Validity and Reliability of the Korean version of the Wong and Law Emotional Intelligence Scale for Nurses

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Abstract
Emotional intelligence is a social ability that enables one to control one’s emotions and understand and empathize with others, which is an essential skill for medical professionals, including nurses. However, no valid and reliable instrument exists to assess the emotional intelligence of nurses in Korea. Thus, the aim of this study was to evaluate the validity and reliability of the Korean version of the Wong and Law Emotional Intelligence Scale. To do this, the existing English version of the scale was translated into Korean and its content, construct, and convergent validity were evaluated. Participants (N = 210 nurses) were recruited from two hospitals in South Korea. The final scale showed a content validity index of .90, had adequate construct validity, and had a Cronbach’s α of .91 for the overall scale. Thus, this scale is a valid, reliable, and suitable measure of Korean hospital nurses’ emotional intelligence.

Keywords
emotional intelligence, hospital, nurses, reliability, validity

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patients in small and medium-sized hospitals (Kang & Jung, 2019). In addition, EI dimensions were related to professional quality of life (Y. N. Kim, 2019), turnover intention (S. J. Lee & Woo, 2015), job stress (J. H. Kim et al., 2013), job performance (Park & Park, 2018), organizational performance (Y. B. Lee & Ko, 2015), and job satisfaction (Jang et al., 2016; Ko & Kim, 2014). These studies attempted to obtain more conclusive information about hospital nurses’ EI. Although various researchers have translated the WLEIS into Korean for their own purposes and published it as a result of their research, it is necessary to develop a verified Korean version of the tool, especially at a time when interest in EI is growing.

Thus, to examine the effect of nurses’ EI on clinical outcomes, a valid, reliable, and user-friendly scale is needed. Accordingly, the underlying dimensions of different EI measures should be examined using cross-validation techniques, including factor analysis. Therefore, this study aimed to examine the validity and reliability of the Korean version of the WLEIS among Korean nursing professionals (Wong & Law, 2002).

Method
Setting and Sample
This study was conducted in two hospitals in Gyeonggi-do, South Korea. We used G*Power 3.1.7 to estimate the required sample size (Faul et al., 2009). According to the correlation model, a sample size of 84 was required to examine the convergent validity of the scale (two-sided test, $\alpha = .05$, power $1 - \beta = .80$, effect size $\rho = .25$). Regarding the analysis of variance model (number of groups = 4, $\alpha = .05$, power $1 - \beta = .80$, effect size $\eta = .25$), the required sample size was 180. For the factor analysis to determine construct validity, the sample size had no determined criteria; however, in the case of less than 40 variables, Comrey (1988) suggested a sample size of 200. Therefore, we recruited 210 hospital nurses who were stratified based on Benner’s stages of nursing proficiency (e.g., advanced beginner and competent, proficient, and expert practitioner; Black, 2014).

Measures
WLEIS. Wong and Law (2002) developed, tested, and cross-validated the WLEIS using a rigorous standardization process (Law et al., 2004). This 16-item scale consisted of four dimensions: self-emotions appraisal (SEA, four items), others-emotions appraisal (OEA, four items), use of emotion (UOE, four items), and regulation of emotion (ROE, four items). Responses to the items were coded as follows: 1 = totally disagree, 2 = disagree, 3 = somewhat disagree, 4 = neutral, 5 = somewhat agree, 6 = agree, and 7 = totally agree. Higher scores were indicative of better EI. Regarding reliability, the alpha coefficients of the four dimensions were .89, .88, .76, and .85 in Wong and Law’s (2002) study, respectively.

Translation and content validity. We obtained written permission to develop and validate a Korean version of the WLEIS from the scale developers. We carefully translated the assessment of scale developers and published it as a result of their research, it is necessary to develop a verified Korean version of the tool, especially at a time when interest in EI is growing.

Thus, to examine the effect of nurses’ EI on clinical outcomes, a valid, reliable, and user-friendly scale is needed. Accordingly, the underlying dimensions of different EI measures should be examined using cross-validation techniques, including factor analysis. Therefore, this study aimed to examine the validity and reliability of the Korean version of the WLEIS among Korean nursing professionals (Wong & Law, 2002).

