

Turkish Validity and Reliability Study of the Fear of Coronavirus Disease-2019 Scale: A Research on Nursing Students

✉ Bilge Bal Özkaptan¹, ✉ Nurten Özen², ✉ Aylin Aydın Sayılan³, ✉ Füsün Terzioğlu⁴

¹Department of Nursing, Sinop University Faculty of Health Sciences, Sinop, Türkiye

²Demiroğlu Bilim University, Florence Nightingale Hospital School of Nursing, İstanbul, Türkiye

³Department of Surgical Nursing, Kırklareli University Faculty of Health Sciences, Kırklareli, Türkiye

⁴Kocaeli Health and Technology University, Kocaeli, Türkiye

Abstract

BACKGROUND/AIMS: The coronavirus disease-2019 (COVID-19) outbreak has taken its toll on individuals' mental health and physical health worldwide. Nurses, who play a key role in patient care, experience greater fear and anxiety due to their high-risk exposure to COVID-19 infection. This also leads to anxiety among undergraduate nursing students. This study aimed to determine the validity and reliability of the "Fear of COVID-19 Scale (FCV-19S)" for Turkish nursing students.

MATERIALS AND METHODS: The study was conducted with 351 nursing students from two different universities in Türkiye between May and June 2020. Participant characteristic form and the Turkish version of FCV-19S were utilized to gather the data. Psychometric tests including language validity, content validity, and reliability analyses were performed.

RESULTS: The item total test correlation of all items varies between 0.537 and 0.637. The Explanatory Factor Analysis made to detect the factor design of the scale found the threshold factor loading value as 0.40. The scale's 7 items and single sub-dimension were related to the scale structure to the Confirmatory Factor Analysis. The scale Cronbach's alpha value was determined as 0.833. The test-retest results, performed to determine the time invariance, revealed a high level of correlation between the two measurements with the Pearson correlation coefficient ($r=0.734$; $p<0.05$).

CONCLUSION: A valid and reliable measurement tool was provided to Türkiye to assess nursing students' fears of COVID-19. The Turkish version of the scale can be utilized as a substantial and reliable estimation device in detecting the fear of coronavirus in nursing students.

Keywords: Coronavirus, COVID-19 fear, scale, nursing, validity and reliability

INTRODUCTION

The infection, first appearing in "Wuhan", "China" in December 2019 due to the new type of Coronavirus, was termed as coronavirus disease-2019 (COVID-19) and rapidly spread all over the world.¹ Türkiye announced its first COVID-19 case on March 10, 2020, one day before

the announcement of the outbreak as a pandemic by the "World Health Organization".^{1,2}

The speedy spread of the disease through respiratory droplets, mortality rate, uncertainty of the treatment process, social distance, and hygiene measures such as the use of surgical masks and handwashing have

To cite this article: Bal Özkaptan B, Özen N, Aydın Sayılan A, Terzioğlu F. Turkish Validity and Reliability Study of the Fear of Coronavirus Disease-2019 Scale: A Research on Nursing Students. Cyprus J Med Sci 2023;8(3):190-196

ORCID IDs of the authors: B.B.Ö. 0000-0001-9388-8333; N.Ö. 0000-0003-3988-0474; A.A.S. 0000-0003-0576-8732; F.T. 0000-0002-8457-0048.



Address for Correspondence: Bilge Bal Özkaptan

E-mail: bilgebal57@hotmail.com

ORCID ID: orcid.org/0000-0001-9388-8333

Received: 07.04.2022

Accepted: 20.09.2022



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had significant impacts on social life. All these measures to control the pandemic have caused negative feelings like fear, anxiety, anger, boredom, disappointment, guilt, desperation, loneliness and irritability among individuals.³ The publication of alarming images of COVID-19 patients (intensive care process, death cases, etc.) on social media and the fact that most people can easily access these images via their smartphones has caused Fear of COVID-19 in society.⁴ The uncertainty of when the pandemic will end, isolation, negative economic impacts, change in daily living habits, and the prevalence and diversity of news about the disease on social media are among other factors leading to fear at the individual and social level.^{2,3,5}

