



framework, the ever-increasing need for nurses every day, and the importance attributed to nursing education provided positive progress toward the professionalization of nursing (3). However, despite the developments in the nursing profession, Florence Nightingale has an important place in the profession. For this reason, it is considered a "female" profession. The profession is associated with the female roles of giving care, feeding, healing, and compassion, which has led to the emergence or even deepening of the concept of gender discrimination, experienced as one of the most important problems for both the nursing profession and education. When considering the nursing profession as a whole, it is undeniable that all sexes can implement the profession without gender discrimination (4, 5).

The perception of the role of providing care services as a task attributed to female nurses deepens gender discrimination in the nursing profession (6). The majority of male nurses, who are more advantageous than female nurses in services that require physical strength and at night shifts, prefer this profession reluctantly because they cannot get a score as high as they want on the university exam. Healthcare institution administrators prefer male nurses as female nurses need to go on maternity leave; accordingly, male nurses have a better chance to proceed in their career path and get a promotion than female nurses. However, male nurses are uncomfortable with society's perception of the nursing profession as a female profession. They refrain from working in services where female patients are predominant, stating that they are discriminated against by patients and their families (7). Due to the name of the profession, low wages, and the feminist attitude of society towards the profession, male nurses' interest in the profession remains insufficient, and the vast majority of male nurses are not satisfied with choosing the profession (8).

Gender discrimination, which nursing students start to experience while continuing their education, is considered a

significant obstacle before the development of the profession in both education and professional life. Throughout the literature review, we could not encounter any study that developed a measurement tool that evaluates the gender attitudes of nursing students towards the nursing profession. Therefore, we thought it would be scientifically valuable to develop a measurement tool that may further be used in studies aiming to improve the awareness of nursing students towards gender discrimination they experience in their education. Accordingly, this research aimed to develop a valid and reliable measurement tool to determine the gender attitudes of nursing students towards the nursing profession and to study the psychometric properties thereof.

## **Methods**

This methodological study was conducted with nursing students at a public university in the Eastern Anatolia Region of Türkiye in March 2020.

The literature review shed light on creating an item pool of 41 items related to the gender attitudes of nursing students towards the profession. Expert opinion was sought to evaluate the comprehensibility of the items included in the scale regarding expression and language and whether they covered the subject to be measured. The opinions of 17 experts were sought in the field of gender, nursing, and measurement evaluation related to the scale items. These experts were asked to evaluate the submitted items in terms of content, appropriateness, meaning, and comprehensibility. The minimum content validity ratio (CVR), which is suggested by Lawshe (1975) (9), has been determined as 0.49, and the necessary arrangements have been performed in terms of the items in accordance with the expert opinions. None of the items have been removed from the item pool. The scale has been finalized in this respect.

The research sample comprised students who received a bachelor's degree education in the nursing department of a public university in Türkiye. The literature

review states that a sample size between 100 to 200 is sufficient for studies aiming to develop a scale where the number of variables is not too high. As a general rule, the sample size is suggested to be at least 5 times the number of variables observed (10). Kline (1994) noted that a sample of 200 people would generally be sufficient to obtain reliable factors, and this figure may further be reduced to 100, even when the factor structure is obvious. The number of variables is few (11). On the other hand, Tabachnick & Fidell (2001) state that a sample size between 100 and 200 is sufficient when the factors are decisive and strong and the number of variables is not that high (12). Taking into account the information derived from the literature reviewed, we aimed to communicate the entire universe (279), and the research was completed with 238 nursing students (85.3%).

The implementation of the scale was carried out in March 2020. “*Descriptive Characteristics of Nursing Students Questionnaire*” (18 questions) and Draft of the “*Scale Evaluating the Gender Attitudes of Nursing Students towards the Nursing Profession*” (41 items), developed within the scope of the research, were used as data collection tools.