Data Collection and Ethical Considerations
Data were collected between May and June 2017. Convenience sampling was utilized; all participants voluntarily agreed to participate in the study and provided written informed consent. Furthermore, they were informed of the purpose of the study and assured about the confidentiality of their responses, their autonomy, the voluntariness of their participation, and their freedom to withdraw at any time. Participants took approximately 10 min to complete the questionnaires. The study protocol and all the study procedures were approved by the Institutional Review Board of Bundang CHA medical center (CHAMC 2017-03-040).
Data Analysis

All analyses were conducted using SPSS (version 23; IBM Corp., Armonk, NY, USA) and AMOS (version 24; IBM Corp., Armonk, NY, USA). Participant’s general characteristics were analyzed and group differences in EI were examined using chi-square test, Fisher’s exact test, the Mann–Whitney U test, analysis of variance, and the Kruskal–Wallis test (with the Bonferroni multiple-comparison correction). Data normality was tested using the Shapiro–Wilk test. The range and distribution of participants’ responses to each item were examined by investigating potential ceiling and floor effects. Since WLEIS is an instrument that has already been developed and validated (Wong & Law, 2002), confirmatory factor analysis was conducted to determine construct validity. Furthermore, Pearson’s correlation analysis was conducted to examine the convergent validity of the scale. The reliability (internal consistency) of the four dimensions of the Korean version of the WLEIS was assessed by computing Cronbach’s alpha and item-total correlation coefficients.

Results

Participant Characteristics

The characteristics of the participants are shown in Table 1. The mean age of the participants ($N = 210$) was $26.47 \pm 3.96$. Most of the participants were women ($n = 202$, 96.2%), unmarried ($n = 189$, 90%), and had a bachelor’s degree ($n = 179$, 85.2%). Among the participants, more people responded that they had no religion ($n = 124$, 59%), and advanced beginner was the largest in Benner’s career classification ($n = 63$, 30%). Furthermore, 168 respondents (80%) reported they had no turnover experience, and a majority of them were regular employees ($n = 201$, 95.7%) and staff nurses ($n = 162$, 77.1%). There were more respondents working in the department they wanted ($n = 150$, 71.4%) and working in general wards ($n = 129$, 61.4%). Approximately half of the respondents reported that they had moderate levels of trauma from care patients ($n = 103$, 49%).

![Table 1. Emotional Labor, Resilience, and Emotional Intelligence According to Participant Characteristics ($N = 210$).](image-url)
Construct Validity

Confirmatory factor analysis was conducted to verify the factor structure of the 16 items (i.e., observed variables) of the Korean version of the WLEIS (Table 2). The standardized regression weights ranged from .589 to .969 and were statistically significant for each item of the four factors (all \( p < .001 \)). A range of goodness of fit criteria to assess overall model fit were used, including root mean square error of approximation (RMSEA) \( \leq .08 \), and comparative fit index (CFI) \( \geq .90 \) (Hooper et al., 2008). The selected indices are appropriate indices as model evaluations (Byrne, 2010) and provide information on model fit (Leak, 2011). The model fit of this instrument was \( \chi^2 = 255.48 \) (\( p < .001 \)), CMIN/df = 2.63, SRMR (standardized root mean residual) = .08, RMSEA (root mean square error of approximation) = .088, IFI (incremental fit index) = .935, CFI (comparative fit index) = .935, which showed that all goodness of fit indices met the baseline of CMIN/df = 3, SRMR = .08, RMSEA = .10 and below, IFI = .90 and above, and CFI = .90 and above (Noh, 2014; Yu, 2012). All indices for model evaluation are presented in Table 3. The value of these indices compared to Model 2 by Model 1 meets the criteria, confirming the feasibility of Model 1, which is the subject of the analysis in this study. The indices presented in Law et al.’s (2004) work are also presented for comparison in Table 3.

