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The Mediating Effect of Teamwork Attitude on the Relationship between Readiness for Interprofessional Education and Problem-Solving Ability among Korean Nursing Students

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ABSTRACT

Interprofessional Education (IPE) enhances collaboration among healthcare students and improves health outcomes. Nursing students' readiness for IPE may influence problem-solving ability, with teamwork attitude serving as a potential mediator. This study examined the mediating role of teamwork attitude between IPE readiness and problem-solving ability among Korean nursing students. A cross-sectional survey was conducted with 202 students using validated scales. Data were analyzed using descriptive statistics, correlations, and Hayes' PROCESS mediation analysis. Results showed that IPE readiness was positively associated with teamwork attitude and problem-solving ability. Teamwork attitude was also positively related to problem-solving ability and partially mediated the association between IPE readiness and problem-solving ability. The direct effect of IPE readiness on problem-solving became nonsignificant when teamwork attitude was included, confirming partial mediation. Findings suggest that fostering teamwork attitudes through IPE may enhance nursing students' problem-solving ability and prepare them for effective collaborative practice in healthcare.

Keywords: Teamwork Attitude, Readiness for Interprofessional Education, Problem-Solving Ability, Nursing Student

INTRODUCTION

Interprofessional Education (IPE) refers to the process in which students from two or more professional fields learn together to enable effective collaboration and improve health outcomes (WHO, 2010). Nursing students prepare themselves to function collaboratively as members of interprofessional healthcare teams through understanding interprofessional healthcare practice, optimizing interprofessional skills, and acquiring methods to deliver quality healthcare by sharing case management (WHO, 2010). As the importance of multidisciplinary healthcare management has been emphasized, nursing, medical, dental, and pharmacy schools in the United States established the Interprofessional Education Collaborative (IPEC), which defined professional responsibilities for collaboration and outlined core competencies for interprofessional teamwork (IPEC, 2016). The National League for Nursing emphasized the need for nursing education to provide team-based interprofessional collaboration and patient-centered nursing, proposing IPE strategies and developing guidebooks for faculty training and curriculum development to implement IPE education. This underscores the increasing importance of IPE in nursing education for developing nursing students' competencies necessary for enhancing interprofessional collaboration outcomes.

When teamwork is employed as an educational tool in IPE, not only interprofessional competencies such as communication, mutual cooperation, and role clarification improve, but also interprofessional attitudes increase (Labrague et al., 2018). Research has consistently reported that IPE utilizing teamwork competencies in

healthcare delivery systems leads to better understanding of interprofessional roles in clinical settings and maximizes teamwork, communication, and collaboration skills (D'amour & Oandasan, 2005). Consequently, countries such as those in Europe, the United States, Canada, and Australia are actively promoting IPE from pre-licensure stages through government and institutional initiatives. Healthcare professionals need to be prepared for IPE early in their socialization process, prior to acquiring professional knowledge and skills, to overcome prejudices or negative stereotypes toward other professions, thus fostering synergistic effects in clinical settings (Brandt, 2017).

Recently, nursing education demands innovative changes to realize the common goal of "patient-centered care" through collaboration with other healthcare professionals (Caputi, 2017). However, in actual nursing education settings, cases of implementing Interprofessional Education (IPE) and prior studies on its effectiveness remain limited . Therefore, efforts must be made to develop nursing students' professional identity and collaborative competencies through IPE, in order to provide person-centered healthcare services. Now more than ever, nursing education must strive to enhance professional identity, teamwork, collaboration, and communication skills—qualities that are highly valued in nursing practice.

Nursing students have shown higher readiness for IPE compared to students in other healthcare-related fields (Kim et al., 2006), which may be related to the characteristics of nursing as a discipline. Nursing is based on human dignity, scientific knowledge, professionalism, therapeutic relationships, and well-being promotion, and nursing curricula are designed to promote well-being and enable professional roles through therapeutic relationships with patients (Kim et al., 2006). Nursing students should be introduced to Interprofessional Education (IPE) early in their socialization process—even before acquiring the knowledge and skills required for their professional roles—in order to overcome biases or negative preconceptions about other professions and to foster synergy in healthcare settings (Brandt, 2017).

