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Psychometric Properties of The Turkish Version of The Academic Nurse Self-Efficacy Scale

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ABSTRACT

Purpose: This study aimed to assess the psychometric properties of the Turkish validity and reliability of the Academic Nurse Self-Efficacy Scale.

Method: This was a methodological study that was conducted in 2020-2021. The sample consisted of 294 bachelor nursing students of a university in Turkey. Data were collected using a student information form and Academic Nurse Self-Efficacy Scale. The study was approved by the ethics committee of the university and permission and informed consent was obtained from participants prior to the onset of research. Reliability was determined using test-retest, Cronbach's Alpha (α), Guttman Split-Half Coefficient, Hotelling's T^2 test, Intraclass Correlation Coefficient. Validity was determined using the First-Order Multifactor Confirmatory Factor Analysis.

Results: Participants had a mean age of 19.95±1.47 years. 86.7% were women and 28.6% were first-year students. Academic Nurse Self-Efficacy Scale had a content validity index of 0.814. Confirmatory factor analysis showed that the scale had factor loadings of 0.554 to 0.872, the goodness of fit indices of >0.85, and a root mean square error of approximation index of <3. The total scale had a Cronbach's alpha of 0.910, while the subscales had Cronbach's alpha values of >0.70. The total scale Tukey's test of additivity was F=67.467 ($p\leq$0.001), and the Academic Nurse Self-Efficacy Scale had an Intraclass Correlation Coefficient of 0.91.

Conclusion and Suggestions: The results showed that the Academic Nurse Self-Efficacy Scale is a valid and reliable scale for the Turkish sample.

Hemşire Akademik Öz Yeterlik Ölçeğinin Psikometrik Özelliklerinin İncelenmesi

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ÖZ

Amaç: Bu çalışma, Hemşire Akademik Öz Yeterlik Ölçeğinin Türkçe geçerlik ve güvenirliğini yapmak amacıyla metodolojik olarak yürütülmüştür.

Yöntem: Çalışma, Türkiye'deki bir üniversitenin Hemşirelik bölümü öğrencileri ile yürütülmüştür. Araştırmanın örneklemi, Türkiye'deki bir üniversitenin 294 lisans hemşirelik öğrencisinden oluşmaktadır. Araştırmanın verileri Öğrenci Tanıtıcı Form ve Hemşire Akademik Öz Yeterlik Ölçeği ile toplanmıştır. Araştırmaya başlanmadan önce etik onay, kurum izni ve öğrencilerden onamları alınmıştır. Güvenilirlik test-tekrar test, Cronbach's Alpha (α), Guttman Split-Half Katsayısı, Hotelling's T^2 testi, Sınıf İçi Korelasyon Katsayısı kullanılarak belirlenmiştir. Geçerlilik, Birinci Dereceden Çok Faktörlü Doğrulayıcı Faktör Analizi kullanılarak belirlenmiştir.

Bulgular: Öğrencilerin yaş ortalaması 19,95±1,47 yıl idi. Katılımcıların %86,7'si kadın, %28,6'sı birinci sınıf da öğrenin görmektedir. Ölçeğin Kapsam Geçerlik İndeksi 0,814 olarak belirlenmiştir. Doğrulayıcı Faktör Analizi sonucunda faktör yüklerinin 0,554-0,872 arasında değiştiği, tüm uyum indekslerinin >0.85 olduğu ve RMSEA indeksinin <3 olduğu belirlenmiştir. Ölçeğin tamamının Cronbach alfa değeri 0.910, alt boyutlarının ise >0.70 olarak belirlenmiştir. Toplam ölçek Tukey'nin toplamsallık testi F=67.467 ($p\leq$0.001) ve ölçeğin Sınıf İçi Korelasyon Katsayısı 0.91'di.

Sonuç ve Öneriler: Araştırmanın sonuçlarına göre, Hemşire Akademik Öz Yeterlik Ölçeğinin Türkiye örnekleminde güçlü geçerlik ve güvenirliğe sahip olduğu belirlenmiştir.

