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DEVELOPMENT OF THE COVID-19 PHOBIA SCALE: VALIDITY AND RELIABILITY STUDY

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Abstract

It is suggested that the psychological and emotional reactions that occurred during the COVID-19 pandemic may lead to serious psychiatric disorders in the long run. This study aims to establish the validity and reliability of the COVID-19 Phobia Scale developed for measuring emotions and behaviours related to the COVID-19 pandemic. The sociodemographic form, COVID-19 Phobia Scale developed by the researchers, Hospital Anxiety and Depression Scale, and Health Anxiety Scale were applied in the study conducted through a web-based survey method. An item-total analysis was performed as the first step of the study that was conducted with 1243 participants. The exploratory and confirmatory factor analyses revealed the final version of the COVID-19 Phobia Scale to comprise four subscales made up of 22 items, where the subscales were termed as Worry, Mood, Reassurance Seeking/Precaution and Avoidance. The internal consistency of the COVID-19 Phobia Scale measured by the Cronbach alpha coefficient was 0.84. A statistically significant positive correlation was found between the COVID-19 Phobia Scale and Hospital Anxiety and Depression Scale, Health Anxiety Scale. The COVID-19 Phobia Scale is a valid and reliable scale that can be used to measure emotions and related behavioural changes.

Keywords: COVID-19, scale, worry, phobia

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1. Introduction

From the beginning of 2020, COVID-19 cases caused by 2019-nCoV—a new type of Coronavirus that was never detected in humans before—were observed with symptoms such as respiratory distress, fever, joint pain and a high risk of mortality. Following the announcement of rapidly increasing incidents of cases and fatalities from numerous countries, the World Health Organization (WHO) announced a global pandemic by specifying the personal protective measures that are to be taken. Globally, there have been 40 million confirmed cases of COVID-19, including 1 million deaths, reported to WHO; while the number of detected cases in Turkey was 340.000 with 9300 deaths (World Health Organization, 2020).

The behavioural or emotional reactions demonstrated by society during the pandemic period, which affects many people in the world and has different psychological effects on every individual, determine the progress of the pandemic (Arden & Chilcot, 2020; Riva, Benedetti, & Cesana, 2014). These emotional reactions can vary from fear and paranoia to indifference (Taylor, 2019; Wheaton, Abramowitz, Berman, Fabricant, & Olatunji, 2012). Moderate levels of fear and anxiety are known to motivate individuals to cope with threats to health while severe levels of anxiety might affect them more negatively. As a result of a chain of psychological reactions, some individuals experience severe anxiety accompanied by symptoms such as distress, avoidance and decreased functionality that may require treatment (Wheaton et al., 2012). Just like the concept of SARS phobia (Cheng, 2004) was coined during the SARS epidemic, the term Coronaphobia, which defined unreasonable fear of the Coronavirus transmission, started to be used in many countries during this period (Asmundson & Taylor, 2020a; Zarghami, 2020). It is speculated that as the virus was a novel discovery, the obscurity of negative scenarios it might lead to and the information pollution in media led to the emergence of the Corona phobia concept; although the number of cases and fatalities resulting from seasonal influenza infections was found to be much higher than that of COVID-19 (Asmundson & Taylor, 2020a). Individuals with severe anxiety and fear of being infected with the virus might demonstrate behaviours that are not recommended by experts, such as withdrawal and taking extreme precautions to protect oneself from the risks (Shigemura, Ursano, Morganstein, Kurosawa, & Benedek, 2020). Although the impact of COVID-19 on mental health is yet not fully known, research on previous epidemics and pandemics suggest that individual trait differences such as intolerance towards uncertainty, perceived vulnerability to disease and tendency towards anxiety might be significant contributing factors to the emergence of serious psychiatric disorders, such as depression, posttraumatic stress disorder and alcohol/substance abuse (Shigemura et al., 2020; Taylor, 2019; Usher, Bhullar, & Jackson, 2020). Individuals with high levels of health anxiety start thinking that they are infected with the disease by misinterpreting their physical sensations, which are physiological. These misinterpretations consequently might lead to certain negative behaviours that can even lead to self-harm by disrupting healthy decision-making abilities due to increased levels of anxiety (Asmundson & Taylor, 2020b; Goyal, Chauhan, Chhikara, Gupta, &