Statistical analysis of the data collected was performed using the IBM SPSS Windows (Statistical Package for Social Sciences) software. For the purpose of testing the distribution of the data, Skewness and Kurtosis values were examined, Kolmogorov-Smirnov analysis was performed, and Q-Q Plot and Detected Plot graphs and box graphics were examined. Pearson’s Product-Moment Correlation Coefficient determined item-total Correlation Coefficients. Both Regression and Pearson’s Product-Moment Correlation Coefficient were used to determine the significance levels within the scope of Item-Remainder analysis. The Independent Samples t-test was used for the item discrimination analyses. Kaiser-Meyer-Olkin Measure (KMO) and Bartlett’s Test of Sphericity were applied in order to determine whether the data were suitable for

factor analysis. Exploratory Factor Analysis was used to test the construct validity of the scale. The reliability analysis of the scale was calculated by the Cronbach-Alpha coefficient.

The approval of the ethics committee (Date-Number: 30.01.2020-13731) and the permission of the institution necessary to carry out the study have been duly obtained (Date-Number: 05.03.2020-5928). The researcher provided the necessary explanations about the research to the participants in March 2020, and the questionnaire was applied face-to-face after their informed consent was received in writing.

## Results

The mean age of the participants was  $21.37 \pm 2.39$  years, and 58.2% of them were women. 65.5% of the students declared that they voluntarily preferred to study in the nursing department, while almost all of them expressed that men should take part in the nursing profession.

### *Creating and editing the data set*

The percentage of missing data in the research dataset is 0.1% (one thousandth), and Series Mean was assigned for the missing data. One-sided outliers in the data set were checked separately for each item using Z-scores, and six items containing 8 data with one-sided outliers were excluded from the questionnaire. The skewness and kurtosis coefficients between -1 and +1, the symmetrical box graph, no outliers, a normal quantile-quantile plot (Q-Q) where data is spread around a straight line, the Detrended Q-Q plot with a random distribution, the Kolmogorov-Smirnov test score of  $p > .05$  revealed that the distribution of the total score of the scale is in accordance with the normal distribution.

### *Item-total and item-remainder analyses*

A total of 6 items with an item-total correlation coefficient below .30 (14) and an item-remainder correlation coefficient below

.20 that did not turn out to be significant (15) were excluded considering that they did not adequately measure the same structure as the items in the corresponding group. A total of 6 items were excluded from the item pool of the scale as a result of the item-total and item-remainder analyses (Table 1).

**Item discrimination analyses**

The independent group t-test revealed that there was a significant difference ( $p < .01$ ) between the mean scores of the upper and lower 27% groups of scores obtained from all items (Table 2).

**Table 1.** Results of Pearson's product-moment analysis performed to determine the corrected item total-remainder correlations and item remainder regressions of the scale

Item No	Item Total	Item Remainder Correlation	Item Remainder Regression	Items	Item Total	Item Remainder Correlation	Item Remainder Regression
	r	r	p		r	r	p
i1	.216**	.187**	.004	i22	.381**	.321**	.000
i2	.066	.695	.695	i23	.360**	.283**	.000
i3	.073	.691	.691	i24	.552**	.492**	.000
i4	.060	.880	.880	i25	.504**	.443**	.000
i5	.255**	.174**	.008	i26	.561**	.506**	.000
i6	.310**	.238**	.000	i27	.468**	.411**	.000
i7	.251**	.172**	.009	i28	.590**	.531**	.000
i8	.237**	.158**	.016	i29	.349**	.282**	.000
i9	.357**	.288**	.000	i30	.368**	.305**	.000
i10	.428**	.366**	.000	i31	.446**	.388**	.000
i11	.519**	.465**	.000	i32	.199**	.128	.052
i12	.295**	.226**	.001	i33	.352**	.295**	.000
i13	.295**	.239**	.000	i34	.346**	.282**	.000
i14	.271**	.204**	.002	i35	.248**	.178**	.007
i15	.355**	.295**	.000	i36	.068	-.005	.938
i16	.398**	.334**	.000	i37	.221**	.149*	.023
i17	.220**	.140*	.033	i38	.430**	.373**	.000
i18	.505**	.454**	.000	i39	.382**	.318**	.000
i19	.487**	.428**	.000	i40	.185**	.110	.094
i20	.351**	.277**	.000	i41	.360**	.187**	.004
i21	.476**	.409**	.000				

