

Translation and psychometric validation of the Korean version of the academic nurse self-efficacy scale for Korean bachelor-level nursing students



Original article

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Abstract: **Objective:** This study aimed to translate the Academic Nurse Self-Efficacy scale (ANSE), assess its appropriateness for use in Korean nursing students, and evaluate the Korean Version of the Academic Nurse Self-Efficacy scale's (K-ANSE) validity and reliability. **Methods:** The data of 444 nursing college students at 10 universities across the country were collected from November 1, 2020 to June 8, 2021. The K-ANSE was analyzed utilizing SPSS 25.0 and AMOS 25.0 programs. The K-ANSE's content validity, construct validity, convergent/discriminant validity, criterion-related validity, and reliability were evaluated. **Results:** Internal emotion management, auto-regulatory behavior, external emotion management, and sociality were established. The Cronbach's α for the overall scale was 0.87, and that of the 4 subscales ranged from 0.70 to 0.89. **Conclusions:** The Korean version of the ANSE seems to be a valid and reliable instrument to measure Korean bachelor-level nursing students.

Keywords: academic self-efficacy • Baccalaureate • confirmatory factor analysis • nursing students • psychometrics • translation and adaptation

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1. Introduction

Academic self-efficacy has been known to be an important predictor of academic performance.¹ In addition to allowing them to choose challenging tasks and put additional effort into performing a given task successfully,² it plays a prominent role in mediating learners' judgment of their abilities to organize and implement the actions necessary to perform tasks in an academic situation.³ The concept of academic self-efficacy will be of interest to bachelor-level nursing college students'

capacity to build skills because it can also play a role in formulating professional identity as a nurse among nursing students besides directly affecting their learning performance.⁴

Studies have shown that college students with high levels of academic self-efficacy are more likely to adapt to university life and have excellent self-directed learning skills.^{5,6} A study of nursing college students also found that academic self-efficacy was associated with

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a high level of learning motivation, critical thinking, and problem-solving skills,⁷ as well as with introspection and insight.⁸ In particular, as clinical reasoning competencies constitute a complex cognitive process that collects and analyzes health questions, prioritizes them through logical reasoning, and leads to clinical judgment,⁹ it is classified as an essential nursing competency that professional nurses must possess.¹⁰ Therefore, imparting clinical reasoning skills is important in nurses' training, and academic self-efficacy has been reported as a factor that increases the clinical reasoning capacity of nursing college students.⁸

In Korea, the nursing profession is presently recognized as one with a high employment rate, and this employment-oriented mindset has led to high competition in recent college entrance examinations. With this, involuntary choices based on the opinions of people around students are also increasing, rather than understanding academics or careers.¹¹ After admission, many nursing students are struggling with the process of studying and clinical practice¹² and show a tendency to drop out owing to the burden of large amounts of study and the fear of clinical practicum.¹¹ Academic self-efficacy is known to have a positive effect on academic sustainability and achievement.¹³ Therefore, it is necessary to identify the degree of academic self-efficacy among nursing college students in Korea and to explore ways to improve and do this, it is imperative to have a measurement tool that has proven its reliability and validity in evaluating academic self-efficacy.

The tool developed by Kim and Park¹⁴ has been used to determine the academic self-efficacy of nursing college students in Korea, but it was originally developed to measure the academic self-efficacy in first grade of high school students. Hence, it is imperative to measure accurately the academic self-efficacy of college students who have already chosen their major.

The Academic Nurse Self-Efficacy scale (ANSEs) was developed by Bulfone et al.¹⁵ to assess the academic self-efficacy of nursing students. It was developed over 3 years by collecting data from 1129 Italian nursing students and verifying its reliability and validity. When using tools developed in foreign countries having a different culture from one's own, in addition to socio-cultural differences and the translation, the validity of the translation must also be checked carefully.¹⁶ Therefore, to use the ANSEs for bachelor-level nursing students in Korea, it is necessary to verify the validity and reliability of the Korean Version of the ANSEs (K-ANSEs). So, the purpose of this study is to translate the original ANSEs developed by Bulfone et al.¹⁵ into Korean and test the validity and reliability of the K-ANSEs for Korean bachelor-level nursing students.

2. Methods

2.1. Design

This is a methodological study of nursing students in Korea that verifies the validity and reliability of the K-ANSEs.

2.2. Participants

This study's participants were conveniently extracted from nursing college students studying in Korea. With respect to the number of participants required to perform a factor analysis for constituent validity verification, Nunnally and Bernstein¹⁷ suggest a ratio of 10:1 (the number of cases to measurement variables), but recently, it has been suggested that >200 people are sufficient for structural model equations or factor analysis.¹⁸ Additionally, Meyers et al.¹⁹ determined that the adequacy of sample sizes for factor analysis is good if the sample size is >300. In this study, 465 nursing students participated and, after excluding insufficient data, finally 444 participants' data were analyzed.