Singh, 2020). Moreover, some individuals with high levels of health anxiety might demonstrate unhealthy behaviour due to their anxiety of getting infected, such as avoiding consulting health institutions and refraining from availing health services that they need. Furthermore, some individuals tend to show maladaptive behaviours, such as overstocking food, excessive hand-washing, locking themselves in their house and avoiding any kind of physical contact, as a result of the severe anxiety, which can be termed as fear, due to the informational convergence resulting from their constant struggle to research and obtain the right information. Conversely, other individuals with low levels of health anxiety tend to disobey the recommended procedures with the mindset that nothing will happen to them, and thus pose a considerable risk in terms of infectiousness (Asmundson, Taylor, Carleton, Weeks, & Hadjstavropoulos, 2012). Psychoneuroimmunology studies demonstrate that adverse emotions and stressful incidents in life might increase the susceptibility to infection by adversely affecting the immune system, suggesting that anxiety is a psychological symptom that should carefully be considered during the pandemic period (Irwin & Slavich, 2017). Only a limited number of structured psychometric measurement tools that facilitate evaluating emotions and behaviours observed during infections or epidemics exist. It is noteworthy that in former times during pandemics, research was conducted with scales constructed by researchers that were not specific to the pandemic; however, a 7-question COVID-19 fear scale (Ahorsu et al., 2020) was constructed by Iranian researchers in March 2020 (Cheng, 2004; Kanadiya & Sallar, 2011; Rajkumar, 2020; Rubin, Amlot, Page, & Wessely, 2009; van der Velden, Marchand, Cuelenaere, & Das, 2020). Studies generally focus on diagnosis and treatment during pandemics, while research on the psychological effects of pandemics is usually conducted towards the end of the pandemic or once it is over. Simple and rapid psychometric measurement tools that facilitate the evaluation of general status in terms of facilitating the determination of risky individuals for the psychological effects of pandemics are thus needed. Research conducted suggests the significance of investigating the symptoms of anxiety and depression with scales at the initial stage (Taylor, 2019). Evaluation of the rapid change in human emotions and behaviours throughout the pandemic, so that the long term psychiatric outcomes could be foreseen and relevant precautions could be taken, would make it easier for us to prepare for new pandemics or disasters that may occur in the years to come. The aim of this study, in this sense, was to demonstrate the validity and reliability of the COVID-19 Phobia Scale constructed for prioritization of symptoms such as worry, avoidance, precaution and mood changes caused by the Coronavirus pandemic in Turkey.

2. Materials and Methods

The ethics committee approval has been obtained from Üsküdar University Non-Interventional Clinical Research Ethics Committee (61351342/2020-227). The current study carried out via internet survey. The link for the survey form prepared through SurveyMonkey was sent to the participants through various social media and e-mail groups. After confirming their participation in the current study from the first page of the survey that was displayed right after clicking the electronic link, the participants proceeded to the survey questions and completed the study.

2.1. Measurement Tools

2.1.1. COVID-19 Phobia Scale

Development of the COVID-19 Phobia Scale comprised 3 stages. A 60-item question pool was compiled by the researchers during the first stage, mainly by using past research that related to psychological disorders that arise during pandemics and the researchers' experience on the subject matter. During the second stage, six different experts working in the field of mental health (psychiatrists, psychologists, and academics) evaluated the questions in terms of parameters that they wanted to measure, namely, comprehensibility and quality. Seventeen items were deleted from the draft form concerning scores assigned to items by the experts, and research continued with the remaining 43-item scale. At the third stage, selected items were restructured for a 5-point Likert scale and applied to a group of 15 people to be tested for question clarity. Finally, the COVID-19 Phobia Scale was applied to the specified sample group for further validity and reliability studies.

2. Sociodemographic Information Form: This form was prepared by researchers based on information obtained from the literature. The form included questions on sociodemographic information of participants, such as gender, age, educational status, current job description, health problems, and attitudes related to Coronavirus.

