is important because these students are educated within distinct professional traditions but may later participate in collaborative or integrative healthcare environments. Recent literature similarly indicates that these competencies are shaped more by shared learning experiences and educational design than by discipline alone [17]. A qualitative study found that both medical and nursing students regarded PSE as meaningful, although they emphasized different aspects of learning [37]. The absence of significant differences by major suggests that patient safety competency may be shaped less by discipline itself and more by shared educational exposure, collaborative attitudes, and interpersonal capabilities. This finding provides a contextual contribution to PSE in Korea, where interprofessional learning opportunities across conventional and traditional healthcare disciplines remain relatively limited. These findings indicate that students from both majors are comparably positioned to benefit from common patient-safety and interprofessional learning opportunities prior to entering full professional practice [17], [37].

Students with CP experience demonstrated higher interprofessional attitudes and patient safety competency, suggesting that clinical exposure may facilitate the application of classroom knowledge to real-world teamwork, communication, and risk management [10]. Recent evidence further indicates that patient safety competency during internship is enhanced when students actively participate in safety-related learning activities, such as case discussions and adverse event analysis, rather than through passive clinical presence [38]. However, empathy and communication skills did not differ by practicum experience in this study, indicating that practicum exposure alone may be insufficient to improve broader interpersonal competencies. Intervention research supports this interpretation, showing that empathy and communication are more likely to improve with explicit and structured training [39]. Collectively, these findings support curricula that integrate practicum experience with structured interprofessional reflection and targeted empathy-communication education [17], [39].

The present findings show that interprofessional attitudes, empathy, and communication skills were all positively related, suggesting that these variables form a connected interpersonal foundation for safe practice rather than operating independently. Recent literature similarly conceptualizes patient safety as

a team-based capability that depends on communication, collaboration, and shared situational awareness, rather than solely on technical skill [4], [17]. The positive association between interprofessional attitudes and empathy aligns with evidence showing that IPE can strengthen empathy toward both patients and interprofessional peers [40]. Similarly, the positive correlation between empathy and communication skills is consistent with recent nursing education findings demonstrating that these two capacities are closely connected and can improve concurrently through educational interventions [39], [41].

Patient safety competency was positively correlated with interprofessional attitudes, empathy, and communication skills, with the strongest correlation observed for interprofessional attitudes. This finding suggests that students who place greater value on collaboration may be better equipped to recognize and manage patient safety issues. This interpretation is supported by evidence that IPE enhances patient-safety-related knowledge, attitudes, and practices across health professions [17]. Communication is likely a key mechanism, as poor communication is a major contributor to patient safety incidents [6]. Empathy also plays a significant role, as relational and compassionate competence has been linked to improved patient safety competency [42]. Recent studies of nursing students and interns emphasize the importance of structured education, case discussion, and active learning in strengthening patient safety competency [10], [38], [43]. Taken together, these findings support patient safety curricula that integrate interprofessional learning, empathy development, and communication training, rather than addressing these domains in isolation [17], [39], [40].

Regression analysis identified interprofessional attitudes as the strongest predictor of patient safety competency, indicating that the value students place on collaboration may be more influential than background characteristics when considering safety competence comprehensively. This finding suggests that students' orientation toward collaboration may serve as a foundational driver of patient safety competency. From an IPE perspective, positive attitudes toward teamwork may facilitate effective communication and empathic engagement, which are essential for recognizing, discussing, and responding to safety risks in complex clinical environments [13]. Interprofessional attitudes may function as a foundational disposition that enables effective communication and empathy, thereby indirectly strengthening patient safety behaviors. This interpretation aligns with evidence showing that IPE improves patient-safety-related knowledge, attitudes, and practices across health professions [17]. Communication skills also remained a significant predictor after adjustment, underscoring the central role of communication in enacting safety in clinical care. Recent evidence demonstrates that poor communication is a major contributor to patient safety incidents, while effective team communication supports shared situational awareness and coordinated action [4], [6]. Empathy also maintained an independent association with patient safety competency, suggesting that relational sensitivity contributes to safe practice beyond collaboration and communication alone. Educational research supports this perspective, showing that empathy-focused training can improve both empathy and communication skills, and that IPE can enhance empathic responses in pre-licensure healthcare students [39], [40].