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INTRODUCTION

Self-efficacy is about one's belief in one's own capacity and competence rather than in one's skills (Kasapoğlu, 2022). Bandura (1997) defines self-efficacy as "beliefs in one's capabilities to organize and execute the course of action required to produce given attainments", or as "the judgments of people about their abilities to reach certain levels of performance" (McCabe et al., 2019; Yada et al., 2022). Kryshko et al. (2022) argues that people with high self-efficacy choose challenging tasks that they believe they can overcome and use their abilities to accomplish rather than easy tasks that they can accomplish (Kryshko et al., 2022). On the other hand, people with low self-efficacy are more likely to be blind to their own potential, have difficulty using their resources to cope with adverse and risky situations, and avoid taking action in the belief that it will be in vain (Özcan & Esen, 2016).

Academic self-efficacy is defined as a belief that one can attain a specific academic goal or task at the desired level. In other words, academic self-efficacy refers to an individual's conviction in his/her capacity to achieve a task at the desired level (Sharma & Nasa, 2014). Liu et al. (2022) states that what matters in academic self-efficacy is not individual skills and attitudes but is one's belief in one's ability to fulfill an academic task. In other words, academic self-efficacy is a belief in one's ability to define and organize the performance that one needs to achieve a goal (Liu et al., 2017).

In their review, Sharma and Nasa (2014) reported that students' beliefs about their own abilities lead to successful and positive outcomes and affect their perceived academic results in the future (Sharma & Nasa, 2014). According to Bandura (1993) students with high academic self-efficacy worked harder to have a high level of motivation, remained more resilient in the face of difficulties, and bounced back from daily challenges better than those with low academic self-efficacy. On the other hand, students with low academic self-efficacy are less interested in learning, give up more easily, and have a hard time learning because they doubt their capacity and competence. Such students experience low cognitive and intellectual activity and high levels of anxiety and stress (Sharma & Nasa, 2014).

Undergraduate nursing students face numerous challenges as they are supposed to do the clinical experience in hospitals, communicate with patients, participate in care, and learn how to deal with patients' problems. Therefore, academic self-efficacy can affect their academic performance (Bulfone et al., 2021). Nursing student's experiences feelings of inadequacy, helplessness, and intense anxiety, the antidote to which is high academic self-efficacy (Bulfone et al., 2021; Kankaya et al., 2021). The first and critical step towards determining nursing students' academic self-efficacy and improving it is to use an appropriate scale. So, this study aimed to assess the psychometric properties of the Turkish validity and reliability of the Academic Nurse Self-Efficacy Scale (ANSEs).

METHOD

Research Type

This was a methodological study that was conducted in 2020-2021. It consisted of two stages: (1) adapting ANSEs to Turkish and (2) confirming its psychometric properties. The study was designed according to the International Test Commission (ITC) Guidelines for Translating and Adapting Tests (ITC, 2018).

First Stage: Adapting ANSEs to Turkish

The first stage consisted of five steps. First, two linguists translated ANSEs from English into Turkish. Second, an independent linguist incorporated the two translated versions semantically, idiomatically, conceptually, linguistically, and contextually. Third, two linguists back-translated the scale into English, and then, an independent linguist incorporated the two translated versions. Fourth, fifteen experts (8 pediatric nursing, 4 psychiatric nursing, 1 public health nursing, and 2 training nursing) checked the scale for semantic, idiomatic, and conceptual equivalence and put it into final form. The Content Validity Ratio (*CVR*) and Content Validity Index (*CVI*) were calculated based on expert feedback. Fifth, a pilot study was conducted with 30 participants to determine the intelligibility of the scale items. The pilot sample was similar in composition to the population in the main study. Then, final alterations were made to the scale based on the results of the pilot scheme.

Second Stage: Confirming the psychometric properties of ANSEs

Reliability was determined using test-retest, Cronbach's Alpha (Cr α), Guttman Split-Half Coefficient, Hotelling's T^2 test, Intraclass Correlation Coefficient (*ICC*). Validity was determined using the First-Order Multifactor Confirmatory Factor Analysis (CFA).

