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Psychological Impact of COVID-19: Validity and Reliability of the Turkish Fear of Illness and Virus Evaluation(FIVE) Scale

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ABSTRACT

Background: During the Coronavirus disease-2019 pandemic, various scales were developed to assess mental health issues linked to the virus. This study aimed to determine the validity and reliability of the Turkish adaptation of the Fear of Illness and Virus Evaluation (FIVE)-Adult Report Form (ARF).
Methods: Individuals aged 18 and above who consented to participate were given access to the questionnaire after being informed about the study's objectives. Authorization for the translation was obtained from the original form's creator.
Results: A total of 466 participants took part in the study. The explanatory factor analysis revealed that items 1-9 assessed fears related to contamination and illness, items 10-19 focused on fears concerning social distancing, and items 20-33 addressed behaviors associated with fears of disease and viruses. Items 34 and 35, which measured the impact of illness and virus fears, were found to load onto the factor related to fears of contamination and illness. The scale explained 44.5% of the total variance. The internal consistency reliability coefficients were 0.902 for the contamination and illness fears subscale, 0.905 for the social distancing fears subscale, 0.777 for behaviors related to illness and virus fears, and 0.916 for the scale.
Conclusion: The findings indicate that the Turkish adaptation of the FIVE-ARF has a 3-factor structure and demonstrates strong validity and reliability for use within the Turkish population.

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INTRODUCTION

The Coronavirus disease-2019 (COVID-19) pandemic, originating in Wuhan, China, in December 2019, quickly expanded to become a worldwide health crisis. Efforts to control the virus's spread led to significant economic setbacks, social and physical isolation, shifts in behavioral patterns, and disruptions in everyday life across many countries. While these steps are critical for mitigating the spread of the disease, they will undoubtedly have mental health consequences in both the short and long term. These results are significant enough that urgent efforts focused on prevention and direct response are needed to address the impact of the epidemic on mental health at the individual and general population level.[1,2]

It is widely acknowledged that the COVID-19 pandemic has significant impacts on both physical and mental health, as well as overall well-being. From a psychopathological standpoint, this pandemic presents a unique form of stress or trauma for mental health professionals.[3] Unlike natural disasters like earthquakes or tsunamis, typically confined to specific locations and timeframes, a pandemic poses a continuous and pervasive threat that can be present anywhere, even from those around us.[4] The measures taken to control the spread—such as quarantine, social distancing, and isolation—can negatively affect mental health. Concerns about personal and loved ones' health, along with uncertainty about the future, may lead to increased levels of fear, anxiety, and depression.

Similar to other pandemics, a threat to physical health becomes a major stressor when its characteristics are unclear, its progression is uncertain, and individuals feel a lack of control over the situation.[5] A heightened perception of risk can prompt individuals to take measures to reduce the chance of infection, but it can also foster feelings of helplessness and a passive response to the threat.[6] Excessive or deficient behaviors linked to fears of contagion, illness, social distancing, and viruses can negatively impact one's social, professional, and community functioning.[7]

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While diagnostic interviews are considered the gold standard for evaluating mental health, they can be time-consuming and difficult, particularly when large-scale assessments are required. To address this challenge, various reliable scales have been developed to monitor mental health over time. During the COVID-19 pandemic, several new scales have been introduced to assess psychological issues related to the virus. A review of current COVID-19-related psychometric tools reveals a strong focus on fear and anxiety. Most of these scales have been validated in middle-aged populations, with considerable differences in sample sizes.[8] The COVID-19 Fear Scale is a 7-item scale that measures the fear structure and focuses mainly on the emotional dimension. The Fear of COVID-19 Scale has been translated into 7 languages: Persian, Hebrew, Bangla, Turkish, Russian, Italian, and Arabic.[9,10] Both the Coronavirus Anxiety Scale and the Fear of COVID-19 Scale are available in English and Turkish.[11,12] Among these tools, the COVID Stress Scales are the longest, with 36 items, while the shortest is the Obsession with COVID-19 Scale, consisting of only 4 items.[13,14] The Obsession with COVID-19 Scale focuses on the cognitive aspect in a brief format, while the Coronavirus Anxiety Scale is a 5-item tool that primarily addresses the physiological symptoms of COVID-19 anxiety.[12] Lastly, the Fear of COVID-19 Scale comprises 7 items that assess fear, with a primary focus on emotional reactions.