2.3. Measurements

2.3.1. General characteristics

The general characteristics of the nursing college students included age, year of study, sex, type of residence, stress level, exercise status, motivation for choosing the nursing department, and average grades.

2.3.2. ANSEs

The academic nurse self-efficacy tool for nursing students in this study was developed for Italian nursing students,¹⁵ and consisted of 14 questions and 4 subscales. The subfactors comprised: "auto-regulatory behavior" (4 questions), "collegiality" (3 questions), "internal emotion management" (3 questions), and "external emotion management" (4 questions). Each question was scored as follows: 1 point for "completely unconfident," 2 for "very little confident," 3 for "moderately confident," 4 for "confident," and 5 for "completely confident," with scores ranging from 14 to 70 points, with a higher score denoting greater academic self-efficacy.¹⁵ The Cronbach's alpha of the ANSEs in Italy was 0.84 for total and 0.72, 0.73, 0.80, and 0.83 for each of the subfactors.¹⁵

2.3.3. Academic self-efficacy

The academic self-efficacy tool is used as the gold standard in Korea for testing the validity of the ANSEs,

whose validity and reliability have been verified. The tool, which was developed by Kim and Park¹⁴ for high school first-graders consists of 3 subfactors with a total of 28 questions, comprising 8 questions on confidence, 10 on self-regulating efficacy, and 10 on preference for task difficulty, each of which were scored on a 6-point Likert scale. The scale's scores ranged from 28 to 168, implying that the higher the score, the greater the self-efficacy. At the time of development, Cronbach's alpha for confidence was 0.74, self-regulating efficacy was 0.76, and task difficulty was 0.84.

2.4. Data collection

To collect data, the researchers asked for the cooperation of professors from nursing departments at 10 universities across the country and conducted the data collection from November 1, 2020, to June 8, 2021. Initially, data collection was carried out in 1 university in Daegu City through questionnaires, but owing to the spread of COVID-19 and the winter vacation, subsequent data collection in the rest of the region was conducted online. Researchers in Daegu verbally explained information about the research process, such as the purpose and content of the study, research ethics, and data collection methods, and informed them that it was irrelevant to the evaluation of the subject. In the other 9 universities nationwide, the researcher asked the professors of the nursing department of the school for cooperation in collecting data and posted the recruitment document on the network to the students through the representative so that students could access the site and check the contents of the research manual and consent form. If the subjects agreed to participate in the study, they were asked to participate in the online survey. When collecting data, all items of the questionnaire must be answered to move to the next page, and only one response per question was allowed. A predetermined electronic coupon was issued to the mobile phone number provided after all responses were completed. Four hundred sixty-five respondents completed the questionnaire online and offline, and 444 copies were used for data analysis.

2.5. Data analysis

The data were analyzed using the IBM SPSS 25.0 (IBM Corporation, Armonk, NY, USA) and AMOS 25.0 (IBM Corporation, Armonk, NY, USA) programs. For the content validity analysis of K-ANSEs, a question item content validity index (I-CVI) was evaluated by a group of experts, and items with a CVI coefficient of 0.80 or higher were selected. The general characteristics of the participants were expressed using frequencies,

percentages, mean and standard deviation; independent *t*-tests or χ^2 were used for the verification of homogeneity of general characteristics between subsample 1 (participants included in the exploratory factor analysis [EFA], $n = 140$) and subsample 2 (subjects included in the confirmatory factor analysis [CFA], $n = 304$). To verify construct validity, item distribution and EFA were performed based on the data of subsample 1. For item distribution, mean, standard deviation, skewness, and kurtosis values were checked for each item, and Kaiser–Mayer–Olkin (KMO) values and Bartlett's test of sphericity were used to check whether the collected data was suitable for factor analysis. EFA was performed, varimax rotation was used for factor rotation, and factors with eigenvalues >1.0 were extracted.

For the second evaluation based on the data of subsample 2, CFA, convergent and discriminant validity tests were performed, and the goodness of fit of the research model was evaluated. The CFA was performed to examine the structural relationship between the subfactors derived through EFA. Since the values of skewness and kurtosis of individual items are assumed to be normal, the maximum likelihood estimation method was used. The goodness of fit of the research model was confirmed by χ^2 statistics, chi-square minimization/degrees of freedom (CMIN/DF), comparative fit index (CFI), Tucker-Lewis index (TLI), the goodness of fit index (GFI), adjusted goodness-of-fit index (AGFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) based on previous research.²⁰ For criterion-related validity tests, Pearson's correlation analysis was used, and internal consistency of the K-ANSEs was tested using Cronbach's α for reliability test.

2.6. Ethical considerations

Permission to conduct the study was approved by the Institutional Review Board of Daegu Catholic University (CUIRB-2020-0028). For the ethical protection of the participants, information about the research process, such as the purpose and content of the research, research ethics, and data collection methods, was written using terms and expressions that were easy to understand. In addition, the researchers' contact information was provided in the explanation so that the research participants could contact them at any time if they had any questions about the study. Subjects who voluntarily agreed to participate in the study were informed that they could refuse to participate in the study at any time and there would be no disadvantage to it. A small gift in return was provided to all who participated in the offline and online surveys. The same compensation was also provided to the participants who withdrew from the survey.