Teamwork attitude refers to the positive attitude necessary for members of healthcare teams to interact and collaborate toward agreed-upon goals (Baker et al., 2010). Although IPE is expected to positively impact healthcare management outcomes by fostering interprofessional collaboration competencies necessary for providing quality healthcare services after graduation, there are almost no cases of IPE-based educational programs applied in domestic nursing education. Homeyer et al. (2018) reported that IPE activities based on patient-centered care enabled nursing and medical students to understand each other's roles and promote therapeutic communication skills through collaboration. Kerry & Ander (2019) found that IPE training among nursing, medical, physical therapy, and physician assistant students enhanced interprofessional collaboration to achieve patient-centered care.

IPE fundamentally involves "learning together" and experiencing team formation for problem-solving, learning attitudes of cooperation and linkage across majors (Lee et al., 2020). In the clinical setting, person-centered care involves collaboration among professionals from various fields to assess and intervene in the diverse needs and issues of the individual. As a result, the person's ability to perform daily activities can be restored, their remaining functions may improve, and they will be able to participate in social activities. This requires a cooperative approach among health, medical, and welfare services, and changes in the clinical field underscore the importance of IPE and the need for curriculum reform in universities.

This study aims to clarify whether teamwork attitude mediates the relationship between nursing students' readiness for IPE and problem-solving ability and to explore antecedents that induce teamwork attitude. Through this, the study seeks to more clearly present the mechanisms of teamwork attitude that have been insufficiently addressed in prior research.

METHODS

This study aims to examine whether teamwork attitude mediates the relationship between readiness for IPE and problem-solving ability. This study was conducted from July 1 to July 30, 2021, after receiving approval from the Institutional Review Board (IRB) of K University in Korea to ensure the ethical protection of the participants. Participants were nursing students at K University located in D region, South Korea, who had completed at least two semesters of clinical practicum courses. After understanding the study purpose and consenting voluntarily, participants were recruited through an online survey link distributed via KakaoTalk. A total of 300 questionnaires were distributed, and 212 were collected, resulting in a response rate of 70.7%. Among the collected questionnaires, 10 with insincere responses were excluded, and 202 were used for the final analysis.

Readiness for IPE was measured using the Readiness for Interprofessional Learning Scale (RIPLS), originally developed by Parsell and Bligh (2002) and later revised and refined by McFadyen et al. (2005). This instrument is openly accessible via the official website of the National Center for Interprofessional Practice and Education in the United States. The instrument was translated by the primary researcher and then back-translated by a nursing

professor fluent in both English and Korean. The translated version was reviewed by seven experts to assess item content validity (I-CVI). All 19 items showed a content validity index (CVI) of 0.8 or higher and were therefore included in the final questionnaire.

This instrument is designed to assess readiness for interprofessional learning and consists of a total of 19 items, divided into five sub-factors: teamwork and collaboration (9 items), negative professional identity (3 items), positive professional identity (4 items), and roles and responsibilities (3 items). Items are rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Higher scores indicate greater readiness for interprofessional learning. The reliability of the instrument was reported as Cronbach's α = .90 in the original study by Parsell and Bligh (2002), and as Cronbach's α = .89 in the revision by McFadyen et al. (2005). In the present study, the reliability was Cronbach's α = .86.

The teamwork attitude was measured using the TeamSTEPPS Attitudes Questionnaire (T-TAQ) developed by Baker et al. (2010). This tool was translated into Korean by TeamSTEPPS Korea and made publicly available through their official website. The 24-item scale comprises four sub-factors: communication, leadership, situation monitoring, mutual support (6 items each). Rated on a 5-point Likert scale; higher scores indicate more positive teamwork attitudes. The reliability of the instrument was reported as Cronbach's α = .74 for communication, α = .81 for leadership, α = .53 for situation monitoring, and α = .70 for mutual support in the original study by Baker et al. (2010). In the present study, the reliability was Cronbach's α = .89 for the overall teamwork attitude scale, with subscale reliabilities of α = .87 for communication, α = .88 for leadership, α = .83 for situation monitoring, and α = .76 for mutual support.

Problem-solving ability was measured using the Problem-Solving Process Assessment Tool developed by Lee et al. (2008), for which permission to use was obtained via email. The 30-item scale includes five sub-factors: problem clarification, problem-solving plan, decision-making, implementation of solution, evaluation and reflection (6 items each). Rated on a 5-point Likert scale, higher scores reflect better problem-solving performance. The reliability of the instrument was reported as Cronbach's α = .93 in the original study by Lee et al. (2008). In the present study, the reliability was Cronbach's α = .88.