Too much fear may result in negative consequences for the people such as mental health issues and anxiety and social levels such as panic exchange or xenophobia, whereas too little fear can also be dangerous for the people and society (for example, failure to comply with national precautions to decelerate the dissemination of COVID-19 and neglect of risks). Moreover, fear triggers protective behaviors that can reduce specific threats (for example, washing dirty hands); however, paradoxically, it can also increase fear (e.g. contamination worries and health anxiety).⁶

Healthcare professionals have an increased risk of infection due to long working hours, increased workload, not getting enough rest, lack of motivation, anxiety, and stress.⁷ This is also an important factor that triggers fear and anxiety among students studying in health departments. "Cao et al.⁸" found that 21.3% of the participants reported slight anxiety, 2.7% moderate anxiety, and 0.9% strong anxiety in medical school students in China. Another study reported that both nurses and nursing students experienced fear and anxiety due to COVID-19, although the fear experienced was higher among graduate/working nurses than among nursing students. However, it was stated that the students developed more negative coping strategies despite problems.⁹ In a study of "Savitsky et al.¹⁰" revealed that 42.8% of the nursing students experienced moderate anxiety and 13.1% experienced severe anxiety. It is important for nursing students to adopt solution-oriented approaches in such crises before starting their professional life. To achieve this, it is essential to define the Fear of COVID-19 among nursing students with a suitable assessment tool. The COVID-19 fear scale was translated into Turkish by various studies. However, these studies included all individuals aged 18 years and older in the sample group to cover the general Turkish society. It is not specific to a particular group and these studies suggest repeating the study in specific groups.^{2,11,12} It is significant to assess the Fear of COVID-19 in nurses and nurse candidates who are in the highest risk group in the COVID-19 pandemic. This situation reveals the need to assess the validity and reliability of this scale for this group. Therefore, this study was applied to assess the psychometric properties of Fear of COVID-19 Scale (FCV-19S) in Turkish nursing students.

MATERIALS

Sample and Participants

This study included 877 nursing students enrolled in two Turkish universities between May and June 2020. Inclusion criteria were as follows: (a) being a nursing student, (b) not having a communication problem, (c) voluntary participation, and (d) having the means to fill out the forms online (smart phone, internet, computer, etc.). The

validity and reliability studies recommend including 5-10 times the number of scale items to calculate the sample size and 7-8 times the number of variables to form two data sets for factor analysis.¹³ In this study, the sample included 351 students considering the number of scale items and the test-retest method was applied with 143 students to define the consistency of the scale over time.

The approval of the was obtained from Kırklareli University Research Ethics Board (Meeting Number: 54001588-199-E.7748, decision number: P0211R00).

Measures

Participant Characteristics Data Collection Form: It was developed by the researchers upon examining the appropriate literature including 20 questions that question the sociodemographic features (age, family type, gender, etc.) and about COVID-19 of nursing students.^{2,7,11,14,15}

The Fear of COVID-19 Scale: It was developed by "Ahorsu et al.¹⁶". It is a one-dimensional 7-item 5-point Likert type. Higher scores indicate greater fear of COVID-19. The total score on the scale goes from a minimum of 7 to a maximum of 35. "Ahorsu et al.¹⁶" calculated the Cronbach's α value of the scale as 0.82. The Cronbach's alpha internal consistency value was calculated as 0.83 in this study.

Hospital Anxiety Depression (HAD) Scale: It was developed by "Zigmond and Snaith¹⁷" and the Turkish version of the scale was done by "Aydemir et al.¹⁸". Seven of the 14 items (even numbers) assess anxiety, whereas the remaining seven (odd numbers) assess the depression. The responses are graded on a four-point Likert scale ranging from 0 to 3. The scale consists of two subscales as anxiety and depression. The score that can be obtained from the scale is between 0 and 21.¹⁸ In this study, it was calculated as 0.79 for the HAD-A sub-dimension and 0.75 for the HAD-D sub-dimension.