2.7. Psychometric testing procedures of K-ANSEs

2.7.1. Translation and cultural contextual verification of tools

For using the tool, approval was obtained from Dr. Bulfone, the developer of ANSEs. Based on the guidelines for the process of translation and application of the tools set forth by the World Health Organization,²¹ a draft of the K-ANSEs was prepared through forward and back translations. The original tool was translated by a researcher proficient in Korean and English, and the questions were revised after 2 nursing professors reviewed any sentences that required clarity and/or a cultural reflection of the translation. The translated questionnaire was translated back into English by those fluent in both English and Korean. Finally, the researchers compared it with the original tool to ensure that there was no difference in meaning between the questions.

2.7.2. Content validity

Each item of K-ANSEs was evaluated by experts consisting of 3 professors and 2 doctoral students with >8 years of clinical experience in the department of nursing. For the translated measurement tool, the I-CVI, which measures the validity of the content on a scale of 4 wherein 1 point represents "not valid at all," 2 "not valid," 3 "valid," and 4 "very valid," was calculated.²² In addition, experts were asked to present their opinions on the need to revise the items and the composition of the measurement tools. As a result of verifying the content validity of the preliminary tool, one item, "Avoiding committing transgressions even when the risk of sanction is minimal," had an I-CVI = 0.8, and the remaining questions were all between 0.94 and 1.00. Therefore, none of the 14 questions presented in the preliminary items were removed. However, the K-ANSEs were modified to reflect the opinions that were difficult to understand or awkward in expression among questions.

2.7.3. Modification and supplementation of the tool through preliminary investigation

The translated K-ANSEs retained the same negative and positive question formats, arrangements, and question counts as the original tool. A preliminary survey was conducted on 16 students in juniors and seniors at a nursing school in Daegu. The questionnaire was distributed to the participants who provided their written consent after the purpose and method of the preliminary investigation were explained, and completed questionnaires were then collected. The preliminary survey was

conducted to identify problems, such as comprehension of questions in the K-ANSE tool, ease of response, and time required to respond. Based on the results of the preliminary investigation, questions whose content meaning was unclear or difficult to understand were corrected. The final translation was completed and the average time taken to complete the questionnaire was approximately 3 min.

3. Results

3.1. General characteristics of participants

The average age of the 444 participants was 22.94 ± 4.21 years, and sophomores were the most with 234 (52.7%) participants. Three hundred sixty-seven (82.7%) participants were women, 303 participants (68.2%) lived with their families, and 243 (54.7%) reported moderate levels of stress. Overall, 264 participants (59.5%) did not exercise regularly and 165 (37.2%) entered the nursing department because it was easy to get a job. A grade of 3.5–4.0 was the most prevalent with 179 (40.3%) of participants. There was no significant difference between the explorative factor analysis and confirmative factor analysis participants (Table 1).

3.2. Construct validity

3.2.1. EFA

For EFA, subsample 1 ($n = 140$) was selected and analyzed by random sampling method of SPSS cases. To confirm the suitability for factor analysis, the distribution of the items was analyzed with a total of 14 questions. The average score of the items ranged from 2.70 to 4.45 points, skewness was -1.38 to 0.27 , kurtosis was -0.96 to 1.13 , and there was no excessive skewness and kurtosis (Table 2).²³ The KMO test result was 0.81, indicating that the correlation matrix was meritorious for factor analysis.²⁴ As a result of Bartlett's test of sphericity, $P < 0.001$ ($P < 0.05$) indicated that the collected data was suitable for factor analysis. Community ranged from 0.54 to 0.81 and there were no items to delete. The cumulative total variance explained was 70.6%, indicating that there was no significant problem with the overall explanatory power. There were 4 cases with an eigenvalue of 1.0 or higher, and 4 factors were selected (Table 2).

3.2.2. CFA

After establishing a measurement model based on the results of the EFA, a CFA was conducted on the data