**Table 2.** Independent group t-test results of the mean scores of the lower and upper 27% of the scale

Item No	$\bar{x} \pm SS$	t	p	Item No	$\bar{x} \pm SS$	t	p
i1	Lower%27	3.98±0.12	-64.000	.000	i22	Lower%27	2.28±0.81
	Upper%27	5.00±0.00				Upper%27	4.98±0.12
i5	Lower%27	1.77±0.75	-34.094	.000	i23	Lower%27	1.68±0.56
	Upper%27	5.00±0.00				Upper%27	5.00±0.00
i6	Lower%27	2.03±0.78	-30.119	.000	i24	Lower%27	1.90±0.71
	Upper%27	5.00±0.00				Upper%27	5.00±0.00
i7	Lower%27	1.57±0.49	95.972	.000	i25	Lower%27	2.44±1.12
	Upper%27	4.92±0.27				Upper%27	5.00±0.00
i8	Lower%27	1.50±0.50	-41.612	.000	i26	Lower%27	2.16±0.81
	Upper%27	4.82±0.38				Upper%27	5.00±0.00
i9	Lower%27	1.25±0.44	-31.237	.000	i27	Lower%27	2.48±0.91
	Upper%27	4.28±0.63				Upper%27	5.00±0.00
i10	Lower%27	1.96±0.65	-31.640	.000	i28	Lower%27	1.60±0.61
	Upper%27	4.87±0.33				Upper%27	5.00±0.00
i11	Lower%27	2.15±0.84	-24.310	.000	i29	Lower%27	1.33±0.47
	Upper%27	4.90±0.29				Upper%27	4.33±0.47
i12	Lower%27	2.11±0.80	-28.468	.000	i30	Lower%27	1.59±0.49
	Upper%27	5.00±0.00				Upper%27	4.38±0.48
i13	Lower%27	2.69±0.68	-26.588	.000	i31	Lower%27	1.89±0.56
	Upper%27	5.00±0.00				Upper%27	4.60±0.49
i14	Lower%27	1.74±0.43	-33.488	.000	i33	Lower%27	1.94±0.44
	Upper%27	4.55±0.50				Upper%27	4.46±0.50
i15	Lower%27	1.71±0.45	-31.635	.000	i34	Lower%27	2.04±0.71
	Upper%27	4.30±0.46				Upper%27	4.86±0.35
i16	Lower%27	1.87±0.61	-31.631	.000	i35	Lower%27	1.23±0.42
	Upper%27	4.79±0.41				Upper%27	4.01±0.87

i17	Lower%27	1.65±0.48	-39.574	.000	i37	Lower%27	2.03±0.56	-41.547	.000
	Upper%27	4.79±0.40				Upper%27	5.00±0.00		
i18	Lower%27	2.66±0.84	-21.984	.000	i38	Lower%27	2.12±0.75	-23.896	.000
	Upper%27	5.00±0.00				Upper%27	4.75±0.43		
i19	Lower%27	1.95±0.58	-41.706	.000	i39	Lower%27	1.85±0.71	-26.747	.000
	Upper%27	5.00±0.00				Upper%27	4.71±0.45		
i20	Lower%27	1.39±0.49	-35.433	.000	i41	Lower%27	1.23±0.42	-29.291	.000
	Upper%27	4.53±0.50				Upper%27	4.28±0.70		
i21	Lower%27	1.47±0.50	-42.038	.000					
	Upper%27	4.82±0.38							

Item total, item remainder, and item discrimination coefficients of the scale evaluating the gender attitudes of nursing students towards the nursing profession are concluded to be at an adequate and desired level.

**Construct validity (Exploratory Factor Analyses)**

The correlations between the items were examined before the factor analysis, and no correlation coefficient higher than .90 was found. Kaiser-Meyer-Olkin Measure (KMO) was found to be .66 and whereas the result of Barlett’s test was found to be  $\chi^2(595) = 2373.790, p < .001$ . The mutual factor variances of the items in the gender attitudes Scale of Nursing Students towards the

Nursing Profession varied between .403 and .753.

As a result of the Varimax vertical rotation technique, it was observed that the eigenvalues of the items in the scale were collected in 11 factors greater than 1. It was determined that it explained 61.52% of the total variance. The items were removed from the analysis one by one, starting with overlapping items. When no overlapping items were left, the items with a factor load value below .40 (12) were removed from the analysis, and the analyses were repeated. As a result, the factor loads of 10 items gathered under 3 factors (Figure 1) after exploratory factor analyses varied between .561 and .834 and explained 57.11% of the total variance (Table 3).

