The Mediating Effect of Self-Regulated Learning on the Relationships Among Emotional Intelligence, Collaboration, and Clinical Performance in Korean Nursing Students

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ABSTRACT

Background: Clinical performance is an important competence for nursing students to achieve. However, little is known about the degree to which self-regulated learning mediates the relationships among emotional intelligence, collaboration, and clinical performance in nursing students.

Purpose: This study was designed to investigate the mediating effect of self-regulated learning on clinical performance.

Methods: A cross-sectional, descriptive, correlational design was used, and a convenience sample of 302 nursing students in Years 3 and 4 of a bachelor’s degree program were recruited as participants from five universities in South Korea. Information on participant characteristics, emotional intelligence, collaboration, self-regulated learning, and clinical performance was collected from the participants using self-reported questionnaires from September to October 2019. Partial least squares structural equation modeling was used to evaluate the research model.

Results: Emotional intelligence, collaboration, and self-regulated learning were found to be statistically significantly related to clinical performance. Moreover, self-regulated learning was identified as a full mediator of the relationship between emotional intelligence and clinical performance (accounting for 62.0% of the variance) and a partial mediator of the influence of collaboration on clinical performance (accounting for 25.4% of the variance).

Conclusions/Implications for Practice: Nursing educators should encourage self-regulated learning among their students and provide a collaborative learning environment to enhance their students’ clinical performance.

KEY WORDS: clinical performance, collaboration, emotional intelligence, nursing students, self-regulated learning.

Introduction

Social–emotional competence has emerged as an essential professional competency in the 21st century (World Economic Forum, 2016) that facilitates academic achievement and job readiness in college students (Durlak et al., 2011). Furthermore, social–emotional learning in college students is a deliberate process that is influenced by educators (Durlak et al., 2011). Therefore, nursing educators should identify factors related to the social–emotional competence of college students, create an environment suitable for intentionally studying social–emotional competencies, and design experiences to foster social–emotional competence. To achieve these goals, the personal factors of nursing students that influence academic performance must be identified.

Academic achievement for nursing students includes clinical performance, which involves students showing their mastery and integration of learned knowledge as well as psychomotor, decision-making, and interpersonal skills (Scott Tilley, 2008). Through nursing education, students develop the integrated clinical performance ability necessary to resolve patients’ health problems as well as the knowledge and skills required to develop as professional nurses. However, earning high grades at nursing colleges does not guarantee high clinical performance as a nurse. Instead, clinical performance is a more appropriate core indicator of academic achievement than university credits, underscoring the importance of clinical importance as a nursing competence.

The ways-of-being model describes people’s social–emotional competencies using an interactive and dynamic conceptualization of being that involves three dimensions (ways of feeling, ways of relating to others, and ways of doing), which are based on three layers (identity, awareness, and navigation; Blyth et al., 2017). First, ways of feeling encompass the skills, experiences, and abilities that people use to identify and understand their feelings, including emotional competence (Blyth PhD, RN, Associate Professor, College of Nursing, Daegu Catholic University, Republic of Korea. Copyright © 2022 The Authors. Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the Creative Commons Attribution License 4.0 (CCBY), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
et al., 2017). Emotional intelligence, which refers to the degree to which one is able to understand, control, and utilize one’s own emotions and those of others (Wong & Law, 2002), is associated with clinical performance (M. S. Kim & Sohn, 2019). Therefore, it is necessary to determine whether emotional intelligence affects the clinical performance of nursing students.

Second, ways of relating to others include the abilities required by students to understand, explore, and develop their relationships with others, including behavioral social skills, which involve teamwork, cooperation, and communication (Blyth et al., 2017). Collaboration is a complex intraprofessional and interprofessional process that requires sharing resources and decisions, teamwork, and respect (Emich, 2018). Although collaboration is necessary for all occupations, it is especially crucial for nursing (American Association of Colleges of Nursing, 2016) and is an important leadership competence (Miles & Scott, 2019). For this reason, the impact of collaboration on the clinical performance of nursing students should be explored.