Population and Sample

The study population consisted of 750 first-, second, third and fourth year nursing students at a university in Turkey in the 2019-2020 academic year. First, the grade levels were stratified based on the number of students (first-grade: 84, second-grade: 82, third-grade: 74, and fourth-grade: 54). Second, participants were recruited using simple random sampling.

The scale consists of 14 items. A common rule of thumb for scale adaptation is to have a sample size 5 to 20 times of scale items (DeVellis, 2017; Field, 2018; Karagöz, 2018). By this criterion, the sample size was set to 280 (14x20=280). However, the final sample consisted of 294 participants, which was more than 20 times the number of items, to compensate for possible missing data. Sampling criteria were defined as students who have the ability to read, write and understand the questions in the survey, being a nursing student, and voluntarily agreeing to participate in the study. It is highly recommended that researchers recruit at least 30 participants for test-retest reliability assessment and perform the assessment twice with a two-week interval (DeVellis, 2017; Polit & Beck, 2017). So, the retest was performed 15 days after the first test (n=150).

Data Collection

The data were collected between June and October 2020 using a student information form and "Academic Nurse Self-Efficacy Scale (ANSEs)". Ten minutes was taken to complete the questionnaire.

Student Information Form: The student information form consisted of ten items of demographic characteristics (age, gender, grade level, income status, family type, success status, love for school, parental attitude, etc.).

Academic nurse self-efficacy scale (ANSEs): The academic nurse self-efficacy scale (ANSEs) was developed by Bulfone et al. (2020) to determine nursing students' academic self-efficacy levels. The scale consists of 14 items and four subscales; internal emotion management, external emotion management, auto-regulatory behavior, and collegiality. The items are scored on a five-point Likert-type scale (1 = very unconfident, 2 = slight unconfident, 3 = somewhat confident, 4 = slight confidence, 5 = very confident). The total

score ranges from 14 to 70, with higher scores indicating higher academic self-efficacy. The scale had a Cr α of 0.84 in this study (Bulfone et al., 2020).

Ethical Considerations

The permission for using the ANSEs was acquired via e-mail. The ethics approval was obtained from the University Social Sciences and Humanities Ethics Committee (Decision No. 2020/82) before starting the study. Also, necessary permission was obtained from the university. Before the study, the purpose of the study was explained to the students and written and verbal consent was obtained from their themselves.

Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS 25, IBM Corp., Armonk, New York, USA). Numbers (n) and percentages (%) were used for descriptive data. Content validity was determined using *CVR* and *CVI*. Reliability was determined using Cr α Internal Consistency Coefficient, the Guttman Split-Half coefficient, Hotelling's T^2 test, and *ICC*. A paired-samples ***t***-test was used to determine whether ANSEs yielded consistent results when repeated over time. Construct validity was determined using the first-order *CFA*.

RESULTS

As table 1 showed the students' mean age was 19.95±1.47 years. Among the participants, 86.7% were women, 28.6% were first-year students, 76.9% had neutral incomes (income=expense). Also, 75.9% had nuclear families, 60.2% lived in cities, 52% lived with their families throughout the semester, 60.9% loved school, and 71.4% felt moderately safe at school (Table 1).

Table 1. *Socio-Demographic Characteristics of Nursing Students*

Demographic characteristics	*n*	*%*
Gender		
Women	255	86.7
Man	39	13.3
Grade		
1st grade	84	28.6
2nd grade	82	27.9
3rd grade	74	25.2
4th grade	54	18.3
Income status		
Low	42	14.3
Middle	226	76.9
High	26	8.8
Family Type		
Nuclear family	223	75.9
Extended family	57	19.4
Broken family	14	4.7
Living place		
Province	177	60.2
District	76	25.9
Village	41	13.9
Loving Your School		
I like	179	60.9
I'm undecided	101	34.4
I do not like	14	4.7

Linguistic Validity

The scale was translated from English to Turkish and then back to English by 6 linguists who are experts in the field of nursing, whose mother tongue is Turkish and who have English language proficiency (see Material and Method section *First Stage: Adapting ANSEs to Turkish*). Thus, the linguistic validity of the scale was ensured.