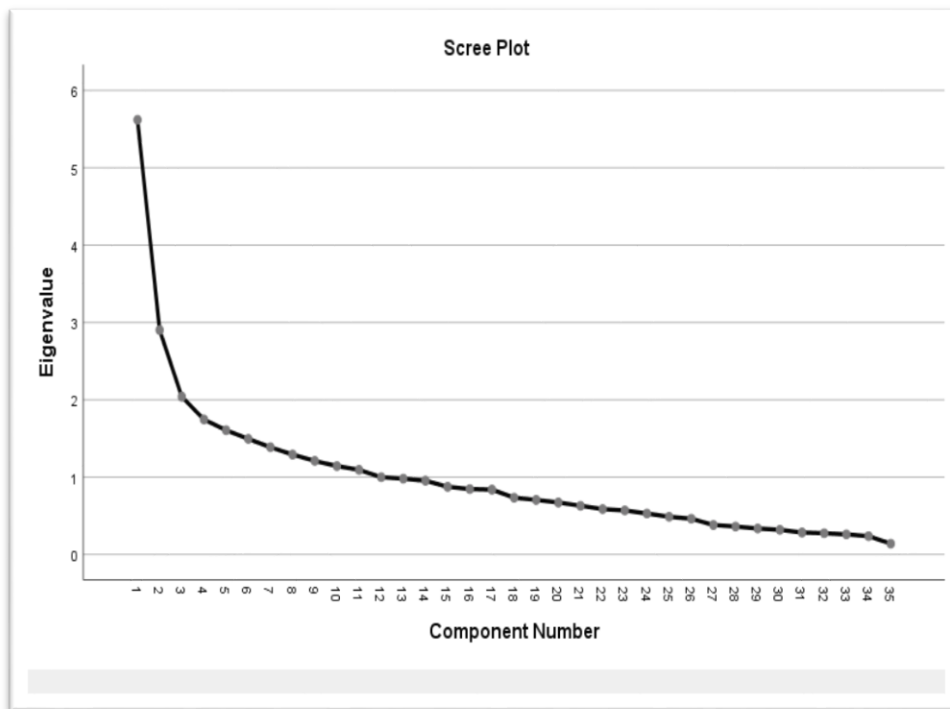


Figure 1. Slope accumulation graphics of the scale for the items

**Table 3.** The total variance of the finalized scale

Factors	Initial core values			Total factor loads			Rotated sums of Factor loads		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	2.537	25.367	25.367	2.537	25.367	25.367	2.429	24.293	24.293
2	1.857	18.572	43.939	1.857	18.572	43.939	1.779	17.788	42.081
3	1.317	13.175	57.113	1.317	13.175	57.113	1.503	15.033	57.113
4	.924	9.243	66.356						
5	.781	7.805	74.162						
6	.711	7.107	81.268						
7	.644	6.441	87.710						
8	.495	4.948	92.657						
9	.471	4.715	97.372						
10	.263	2.628	100.000						

Factor loads of 10 items collected under 3 factors after exploratory factor analyses ranged between .561 - .834. Three factors were found to explain 57.11% of the total variance. The items collected under each

factor were examined in terms of their content; the factors were named: "Male Gender Roles" (4 items), "Professional Stereotypes" (3 items), and "Gender-Based Discrimination" (3 items) (Table 4).

**Table 4.** Rotated component matrix of factor analysis

Item #	Items	Factors		
		1	2	3
i25	Male nurses should be paid higher than female nurses.	.834		
i26	Male nurses pose a threat to female nurses in terms of career opportunities.	.787		
i24	Male students should wear a white coat instead of a nurse's uniform.	.736		
i28	Male students are more successful than female students in terms of leadership characteristics.	.692		
i14	Patients experience much more difficulty in communicating with male students due to their gender.		.772	
i12	Male students always find an excuse to avoid the workload.		.751	
i13	Male students more frequently make medical mistakes.		.640	
i33	The lower number of men studying nursing causes social isolation for male students.			.778
i17	Male nurses in the nursing profession more frequently experience gender-based discrimination.			.630
i9	Students of the same sex as the patient should be prioritized in providing treatment/care.			.561
<b>Initial Eigenvalue</b>		2.53	1.85	1.31
<b>Variance %</b>		25.36	18.57	13.17

Pearson's Product Moment Correlation Coefficient determined the correlation between the total score and the factors of the scale. Correlation coefficients between the factors

of the scale ranged between .145 to .773. Table 5 displays the standard deviation, mean values, and correlation analysis results of the total score of the scale and all factors.