Third, ways of doing incorporate the cognitive skills used to accomplish tasks and goals, ways of feeling, and ways of relating to others (Blyth et al., 2017). Self-regulated learning refers to active involvement of the learner in his or her own metacognitive, motivational, and behavioral learning process (Panadero, 2017). Through self-regulated learning, students activate and sustain the use of knowledge using strategic monitoring and modulation of their affect, cognition, and behavior to achieve their educational goals (Schunk & Zimmerman, 2012). Self-regulated learning is a social-emotional competence that reflects a way of doing because it refers to a self-regulation strategy in which emotions, ways of feeling, and ways of relating to others are integrated for the goal of academic achievement. Self-regulated learning is relatively strongly correlated with academic achievement and is predictive of student achievement regardless of the type of learning task (Mega et al., 2014; Schunk & Zimmerman, 2012). Furthermore, it is an actual facilitator and mediator of academic achievement (Schunk & Zimmerman, 2012). Therefore, it may be assumed that learners with the social–emotional competencies of emotional intelligence and collaboration achieve academic performance through the mediating role of self-regulated learning.

Associations between higher levels of emotional intelligence and, respectively, higher clinical performance (M. S. Kim & Sohn, 2019) and academic performance (Foster et al., 2017) have been reported. Moreover, collaboration has been reported to be associated with clinical competence (Stone et al., 2013), academic achievement has been shown to be correlated with self-regulated learning (Ergen & Kanadli, 2017), and the self-regulated learning ability of nursing students has been shown to affect academic performance in basic nursing practicum settings (Hsu et al., 2009). However, the degree to which self-regulated learning is associated with clinical performance in nursing students is an issue that has yet to be examined in the literature.

In this study, the ways-of-being approach to social–emotional learning and the findings of previous studies are employed to predict clinical performance in nursing students. Emotional intelligence, collaboration, and self-regulated learning were selected as the factors belonging, respectively, to the emotional, relational, and behavioral domains of social–emotional learning, whereas clinical performance was analyzed as a component of academic achievement. The aim of this study was to explore self-regulated learning as a mediator in the relationship between the respective variables of emotional intelligence and collaboration and clinical performance in nursing students.

### Hypothesis

Emotional intelligence and collaboration simultaneously affect clinical performance directly and indirectly via a mediator in nursing students. On the basis of this, the following four hypotheses were formulated in this study:

- **Hypothesis 1:** Higher emotional intelligence relates to higher clinical performance.
- **Hypothesis 2:** Higher collaboration relates to higher clinical performance.
- **Hypothesis 3:** Self-regulated learning mediates the relationship between emotional intelligence and clinical performance.
- **Hypothesis 4:** Self-regulated learning mediates the relationship between collaboration and clinical performance.

### Methods

#### Study Design

A cross-sectional survey was conducted to investigate the relationships among emotional intelligence, collaboration, and clinical performance and the mediating role of self-regulated learning in a population of Korean nursing students.

#### Participants

The participants were nursing students in their third or fourth year of a bachelor’s degree program who had at least one semester of clinical training and who provided written informed consent to participate. Of the 305 nursing students enrolled, 302 completed the questionnaire (response rate: 99%).

A sample size of 200–400 is widely recommended for testing models designed using structural equation modeling, whereas a sample size of 100–200 is required for testing latent variable mediation models (Hoyle et al., 1999). Thus, the sample size used in this study was sufficient for the analysis.

#### Instruments

**Emotional intelligence**

Emotional intelligence was evaluated using the Korean version (Jung & Jung, 2007) of the Emotional Intelligence Scale (Wong & Law, 2002), which has been widely used to measure emotional intelligence in Korean nursing students. This scale contains four subcategories: (a) appraisal and expression of emotion in oneself (four items), (b) appraisal and recognition...
of emotion in others (four items), (c) regulation of emotion (four items), and (d) use of emotion (four items). Each item is scored using a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree), with higher scores corresponding to higher emotional intelligence. Mean subcategory and total scale scores were used in this study. The Cronbach’s alpha coefficient for this scale was .95 in this study.