Content Validity

Fifteen experts were consulted for content validity, and then the *CVR* values of the items were calculated. The results showed that each item had a *CVR* of ≥ 0.730. The total scale had a *CVI* of 0.814.

Reliability Analysis

The items had an item-total correlation of 0.454 to 0.726. The total scale had a Cr α of 0.910. The subscales "internal emotion management," "external emotion management," "auto-regulatory behavior," and "colleague solidarity" had Cr α values of 0.740, 0.769, 0.829, and 0.854, respectively (Table 2).

Table 2. *Item Analysis and Cronbach's Alpha Results of Subscale of ANSEs*

Subscale	Item	Cronbach's Alpha	Corrected Item Total Correlation	Item Deleted Cronbach's Alpha
Internal emotion	I1	α=0.740	0.645	0.903
	I2		0.454	0.910
	I3		0.644	0.903
Auto regulatory	I4	α=0.769	0.663	0.902
	I5		0.470	0.910
	I6		0.657	0.902
	I7		0.489	0.908
External emotion	I8	α=0.829	0.632	0.903
	I9		0.583	0.905
	I10		0.726	0.900
	I11		0.662	0.902
Collegiality	I12	α=0.854	0.676	0.902
	I13		0.693	0.902
	I14		0.693	0.901

The scale had Spearman-Brown and Guttman Split-half coefficients of 0.880 and 0.882, respectively. Tukey's Test of Additivity was used to check whether the factors were additive or not. The result was F=67.467 (p≤0.001). The scale had a mean score of 51.25±11.67. Hotelling's T^2 test was performed to determine whether the scale had a response bias. The result was F=39.120 (p≤0.001). The mean test-retest scores were analyzed using a paired-samples t-test to determine whether ANSEs yielded consistent results when repeated over time. The *ICC* was used to measure the level of agreement between the test and retest scores. The results showed no significant difference in the total mean ANSEs scores between the test and retest (p=0.051). The total scale had an *ICC* of 0.910 (p≤0.001) (Table 3).

Table 3. *Reliability Results of the ANSEs*

Cronbach's Alpha			**0.910**	
Guttman Split-Half Coefficient			0.880	
Spearman-Brown Coefficient			0.882	
			F	***p***
Tukey's Test for Nonadditivity			67.467	≤0.001
Hotelling's T-Squared Test			39.120	≤0.001
			r	***p***
Intraclass Correlation Coefficient			0.910	≤0.001
	Pre Test ***x±SD***	**Post Test** ***x±SD***	***t****	***p***
ANSEs	51.61±11.99	53.72±10.88	-1.966	0.051

The First-Order Multifactor Confirmatory Factor Analysis

According to the *CFA*, the first factor (subscale) had factor loadings of 0.554 to 0.777, the second factor had factor loadings of 0.439 to 0.860, the third factor had factor loadings of 0.680 to 0.831, and the fourth factor had factor loadings of 0.755 to 0.872 (Table 4) (Figure 1).

Table 4. *Factor Loadings Obtained as a First Level Multifactor CFA Result of the ANSEs*

Subscale	Item	Factor Loadings
Internal emotion	I1	0.777
	I2	0.554
	I3	0.768
Auto regulatory	I4	0.860
	I5	0.439
	I6	0.860
	I7	0.542
External emotion	I8	0.713
	I9	0.680
	I10	0.831
	I11	0.744
Collegiality	I12	0.755
	I13	0.836
	I14	0.872

The four-factor model had a Chi-Square of 190.230 and a degree of freedom of 71 ($p \leq 0.001$). Indices were used to determine Goodness-of-Fit. ANSEs had a Chi-Square/Standard Deviation (χ^2/SD) of 2.67; a Root Mean Square Error of Approximation (*RMSEA*) of 0.076; a Groningen Frailty Indicator (*GFI*) of 0.915; a Composite Financial Index (*CFI*) of 0.942; a Normed Fit Index (*NFI*) of 0.911; a Tucker–Lewis index (*TLI*) of 0.926; and an Adjusted Composite Financial Index (*AGFI*) of 0.875 (Table 5).