3. Hospital Anxiety and Depression Scale: The Turkish adaptation of the scale developed in 1983 by Aydemir et al. in 1997 was used. The 4-point Likert type scale with 0-3 scoring comprised a total of 14 items, where seven questions were related to anxiety and the remaining seven with depression. The higher scores pointed out the greater severity of anxiety and depression (Aydemir, 1997).

4. Health Anxiety Scale: The Turkish adaptation of the 18-item self-report type Health Anxiety Scale developed by Salkovskis et al. ((Salkovskis, Rimes, Warwick, & Clark, 2002) was conducted by Aydemir et al (Aydemir, Kirpinar, Sati, Uykur, & Cengisiz, 2013). The internal consistency in terms of Cronbach alpha was found to be 0.918 in reliability analysis. The score range of items was 0–3, and higher scores indicated higher levels of health anxiety.

2.1.2. Data Analysis

Data collected in the study were statistically analyzed by using SPSS and SPSS Amos v.21 program. Correlation coefficients between total scores of the scale and items of the scale were calculated before proceeding to the validity analysis of the COVID-19 Phobia Scale, and items with r < .20 were deleted from the scale. Following the item analysis, the lowest factor load was taken as .300 during the exploratory factor analysis, and the remaining items were subjected to obliquely rotated principal components analysis. Items obtained as a result of five-step obliquely rotated principal components analysis were then evaluated in terms of their logical features and certain items were distributed to other factors. Cronbach alpha reliability coefficients were calculated for the scale and subscales obtained as a result of the analysis and items decreasing the reliability were deleted from the scale at this point. Model-data fit was then analyzed for the obtained model by conducting first- and second-order confirmatory factor analysis. The lower and upper group averages of 27% were compared with independent samples t-test for calculating the scale's discriminant validity.

3. Results

3.1. Participants

The study population comprised N =1243 participants with ages ranging from 20 to 78 years (Age ave. = 44.74; SD =13.061), where 738 were female (Age ave. = 42.94; SD = 12.824), 497 were male (Age Ave. = 47.51; SD = 12.977) and eight refraining from providing their gender information (Age ave. = 37.49; SD = 8.655). Participants joined the study voluntarily and were randomly selected. The sociodemographic characteristics of participants can be found in Table 1.

Table 1. Frequency Distributions and Percentages ofParticipants' Sociodemographic Properties

Sociodemographic Variable	Category	n	%
	Female	738	59.4
Condor	Male	497	40.0
Gender	I prefer not to respond	8	.6
	Total	1243	100.0
	Married	784	63.5
	Single	309	25.0
Marital	Widow (divorced)	116	9.4
Status	Widow (lost his wife)	19	1.5
	Separated	7	.6
	Total	1235	100.0
	Literate	4	.3
	Primary school	3	.2
	Junior high school	5	.4
	High school	90	7.2
Educational Status	University degree	627	50.4
	Master's degree	325	26.1
	Doctoral degree	137	11.0
	Associate professor	52	4.2
	Total	1243	100.0
	Low	48	3.9
	Middle	750	60.3
Income Status	High	423	34.0
	Very high	22	1.8
	Total	1243	100.0

3.2. Item Analysis

Before proceeding to reliability and validity studies, item analysis for the 43-item COVID-19 Phobia Scale was conducted in terms of correlation of each item in the scale with the total score of the scale. As a result of the

Table 2. Findings of Spearman Correlation Analysis for Item-total Scores of 39 Items and Individual Items

13	127	124	135	134	139	129	140	136	18
.234**	.241**	.261**	.278**	.295**	.315**	.330**	.363**	.374**	.379**
130	19	114	141	l17	143	133	138	14	I18
.387**	.389**	.409**	.414**	.422**	.426**	.441**	.493**	.506**	.517**
16	15	l12	142	17	132	l19	125	113	126
.528**	.531**	.536**	.551**	.559**	.588**	.630**	.638**	.640**	.645**
121	116	110	11	123	115	111	137	120	
.653**	.659**	.660**	.662**	.678**	.692**	.701**	.708**	.711**	

**p < .01

Table 3. Final Obliquely Rotated Key Components Analysis Applied to COVID-19 Phobia Scale