**Table 5.** The results of correlation analysis between mean and SD scores of the final scale factors, factors, and the total score of the scale

Scale and factors	Number of Items	X ± SD	Total scale score	Factor 1	Factor 2	Factor 3
Total scale score	10	34.97±5.86	1			
Male Gender Role	4	15.24±4.00	.773**	1		
Professional Stereotypes	3	10.88±2.49	.528**	.060	1	
Gender-based Discrimination	3	8.84±2.46	.586**	.151*	.145*	1

\**p* < .05; \*\* *p* < .001

**Reliability**

Cronbach Alpha reliability coefficient of the *Scale Evaluating the Gender Attitudes of Nursing Students*

towards the *Nursing Profession* was calculated as .627, and Cronbach Alpha reliability coefficients of the factors of the scale were determined to range between .770 - .410 (Table 6).

**Table 6.** Reliability coefficients of the scale and its factors

Scale and factors	Number of Items	Cronbach Alpha
Total scale score	10	.627
Male gender role	4	.770
Professional stereotypes	3	.592
Gender-based discrimination	3	.410

**Discussion**

Should the data set have a high number of outliers, the data set may deviate from the normal distribution, which may affect the statistical analysis to be performed (16). Outliers of each item included in the data set of our study were checked using Z scores; no data with a Z score greater than +4 were found, while the items containing 8 data with a Z score less than -4 were excluded from the questionnaire. The fact that the skewness and kurtosis coefficients range between -1 to +1 is considered to provide evidence that the data set is within the limits of the normal distribution and that there are no extreme deviations in the data set (17). Another finding indicating a normal distribution is that the skewness-kurtosis coefficients are not twice as large as the absolute value of their standard deviations (18). The item's remainder correlation coefficient is expected to be at least .20 (15), while the item-total correlation coefficient is expected to be over .30 (14). 6 items that did not meet these values and were insignificant were excluded from the item pool. When the raw scores obtained from the scale are sorted as descending, a statistically significant difference ( $p < .01$ ) has been determined between the mean values of the groups that make up the lower and upper 27% of all items. As a consequence of these findings, item-total, item remainder, and item discrimination coefficients of the scale evaluating the gender attitudes of nursing students towards the nursing profession are

concluded to be at an adequate and desired level.

The main purpose of factor analysis is to define the data set and to summarize the data using a combination of multivariate statistical analyses to decipher the structure underlying the data set and to be able to reduce the variables, if necessary (19). Confirmatory factor analysis is appropriate in cases where it is necessary to test the hypotheses based on a formerly developed theory or previously conducted research, while exploratory factor analysis is suitable for deciphering the structure between variables (20). We used exploratory factor analysis as we did not aim to test any hypotheses based on a formerly developed theory or previously conducted research.

The significant score in Bartlett's Test of Sphericity and the KMO coefficient higher than .60 indicates that the sample size was sufficient for this study and the data set was suitable for factor analysis (13, 14, 21). As the correlation coefficient between the variables decreases, i.e., diverges from 1 and approaches zero, the degree of multicollinearity increases accordingly. A correlation coefficient between the variables, which is not higher than .90, indicates no multicollinearity problem (22). Accordingly, the correlations between the items were examined before the factor analysis, and no correlation coefficient higher than .90 was found. Therefore, it was concluded that the data set is suitable for factor analysis.

Common factor variances for the items higher than .10 is a desired result. Common factor variance below .10 indicates a possible problem with the specified item, and it may be necessary to exclude this item (21). The lowest common factor variance of the items included in our scale was .403, which was further concluded to be among the acceptable limits (14). Exploratory factor analysis requires the number of items/variables to be at least three for each sub-dimension. The factor analysis results confirmed that our scale consists of three factors, each of which consists of at least three items. Three factors of the scale evaluating the gender attitudes of nursing students towards the nursing profession explain 57.11% of the total variance. The calculated variance between 40% to 60% is considered sufficient for multi-factorial patterns (21). Considering all these results, it was determined that the total variance explained by the factors of the scale was sufficient and that the scale was appropriate in terms of construct validity. The correlation between the factors of a valid measurement tool is expected to be neither excessively low nor excessively high; in other words, the correlation between the factors should not vary between extreme outliers, and the current correlation is expected to give meaningful results (15). It has been observed that there are not many outliers concerning the factors that make up our scale, which indicates that our scale is a reliable measurement tool.