Collaboration
Collaboration was evaluated using a previously published collaboration scale (M. J. Chung & Chang, 2012) comprising the two subcategories of interpersonal teamwork (eight items) and functional teamwork (nine items), with each item scored using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) and higher scores indicating higher levels of collaboration. The mean scores for the subcategories and the overall collaboration scale were used. The Cronbach’s alpha coefficient for this scale was .91 in this study.

Self-regulated learning
Self-regulated learning was evaluated in this study using the Self-Regulated Learning Scale (M. K. Chung, 2005). This scale is a higher-order construct consisting of three dimensions (motivational, cognitive, and behavioral self-regulated learning), each of which includes four subcategories. The subcategories of motivational self-regulated learning are self-efficacy (11 items), internal value (10 items), test anxiety (six items), and external goal orientation (five items); those for cognitive self-regulated learning are cognitive strategy (13 items), rehearsal and memorizing (seven items), inspection (six items), and planning (five items); and those for behavioral self-regulated learning are effort control (eight items), time and study control (seven items), seeking help (six items), and study environment control (four items). Each item is scored using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), with higher scores corresponding to higher levels of motivational, cognitive, and behavioral self-regulated learning, respectively. The mean scores for the subcategories and the overall motivational, cognitive, and behavioral self-regulated learning scales were calculated. The Cronbach’s alpha coefficients for the overall scale and the motivational, cognitive, and behavioral self-regulated learning dimensions were .96, .89, .93, and .90, respectively, in this study.

Clinical performance
Clinical performance was evaluated using the Clinical Performance Scale (Lee et al., 1990), which consists of five subscales: nursing process (11 items), nursing skill (11 items), teaching/coordinating (eight items), interpersonal relationship/communication (six items), and professional development (nine items). Each item is scored using a 5-point Likert scale (1 = I can’t do it at all, 5 = I do it very well), with higher scores indicating higher clinical performance. The mean scores for the subscales and the overall scale were used. The Cronbach’s alpha coefficient for this scale was .95 in this study.

Data Collection and Ethical Considerations
The study was conducted after approval was received from the institutional bioethics review board of Daegu Catholic University (Approval No. CUIRB-2019-0024). Data collection was conducted from September to October 2019 at five nursing departments located, respectively, in three metropolitan cities and two medium-sized cities. The head of each nursing department assisted the researcher with data collection. Assistant researchers recruited participants by posting promotional posters for nursing college students on online and/or offline bulletin boards regularly used by the nursing departments. Those students who expressed interest in participating were asked to gather in one classroom to complete the questionnaire survey at a predetermined time. The participants were provided explanations by a research assistant about the purpose of the study, the methods used to collect data, guarantees of confidentiality and anonymity, their right to refuse to consent and to withdraw, the benefits and disadvantages of participating (including the lack of any possible negative impact on their grades), and the storage and disposal of study data. After the participants voluntarily signed the consent form, they began completing the questionnaire survey and were given a gift worth approximately 3.5 U.S. dollars.

Data Analysis
A descriptive analysis using SPSS Version 25.0 (IBM Corp., Armonk, NY, USA) was conducted to summarize the participants’ demographic characteristics. Means and standard deviations of the variables were computed, as well as Pearson correlation coefficients and Cronbach’s alpha.

Using SmartPLS Version 3.0 (Ringle et al., 2015), partial least squares structural equation modeling (PLS-SEM) was performed to validate the measurements and the proposed hypotheses. PLS-SEM was used because it is appropriate for exploring new ideas and verifying self-regulated learning as a mediator in the relationships between emotional intelligence and collaboration, respectively, and clinical performance. PLS-SEM also allows higher-order models to be verified. In this study, self-regulated learning was conceptualized as a three-dimensional construct explained by motivational, cognitive, and behavioral self-regulated learning. A two-step procedure was followed to assess the measurement and structural models.