Item		F1	F2	F3	F4	F5	F6
	Eigenvalue: 8.682; Explained Variance: 31,00)6					
121	I have doubts about the symptoms of the disease that I had after I learned about coronavirus	.801					
120	I became more concerned with the any disease symptoms I had after I learned about coronaviruss	.791					
l15	I am afraid of diseases after I learned about coronavirus	.779					
l19	I thought getting infected with a contagious disease was more likely for me after I learned about coronavirus	.778					
123	Having my mind occupied with thought of what would happen to me in case I get sick after I learned about the Coronavirus is keeping my mind occupied	.767					
126	I started to think that I had a high risk of COVID-19 disease after I learned about coronavirus	.765					
l16	Compared with other people, I became more worried about my health after I learned about coronavirus	.758					
125	I was curious about the changes in my body after I learned about coronavirus	.757					
111	I became more worried about my health after I learned about coronavirus	.732					
l13	My preoccupation to deal with what's going on in my body after I learned about the Coronavirus	.689					
11	I became more worried after I learned about coronavirus	.636					
132	Once I learned about the Coronavirus, I had a worry that a severe illness will affect all areas of my life	.632					
l18	Once I learned about Coronavirus, I am always preoccupied with a feeling that I might be sick, even though my test results are negative	.631					
	Eigenvalue: 1,850; Explained Variance: 6.606%						
133	My joy of life after I learned about the coronavirus*		836				
134	My energy to focus on the meaning of my life after learning about the coronavirus $\!\!\!\!\!^\star$		808				
129	After I learned about the coronavirus, I still think I'm going to continue to have enjoy in my life Even if I have a severe illness *		633				
	Eigenvalue: 1.464; Explained Variance: 5.227%						
17	I became more willing to wash food after learning about coronavirus			.748			
15	I became more willing to wash my hands frequently after learning about coronavirus			.727			
16	I became more interested in following the news after learning about coronavirus			.714			
14	I became more irritated with people coughing and sneezing after learning about coronavirus			.567			
18	I am concerning to order takeaway food after learning about coronavirus			.474			
	Eigenvalue: 1.432; Explained Variance: 5.114%						
135	I became more willing to avoid crowds after learning about coronavirus				.836		
140	After I learned about the Coronavirus, I don't want to be indoors				.815		
	Eigenvalue: 1.125; Explained Variance: 4.016%						
124	After learning about coronavirus, I want to get away from conversations where the subject is the disease					.776	
136	I care to pay attention to healthy eating after learning about coronavirus					.521	
	Eigenvalue: 1,063; Explained Variance: 3.797%						
130	Once I learned about the Coronavirus, I have no difficulty focusing on my tasks						.668
139	I need to talk to others after learning about coronavirus						.609
19	I'm having trouble with my sleep pattern after learning about coronavirus						.585
	*Reverse Items						

first round of Spearman correlation analysis conducted during item analysis, items 2, 22, 28 and 31 were found to correlate .20 with the item-total score and thus were deleted from the scale. Correlations of the remaining 39 items with the total item score were found to range between .234 (item 3) and .711 (item 20), according to the correlation analysis results obtained with the new total score after deletion of these items from the scale. Factor analysis was then performed as the correlations of the remaining 39 items with the total score were found to be r > .20. Item-total scores and correlation coefficients for 39 items are provided in Table 2.