Health Anxiety Scale: The Turkish version of the scale was carried out by "Aydemir et al.¹⁹" which was before developed by "Salkovskis et al.²⁰". The scale is a self-report scale consisting of 18 items. Responses for each item were evaluated between 0 and 3 points. The scale score ranges from 0 to 54. A high rating on the scale denotes a significant amount of health concern. The Cronbach's alpha of the scale was determined to be 0.91 by "Aydemir et al.¹⁹". Cronbach's alpha was calculated to be 0.80 in this study.

Data Collection

Written permission, the original version of the FCV-19S, and necessary information about the evaluation method were obtained from the authors who developed the scale via e-mail before its implementation on nursing students in Türkiye. The questionnaire prepared using Google Documents was forwarded to the students by the researchers responsible for each center, and data were collected online.

The forms took about 10 min to complete. Before filling in the data collection form, the participants were informed about the study to the first page. In addition, an informed consent form was attached informing the participants that no IP tracking would occur in the case of participation in the study. If they complied with the study, they were prompted to click the 'I approve' button on the screen with the online questionnaire.

The Translation of FCV-19S

Eight people, seven of whom were faculty members and one of whom was an authority on the English language, translated the scale into the Turkish. The researchers then evaluated eight translations, and after selecting suitable expressions, one translation was formed.¹³ Then, the validity and reliability study of the Turkish form was started. Five specialists were applied to assess the content validity of the scale. The Davis²⁰ method was used to assess expert opinions.²¹

Psychometric Testing of FCV-19S

In this study, item analysis and Cronbach's alpha test were used to assess the reliability of the scale. Additionally, the test-retest method was applied. The scale was implemented to the participants twice with an interval of two weeks.¹³ In the first stage, the scale was applied to 351 students. Two weeks after the initial implementation, the test was repeated with 143 students. The results of the FCV-19S were compared to those of the HAD Scale and the HAS to test concurrent and construct validity.

Statistical Analysis

The data obtained were analysed utilizing "SPSS for Windows 25.0" and "Amos 22.0" programs in the study. Data were stated within definitive statistics. Data reliability is the most important condition for the analysis of collected data with appropriate technique. Reliability analysis was applied to test the reliability of the scales, on the other hand, for testing the construct validity "Explanatory Factor Analysis (EFA)" and "Confirmatory Factor Analysis (CFA)" were performed. Also,

the test-retest technique was used. Concurrent validity among the FCV-19S, HAD Scale, and HAS was examined via Pearson correlation. A statistically significant p-value of <0.05 was used.

RESULTS

Participant Features

The socio-demographic features of the students are given in Table 1. Seventy-two-point nine percent of the students were male and 46.7% were first year students. According to the income status, 64.4% of the participants had equal income and expenditures, and most of them did not smoke (85.5%) or drink alcohol (91.7%). Ninety-three point two percent of the participants reported not having any chronic disease, 98.3% were not diagnosed with COVID-19 infection, and 50.4% expressed that their knowledge about COVID-19 infection was "partially adequate".

Psychometric Features of FCV-19S

Results of the Content Validity of the Scale

The content validity rate and scale validity index for the scale items were calculated as 1.0 regarding the Davis Technique.

Results of the Item Analysis of the Scale

Table 2 shows 27% lower-upper independent group t-test results showing the discriminatory power of all items and item-total correlation. According to Table 2, the item total test correlation for all items varies between 0.537 and 0.637.

Table 1. Participants characteristics (n=351)

Characteristics		n	%
Gender	Female	95	27.1
	Male	256	72.9
Year	1	164	46.7
	2	92	26.2
	3	64	18.2
	4	31	8.8
Income status	Income exceeds expenditure	55	15.7
	Income equal to expenditure	226	64.4
	Income less than expenditure	70	19.9
Smoking	Yes	51	14.5
	No	300	85.5
Alcohol	Yes	29	8.3
	No	322	91.7
The status of employment	Employed	6	1.7
	Unemployed	345	98.3
Chronic disease	Yes	24	6.8
	No	327	93.2
COVID-19 diagnosis	Yes	6	1.7
	No	345	98.3
Adequate knowledge about COVID-19 infection	Partly	177	50.4
	Adequate	163	46.4
	Inadequate	11	3.1

COVID-19: Coronavirus disease-2019.