In the first step, the suitability of the measurement model was evaluated in terms of reliability (indicator and internal consistency) and validity (convergent and discriminant). The indicator loadings of all latent variables were checked to evaluate indicator reliability. An indicator loading of .4 or greater is appropriate, and inappropriate indicators should be removed (Hair et al., 2016). Internal consistency reliability was evaluated using Cronbach’s alpha coefficients and composite reliability. The threshold value for composite reliability is between .6 and .95 (Hair et al., 2016). Average variance extracted (AVE) was used to assess convergent validity. The AVE threshold value should be above .5 (Hair et al., 2016). To evaluate
Discriminant validity, the square root of the AVE for each construct was compared with its correlations with all other constructs (Fornell & Larcker, 1981). Discriminant validity was confirmed if the correlations of a construct with all other constructs were less than the square root of its AVE (Fornell & Larcker, 1981).

In the second step, collinearity was evaluated using the variance inflation factor (VIF) before evaluating the structural model, with a VIF of 5 or more indicating collinearity (Hair et al., 2016). The structural model was evaluated using significant coefficients (t value), the coefficient of determination (R²), the cross-validated redundancy measure (Q²), and the effect size (F²). R² threshold values of .25, .50, and .70 denote weak, moderate, and strong coefficients of determination, respectively (Hair et al., 2016). In SmartPLS, the relationships between the constructs were determined by examining path coefficients and t statistics using bootstrapping procedures. Q² denotes the predictive relevance of a structural model (Hair et al., 2016). F² is a measure of the strength of the relationship between constructs and represents the degree to which an exogenous construct is relevant as a predictor for an endogenous construct. F² values of .02, .15, and .35 are considered to be low, moderate, and high, respectively (Hair et al., 2016).

For bootstrapping in a two-step procedure, the Preacher and Hayes procedure was used in this study to test the mediating effects (Preacher & Hayes, 2008). First, the direct effects were verified using bootstrapping without the mediator. Second, after including the mediator in the model, the path coefficients, the t values, and the bias-corrected 95% confidence interval were calculated to confirm the significance of the indirect effects. If the indirect effects were found to be significant, the strength of the mediator was then examined using total effects and variance accounted for (VAF). VAF is the indirect effect divided by the total effect, with VAF values exceeding .2 and .8 considered to indicate partial and full mediation, respectively.

**Measurement Model**
The indicator loadings for test anxiety and external goal orientation (within motivational self-regulated learning) were less than .40 (the threshold value). Furthermore, the Cronbach’s alpha of motivational self-regulated learning was .41, its composite reliability was .68, and its AVE was .42, all of which were lower than the threshold values. Therefore, these two indicators were deleted.

As shown in Table 1, all indicator loadings were .62 or higher. The Cronbach’s alpha coefficients were higher than .70 for all of the constructs, and the composite reliability was between .85 and .95. Therefore, internal consistency reliability was confirmed.

The AVE was above .51, showing satisfactory convergent validity for the measurement model (Table 1). For discriminant validity testing, the correlations between variables were compared using the square root of the AVE of each variable. The correlation between clinical performance and emotional intelligence was .40, that between clinical performance and collaboration was .53, and that between clinical performance and self-regulated learning was .54. The correlation between emotional intelligence and collaboration was .46, and that between emotional intelligence and self-regulated learning was .49. The correlation between collaboration and self-regulated learning was .48. The square roots of the AVE for clinical performance, emotional intelligence, collaboration, and self-regulated learning were .83, .76, .95, and .71, respectively. The correlation of each construct with all other constructs was less than the square root of its AVE, confirming discriminant validity.

**Structural Model**
The VIF was less than 5, indicating the absence of collinearity. The significance of each coefficient, the t value, and the respective amounts of variance explained by R², Q², and F² are presented in Tables 2 and 3.

As shown in Table 2, the R² value for clinical performance was .31, indicating that emotional intelligence and collaboration in the PLS path model without the mediator of self-regulated learning jointly explained 31.3% of the variance in clinical performance. The Q² value for clinical performance was .20, indicating that the model showed good predictive relevance because its Q² value was larger than zero. The F² values for emotional intelligence and collaboration were .04 and .23, respectively. As the F² value for emotional intelligence was between .02 and .15 (the threshold values), emotional intelligence was interpreted as having a small effect size. As the F² value for collaboration was between .15 and .35 (the threshold values), collaboration was therefore interpreted as having a medium effect size.