3.3. Factor Analysis

The exploratory factor analysis procedure was conducted with obliquely rotated principal components analysis (KMO = .948; Bartlett Test (741) = 17745,116; p < .001) for all 39 items that remained after item analysis of the COVID-19 Phobia Scale. As a result of the analysis, an 8-factor structure with 39 items having an eigenvalue above 1 was obtained, explaining 53.81% of the variance. Considering the items with factor loads above .30, I37, I10, I38 and I42 were observed to have factor loads on multiple factors; however, the difference between these loads was less than .10. These items, therefore, were eliminated from the scale, and a second factor analysis was then applied. All 35 remaining items were subjected to obliguely rotated basic components analysis (KMO = .939; Bartlett Test (595) =14726.081; p < .001). As a result of the analysis, a 7-factor structure with 35 items having an eigenvalue above 1 was obtained, explaining 51.75% of the variance. Considering the items with factor loads above .30, I17, I3 and I14 were observed to have factor loads on multiple factors; however, the difference between these loads was less than .10. Therefore, these statements were eliminated from the scale and a third factor analysis was applied. All 32 remaining items were subjected to obliquely rotated basic components analysis (KMO = .938; Bartlett Test (496) = 13946.204; p < .001). As a result of the analysis, a 7-factor structure with 32 items having an eigenvalue above 1 was obtained, explaining 54.59% of the variance. Considering the items with factor loads above .30; it was found that I41, I43 and I12 were observed to have factor loads on multiple factors, however the difference between these loads was less than .10. These items were thus removed from the scale and a fourth factor analysis was conducted. All 29 remaining items were subjected to obliquely rotated basic components analysis (KMO = .936; Bartlett Test (406) = 13026.053, p < .001). As a result of the analysis, a 6-factor structure with 29 items having an eigenvalue above 1 was obtained, explaining 54.42% of variance. Considering the items with factor loads above .30, it was found that I27 received a load on more than one factor, but the difference between these loads was less than .10. This item was thus deleted from the scale and a fifth factor analysis was performed. All 28 remaining items were subjected to obliquely rotated basic components analysis (KMO = .937; Bartlett Test (378) =12825; p < .001). As a result of the analysis, a 6-factor structure explaining 55.77% of the variance, comprising 28 items with eigenvalues above 1 was obtained. The final results of obliquely rotated basic components analysis performed

for the COVID-19 Phobia Scale can be found in Table 3. Logical investigation of item distributions to factors was performed following the obliquely rotated basic components analysis, and I13, I18, and I32 belonging to first factor; I30 and I9 from the sixth factor were decided to be eliminated from the scale. Moreover, I24 with its loading on fifth factor was found to be compatible with the statements of fourth factor; I39 with its loading on sixth factor along with I36 with its loading on fifth factor were found to be compatible with the statements of the third factor. These items were thus allocated to related factors for confirmatory factor analysis.

3.4. Internal Consistency

The internal consistency coefficients of the 23 items remaining after exploratory factor analysis based on their final factor distributions are provided in Table 4.

The internal coefficients of the scale were found to be cra = .84 for items in total; cra = .92 for F1 (Worry); cra = .67 for F3 (Reassurance Seeking/Precaution) and cra = .60 and F4 (Avoidance). It was observed that the internal consistency coefficient decreased with the presence of I24 in the avoidance subscale, and, thus, this item was eliminated from the scale before proceeding to confirmatory factor analysis for the remaining 22 items and four subscales. After the elimination of I24 from the scale, the internal consistency coefficients were found to be cra = .84 for the items in total; and cra = .60 for subscale F4 (Avoidance).

Table 4. Internal Consistency Analyses Findings for

 COVID-19 Phobia Scale

Factor	Factor Name	Item Numbers	Number of Items	Cronbach's Alpha	After Deletion of Item
F1	Worry	1, 11, 15, 16, 19, 20, 21, 23, 25, 26	10	.918	.918
F2	Mood	29*, 33*, 34*	3	.673	.673
F3	Reassuarance Seeking/ Precaution	4, 5, 6, 7, 8, 36, 39	7	.601	.601
F4	Avoidance	24**, 35, 40	3 (2)	.441	.601
Total			23 (22)	.838	.840
*Re	everse Items	**Delet	ed item	-	

3.5. Criterion Validity

Spearman correlation analysis was conducted for the total scale scores and the scores of Hospital Anxiety and Depression Scale and Health Anxiety Scale for the determination of scale's criterion validity. Results of analysis are provided in Table 5.

Table 5.SpearmanCorrelationAnalysesFindingsbetween the Scores of COVID-19PhobiaScale and theScores from the Hospital Anxiety and DepressionScaleand HealthAnxietyScale

	HAD Anxiety	HAD Depres- sion	Health Anxiety Total	SA Physical Sensitivity	SA Negative Outcomes
Covid Total	.464**	.371**	.471**	.457**	.340**
Covid Worry	.568**	.434**	.531**	.509**	.394**
Covid Mood	529**	585**	363**	325**	356**
Covid Re- assurance Seeking/ Precaution	.371**	.409**	.416**	.390**	.338**
Covid Avoidance	.283**	.287**	.232**	.200**	.254**
*p <. *5; **p <	.01				

A significant positive correlation was found to exist between the total COVID-19 Phobia Scale score and anxiety (r = .464; p = .000); depression (r = .371; p = .000); total health anxiety score (r = .471; p = .000); health anxiety subscales "oversensitivity to physical symptoms" and "anxiety" (r = .457; p = .000) and "negative outcomes" of health anxiety subscale (r = .340; p = .000).