PSE experience remained a significant factor after controlling for other variables, supporting the view that patient safety competency can be enhanced through explicit educational exposure rather than being a by-product of academic progression. A recent meta-analysis similarly found that PSE programs improve nursing students' knowledge, attitudes, and competencies, particularly when delivered through structured and interactive formats [43]. Additionally, students with moderate major satisfaction exhibited lower patient safety competency compared to those satisfied with their major, suggesting that a stronger sense of fit with one's discipline may enhance engagement with professional values and promote safer practice. A recent study similarly found that high major satisfaction and positive experience in safety education were linked to patient safety performance among nursing students [36]. In contrast, academic year and college life satisfaction were not significant after adjustment. This pattern suggests that more proximal educational and interpersonal factors may be more influential than general student characteristics when considered together. The model explained 46.9% of the variance, demonstrating that patient safety competency is substantially shaped by modifiable educational and relational factors.

Theoretically, this study contributes to PSE research by supporting a sociocultural understanding of patient safety competency. The findings suggest that patient safety competency is not merely an individual or technical attribute but a socially constructed and learnable competence associated with learners' attitudes toward interprofessional collaboration, empathic orientation, communication skills, and PSE experience. Interprofessional attitudes may provide the collaborative foundation for safe practice, while communication skills and empathy may help students translate this orientation into patient-centered and team-based safety behaviors. Thus, patient safety competency may be understood as an interpersonal and collaborative capability developed through educational experiences, rather than only as technical or procedural knowledge. Taken together, the novel contribution of this study is its integrated explanation of patient safety competency as a competence shaped by collaborative readiness, empathic orientation, structured communication, and PSE. Although the findings should be interpreted within the limits of a cross-sectional design, they provide empirical support for curriculum development that prepares traditional Korean medicine and nursing students for collaborative and safe practice.

These findings have significant educational implications because they identify modifiable factors that can be addressed through teaching and learning. Patient safety competency in this study was influenced more by modifiable educational factors, particularly interprofessional attitudes, empathy, communication skills, and PSE experience, than by fixed student characteristics. This suggests that patient safety should be taught as an integrated competence rather than as a stand-alone topic or a knowledge-based module. Educators can apply these findings by designing IPE modules in which nursing and traditional Korean medicine students work together on patient safety cases. Such modules may include analysis of adverse events, identification of communication breakdowns, and collaborative planning of risk-reduction strategies. Simulation-based learning should include scenarios that require structured communication, speaking up, handoff communication, and shared decision-making. Empathy training can be implemented through patient narratives, perspective-taking exercises, reflective writing, and guided debriefing that links patients' experiences with safety-related professional responsibilities. Curricula for nursing and Korean medicine students should incorporate structured PSE alongside interprofessional learning, communication training, and empathy-enhancing activities [17], [43]. Recent evidence supports this approach, demonstrating that IPE can improve patient-safety-related knowledge, attitudes, and practices, and that structured PSE programs can enhance nursing students' safety knowledge, attitudes, and competencies [17], [43]. Empathy-focused education should also be included, as it has been shown to improve both empathy and communication skills in undergraduate nursing students [39]. Furthermore, gaps may persist between classroom learning and clinical practice unless patient safety is reinforced through active and practice-oriented methods across both settings [10]. Overall, the present study supports the development of an interprofessional, communication-centered, and empathy-informed patient safety curriculum that prepares students for team-based clinical environments by integrating classroom teaching with simulation, case discussion, reflective learning, and guided clinical application prior to professional practice [10], [17], [39], [43].