Results of the Construct Validity of the Scale

EFA was conducted to show the factor design of the scale. EFA of the scale are given in Table 3. The scale, which originally consisted of 7 items, was developed as a single subdimension. After the adaptation, it was determined that the scale was still unidimensional. No overlapping items were detected in the EFA. The EFA made to detect the factor design of the scale found the threshold factor loading value as 0.40 (Table 3). The analysis revealed a KMO value of 0.855 (Table 3). Moreover, the evaluation of the Bartlett sphericity test results exposed a chi-square value of 809.888; $p < 0.01$. The Principal Components Analysis demonstrated that there was only one component for 7 items (Table 3).

The Scree Plot of the scale is revealed in Figure 1. The evaluation in the graph in Figure 1 with the number of factors on the horizontal axis and the eigenvalues on the vertical axis shows that the high accelerated decline decreases after the first point. After the first point, the contribution of every factor to the variance decreases and the contributions of the variances to be added are observed to be quite similar. A one-factor structure was deemed appropriate based on the eigenvalue and variance percentages as well as the data taken from the graph in line with the EFA (Table 3).

The confirmatory factor fit indices for the pre- and post-modification scales are given in Table 4. The scale’s structural equation modeling results were important at the $p = 0.001$ level, and the scale’s 7 items and single sub-dimension had a relation with the scale structure,

according to the CFA. The model underwent some improvements. Variables reducing consent were defined during the adjustments, and new covariances were formed for the ones with significant equivalence among residual values (e_1-e_5 ; e_6-e_7). Renewed calculations of fit indices are given in Table 4.

The t-statistics regarding the significance of the factors after the CFA shows that all factors were significant ($p < 0.05$) (Table 5). The outcomes of the first-order CFA are revealed in Figure 2. As a result, the scale consists of seven elements, the lowest of which has a factor load of 0.56 and the greatest of which has a factor load of 0.77 (Figure 2). Also, the “composite reliability (CR)” value computed to test the reliability of the measurement model was 0.85.

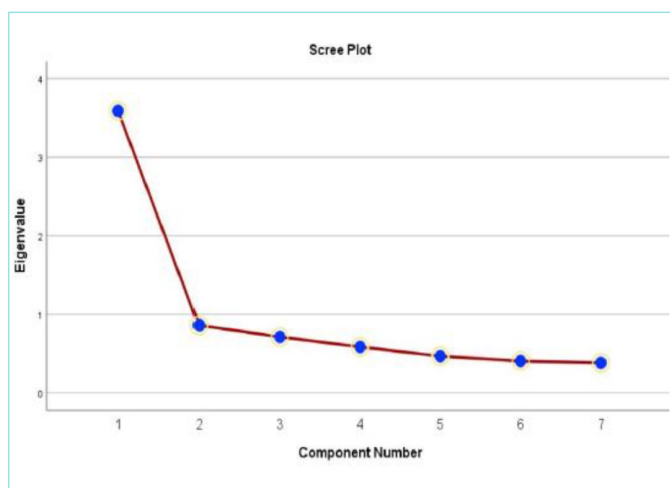


Figure 1. Scree Plot of the Fear of COVID-19 Scale.
COVID-19: Coronavirus disease-2019.

Table 2. Results of the item analysis of the Fear of COVID-19 Scale

	Item number	Item-total score correlation	t (Lower 27%-Upper 27%)	p-value, (Lower 27%-Upper 27%)
The Fear of COVID-19 Scale	Item 1	0.637	18.094	0.001**
	Item 2	0.600	18.488	0.001**
	Item 3	0.612	16.069	0.001**
	Item 4	0.551	15.836	0.001**
	Item 5	0.602	17.551	0.001**
	Item 6	0.537	13.022	0.001**
	Item 7	0.591	18.238	0.013**

$n=351$, $n_1=n_2=95$, **Significant values for $p < 0.05$. COVID-19: Coronavirus disease-2019.