A significant positive correlation was found to exist between COVID-19 Phobia Scale Worry Subscale and anxiety (r = .568; p = .000); depression (r = .434; p = .000); total health anxiety score (r = .531; p = .000); health anxiety subscale (r = .531; p = .000); health anxiety subscales "oversensitivity to physical symptoms" and "anxiety" (r = .509; p = .000) and "negative outcomes" of health anxiety subscale (r = .394; p = .000).

A significant negative correlation was found to exist between COVID-19 Phobia Mood subscale and anxiety (r = -.529; p = .000); depression (r = -.585; p = .000); total health anxiety score (r = -.363; p = .000); health anxiety subscale (r= -.363; p = .000); health anxiety subscales "oversensitivity to physical symptoms" and "anxiety" (r = -.325; p = .000) and "negative outcomes" of health anxiety subscale (r = -.356; p = .000).

A significant positive correlation was found to exist between COVID-19 Phobia Scale Reassurance Seeking/ Precaution subscale and Anxiety (r = .371; p = .000); depression (r = .409; p = .000); total health anxiety score (r = .416; p = .000); health anxiety subscale (r = .416; p = .000); health anxiety subscales "oversensitivity to physical symptoms" and "anxiety" (r = .390; p = .000) and "negative outcomes" of health anxiety subscale (r = .338; p = .000).

A significant positive correlation was found to exist between COVID-19 Phobia Scale Avoidance subscale and

anxiety (r = .283; p=.000); depression (r = .287; p = .000); total health anxiety score (r = .232; p = .002); health anxiety subscales "oversensitivity to physical symptoms" and "anxiety" (r = .200; p = .008) and "negative outcomes" of health anxiety subscale (r = .254; p = .001).

Depending on the results of correlation analyses for criterion validity, it can be concluded that the COVID-19 Phobia Scale proved for criterion validity.

3.6. Confirmatory Factor Analysis

Investigation of correlation findings revealed a significant positive relationship between COVID-19 Phobia Scale total score and the scores of subscales. Correlation coefficients between the subscales of COVID-19 Phobia Scale are provided in Table 6.

Table 6. Correlation Coefficients between the Subscalesof the COVID-19 Phobia Scale

		1	2	3	4	5
	r	1				
1. worry	р					
2. Mood	r	.346**	1			
	р	.000				
3. Reassurance	r	.527**	.128**	1		
Precaution	р	.000	.000			
4 Avoidance	r	.097**	029	.176**	1	
4. Avolualice	р	.001	.313	.000		
5. COVID-19	r	.888**	.457**	.756**	.372**	1
Phobia Total	р	.000	.000	.000	.000	
**p < .01						

The result of confirmatory factor analysis conducted for identifying the measurability of implicit structures of anxiety, mood, reassurance-seeking/precaution and avoidance parameters used for predicting COVID-19 phobia is depicted in Figure 1.

The most commonly used statistical measures for calculating the model-data fit with Confirmatory Factor Analysis are the Chi-Square (χ 2), χ 2/sd, RMSEA, RMR, GFI and CFI. GFI values less than 0.85 and RMR and RMSEA values less than 0.10 are nevertheless considered as the acceptable lower limits for model-data fit (Cole, 1987; James C. Anderson & David W. Gerbing, 1984). A model-data fit is said to exist whenever the calculated χ 2/ df ratio is less than 5, the GFI and CFI values are higher than 0.90 and RMR and RMSEA values lower than 0.05 (Jöreskog KG, 1993). Goodness of fit results based on the first-order confirmatory structure tested with four latent and 22 indicator variables was found as χ 2/sd = 3.899, RMSEA = .048, RMR = .033, GFI = .943, CFI = .942 (Table 7).