Table 5. *Goodness-of-fit Indexes Obtained as a First-Order Multifactor CFA of the ANSEs*

Index	Values	Perfect fit	Good fit	Result
x^2/SD	2.679	0-3	3-5	Perfect fit
RMSEA	0.076	0.00≤ RMSEA≤0.05	0.05≤ RMSEA≤0.10	Good fit
CFI	0.942	0.95≤ CFI ≤1.00	0.90≤ CFI ≤0.95	Good fit
NFI	0.911	0.95≤ NFI ≤1.00	0.90≤ NFI ≤0.95	Good fit
TLI	0.926	0.95≤ TLI ≤1.00	0.90≤ TLI ≤0.95	Good fit
GFI	0.915	0.95≤ GFI ≤1.00	0.90≤ GFI ≤0.95	Good fit
AGFI	0.875	0.95≤ AGFI ≤1.00	0.85≤ AGFI ≤0.90	Good fit

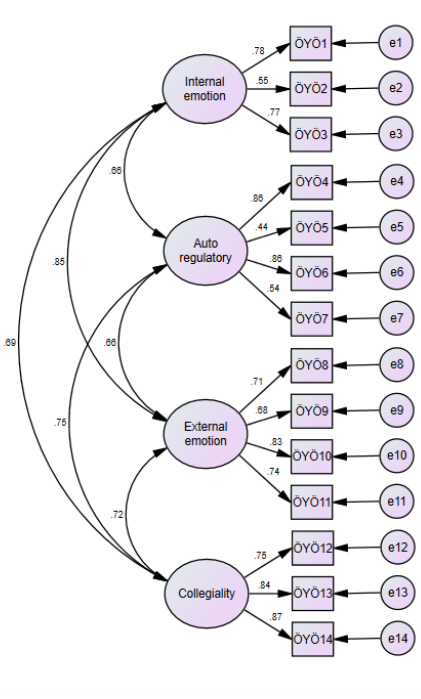

Figure 1. *Model of First Order Multi-Factor Confirmatory Factor Analysis of ANSEs*

DISCUSSION

This study aimed to assess the psychometric properties of the Turkish validity and reliability of the 14-item Academic Nurse Self-Efficacy Scale. The results showed that the Academic Nurse Self-Efficacy Scale is a valid and reliable scale for the Turkish sample. Five to forty experts are recommended for content validity assessment (Ayre & Scally, 2014). To determine the content validity of ANSEs, 15 experts were consulted, and the *CVR* values of the items and the *CVI* value of the total scale were calculated based on expert feedback. The minimum *CVR* value is based on the number of experts, but the lowest *CVR* value for 15 experts should be greater than 0.50 (Ayre & Scally, 2014). In this study, all items had a *CVR* of greater than 0.73. The total scale *CVI* should be greater than *CVR* values (Ayre & Scally, 2014; Heavey, 2019). The total scale had a *CVI* of 0.81. These results suggested that ANSEs had content validity.

For scale adaptation, it is highly recommended to conduct a *CFA* to compare the factor structures of an original scale and its adapted version. In *CFA*, all factor loadings should be greater than 0.30 (Boateng et al., 2018; Çelik & Yılmaz, 2016; Eser & Güzeller, 2017; Field, 2018; Morgado et al., 2017; Özdamar, 2017; Seçer, 2018). According to the *CFA*, the first subscale had factor loadings of 0.554 to 0.777; the second subscale had factor loadings of 0.439 to 0.860; the third subscale had factor loadings of 0.680 to 0.831; the fourth subscale had factor loadings of 0.755 to 0.872. Of the model Goodness of Fit indices, the *CFI*, *NFI*, *TLI*, and *GFI* should be greater than 0.89, the *AGFI* should be greater than 0.84, the *RMSEA* should be smaller than 0.10, and X^2/SD should be smaller than 3 (Boateng et al., 2018; Çelik & Yılmaz, 2016; Eser & Güzeller, 2017; Field, 2018; Prudon, 2015; Özdamar, 2017; Seçer, 2018; Heavey, 2019). In this study, according to the *CFA*, ANSEs had an *χ2/SD* of 2.67, an *RMSEA* of 0.076, a *GFI* of 0.915, a *CFI* of 0.942, an *NFI* of 0.911, a *TLI* of 0.926, and an *AGFI* of 0.875. The CFA confirmed the four-factor structure. According to the *CFA* results, the data agreed with the model, the subscales were correlated with the scale, and each item adequately explained the factor on which it was loaded. All in all, the *CFA* results indicate that the scale is a valid and useful measure.