Table 3. Results of Explanatory Factor Analysis for the Fear of COVID-19 Scale

Items	Explained variance	Eigenvalue (λ)	Factor load
F1			
Item 3	51.010	3.571	0.744
Item 1			0.743
Item 2			0.725
Item 7			0.720
Item 5			0.718
Item 6			0.677
Item 4			0.669

Kaiser-Meyer-Olkin: 0.855; $\chi^2 = 809.888$; Bartlett’s test of Sphericity $p = 0.001$. COVID-19: Coronavirus disease-2019.

Table 4. Confirmatory factor fit indices for the pre- and post-modification Fear of COVID-19 Scale

RMSEA	NFI	CFI	IFI	GFI	TLI	AGFI	CMIN/df
0.084	0.795	0.840	0.845	0.960	0.760	0.919	3.491
0.075	0.850	0.891	0.895	0.970	0.809	0.931	2.983

RMSEA: Root-mean-square error of approximation, NFI: Normed Fit Index, CFI: Comparative fit index, IFI: Incremental Fit Index, GFI: Goodness of Fit Index, TLI: Tucker-Lewis Index, AGFI: Adjusted goodness of fit index, CMIN/df: chi-square/degree of freedom, COVID-19: Coronavirus disease-2019.

Table 5. Confirmatory Factor Analysis results of the Fear of COVID-19 Scale

Items	Composite reliability (t-statistics)	Factor load
Item 1		0.773
Item 2	12,382*	0.736
Item 3	10,873*	0.662
Item 4	11,031*	0.619
Item 5	12,808*	0.750
Item 6	9,323*	0.558
Item 7	10,423*	0.584

* $p < 0.05$, COVID-19: Coronavirus disease-2019.

Results of the Concurrent Validity of the Scale

The correlation between the FCV-19S to be adapted and the other scales were determined to determine the reliability of parallel forms (Table 6). We can observe that there is a positive and weak correlation between FCV-19S and HAD-A in Table 6 ($r=0.396$; $p<0.01$). It was observed that a positive and very weak correlation between the FCV-19S were observed and the HAD-D ($r=0.196$; $p<0.01$). There was a positive and moderate correlation ($r=0.436$; $p<0.01$) between FCV-19S and HAS. There was a positive and moderate correlation between FCV-19S and hypersensitivity to physical symptoms and anxiety sub-dimension ($r=0.414$; $p<0.01$); a positive and weak correlation was observed between the negative outcomes of the disease sub-dimension ($r=0.288$; $p<0.01$) (Table 6).

Results of the Reliability of FCV-19S

Cronbach’s alpha was determined as 0.833. The test-retest results, performed to determine the time invariance, revealed a high level of correlation between the two measurements with the Pearson correlation coefficient ($r=0.734$; $p<0.05$). This shows that the scale is consistent over time. In addition, the reliability of both measurements was sufficient and above 0.70 ($\alpha^2=0.819$, $\alpha_1=0.844$).

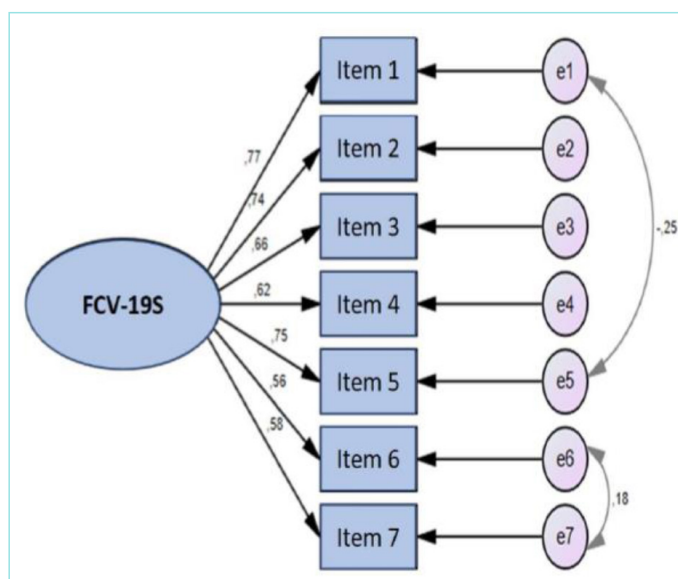


Figure 2. Results of the first-order Confirmatory Factor Analysis of the Scale.