In this study, the participants' general characteristics related to IPE activities—major satisfaction, clinical practice satisfaction, and school life satisfaction—were each measured using a single item on a 3-point Likert scale.

Data were analyzed using SPSS 27. Reliability was confirmed via Cronbach's alpha. Descriptive statistics and correlation analyses were conducted to examine relationships among variables. To verify the mediating effect, hierarchical regression analysis was conducted, and the significance of the mediating effect was analyzed using Hayes' PROCESS Macro.

RESULTS

Table 1. Descriptive Statistical Analysis of Research Variables (n=220)

Variables	Mean	SD	Minimum	Maximum
Major satisfaction	2.44	.73	1.0	3.0
Clinical practicum satisfaction	2.49	.64	1.0	3.0
School life satisfaction	2.51	.68	1.0	3.0
Readiness for IPE	3.75	.41	1.0	5.0
Teamwork attitude	4.01	.46	1.0	5.0
Problem-solving ability	3.80	.47	1.0	5.0

Among 202 nursing students, mean scores were as follows: major satisfaction 2.44 (SD=0.73), clinical practicum satisfaction 2.49 (SD=0.64), school life satisfaction 2.51 (SD=0.68), readiness for IPE 3.75 (SD=0.41), teamwork attitude 4.01 (SD=0.46), and problem-solving ability 3.80 (SD=0.47) (Table 1).

Table 2. Correlation Analysis of Research Variables (n=220)

Variable	Readiness for IPE (r)	Teamwork attitude (r)	Problem-solving ability (r)
Readiness for IPE	1		
Teamwork attitude	.615***	1	
Problem-solving ability	.585***	.705***	1

Note: ***p< .001

Readiness for IPE was significantly positively correlated with teamwork attitude (r=.615, p<.001) and problem-solving ability (r=.585, p<.001). Teamwork attitude also correlated positively with problem-solving ability (r=.705, p<.001) (Table 2).

Table 3. Mediating Effect of Teamwork Attitude on the Relationship between Readiness for IPE and Problem-solving Ability (n=220)

Path	**B[1]**	**SE**	**t**	**LLCI[2]**	**ULCI[3]**
Readiness for IPE → Teamwork attitude	.411	.031	10.120***	.318	.501
Teamwork attitude → Problem-solving ability	.164	.041	3.642***	.082	.254
Readiness for IPE → Problem-solving ability	-.048	.039	-1.358	-.157	.038

Effect	B[1]	SE	LLCI[2]	ULCI[3]
Total effect	.028	.041	-.040	.083
Direct effect	-.050	.041	-.140	.032
Indirect effect	.059	.036	.039	.139

Note: 1. B = Unstandardized coefficient, 2. LLCI = Lower limit of the 95% confidence interval (bootstrapped) for the indirect effect 3. ULCI = Upper limit of the 95% confidence interval (bootstrapped) for the indirect effect, ***p< .001(two-tailed test)

This study investigated whether teamwork attitude serves as a mediating variable in the relationship between readiness for IPE and problem-solving ability. Prior to conducting the regression analysis, the assumptions underlying the model were evaluated by examining multicollinearity and the independence of error terms. To assess multicollinearity, the Variance Inflation Factor (VIF) was calculated. All VIF values were found to be below 2.0, indicating that multicollinearity was not a concern in this analysis. Additionally, to verify the assumption of independence of error terms, the Durbin-Watson statistic was examined and found to be 1.84, indicating that the assumption of independent errors was satisfied.

Readiness for IPE significantly influenced teamwork attitude (B=0.411, t=10.120, p<.001). Teamwork attitude significantly predicted problem-solving ability (B=0.164, t=3.642, p<.001), whereas readiness for IPE did not directly affect problem-solving ability (B=-0.048, t=-1.358, ns) when teamwork attitude was controlled. The total effect of readiness for IPE on problem-solving ability was greater than the direct effect, indicating a mediating effect. Bootstrapping analysis for the indirect effect revealed that the confidence intervals did not include zero, thereby confirming the significance of the mediation. These results suggest that teamwork attitude partially mediates the relationship between readiness for IPE and problem-solving ability (Table 3).