Variables	Total (N = 444), n (%) or M ± SD	Participants for EFA (n = 140), n (%) or M ± SD	Participants for CFA (n = 304), n (%) or M ± SD	t/ χ^2	P
Age (years)	22.94 ± 4.21	23.07 ± 4.93	22.88 ± 3.84	0.46	0.648
Grade				7.20	0.066
Freshman	11 (2.5)	5 (3.5)	6 (2.0)		
Sophomore	234 (52.7)	76 (54.3)	158 (52.0)		
Junior	105 (23.6)	39 (27.9)	66 (21.7)		
Senior	94 (21.2)	20 (14.3)	74 (24.3)		
Gender				1.33	0.248
Female	367 (82.7)	120 (85.7)	247 (81.3)		
Male	77 (17.3)	20 (14.3)	57 (18.8)		
Living arrangement				0.31	0.577
With family or relative	303 (68.2)	93 (66.4)	210 (69.1)		
Independent	141 (31.8)	47 (33.6)	94 (30.9)		
Stress degree				0.59	0.745
Little	78 (17.6)	22 (15.7)	56 (18.4)		
Moderate	243 (54.7)	77 (55.0)	166 (54.6)		
A lot	123 (27.7)	41 (29.3)	82 (27.0)		
Regular exercise				0.003	0.96
Yes	180 (40.5)	57 (40.7)	123 (40.5)		
No	264 (59.5)	83 (59.3)	181 (59.5)		
Reason to choose nursing major				11.83	0.066
Guaranteed employment	165 (37.2)	45 (32.1)	120 (39.5)		
Advice from others	60 (13.5)	16 (11.4)	44 (14.5)		
Aptitude and interest	66 (14.9)	29 (20.7)	37 (12.2)		
Dreams from childhood	50 (11.3)	11 (7.9)	39 (12.8)		
Help others	56 (12.6)	22 (15.7)	34 (11.2)		
Economically guaranteed	29 (6.5)	12 (8.6)	17 (5.6)		
Can keep my major	18 (4.1)	5 (3.6)	13 (4.3)		
Average GPA				1.55	0.817
2 < GPA ≤ 2.5	8 (1.8)	4 (2.9)	4 (1.3)		
2.5 < GPA ≤ 3.0	31 (7.0)	9 (6.4)	22 (7.2)		
3.0 < GPA ≤ 3.5	84 (18.9)	28 (20.0)	56 (18.4)		
3.5 < GPA ≤ 4.0	179 (40.3)	55 (39.3)	124 (40.8)		
4.0 < GPA	142 (32.0)	44 (31.4)	98 (32.2)		

Note: CFA, confirmatory factor analysis; EFA, exploratory factor analysis; GPA, grade point average; SD, standard deviation.

Table 1. General characteristics of participants.

of the remaining 304 participants. First, the normality verification for CFA showed that skewness was from -1.92 to 0.32 and kurtosis was -0.98 to 3.37, which is not severely non-normal.¹⁸ Thus, the assumption of univariate normality was satisfied (Table 3). CFA was performed on 4 subfactors of the K-ANSEs to evaluate the fit index of the measurement model (Table 4, Figure 1). The fit index was not reached, except SRMR, with $\chi^2 = 250.03$ ($P < 0.001$), CMIN/DF = 3.52, CFI = 0.89, TLI = 0.86, GFI = 0.89, AGFI = 0.84, RMSEA = 0.09, SRMR = 0.08.¹⁸ Therefore, β of each sub-factor was

examined and the standardized regression weights of items 5 and 7 were found to be 0.23 and 0.24, respectively. So the CFA was conducted again for the modified K-ANSEs, excluding these 2 items. As a result, $\chi^2 = 141.08$ ($P < 0.001$), CMIN/DF = 2.94, CFI = 0.94, TLI = 0.92, GFI = 0.93, AGFI = 0.89, RMSEA = 0.08, SRMR = 0.06; all the fit indices except AGFI reached the recommended levels. Next, it was checked that the second-order hierarchical model presented in the original tool ANSEs was well matched for modified K-ANSEs (Table 4, Figure 2). As a result, all goodness of fit indices

Items	M(SD)	Skewness	Kurtosis	External emotion management	Internal emotion management	Sociality	Auto- regulatory behavior	Communalities
Item1	3.33 (1.01)	-0.40	-0.23	0.352	0.773	0.145	-0.014	0.742
Item2	3.64 (0.96)	-0.29	-0.41	0.144	0.852	0.129	0.151	0.786
Item3	3.41 (1.14)	-0.38	-0.73	0.266	0.769	0.162	0.119	0.702
Item4	3.61 (1.08)	-0.54	-0.44	0.308	0.025	0.262	0.674	0.618
Item5	4.45 (0.84)	-1.38	0.88	-0.279	0.151	0.026	0.660	0.536
Item6	3.72 (1.05)	-0.60	-0.22	0.477	-0.066	0.064	0.727	0.764
Item7	4.39 (0.82)	-1.30	1.13	-0.138	0.118	0.102	0.744	0.597
Item8	2.84 (1.18)	0.24	-0.74	0.771	0.312	-0.024	0.047	0.695
Item9	2.70 (1.16)	0.27	-0.79	0.884	0.151	-0.002	0.003	0.804
Item10	3.08 (1.09)	-0.12	-0.61	0.804	0.160	0.213	-0.016	0.718
Item11	2.94 (1.08)	0.16	-0.63	0.825	0.314	0.172	-0.003	0.809
Item12	4.00 (0.91)	-0.69	0.00	0.115	0.087	0.770	0.266	0.685
Item13	3.83 (0.94)	-0.64	0.07	0.073	0.260	0.834	0.001	0.769
Item14	3.94 (0.92)	-0.32	-0.96	0.056	0.062	0.804	0.098	0.664
Eigenvalue				3.36	2.28	2.16	2.09	
Variance (%)				24.00	16.29	15.43	14.93	
Cumulated total variance (%)				24.00	40.28	55.71	70.64	

Note: Coefficients in bold express the primary factor loadings; Kaiser–Meyer–Olkin test = 0.805, Bartlett's Test of Sphericity $\chi^2 = 926.71$ ($df = 91$, $P < 0.001$); EFA, exploratory factor analysis; K-ANSEs, Korean Version of the Academic Nurse Self-Efficacy scale.