FCV: Fear of COVID-19 Scale.

Table 6. Correlation analysis between scales

Scales	1	2	3	4	5	6
1 COVID-19 Fear Scale	1					
2 Hospital Anxiety Scale	0.396*	1				
3 Hospital Depression Scale	0.196*	0.574*	1			
4 Health Anxiety Scale	0.436*	0.418**	0.290*	1		
5 Sub-Dimension of Hypersensitivity to Physical Symptoms and Anxiety	0.414*	0.359*	0.172*	0.924*	1	
6 Sub-dimension of adverse consequences of the disease	0.288*	0.332*	0.39*	0.643*	0.344*	1

* $p<0.01$, COVID-19: Coronavirus disease-2019.

DISCUSSION

The scale was a viable and trustworthy measurement tool for Turkish nursing students in the study. Five experts evaluated the scale items depending on the Davis Technique to determine the content validity.²¹ This technique involves the classification of expert opinions as “appropriate” (4 points), “appropriate but needs minor revision” (3 points), “appropriate but needs major revision (2 points)”, and “not appropriate” (1 point). Instead of using a statistical criterion, the number of experts who state “suitable” and “appropriate but requires minor revision” is divided by the total number of experts to generate the “Content Validity Index (CVI)” for the item, which is then compared to the recognized value of 0.80.¹³ The CVI value was calculated as 1.0. The result reveals that FCV-19S is suitable for Turkish society.

The validity and distinctiveness of the items on the COVID-19 scale were determined using item-total correlation and 27% upper-lower group comparisons. Item-total test correlation values of all items vary between 0.537 and 0.637 (Table 2). The minimum value for sufficient item total test is specified as 0.30.²² The item-total test correlation values of the participants’ responses to the questions were examined and no items below 0.30 were detected. According to the item total test correlation table, all remaining items were correlated with each other. The scale raw scores were sorted in descending order to measure item uniqueness, and the mean scores of the 27% lower-upper groups were analyzed using an independent group t-test. It was statistically significant that the means of the lower and upper group item scores differed. In this sense, the scale stands out in terms of determining the necessary level of quality (Table 2).²²

The KMO value of 0.855 in the EFA managed to define the construct validity of FCV-19S, revealing that the factor analysis sample size was “perfectly sufficient”.²³ Also, the evaluation for the test results of Bartlett’s sphericity showed that the obtained chi-square value was significant [$\chi^2(21)=809.888$; $p<0.01$] (Table 3). As a result, it was presumed that the data was formed by a multivariate normal distribution. The Principal Components Analysis managed to examine the scale factor structure after accepting the fitness of the data for factor analysis, revealing only one component for 7 items. This component contributed 51.01% of the overall variance (Table 3). In a measurement tool, at least 40% explained variation is required for construct validity.¹³ This indicates that the level of explained variation by the adapted scale is above the desired level of explained variation. The Scree Plot of the FCV-19S, which includes the number of factors on the horizontal axis and eigenvalues on the vertical axis, demonstrates the contribution of the tendency of the descents from the first point to the variance (Figure 1).²³ After the first point, the contribution of every factor to the variance decreases and the contributions of the variances to be added are observed to be quite similar. A one-factor structure was confirmed based on the eigenvalue and variance percentages as well as the data gathered from the graph and the results of EFA (Figure 1) (Table 3).

GFI index above 0.80, AGFI value above 0.85, CMIN/df below 5, and RMSEA value below 0.08 are required for good fit.^{24,25} The fit indices in accordance with the results of the first-level multifactorial CFA analysis show that the index values are sufficient (Table 4).