Cr α reliability coefficient refers to how relevant scale items are to the construct they intend to measure and how well different items measure the same construct. The Cr α reliability coefficient should be close to 1, $0.60<\alpha<0.80$ indicates reliability, while $0.80<\alpha<1.00$ indicates high reliability (Alpar, 2018; DeVellis, 2017; Esin, 2018; Field, 2018; George & Mallery, 2019; George & Mallery, 2020; Heavey, 2019; Karagöz, 2018; Özdamar, 2017). Analysis results showed that the total scale and the subscales had Cr α values of greater than 0.70. The Spearman-Brown and the Guttman Split-Half coefficients were also used to determine reliability. ANSEs had Spearman-Brown and Guttman Split-Half coefficients of greater than 0.80. These results indicate that the scale is a reliable measure with relevant items measuring the construct they intend to measure.

Tukey's Test of Additivity was used to check whether the factors were additive or not. The result was F=67.467 ($p\leq0.001$), suggesting that item scores can be added to achieve a composite score. A Hotelling's T^2 test was used to determine whether the scale had a response bias. The result was F=39.120 ($p\leq0.001$), indicating no response bias (DeVellis, 2017; George & Mallery, 2019; George & Mallery, 2020; Heavey, 2019;).

The Item Total Correlation (*ITC*) is the correlation between an individual score and the total score. It indicates whether scale items measure a construct they intend to measure. The *ITC* should be greater than 0.30 (Alpar, 2018; DeVellis, 2017; George & Mallery, 2019; George & Mallery, 2020; Heavey, 2019). In this study, ANSEs had *ITC* values greater than 0.30. According to these results, individual scores are strongly correlated with the total score, the items measure what they intend to measure, and the scale and subscales have high item reliability.

Test-retest is used to determine whether a measure yields consistent results when administered to the same sample at different times. The expected outcome is the measure yielding consistent results over time. There should be an interval of two to four weeks between pretest and posttest administration to a sample of at least 30 people (DeVellis, 2017; George & Mallery, 2019; George & Mallery, 2020; Polit & Beck, 2017). In this study, the retest was administered to 150 participants 15 days after the first test. There was no significant difference between pretest and posttest ANSEs scores ($p>0.05$), suggesting that the scale yields consistent results over time.

Intra-observer reliability *ICC* is another method used to determine reliability. The *ICC* is a ratio of association between repeated measures for the same variable. A reliability coefficient (R) close to 1.00 indicates perfect agreement between raters' responses to items in two measurements (Alpar, 2018; George & Mallery, 2019; George & Mallery, 2020; Koo et al., 2016). ANSEs had an *ICC* of 0.91, indicating that it is a consistent scale with an excellent correlation between repeated measurements.

CONCLUSION AND SUGGESTIONS

According to the results of the study, it was determined that the Academic Nurse Self-Efficacy Scale has strong validity and reliability in the Turkish sample. So, the four-factor ANSEs measurement tool allow to determin the academic self-efficacy of nursing students. In line with the results, it may be suggested that the scale be used as an assessment tool in new studies to measure the levels of self-efficacy in nursing students.

LIMITATIONS

This study was conducted with 294 bachelor nursing students from a university in Turkey. All data were limited with self-reports.

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Conflict of Interest

No conflict of interest has been declared by the authors

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Authorship Contributions

Design: H.Ö., K.B., M.K., M.B. Data Collection or Processing: H.Ö., M.K. Analysis or Interpretation: H.Ö. Literature Search: H.Ö., K.B., M.K., M.B. Writing: H.Ö., K.B., M.K., M.B

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