As shown in Table 3, the R² value for clinical performance was .39, meaning that emotional intelligence, collaboration, and self-regulated learning could jointly explain 39.4% of the variance in clinical performance. The R² value for self-regulated learning was .33, indicating that emotional intelligence...
and collaboration could jointly explain 33.0% of the variance in self-regulated learning. The $Q^2$ values for clinical performance and self-regulated learning were .26 and .16, respectively, showing that the model demonstrated good predictive relevance because its $Q^2$ value was larger than zero. The $F^2$ values for emotional intelligence, collaboration, and self-regulated learning were .01, .13, and .14, respectively. Because the $F^2$ value for emotional intelligence was less than .02 (the threshold value), emotional intelligence was interpreted as having a negligible effect size. Because the $F^2$ values for collaboration and self-regulation were between the threshold values of .02 and .15, these factors were interpreted as having small effect sizes.

### Hypothesis Testing

To test the direct effects, bootstrapping was used in a model with no mediator, with results shown in Table 2. The direct effects of emotional intelligence ($\beta = .19, p < .001$) and collaboration ($\beta = .45, p < .001$) on clinical performance were statistically significant, supporting Hypotheses 1 and 2.

| Construct                              | Mean  | SD   | Indicator Loadings | Cronbach’s $\alpha$ | Composite Reliability | AVE   |
|----------------------------------------|-------|------|--------------------|----------------------|-----------------------|-------|
| **Clinical performance**               | 3.67  | 0.45 | .88                | .91                  | .68                   |       |
| Nursing process                        | 3.61  | 0.52 | .80                |                       |                       |       |
| Nursing skill                          | 3.64  | 0.55 | .84                |                       |                       |       |
| Teaching/coordinating                  | 3.71  | 0.57 | .83                |                       |                       |       |
| Interpersonal relationship/communication| 3.79  | 0.60 | .85                |                       |                       |       |
| Professional development               | 3.68  | 0.52 | .81                |                       |                       |       |
| **Emotional intelligence**             | 5.23  | 0.75 | .76                | .85                  | .58                   |       |
| Appraisal and expression of emotion in oneself | 5.42  | 0.94 | .75                |                       |                       |       |
| Appraisal and recognition of emotion in others | 5.50  | 0.93 | .75                |                       |                       |       |
| Regulation of emotion                  | 5.15  | 0.99 | .71                |                       |                       |       |
| Use of emotion                         | 4.84  | 1.08 | .84                |                       |                       |       |
| **Collaboration**                      | 4.01  | 0.53 | .90                | .95                  | .91                   |       |
| Interpersonal teamwork                 | 3.99  | 0.55 | .95                |                       |                       |       |
| Functional teamwork                    | 4.04  | 0.56 | .96                |                       |                       |       |
| **Self-regulated learning**            | 3.45  | 0.42 | .89                | .91                  | .51                   |       |
| Self-efficacy                          |       |      | .72                |                      |                       |       |
| Internal value                         |       |      | .72                |                      |                       |       |
| Cognitive strategy                     |       |      | .77                |                      |                       |       |
| Rehearsing and memorizing              |       |      | .78                |                      |                       |       |
| Inspection                             |       |      | .74                |                      |                       |       |
| Planning                               |       |      | .62                |                      |                       |       |
| Effort control                         |       |      | .73                |                      |                       |       |
| Time and study control                 |       |      | .71                |                      |                       |       |
| Seeking help                           |       |      | .73                |                      |                       |       |
| Study environment control              |       |      | .63                |                      |                       |       |
| **Motivational self-regulated learning**| 3.33  | 0.42 | .70                | .87                  | .77                   |       |
| Self-efficacy                          | 3.24  | 0.58 | .87                |                       |                       |       |
| Internal value                         | 3.68  | 0.62 | .89                |                       |                       |       |
| **Cognitive self-regulated learning**  | 3.59  | 0.50 | .81                | .87                  | .63                   |       |
| Cognitive strategy                     | 3.55  | 0.57 | .81                |                       |                       |       |
| Rehearsing and memorizing              | 3.73  | 0.60 | .81                |                       |                       |       |
| Inspection                             | 3.75  | 0.65 | .84                |                       |                       |       |
| Planning                               | 3.26  | 0.78 | .72                |                       |                       |       |
| **Behavioral self-regulated learning** | 3.46  | 0.52 | .77                | .85                  | .59                   |       |
| Effort control                         | 3.72  | 0.65 | .78                |                       |                       |       |
| Time and study control                 | 3.22  | 0.72 | .81                |                       |                       |       |
| Seeking help                           | 3.28  | 0.60 | .76                |                       |                       |       |
| Study environment control              | 3.59  | 0.74 | .72                |                       |                       |       |