Table 2. Items' distribution and EFA of the K-ANSE's ($N = 140$).

Factors and items	How much are you confident with	M (SD)	Min	Max	Skewness	Kurtosis
Factor 1	Internal emotion management	3.40 (0.81)				
Item1	Controlling anxiety in front of a problem	3.25 (0.94)	1	5	-0.23	-0.40
Item2	Keeping calm during an exam	3.67 (0.94)	1	5	-0.57	-0.06
Item3	Avoiding discouraging myself in adversity	3.29 (1.09)	1	5	-0.17	-0.73
Factor 2	Auto-regulatory Behavior	4.08 (0.65)				
Item4	Resisting the pressure of friends for doing some things that risk getting you into a trouble	3.63 (1.12)	1	5	-0.55	-0.55
Item5	Resisting the temptation not to go to the lesson if you feel bored (deleted in final version)	4.51 (0.84)	1	5	-1.92	3.37
Item6	Avoiding the insistence of friends who ask you to do some things that you think would be better to avoid	3.69 (1.05)	1	5	-0.52	-0.54
Item7	Avoiding committing transgressions even when the risk of sanction is minimal (deleted in final version)	4.47 (0.77)	2	5	-1.44	1.50
Factor 3	External emotion management	2.92 (0.98)				
Item8	Do not spiritless when you are criticized	2.93 (1.20)	1	5	0.14	-0.98
Item9	Containing shame after making a bad impression in front of the class	2.75 (1.12)	1	5	0.32	-0.65
Item10	Overcoming the embarrassment of having made a "gaffe" with a person to the judgment of which you care a lot	3.04 (1.13)	1	5	-0.07	-0.91
Item11	Dominating shame when your frailties have highlighted in front of the class	2.94 (1.08)	1	5	-0.02	-0.88
Factor 4	Sociality	3.93 (0.76)				
Item12	Ensuring me the help of other students when necessary	3.95 (0.95)	1	5	-0.80	0.14
Item13	Helping a colleague in difficulty in the study	3.90 (0.96)	1	5	-0.82	0.56
Item14	Helping in creating a good atmosphere among students	3.93 (0.97)	1	5	-0.77	0.38

Note: ANSE, Academic Nurse Self-Efficacy scale.

Table 3. Korean version of the ANSE questionnaire scores ($N = 304$).

Items	χ^2 (P)	Normed χ^2	CFI	TLI	GFI	AGFI	RMSEA	SRMR
Original model K-ANSEs	250.03 (<0.001)	3.52	0.89	0.86	0.89	0.84	0.09	0.08
Modified model K-ANSE (deleted items 5 and 7)	141.08 (<0.001)	2.94	0.94	0.92	0.93	0.89	0.08	0.06
Modified K-ANSE (deleted items 5 and 7) Second-order hierarchical model	148.43 (<0.001)	2.97	0.94	0.92	0.93	0.89	0.08	0.07

Note: Normed χ^2 , chi-square/degrees of freedom; AGFI, adjusted goodness-of-fit index; CFI, comparative fit index; GFI, goodness of fit index; K-ANSEs, Korean Version of the Academic Nurse Self-Efficacy scale; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; TLI, Tucker-Lewis index.

Table 4. Model fit indices for K-ANSEs subscales from confirmatory factory analysis.