Convergent Validity

To evaluate convergent validity using confirmatory factor analysis, the standardized factor loadings for all items was .589–.969, above the reference (\( \geq .50 \)), and the critical ratio value was 9.70–15.27, meeting the criterion of being \( \geq 1.97 \). In addition, the average variance extracted was between .58 and .68 and above the reference value of \( \geq .50 \) (Noh, 2014; Yu, 2012); thus, convergent validity was verified (Table 2). The goodness of fit of the regression model was examined by conducting the Kolmogorov–Smirnov residual normality test, Durbin-Watson test for autocorrelation, and Koenker test for the equality of variances and for computing the variance inflation factor (a measure of multicollinearity). The results supported the goodness of fit of the model (Table 4).

Internal Consistency of the Scale

The 16 items of the Korean version of the WLEIS were valid and intercorrelated (all \( p < .001 \)). The following ranges of

### Table 2. Confirmatory Factor Analysis of the Wong and Law Emotional Intelligence Scale (WLEIS).

| Items | Factors | Standardized estimate | SE | C.R. | \( p \) | AVE |
|-------|---------|-----------------------|----|------|------|-----|
| 1. I have a good sense of why I have certain feelings most of the time. | Self-emotions appraisal | .788 | — | — | .64 |
| 2. I have good understanding of my own emotions. | .910 | .07 | 14.49 | \( <.001 \) |
| 3. I really understand what I feel. | .857 | .08 | 13.62 | \( <.001 \) |
| 4. I always know whether or not I am happy. | .719 | .08 | 10.96 | \( <.001 \) |
| 5. I always know my friends’ emotions from their behavior. | Others-emotions appraisal | .817 | — | .68 |
| 6. I am a good observer of others’ emotions. | .884 | .06 | 15.27 | \( <.001 \) |
| 7. I am sensitive to the feelings and emotions of others. | .881 | .07 | 15.18 | \( <.001 \) |
| 8. I have good understanding of the emotions of people around me. | .847 | .06 | 14.37 | \( <.001 \) |
| 9. I always set goals for myself and then try my best to achieve them. | Use of emotion | .757 | — | .61 |
| 10. I always tell myself I am a competent person. | .820 | .08 | 12.33 | \( <.001 \) |
| 11. I am a self-motivating person. | .929 | .08 | 13.93 | \( <.001 \) |
| 12. I would always encourage myself to try my best. | .813 | .08 | 12.21 | \( <.001 \) |
| 13. I am able to control my temper so that I can handle difficulties rationally. | Regulation of emotion | .589 | — | .58 |
| 14. I am quite capable of controlling my own emotions. | .733 | .11 | 10.74 | \( <.001 \) |
| 15. I can always calm down quickly when I am very angry. | .883 | .17 | 9.54 | \( <.001 \) |
| 16. I have good control of my own emotions. | .969 | .17 | 9.70 | \( <.001 \) |

**Fitness index**

| Criteria | \( \chi^2(p) \) | CMIN/df | SRMR | RMSEA | IFI | CFI |
|---------|----------------|--------|------|-------|-----|-----|
| Model | 255.48 (\( <.001 \)) | 2.63 | .08 | 0.088 | .935 | .935 |

Note. C.R. = Critical ratio; AVE = average variance extracted; CMIN/df = chi-square minimum/degree of freedom; SRMR = standardized root mean residual; RMSEA = root mean square error of approximation; IFI = incremental fit index; CFI = comparative fit index.
construct validity. Results showed that the Korean version of the WLEIS among hospital nurses. Study is the first to have evaluated the validity and reliability utilized in these samples were not conducted. Thus, the present et al., 2016); however, validity and reliability of the scales uti-
ducted using the WLEIS in Korea (Cho & Hwang, 2014; Jang 
research findings.

Given the growing importance of EI, the evaluation and validation of assessments that measure EI are essential to the utilization of relevant perspectives (Y. B. Lee & Ko, 2015). Organizations today need employees who have high levels of EI and can persevere in the face of competition as well as understand and collaborate with others to solve problems and achieve goals (Ko & Kim, 2014). In addition to fostering trust-based nurse–patient relationships, EI is also an essential skill that enables nurses to empathize with patients and understand their perspectives (Y. B. Lee & Ko, 2015). Given the growing importance of EI, the evaluation and validation of assessments that measure EI are essential to the utilization of relevant research findings.

As previously described, studies were previously conducted using the WLEIS in Korea (Cho & Hwang, 2014; Jang et al., 2016); however, validity and reliability of the scales utilized in these samples were not conducted. Thus, the present study is the first to have evaluated the validity and reliability of a Korean version of the WLEIS among hospital nurses.