*Note.* AVE = average variance extracted.

*Higher-order construct.*
To test the indirect mediating effect, bootstrapping was used in a model with a mediator, with results shown in Table 3 and Figure 1. Emotional intelligence had a significant indirect impact on clinical performance ($\beta = .12$, $p < .001$), supporting Hypothesis 3. However, the direct impact of emotional intelligence on clinical performance was not significant ($\beta = .07$, $p = .193$), implying that self-regulated learning is the strategic mechanism through which emotional intelligence influences clinical performance. Thus, self-regulated learning fully mediated the influence of emotional intelligence on clinical performance, as it accounted for 62.0% of the variance. Collaboration was found to have a significant, indirect effect on clinical performance ($\beta = .11$, $p < .001$), supporting Hypothesis 4 and implying that self-regulated learning is the strategic mechanism through which collaboration influences clinical performance. Self-regulated learning was found to be a partial mediator of the influence of collaboration on clinical performance, accounting for 25.4% of the variance.

### Discussion

Emotional intelligence is related to clinical performance (Beydler, 2017), and self-regulated learning is an essential competence for learners to develop their performance skills (Panadero, 2017). In this study, emotional intelligence influenced clinical performance only indirectly, through the mediating effect of self-regulated learning, with the strength of this mediator accounting for 62.0% of the total effect. This finding indicates that the indirect effect through self-regulated learning was somewhat greater than the direct effect of emotional intelligence. In other words, nursing college students with high...
emotional intelligence improved their clinical performance through self-regulated learning, and the impact of self-regulated learning was important. This implies that nursing students with a high ability to understand, control, and utilize their emotions may improve their clinical performance by maintaining and strengthening their motivation to learn through emotional self-regulation. Moreover, negative emotions impede self-regulation efforts to seek positive emotions, which impairs information processing and may lead individuals to make wrong decisions. In addition, unpleasant emotions lead to the avoidance of self-awareness to minimize one's negative emotional state, resulting in a decrease in self-awareness and, eventually, a decrease in self-regulation. Emotions may also stimulate learning by initiating self-regulation when students do not feel satisfied with their accomplishments (Baumeister et al., 2007). This also means that certain factors of self-regulated learning are more influential on clinical performance than emotional intelligence. One possible explanation for this finding is that cognitive regulation and behavioral regulation, in addition to self-monitoring of the self-regulated learning process, are important to learning within the nursing practice (Briscoe & Brown, 2019). Another explanation may be that self-efficacy, a self-motivational belief in the forethought phase, has a more significant effect on performance than on emotion or emotional regulation (Panadero, 2017). Therefore, it may be inferred that, in nursing students, improvements in emotional intelligence help improve clinical performance by fostering self-regulated learning.