Figure 1. Four-factor implicit structure established with CFA



Figure 2. Second-order CFA

Table	7.	Findings	of	First-order	Confirmatory	Factor
Analysi	s fo	r COVID-1	19 F	Phobia Scale		

Measure- ment Tool	χ 2	df	χ 2/df	RMR	CFI	GFI	RM- SEA
COVID-19 Phobia Scale	791.542	203	3.899	.033	.942	.943	.048

Comparing the results of CFA with the acceptable fit indices reported in literature, it was concluded that the model constructed for the theoretical structure of COVID-19 Phobia Scale complied with the fit indices.

A second-order confirmatory analysis indicating the structural relations of worry, mood, reassurance-seeking/ precaution and avoidance dimensions with the upper dimension of COVID-19 phobia was constructed and depicted in Figure 2 to prove that these four dimensions obtained by the first-order confirmatory factor analysis for COVID-19 Phobia Scale represented the theoretically suggested COVID-19 phobia.

Goodness of fit results based on testing the second-order factor model constructed with the addition of COVID-19 latent variable to the first-order confirmatory structure tested with four latent and 22 indicator variables were found to be $\chi 2/sd = 3.939$, RMSEA = .049, RMR = .037, GFI = .942 and CFI = .940 (Table 8).

Table 8. Findings of Second-order Confirmatory Factor Analysis for COVID-19 Phobia Scale

Measure- ment Tool	χ 2	df	χ 2/df	RMR	CFI	GFI	RM- SEA
COVID-19							
Phobia	807.538	205	3.939	.037	.940	.942	.049
Scale							

Reviewing the results of first-order and second-order factor analyses, it can be stated that the COVID-19 Phobia Scale can be used as a measurement tool to predict COVID-19 phobia, worry, mood, reassurance-seeking/ precaution and avoidance levels.

3.7. Discriminative feature of the scale

A 27% upper-lower subgroup comparison was performed to determine the distinctiveness of the COVID-19 Phobia Scale. Independent samples t-test was utilized to determine whether there exists a significant difference between the averages of 27% upper subgroups and 27% lower subgroups. The results are provided in Table 9.

Table 9. COVID-19 Phobia Scale Lower–Upper GroupMeans, Standard Deviations and Independent Samplest-test Findings

Groups	N	AVE	SD	t	р	
27% Lower Group	335	70.30	4.857	60.404	000	
27% Upper Group	335	93.27	4.972	-00.464	.000	

Results of the t-test revealed a significant difference between the averages of 27% upper subgroups and 27% lower subgroups of the COVID-19 Phobia Scale (t = -60.484; p = .000). This finding suggested that those who scored higher on the COVID-19 Phobia Scale could be differentiated from those who scored low.

4. Discussion

As negative emotions such as anxiety, phobia and fear that arise during a pandemic period adversely affect the behaviour of individuals, relevant psychometric measurement tools are needed for determining the risk factors to guide both the individual and social preventive actions during the pandemic. This study aimed to reveal whether the COVID-19 Phobia Scale, which was constructed to evaluate the changes in emotions and behaviours that arise during the COVID-19 pandemic, was a valid and reliable tool. Exploratory and confirmatory factor analyses of the COVID-19 Phobia Scale demonstrated the scale to be valid and reliable, along with the correlation analyses providing the same result. The COVID-19 Phobia Scale, comprising 22 items and four subscales to measure the emotions and behavioural changes observed during the COVID-19 pandemic, was thus shown to be a valid and reliable measurement tool.

The main factor structure was first determined through the utilization of exploratory factor analysis, where the items having lower reliability coefficients were eliminated from scale and the analysis was repeated to construct the final version of the scale. The lower acceptable limit for the Cronbach alpha coefficient, indicating the reliability of scales, is accepted to be 0.70 in the literature. The Cronbach alpha coefficient of the COVID-19 Phobia Scale was found to be 0.84. The scale proved to have a good factor structure concerning total and individual subscales.