We conducted confirmatory factor analyses to determine construct validity. Results showed that the Korean version of the WLEIS consisted of four factors: SEA (Items 1–4), OEA (Items 5–8), UOE (Items 9–12), and ROE (Items 13–16). The goodness of fit indices revealed that all the items measured their intended constructs; therefore, no items were eliminated. This result is consistent with the four-factor structure of the original scale (Wong & Law, 2002).

The Cronbach’s alpha of the Korean version of the WLEIS and its subscales were acceptable and ranged from .88 to .92. Ponterotto and Ruckdeschel (2007) have suggested that alpha values > .80 are indicative of excellent internal consistency. Thus, the internal consistency of the Korean version of the WLEIS was not only satisfactory, but was stronger than that of the original version. To illustrate, in the original study (Wong & Law, 2002), although the correlation coefficients were significantly correlated (ranging from $r = .13$ to .42) between the EI dimensions, they were lower than in this study.

These results indicate that this scale is the only translation of the original WLEIS that has demonstrated adequate reliability and validity. Furthermore, the scale translation procedure that was undertaken in this study was successful and was supported by the reliability and validity results of the Korean version of the WLEIS.

Although the emergent validity and reliability of the Korean version of the WLEIS met the required criteria, this study had several limitations. First, no additional detailed analysis was conducted to verify measurement invariance. As this study was conducted on participants from different cultures for which the tool was originally developed, it is essential to identify measurement equivalence (or “measurement invariance”) between populations. An example of a representative question of measurement equivalence/invariance is whether respondents in other cultures interpret a given measurement in a conceptually similar manner (Vandenberg & Lance, 2000). That is, the limitation of this study was that no additional detailed analysis was conducted to verify measurement invariance.

Second, the nurses who participated in this study were recruited from only two hospitals in South Korea, which may have limited the representativeness of our sample. Furthermore, participants were recruited using convenience sampling; thus, a gender bias could have been evident in the sampling method. Therefore, this may have limited the representativeness of our sample.

Finally, recall biases and socially desirable response sets, which are limitations that are inherent to self-report

### Table 3. Various CFA Fit Indices for the Three Models Developed to Test the Factorial Validity.

| Model                        | $\chi^2(p)$ | $df$ | $CMIN/df$ | RMSEA | RMR | GFI | IFI | TLI | CFI |
|------------------------------|-------------|------|-----------|-------|-----|-----|-----|-----|-----|
| Model 1                      | 255.48 (<.001) | 97   | 2.63      | .088  | .113 | .872 | .935 | .919 | .935 |
| Model 2                      | 2546.66 (<.001) | 120  | 21.2      | .311  | .511 | .275 | .000 | .000 | .000 |
| Law & Song (2004)            | 846.41      | 398  | .53        |       |     |     |     |     |     |

Note. Model 1 is based on the original theoretical model that generated the Wong and Law Emotional intelligence scale (WLEIS) and it contained four factors and 16 indicators. Model 2 is the independence model generated by the AMOS program. $df =$ degree of freedom; RMSEA = root mean square error of approximation; RMR = root mean square residual; GFI = goodness of fit index; IFI = incremental fit index; TLI = Tucker–Lewis index; CFI = comparative fit index.

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Finally, recall biases and socially desirable response sets, which are limitations that are inherent to self-report
Table 4. Floor and Ceiling Effects, Reliability, and Correlation Coefficients.