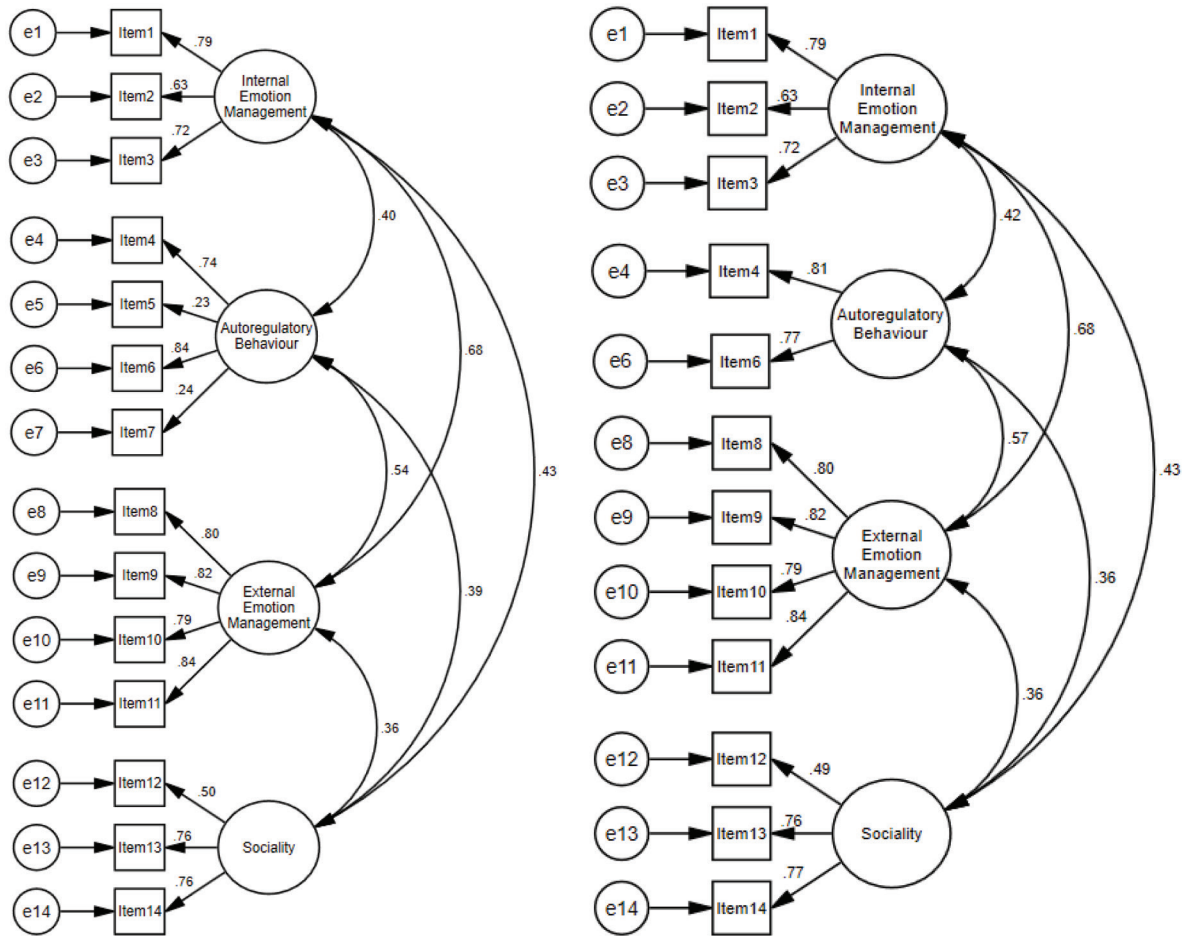


Figure 1. Confirmatory Factor Analysis original and modified model of K-ANSEs.

still met the criteria except for AGFI, but it was confirmed that the existing modified K-ANSEs were better suited to the goodness of fit of the model. The range of β values for each subfactor of these modified K-ANSEs is as follows: internal emotion management (0.63–0.79), auto-regulatory behavior (0.77–0.81), external emotion management (0.79–0.84), and sociality (0.50–0.77) (Table 5, Figure 1).

3.2.3. Convergent/discriminant validity

The convergent/discriminant validity of the 12 items was verified using construct reliability (CR) and average variance extracted (AVE). As a result, the CR was 0.74–0.86, and for AVE, the sociality was slightly lower at 0.49, but for the other items, the AVE was concentrated between 0.52 and 0.61, confirming the convergent validity of the K-ANSEs. The correlation coefficient

Dimensions and items	β	B	SE	C.R.	P	CR	AVE	Cronbach's α
<i>Internal emotion management</i>						0.76	0.52	0.76
1	0.79	0.94	0.09	10.99	<0.001			
2	0.63	0.75	0.08	9.46	<0.001			
3	0.72	1	Fix	Fix	Fix			
<i>Auto-regulatory behavior</i>						0.74	0.59	0.77
4	0.81	1.12	0.13	8.88	<0.001			
6	0.77	1	Fix	Fix	Fix			
<i>External emotion management</i>						0.86	0.61	0.89
8	0.8	1.09	0.07	14.89	<0.001			
9	0.82	1.03	0.07	15.27	<0.001			
10	0.79	1	Fix	Fix	Fix			
11	0.84	1.01	0.07	15.64	<0.001			
<i>Sociality</i>						0.74	0.49	0.7
12	0.5	0.64	0.09	7.15	<0.001			
13	0.76	0.99	0.11	8.7	<0.001			
14	0.77	1	Fix	Fix	Fix			
<i>Total</i>								0.87

Note: AVE, average variance extracted; CFA, confirmatory factor analysis; C.R., criterion ratio; CR, composite reliability; SE, standard error.

Table 5. Results of CFA, convergent and discriminant validity, and reliability test of final K-ANEs (N = 304).

of the subfactors was found to be 0.33–0.56, and by squaring it, the correlation between the latent variables and the AVE value was confirmed. As a result, discriminant validity was confirmed (Table 5).