The COVID-19 Phobia Scale assesses coronavirus-related phobia across 4 dimensions: psychological, psychosomatic, economic, and social.[15] Meanwhile, the COVID Stress Scales consist of 5 factors addressing fear of COVID-19 in terms of danger and contamination, socioeconomic impact, xenophobia, traumatic stress, and compulsive behaviors.[11] The COVID-19 Anxiety Scale includes 7 items that capture anxiety's cognitive, physiological, and emotional aspects.[11] Additionally, the COVID-19 Peritraumatic Distress Index is a 24-item measure that evaluates psychological distress linked to COVID-19, with total scores ranging from 0 to 100.[16]

This study examined the Fear of Illness and Virus Evaluation (FIVE)-Adult Report Form (ARF) for validity and reliability. The FIVE is a self-report Likert-type scale, scored from 1 to 4, consisting of 35 items. Nine items assess fears related to contamination and illness, 10 items focus on fears about social distancing, 14 items evaluate behaviors associated with illness and virus fears, and 2 items measure the impact of these fears.[17] Unlike other scales such as the Coronavirus Anxiety Scale and the COVID-19 Fear Scale, which primarily assess physiological and emotional aspects of anxiety, the FIVE also includes cognitive and behavioral dimensions, making it a more comprehensive tool for assessing fear.[10,12]

This study sought to assess the validity and reliability of the Turkish adaptation of the FIVE-ARF. It is hypothesized that the scale will exhibit a 4-factor structure as originally intended and that individuals' levels of depression, anxiety, and stress will be associated with their fears related to illness and viruses. Due to these fears, they will also correlate with some dysfunctional cognitive and behavioral processes. These health-related cognitions will also correlate with this fear. With the help of this, the scale can distinguish groups with and without mental distress; as a result, it will allow a valid and reliable evaluation of Turkish society. This study will help design a scale that can evaluate patients' mental states in detail during the COVID-19 pandemic in Turkish society.

MAIN POINTS

- The Turkish version of the Fear of Illness and Virus Evaluation (FIVE)-Adult Report Form (ARF) demonstrated a 3-factor structure, with high internal consistency coefficients for each subscale and the overall scale. This confirmed its reliability and validity in assessing fears related to contamination, social distancing, and illness-related behaviors.
- The Turkish adaptation of the FIVE-ARF is a trustworthy and effective instrument for assessing the psychological effects of COVID-19 on the Turkish population. It is suitable for use in clinical practice and research environments.

MATERIAL AND METHODS

Study Population and Sample

This study was designed as an online survey conducted using various social communication networks, including Facebook, Twitter, and Instagram. Invitations to participate in the research were posted on these platforms and disseminated through relevant community groups and forums. Participants were encouraged to join by clicking on a link that directed them to the survey hosted on a secure online survey platform. The study included individuals aged between 18 and 65 who had at least a primary school education. Only those who consented to participate, after reviewing a preliminary information form that explained the study's purpose, were directed to the survey questions. This study was approved by the Ethics Committee of Sakarya University (Approval no.: 715224073/050.01.04/502, Date: 22/09/2020).

The research utilized a cross-sectional, descriptive design and employed a simple random sampling method. The sample selection was made based on volunteers. A total of 466 participants were recruited. Detailed sociodemographic information, including age, gender, marital status, education level, and place of residence, was collected (Table 1).

Instruments of Assessment

Sociodemographic and Clinical Data Form: In this form, besides the sociodemographic information of the participants, there are questions about the psychiatric diagnoses and treatments taken during the COVID-19

Table 1. Sociodemographic Characteristics

Characteristic	n	%
Gender		
Female	306	65.66
Male	160	34.34
Age (mean ± SD)	31.60 ± 10.54	
Marital status		
Married	208	44.63
Single/other	258	55.37
Education level		
College degree	285	61.15
Place of residence		
Large city	239	51.28

outbreak, the precautions they took during the COVID-19 outbreak, and their ways of coping.

Fear of Illness and Virus Evaluation-Adult Report Form

The FIVE-ARF was developed by Ehrenreich-May.[17] The scale consists of 35 items in total: 9 items focus on fears surrounding contamination and illness, 10 address fears related to social distancing, 14 assess the intensity of behaviors linked to illness and virus fears, and 2 measure the overall impact of these fears. It is a self-reported Likert-type scale, with responses rated on a 1-4 scale. A total score and a percentage score can be calculated for each subscale. In this context, the maximum total score that can be obtained for the "fear of contagion and disease" subscale is 36, 40 for the "fear of social distance" subscale, 56 for the "behavioral-related behaviors" to fear of disease and virus subscale, and 8 for "the impact of the disease and fears of the virus."