A 4-factor scale comprising Worry, Mood, Reassurance-Seeking/Precaution and Avoidance subscales was obtained as a result of the factor analyses performed with the scale items. The Cronbach alpha coefficient of the first factor, which was coined as "Worry subscale" that comprised 10 questions including feelings and thoughts, such as thoughts about the disease that arose with the outbreak of the pandemic, worry to be infected with the disease, health and future concerns, was found to be 0.92. The Cronbach alpha coefficient value of the first factor, which indicated the severity of the initial emotional reactions that arise following the outbreak and constitute almost half the total number of questions on the scale, is the highest among all factors. The second factor coined as the "Mood subscale" evaluates the depressive mood, comprised three questions on the joy of life, enjoying life and meaning of life. Research conducted during pandemic suggests that depressive symptoms were the second most observed group of symptoms following the first group of symptoms being anxiety (Brooks et al., 2020; Rajkumar, 2020). We believe that the inclusion of depressive symptoms, unlike other scales used for COVID-19 and its psychological effects, would add to the authenticity of our COVID-19 Phobia Scale. The "Reassurance Seeking/Precaution" determined as the third factor comprised seven questions that involved individual measures taken to protect oneself from infection, acquiring information about infection and talking to others to feel safe and comfortable. The "Avoidance subscale," determined as the last factor, comprised two questions involving the avoidance to enter crowded and closed environments. "Avoidance in talking about COVID-19" was also considered to be included in this subscale during the item preparation stage; however, it was observed through analyses that elimination of this item increased the validity of the total and the existing factorial structure. This might be related to the level of trauma experienced by individuals during the process. While some individuals experiencing traumatic symptoms might refrain from talking about COVID-19,

other individuals might feel the urge to constantly talk about the subject for alleviating their anxiety levels. This ambivalent situation might have resulted in the increase of the internal consistency coefficient as the 24th item was eliminated from the scale.

Hospital Anxiety and Depression Scale and Health Anxiety Scale were used for determining the criterion validity of the COVID-19 Phobia Scale. Health Anxiety Scale was used for this purpose as the health anxiety was considered to be one of the main factors that determine human behaviour during pandemic periods (Asmundson & Taylor, 2020b). Because the COVID-19 Phobia Scale measures both anxiety and depression symptoms, the Hospital Anxiety and Depression Scale, where anxiety and depression are evaluated together, was chosen to be another scale to test for criterion validity. Correlation analyses revealed that the total and subscales of the COVID-19 Phobia Scale correlated highly with other scales and that the criterion validity was high.

In conclusion, the COVID-19 Phobia Scale is found to be a valid and reliable tool that can be used to detect mood changes, such as anxiety and depression in individuals, during the pandemic and the behavioural changes that arise to cope with worry. Our scale is constructed such that it can be used to establish health policies against possible outbreaks in the coming years, and is relatively short and accessible online can be counted as one of its advantages.

4.1. Limitations

Despite the high number of participants in the study, one of its limitations was the online introduction method of scales to the participants due to the circumstances of the pandemic. Face-to-face interviews constitute a crucial stage in clinical research, and this could not be performed for this study. Although online face-to-face interviews with participants were considered to be conducted early during the pandemic, it was predicted that the possible biasing effects of online meetings might fail to be controlled. The fact that a re-test could not be conducted due to the pandemic circumstances was yet another limitation of the research. Conversely, likely, re-test results of the participants who adapted more easily to the process might change in the opposite direction as no research on coping with this process has yet been conducted. The lack of a re-test was thus found reasonable, while it also was a limitation of the study. It is noteworthy that the majority of participants were females and had an educational status of an undergraduate degree or above. It was concluded that the online conduction of research facilitated access to individuals with higher educational statuses rather than individuals with lower educational statuses. It might be of use to reassess the scale with participants that have an educational qualification of high school and below.

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Nesrin Dilbaz (%40): Conception/design of the work, data acquisition, drafting and its critical revision for important intellectual content.

Cemal Onur Noyan (%30): Involved in refining the conception of the work, have given final approval of the version to be published.

Gül Alpar (%15): Involved in refining the conception of the work, analysis and interpretation of data, prepared the figures.

Özlem Kızılkurt Kazan (%15): Involved in refining the conception of the work, the interpretation of data for the work and revising it critically for important intellectual content.

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