Several limitations of this study should be acknowledged. The cross-sectional design precludes causal inferences regarding the relationships among interprofessional attitudes, empathy, communication skills, and patient safety competency. Participants were recruited through convenience sampling from a single university in one region of South Korea, limiting the generalizability of the findings to other institutions and student populations. All variables were measured using online self-report questionnaires, which may introduce recall bias, social desirability bias, no formal statistical test for common method bias was conducted. Thus, common method bias cannot be entirely excluded, and the findings should be interpreted with caution. Future studies should apply additional procedural and statistical controls, including multi-source data collection, temporal separation of measurements, and formal tests for common method variance. In addition, although the reliability of the empathy scale was acceptable in the present study, it was relatively lower than that of the other measures. This may reflect the multidimensional nature of empathy, which includes both cognitive and affective components. As a result, some degree of measurement error may have affected the precision of the empathy-related findings. Therefore, findings involving empathy should be interpreted with appropriate caution. Notably, patient safety competency was assessed as perceived competency rather than actual performance, which may not fully capture students' behaviors in real or simulated clinical situations.

Additionally, comparisons by academic year should be interpreted with caution, as nursing and traditional Korean medicine students follow different curricular structures and clinical training trajectories. Future research should employ multi-institutional and longitudinal designs with more diverse and balanced samples, incorporate objective or performance-based indicators such as simulation-based assessments or observational measures, and examine whether structured interprofessional and PSE programs can enhance patient safety competency over time. Although the present study identified significant predictors of patient safety competency, it did not test mediating or moderating mechanisms. Future studies should examine whether empathy or communication skills mediate the relationship between interprofessional attitudes and patient safety competency. In addition, practicum experience may moderate the effects of interprofessional attitudes, empathy, or communication skills on patient safety competency, because clinical exposure may strengthen the translation of interpersonal capacities into safety-related behaviors.

## 5. CONCLUSION

This study found that nursing students and traditional Korean medicine students reported comparable levels of interprofessional attitudes, empathy, communication skills, and patient safety competency. CP experience was correlated with higher interprofessional attitudes and patient safety competency. Patient safety competency showed positive associations with all three psychosocial variables, and the multivariable model indicated that PSE experience, interprofessional attitudes, empathy, and communication skills were significant associated factors, with interprofessional attitudes showing the

strongest association. The novelty of this study lies in its examination of patient safety competency within an IPE context involving both nursing and traditional Korean medicine students.

The findings show that patient safety competency is associated less with academic major alone and more with modifiable interpersonal and educational factors, particularly interprofessional attitudes, empathy, communication skills, and PSE experience. This suggests that patient safety curricula should move beyond knowledge-focused instruction and incorporate integrated learning strategies that foster collaborative readiness, effective communication, and empathic engagement. Longitudinal and performance-based educational approaches, such as simulation, case discussion, reflective learning, and guided clinical application, may help prepare students to deliver safe care in increasingly team-based clinical environments.

## FUNDING INFORMATION

This study was supported by the National Research Foundation of Korea (NRF) grant funded by the Korean government (No. RS202500517943).

## AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

| Name of Author | C | M | So | Va | Fo | I | R | D | O | E | Vi | Su | P | Fu |
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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## INFORMED CONSENT

Written informed consent was obtained electronically before participants could proceed to the questionnaire. Only individuals who provided consent after reviewing the study information were permitted to access and complete the survey. Participants were informed that they could withdraw at any point without any negative consequences. To protect privacy, data were collected anonymously and managed to maintain confidentiality throughout the study.

## ETHICAL APPROVAL

Permission to conduct the study was obtained from the heads of the Korean medicine and nursing departments prior to data collection. The first page of the online questionnaire included an information sheet outlining the study purpose and procedures. The information sheet emphasized that participation was voluntary and that participants could discontinue the survey at any time without penalty. Participants were assured that their responses would be remain confidential, be analyzed only in aggregate form, and be used exclusively for research purposes. It was also clarified that the survey was unrelated to academic grades or evaluations.

## DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author, [HP]. The data, which contain information that could compromise the privacy of research participants, are not publicly available due to certain restrictions.

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