3.3. Criterion-related validity

To verify the criterion-related validity of the K-ANSEs, correlation analysis with Kim and Park's¹⁴ academic self-efficacy scale showed that the correlation coefficient between the 2 measuring tools was 0.63 ($P < 0.001$) and was positively correlated (Table 6).

3.4. Reliability test

The overall Cronbach's α for the K-ANSEs was 0.87, whereas for the sub-factors, it ranged from 0.70 to 0.89 (Table 5).

4. Discussion

The purpose of this study was to verify the validity and reliability of the K-ANSEs by translating the ANSEs developed by Bulfone et al.¹⁵ to measure the academic self-efficacy of Korean nursing college students. As the

validity of tools cannot be sufficiently supported by one type of validity verification, a variety of logical analyses must be presented to provide a rational rationale for the use of the tool.^{25,26} This study was conducted to verify the validity and reliability of the K-ANSE among 444 Korean nursing college students. We confirmed that the K-ANSEs consisted of 12 items, in which 2 of the 14 items in the original tool were deleted, were the same as the constituent factors of the original tool, and convergent and discriminant validity at the factor and item levels were confirmed.

EFA, CFA, convergent/discriminant validity and criterion-related validity were performed to determine the constituent validity of the K-ANSEs. The EFA results were extracted from 4 factors. The factor load for each item was ≥ 0.66 and the explained variance of factors 1, 2, 3, and 4 were 24.0%, 16.3%, 15.4%, and 14.9%, respectively. The total explained cumulative variance of the K-ANSE question was 70.6%, which was $>65.3\%$ of the original tool¹⁵ and was generally judged to be a valid question when the factor load was >0.60 with the relevant factors.²⁷ Therefore, we confirmed that the corresponding questions for the 4 sub-factors of the K-ANSEs measure each factor appropriately.

The CFA was conducted to confirm whether the components of the original ANSE were suitable for Korea. In the initial model, the SRMR value was 0.08, and all fitness indices, except the SRMR, did not meet the standard.¹⁸ As a result of checking the standardized regression weights of the question, item 5 (“Resisting the temptation not to go to the lesson if you feel bored”) is 0.23 and item 7 (“Avoiding committing transgressions even when the risk of sanction is minimal”) is 0.24. In the modified model, these items were deleted because they did not meet the criterion of 0.5.²⁸ Only the AGFI was 0.89, which did not meet the AGFI criterion of 0.90 or higher,¹⁸ but all other fitness indices met the criterion.

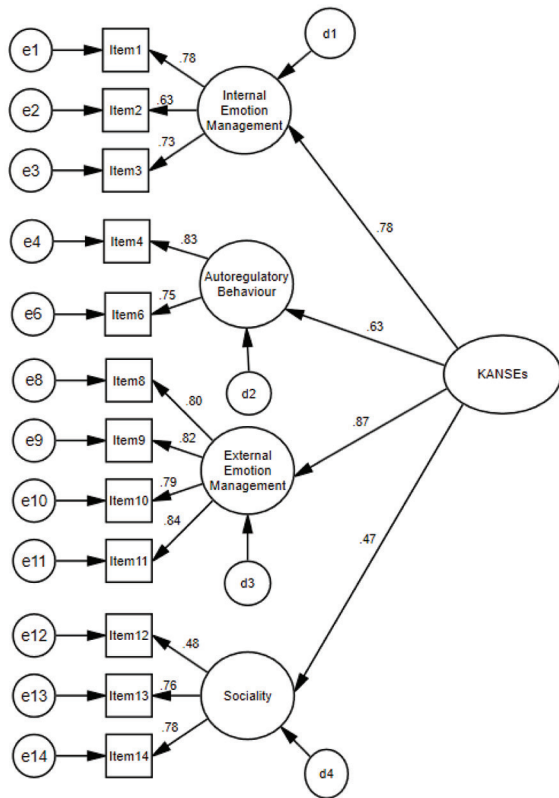


Figure 2. Final model of K-ANSE: Second-order hierarchical model with modified K-ANSEs.

The 2 deleted questions were all auto-regulatory behaviors of the subfactors and it seems that the standardized regression weights were low due to the situational difference between Italy and Korea. First, item 7 has a CVI value of 0.8 in the content validity verification, which is lower than the CVI values of 0.94–1.00 for the other questions but is in line with the adoption criteria,²² which is an item included in the CFA. Looking at the domestic situation, the number of nursing departments in Korea has doubled over the past 10 years from about 10,000 in 2008 to over 20,000 in 2019.²⁹ Consequently, owing to the high employment rate compared to other majors that do not include personal values, such as aptitude or interest, the number of nursing students who want to enter the department is also increasing,³⁰ indicating a high level of competition for entrance examinations. As a result, the number of students entering nursing schools with excellent grades has increased and hence the number of new nurses produced each year is also increasing. Hence, the competition for employment is intensifying. It seems that the standardized regression weights of the 2 items were low because the 2 deleted items did not reflect the high sensitivity to attendance and grades owing to the so-called credit war experienced by nursing students in Korea. This reasoning is also supported by the fact that the mean $\pm$ SD of the item at the time of tool development was 3.91 ± 1.11 and 4.06 ± 0.97 , respectively, lower than the score of 4.51 ± 0.84 and 4.47 ± 0.77 for the subjects in this study. However, this study looked at some nursing students in South Korea. Also, information can be lost or tampered with when moving from one language to another, so it is necessary to reconfirm the standardized regression weights through repeated studies in the future.