Collaboration is an essential competence for improving healthcare systems (Olupeliyawa, 2020). Therefore, for nurses to conduct their clinical duties successfully, collaboration with patients, families, and other medical professionals is essential (American Association of Colleges of Nursing, 2016). In this study, collaboration was shown to influence clinical performance both directly and indirectly through self-regulated learning, with the mediator accounting for 25.4% of the total variance. This finding indicates that the direct effect of collaboration is slightly greater than the indirect effect through self-regulated learning. Peer learning, which enhances confidence, increases competence, and reduces anxiety, is a collaborative activity for nursing students (Nelwati et al., 2018), and team-based learning enhances clinical performance (H.-R. Kim et al., 2016). Therefore, it may be inferred that collaboration improves self-confidence and reduces anxiety; affects motivational self-regulation; helps with memory, self-checking, and self-assessment of learning; and eventually affects cognitive self-regulation and behavioral self-regulation (including seeking help from friends or professors), thereby improving clinical performance. A collaboration between nurses and physicians improves clinical nursing performance (Kwon et al., 2019); the positive outcomes of collaboration may improve patient care, reduce error rates, reduce patient
mortality, and reduce length of stay (Emich, 2018). Therefore, promoting collaboration among nursing students may be expected to affect self-regulated learning and clinical performance, with positive impacts on future patient care results. However, strong leadership is important for collaboration, and strategies and guidance for collaboration are needed (Lankshear, 2018). Interprofessional education (IPE) has been reported to be an effective way to foster the attitudes, skills, and knowledge necessary to achieve interprofessional collaboration competencies (Guraya & Barr, 2018; Murdoch et al., 2017). Furthermore, IPE has been shown to augment the work-related knowledge, skills, and attitudes of learners (Guraya & Barr, 2018). Therefore, nursing educators should work to improve collaboration among nursing students and strive to develop teaching and learning strategies such as IPE to enhance collaboration and clinical performance.

In this study, self-regulated learning was shown to have a significant, direct effect on clinical performance. Furthermore, as discussed above, self-regulated learning was shown to also be a significant mediator both between emotional intelligence and clinical performance and between collaboration and clinical performance. These findings support self-regulated learning as an important predictor of clinical performance. Prior studies have also shown that self-regulated learning influences academic achievement (Ergen & Kanadli, 2017) and that test anxiety and internal academic motivation, which are components of motivational self-regulated learning, are associated with academic achievement (Khalaila, 2015). Thus, to help learners enhance their self-regulation abilities, educators should promote self-regulated learning environments by integrating the main components of self-regulated learning (Shin, 1998). To develop self-regulation, a learner must develop metacognitive execution, ownership, self-reflection, learning orientation, and learning potential (Shin, 1998). In particular, a study that implemented a self-regulated learning process incorporating a self-assessment that encouraged monitoring for self-directed feedback seeking found self-regulated learning to be the most powerful predictor of academic achievement (Yan, 2020). Therefore, educators should devise a teaching and learning strategy that enables learners to self-check to help students achieve academic performance and seek feedback both through external monitoring (e.g., faculty and peers) and internal monitoring (e.g., self-questioning; Yan & Brown, 2017).

**Implications and Limitations**

This study presents novel empirical research on the mechanisms that underlie the relationships in the nursing profession between clinical performance and, respectively, emotional intelligence and collaboration. In addition, although the importance of collaboration has been claimed in the literature, empirical studies of the causal relationship between collaboration and clinical performance in nursing students are still insufficient. Therefore, the results of this study are especially meaningful. In this study, emotional intelligence and collaboration explained clinical performance to a limited extent through the mediating effect of self-regulated learning, whereas self-regulated learning was also confirmed as a definite predictor and important mediator of clinical performance. In particular, as emotional intelligence was found to have a stronger indirect effect on clinical performance, as mediated through self-regulated learning, the nursing curriculum should be structured to promote emotional intelligence and self-regulated learning simultaneously. However, other mechanisms with greater power to explain the relationships between social–emotional competencies and clinical performance should be explored. Therefore, in the future, experimental research suggesting concrete strategies to facilitate collaboration and self-regulated learning among nursing students is needed. In addition, because a correlation between emotional intelligence and collaboration was identified in this study, a structural equation model that includes this correlation is needed. Although this study collected data from various regions of Korea, the use of convenience sampling limits the generalizability of the findings.

**Conclusions**

In this study, emotional intelligence and collaboration were found to have both direct effects on clinical performance and indirect effects through self-regulated learning. Thus, the results support promoting emotional intelligence, collaboration, and self-regulated learning in nursing education to improve the clinical performance of new nurses. Future research should identify related strategies to promote specific aspects of emotional intelligence, collaboration, and self-regulated learning to improve clinical performance.

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