DISCUSSION

IPE in healthcare is recognized as a critical factor that enhances learners' collaborative teamwork attitudes and improves the quality of patient-centered care (Lestari et al., 2016; Lee et al., 2020). IPE education also plays a crucial role in fostering positive clinical problem-solving experiences. Readiness for IPE can serve as an indicator for evaluating IPE outcomes. Nursing students with high teamwork attitudes tend to strive for self-improvement and continuous development, while those with low teamwork attitudes may easily give up in difficult clinical situations. Therefore, improving nursing students' teamwork attitudes can promote interprofessional collaboration and contribute to delivering high-quality nursing services with positive patient care outcomes.

In advanced countries such as the U.S., various IPE programs have been implemented to strengthen nursing students' interprofessional competencies (McFadyen et al., 2005). Positive effects of IPE education on practical collaboration and understanding roles among professions have been documented in numerous programs. However, there have been no reported cases of IPE integration into nursing curricula in Korea so far.

Applying IPE education to nursing students increased interprofessional competencies such as communication, teamwork, and role clarity, as well as interprofessional attitudes. This suggests that readiness for IPE deepens teamwork attitudes, which positively influence problem-solving ability.

This study's findings include: First, readiness for IPE positively affects nursing students' perceptions of teamwork attitude. In healthcare services, the collaborative nature of patient-centered nursing care involves encountering a wide range of situations. In this process, readiness for IPE enhances nursing students' appreciation of the value of interprofessional collaboration in healthcare and fosters a teamwork attitude that empowers them to effectively deliver patient-centered nursing care (Çınar Tanrıverdi et al., 2025). Students with interprofessional work experience had higher readiness for interprofessional learning than those without such experience (Lestari et al., 2016). Kim (2017) also showed a positive relationship between readiness for IPE and

teamwork attitude among healthcare workers, consistent with this study's results. Readiness for IPE plays a critical role in fostering positive attitudes toward interprofessional learning and practical experience, thus serving as an indicator for IPE success. Institutional support for diverse interprofessional education programs is necessary to prepare nursing students to enhance teamwork attitudes.

Second, readiness for IPE directly influenced problem-solving ability. IPE curricula encompass patient care, patient safety, collaboration, practical learning, and role understanding, contributing significantly to clinical problem-solving through enhancing professional identity, teamwork, communication skills, and confidence (Park et al., 2018). To secure a collaborative advantage in healthcare teamwork, it is necessary to introduce curricula that prepare nursing students for IPE. Although various interprofessional education programs exist in nursing schools in advanced countries (Caputi, 2017; Homeyer et al., 2018), no integrated IPE nursing curricula have been reported in Korea. Developing IPE courses and strategies to improve problem-solving ability through IPE in Korean nursing education is urgently required.

Third, teamwork attitude partially mediated the relationship between readiness for IPE and problem-solving ability. Lee et al. (2009) found that nurses with high teamwork attitudes had strong self-efficacy, demonstrating proficient clinical skills and problem-solving ability. The findings of this study are supported by Altun (2003), which demonstrated that as nursing students' teamwork attitudes increased, their clinical problem-solving ability also improved, indicating a mediating relationship. Accordingly, teamwork attitude was found to have a mediating effect in the relationship between nursing students' readiness for IPE and their problem-solving ability. This study extends previous research by simultaneously exploring antecedents and outcomes of teamwork attitude.

CONCLUSION

This study verified that teamwork attitude mediates the relationship between readiness for IPE and problem-solving ability among nursing students. Significant correlations were observed among teamwork attitude, readiness for IPE, and problem-solving ability, with teamwork attitude serving as a mediator. Therefore, nursing students' problem-solving ability is influenced by their readiness for IPE, and higher levels of teamwork attitude enable successful clinical problem-solving and effective interprofessional collaboration in patient-centered care.

As a limitation of this study and a direction for future research, the first point is that the study sample was limited to a specific geographic region. To minimize potential biases or exogenous effects related to regional characteristics, future studies should include samples from diverse locations. Second, this study did not investigate the differences in causal relationships according to the subcomponents of teamwork attitude. If differences in causal relationships are identified according to the subcomponents of teamwork attitude, such findings could offer meaningful implications for enhancing clinical problem-solving activities by addressing the unique attributes of each subcomponents. Third, future research should consider not only individual-level antecedents of readiness for IPE but also organizational factors. Additionally, further investigation is planned to explore potential mediating variables in the relationships among teamwork attitude, its antecedents, and outcomes.

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Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board of K University.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the authorship and/or publication of this review.

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Author Contribution

Sooyoung Jun: conceptualization, investigation, methodology, data collection, data analysis, writing –original draft, review & editing

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