| Variables | Dimensions | Items                                                                 | M ± SD   | Floor (%) | Ceiling (%) | Cronbach’s α | Item-total correlation | r   | p     |
|-----------|------------|----------------------------------------------------------------------|---------|-----------|-------------|---------------|------------------------|-----|-------|
| EI        | SEA        | 1. I have a good sense of why I have certain feelings most of the time. | 5.41 ± 1.08 | 1.9       | 10.5        | .53           | .59                    | <.001 |
|           |            | 2. I have good understanding of my own emotions.                      | 5.42 ± 1.02 | 1.4       | 8.6         | .61           | .67                    | <.001 |
|           |            | 3. I really understand what I feel.                                   | 5.28 ± 1.10 | 2.4       | 8.6         | .61           | .67                    | <.001 |
|           |            | 4. I always know whether or not I am happy.                           | 5.33 ± 1.12 | 1.4       | 11.9        | .59           | .65                    | <.001 |
|           |            | Mean of SEA                                                           | 5.36 ± 0.94 | 0.5       | 5.2         | .89           |                        |      |
|           | OEA        | 5. I always know my friends’ emotions from their behavior.           | 5.11 ± 1.16 | 0.5       | 6.7         | .61           | .67                    | <.001 |
|           |            | 6. I am a good observer of others’ emotions.                         | 5.11 ± 1.07 | 1.4       | 4.3         | .59           | .64                    | <.001 |
|           |            | 7. I am sensitive to the feelings and emotions of others.            | 4.87 ± 1.19 | 3.3       | 5.7         | .58           | .65                    | <.001 |
|           |            | 8. I have good understanding of the emotions of people around me.     | 4.97 ± 1.10 | 2.9       | 4.8         | .62           | .68                    | <.001 |
|           | Mean of OEA |                                                                     | 5.01 ± 1.01 | 1.4       | 1.4         | .92           |                        |      |
|           | UOE        | 9. I always set goals for myself and then try my best to achieve them.| 4.60 ± 1.22 | 0.5       | 4.8         | .59           | .65                    | <.001 |
|           |            | 10. I always tell myself I am a competent person.                     | 4.20 ± 1.18 | 1.0       | 1.4         | .59           | .65                    | <.001 |
|           |            | 11. I am a self-motivating person.                                    | 4.42 ± 1.16 | 0.5       | 3.3         | .61           | .67                    | <.001 |
|           |            | 12. I would always encourage myself to try my best.                   | 4.51 ± 1.17 | 0.5       | 3.8         | .63           | .68                    | <.001 |
|           | Mean of UOE |                                                                     | 4.43 ± 1.03 | 0.5       | 1.4         | .90           |                        |      |
|           | ROE        | 13. I am able to control my temper so that I can handle difficulties rationally. | 4.41 ± 1.13 | 4.8       | 1.0         | .62           | .67                    | <.001 |
|           |            | 14. I am quite capable of controlling my own emotions.                | 4.44 ± 1.17 | 1.4       | 1.0         | .58           | .64                    | <.001 |
|           |            | 15. I can always calm down quickly when I am very angry.             | 3.95 ± 1.25 | 2.4       | 0.5         | .49           | .57                    | <.001 |
|           |            | 16. I have good control of my own emotions.                          | 4.20 ± 1.17 | 0.5       | 1.0         | .56           | .63                    | <.001 |
|           | Mean of ROE |                                                                     | 4.25 ± 1.01 | 1.0       | 1.0         | .88           |                        |      |
|           | Mean of EI |                                                                     | 4.76 ± 0.74 | 0.5       | 1.0         | .91           |                        |      |

Note. Correlation coefficient by Pearson’s correlation analysis. SEA = self-emotions appraisal; OEA = others-emotions appraisal; UOE = use of emotion; ROE = regulation of emotion; EI = emotional intelligence.
questionnaires, may have adversely influenced the results. Therefore, further evaluation of the Korean version of the WLEIS should be undertaken among nurses who work in different types of hospitals (e.g., acute and nursing hospitals and hospices).

**Conclusion**

In this study, the Korean version of the WLEIS was found to be undergirded by a four-factor structure and demonstrated reliability and validity among Korean nurses. Therefore, this scale can be used to assess the EI of Korean hospital nurses. EI is no longer an unfamiliar concept to nursing researchers and may serve as an indirect index of the psychosocial capabilities of nurses. The present findings can thus be utilized to stimulate further research within the field of human resource management in nursing. The findings also serve as empirical evidence that can be utilized to develop programs that improve the EI of nurses. Nonetheless, further research is needed to confirm that the Korean version of the WLEIS has robust psychometric properties and is suitable for use in clinical settings. Furthermore, additional testing of the validity of this scale should be undertaken among different groups of health care providers such as physicians, dentists, and social workers to offer more robust findings and guide further research on the topic.

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