After CFA, the t-statistics used to determine the significance of the factors revealed that all of them were significant statistically ($p<0.05$) (Table 5). The outcomes of the first level CFA shows that the factor load

values for the 7-item scale range from 0.56 to 0.77 (Figure 2). The CFA results in our investigation supported Turkish FCV-19S unidimensional structure. When compared to different versions of the scale (0.68 to 0.90 for the Italian version; 0.72 to 0.80 for the Bangla version; 0.48 to 0.72 for the Turkish version and 0.52 to 0.81 for another Turkish version; 0.62 to 0.84 for the Arabic version; 0.64 to 0.66 for the original Iran version), each study produced different results.^{2,11,16,26-28}

In our study, the CR value for testing the reliability of the measurement model was 0.85. The CR of latent variables in the measurement model must be greater than 0.70,¹³ which supports the test reliability in our study.

A significant positive correlation was observed with anxiety and depression as examined by the HAD Scale and HAS (Table 6), and this result is consistent with other results in the literature.^{11,16,27,28} This finding demonstrates that the translated scale has contemporaneous validity. COVID-19 fear has revealed a relationship related to mental problems. In the later stages of infectious epidemics that cause pandemics such as COVID-19, negative psychological processes (e.g. anxiety, depression) also affect individuals psychologically.

The Cronbach alpha value for the entire scale and each individual item can be computed.²⁹ According to Bayram³⁰, the Cronbach's alpha value determined for all elements shows the scale's overall reliability, with 0.70 being widely acknowledged as the minimal number. According to our study, the Cronbach's alpha (0.83), similar to the original scale ($\alpha=0.82$), were slightly lower than the Italian ($\alpha=0.87$) Bangladesh ($\alpha=0.87$), Arab ($\alpha=0.88$), Israel ($\alpha=0.86$) and Turkish ($\alpha=0.85$, $\alpha=0.86$ and $\alpha=0.89$) versions and higher than the Eastern European ($\alpha=0.80$) version.^{2,5,11,12,16,26-28,31}

The similarity of two measures taken at different periods determines the coherence of a test or scale.¹³ The test-retest procedure was applied to establish the scale's invariance over time in our study. The evaluation of the Pearson correlation coefficient between two measurements revealed a high level of correlation ($r=0.734$; $p<0.05$). This demonstrates that the scale is stable over time. Furthermore, both readings were sufficiently reliable and above 0.70 ($\alpha^2=0.819$, $\alpha_1=0.844$).

CONCLUSION

Finally, the current research with nursing students revealed that the Turkish version of the scale is a valid and accurate measurement tool. This measurement tool can be applied in studies to assess COVID-19 fear. The use of an objective assessment method to assess COVID-19 fear is vital for comprehending the association between COVID-19 fear and other mental problems, including anxiety and depression, as well as for preventing these problems. Although the scale's validity and reliability were previously tested with several groups in the Turkish community, it is asserted that the study be repeated with other health professionals and risk groups, in addition to nursing students.

MAIN POINTS

- Fear and concern were sparked by the rapid spread of COVID-19 infection in a brief period of time, which resulted in deaths. COVID-19 infection is particularly dangerous for nurses and nursing candidates who are responsible for patient care.

- It is critical to assess the COVID-19 concerns of nursing students, who will be future nurses. FCV-19S can be utilized in studies to assess COVID-19-related fear.
- The use of an objective assessment method to assess COVID-19 fear is vital for apprehending the relationship between COVID-19 fear and other mental problems, including anxiety and depression, as well as preventing these problems.

Ethics

Ethics Committee Approval: The approval of the was obtained from Kırklareli University Research Ethics Board (approval number: 54001588-199-E.7748, P0211R00).

Informed Consent: Students were informed about the study on the first page of the data collection form, and they were asked to click the "I approve" button on the screen with the online questionnaire if they approved to participate in the study. Participants who filled out the online form were considered to have agreed to attend the study. All students presented informed consent.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Concept: B.B.Ö., Design: B.B.Ö., N.Ö., Data Collection or Processing: B.B.Ö., A.A.S., Analysis or Interpretation: B.B.Ö., N.Ö., A.A.S., F.T., Literature Search: B.B.Ö., N.Ö., A.A.S., F.T., Writing: B.B.Ö., N.Ö., A.A.S., F.T.

Conflict of Interest: The authors declared that they have no conflict of interest.

Financial Disclosure: The authors declared that this study received no financial support.

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