In this study, the discriminant validity of the questions was evaluated. Although the AVE of sociality was 0.49, slightly lower than the recommended standard of 0.50,³¹ the AVE in the remaining 3 factors met the recommended criteria, and CR also met the recommended criterion of 0.70 or higher.³¹ This means that the contents of each item constituting the K-ANSEs consistently measure the constituent concepts of the subfactors. At the time of the development of the ANSEs,¹⁵ discriminant

Items	12-item K-ANSE total	F1 = Internal emotion management	F2 = Auto-regulatory behavior	F3 = External emotion management	F4 = Sociality
Academic self-efficacy total	0.63 (<0.001)	0.53 (<0.001)	0.36 (<0.001)	0.48 (<0.001)	0.51 (<0.001)
F1 = Task difficulty preference	0.38 (<0.001)	0.35 (<0.001)	0.16 (0.005)	0.34 (<0.001)	0.24 (<0.001)
F2 = Self-regulatory efficacy	0.44 (<0.001)	0.31 (<0.001)	0.29 (<0.001)	0.27 (<0.001)	0.49 (<0.001)
F3 = Self-confidence	0.59 (<0.001)	0.52 (<0.001)	0.35 (<0.001)	0.46 (<0.001)	0.43 (<0.001)

Note: K-ANSEs, Korean Version of the Academic Nurse Self-Efficacy scale.

Table 6. Correlation coefficients between the 12-item K-ANSEs and ASEs (N = 304).

validity was not tested, so the discriminant validity of the K-ANSEs and ANSEs could not be directly compared. The coefficients ranged from 0.33 to 0.56, indicating that the degree of correlation between the sub-factors was similar. Consequently, even though the two studies targeted nursing students from different countries, the influence of the subfactors of the ANSEs and the K-ANSEs was judged to be similar.

To confirm the criterion-related validity of the K-ANSEs, the academic self-efficacy scale of Kim and Park¹⁴ which is widely used in domestic academic self-efficacy measures, was used as the gold standard. The correlation between the 2 tools indicated a statistically significant positive correlation, confirming that it is an appropriate tool for measuring the academic self-efficacy of nursing college students in the field of nursing education in Korea. The total explained that the cumulative variance of K-ANSEs was 70.6%, which was lower than the 78% of Kim and Park¹⁴. However, Kim and Park's¹⁴ study was designed for high school students, whereas K-ANSE was designed for nursing students and the total cumulative variance explained met the recommended level. Therefore, this tool was used to determine the level of academic self-efficacy of home nursing students.

Based on the result of the internal consistency analysis of the K-ANSEs, the reliability of Cronbach's α was 0.76 and the subfactors were 0.70–0.76, which was slightly lower than the reliability of the original ANSEs.¹⁵ However, as the values are higher than the recommended reliability standard of 0.70,¹⁷ overall, the tool can be judged as a reliable tool. However, there are certain limitations of this study. First, since this scale is a self-assessment scale and the study participants often select the correct answer instead of what they really think subconsciously, and so bias is inevitable. Second, the sample was selected for convenience and the findings may reflect local reality. Third, the total number of female nursing students in the sample of this study was much larger than that of male nurses, and the distribution

of participants' academic performance was uneven, with only a small percentage of students performing poorly. It is proposed to conduct research by selecting subjects with similar gender composition and academic achievement distribution.

5. Conclusions

Academic self-efficacy—the ability to adapt and perform the necessary skills using one's knowledge and own judgment with confidence, when faced with a difficult problem in an academic situation—is a significant factor in adapting to school life. This study examined the ANSEs developed for Italian nursing students through a tool translation process, constructing the K-ANSEs with 4 factors, 12 questions, and verifying their credibility and validity. To determine the validity of their constituents, EFA and CFA were used to extract subfactors and test their suitability and theoretical validity. However, 2 items with low standardized regression weights were excluded from this study. Future testing of K-ANSE is recommended to reassess the stability of the tool. Based on our findings, this tool is intended to be used to develop and evaluate various programs to improve scientific self-efficacy. Academic self-efficacy monitoring can also help to assess the long-term impact of different teaching methods and curricula in nursing education and to improve the quality of nursing degree programs.

Ethical approval

This study was approved by the Institutional Review Board of Daegu Catholic University (Approval No. CUIRB-2020-0028) before the initiation of research procedures to protect the participants. Written informed consent was obtained from all the participants.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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