The total scale score of the scale's Cronbach Alpha reliability coefficient is .627. For the sub-dimensions, it was determined to be between .410-.770. Cronbach Alpha reliability coefficients higher than .41 indicate that the scale is reliable, while the Cronbach Alpha values below .40 indicate that the scale is unreliable (23). Neither the overall scale nor the factors of our scale had Cronbach Alpha reliability coefficients below .40, indicating that our scale is a reliable measurement tool.

The first factor of the scale, "*Male Gender Role*," consists of a total of 4 items. The minimum and maximum scores that can

be obtained from this factor are "4" and "20", respectively. Male Gender Role factor; It includes statements such as gender pay, career opportunities, uniforms, and leadership qualities. Kaya et al. (2011) stated that the male gender is an important concept in the nursing profession. According to the participants, it was determined that gender lags behind success in health practices and that men's managerial positions were not supported by the participants (24). Christensen and Knight (2014) concluded in their research study that male students are more advantageous than female students in terms of career opportunities and finding a job after graduation (25). Ajith (2020) found out in their study conducted with different sample groups that most participants did not know how to call male nurses and had different ideas about men's uniforms (26). Alghamdi et al. (2017), in their descriptive study conducted with the nurses, reported that male nurses are more successful in leadership qualifications due to their gender and that nurses' job satisfaction was higher, regardless of their gender, in institutions where the managers are men (27).

The second factor of the scale, "*Professional Stereotypes*," consists of a total of 3 items. The minimum and maximum scores that can be obtained from this factor are "3" and "15" respectively—the "Professional Stereotypes" sub-dimension of our scale; communication, fulfilling responsibilities, and medical error. Başçı and Yılmazel (2016) determined in their research study that one of the reasons for gender discrimination in the nursing profession is the problems experienced in communicating with male nurses (28). Sayılan and Boğa (2018) determined in their research that the work stress of male nurses was higher than that of female nurses; accordingly, the tendency of male nurses to make medical mistakes was higher (29).

The third factor of the scale, "*Gender-based Discrimination*," consists of a total of 3 items. The minimum and maximum scores obtained from this factor are "3" and "15" respectively. *Gender-based*



Discrimination factor of our scale includes phrases such as “lower number of men studying nursing causes social isolation for male students”, “gender-based discrimination is more frequently experienced by male nurses in the nursing profession,” and “nurses who are of the same sex as the patient should be prioritized in providing treatment/care.” Kaya et al. (2011) concluded that most participants support male nurses who prefer the nursing profession and believe that health care should be provided by female nurses (24). Christensen and Knight (2014) reported in their research that male students have a difficult time when providing health care in the clinic, and they even cannot have the opportunity to work in some clinics due to their gender. Female students do not experience the difficulties they have experienced, and that female students are not satisfied with men who prefer nursing as a profession (25). On the other hand, Chang and Jeong (2021) stated in their study that male nurses are more frequently exposed to gender-based discrimination in the nursing profession (30).

### Conclusion

In line with the findings from this study, the *Scale Evaluating the Gender Attitudes of Nursing Students toward the Nursing Profession* has been defined as a valid and reliable measurement tool that can be used to determine the gender attitudes of nursing students toward the nursing profession. The scale, which includes 3 factors and a total of 10 items, uses a Likert-type scale (1: Strongly agree, 2: Agree, 3: Neither agree nor disagree, 4: Disagree, 5: Strongly disagree) to assess attitudes. There are no items in the scale that require reverse scoring. The minimum and maximum scores obtained from this scale are “10” and “50,” respectively. Higher scores correspond to positive gender attitudes of nursing students toward the nursing profession, whereas lower scores indicate rather negative gender attitudes of nursing students toward the nursing profession.

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### Conflicts of interest

The authors declare no competing interests.

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