Depression Anxiety Stress Scale-21

It is the short form of the original 42-item Depression Anxiety Stress Scale-42. It is a self-report scale consisting of 21 items. It includes 3 separate subscales measuring depression, anxiety, and stress. Depression Anxiety Stress Scale-21 (DASS-21) contains 7 items for each scale, and the items are scored between 0 and 4. High-scale scores show the sub-dimensions of depression, anxiety, and stress with which the individual is struggling. The reliability of the DASS-21 was confirmed by strong Cronbach's α values, with 0.81 for the depression subscale, 0.89 for the anxiety subscale, and 0.78 for the stress subscale.[18] Sarıcam made the Turkish adaptation of the scale.[19] This adaptation study concluded that the scale is a valid and reliable tool for the Turkish population. In this study, the Cronbach's α values for the scale's sub-dimensions were 0.84 for anxiety, 0.87 for depression, and 0.85 for stress, demonstrating strong internal consistency. It was shown that those who scored above 10.83 for depression ($P < .001$), 10.39 for anxiety ($P < .001$), and 11.85 for stress ($P < .001$) were able to distinguish them from the healthy control group.[19]

Cognitive Behavioral Process Questionnaire

The scale was designed as a self-report tool based on cognitive-behavioral theory to explore the key psychological processes identified in the literature, particularly in relation to individual problem areas. In its original reliability and validity assessment, Cronbach's α values ranged from 0.90 to 0.92.[20] This self-report tool is organized into 2 parts: Section A and Section B. Section A addresses topics such as avoidance/suppression, mental control, thought-action fusion, rumination, worry, and self-criticism. Section B explores individuals' responses to distress, offering examples of potential behaviors they might exhibit in such situations. It assesses hypervigilance to threats, safety-seeking actions, avoidance behaviors (both inactivity and hyperactivity), and experiential avoidance through substances or other activities. Respondents rate items on a scale from 0 to 8, with higher scores indicating a greater reliance on dysfunctional mental and behavioral responses. The total score can range from 0 to 120. The internal consistency of the scale (Cronbach's α) is reported to be between 0.785 and 0.816.[21]

The scale was created as a self-report tool designed to explore key processes identified in the literature, aligned with the problem areas individuals encounter, and grounded in cognitive-behavioral theory. In the original study assessing its validity and reliability, Cronbach's α values ranged from 0.90 to 0.92.[20] This self-report scale is divided into sections A and B. Section A addresses areas such as avoidance/suppression, mental control, thought-action fusion, rumination, worry, and self-criticism. Section B focuses on individuals' responses to distress, providing examples of actions they might take in these situations. It explores hypervigilance to threats, safety-seeking actions, avoidance behaviors (including both inactivity and hyperactivity), and experiential avoidance through the use of alcohol, drugs, food, or activities. Respondents are asked to score each item between 0 and 8, representing opposite ends of the same behavior. The total score can range from 0 to 120, with higher scores indicating a greater reliance on dysfunctional mental and behavioral strategies. The internal consistency of the scale, as measured by Cronbach's α, falls between 0.785 and 0.816.[21]

Health Cognitions Questionnaire

This scale assesses dysfunctional health-related beliefs associated with the severity of health anxiety experienced by individuals.[22] The scale is composed of 4 factors: perceived likelihood of illness (7 items), severity of illness (8 items), challenges in coping with illness (6 items), and inadequacy of medical services (9 items). It has been prepared in 2 parallel forms containing 20 items each, depending on whether the person has been diagnosed with any physical illness or not. Scale items are scored with a 5-point scale. The scores of items 2, 4, 7, 9, 10, 15, 19,

and 20 are reverse coded. High scores on the scale reflect people's dysfunctional beliefs about health. The internal consistency coefficients (Cronbach's α) of the factors in the original scale were between 0.72 and 0.90 in the group without a physical diagnosis and between 0.75 and 0.91 in the group with physical diagnosis.[22] Turkish validity and reliability study was conducted.[23] The Cronbach α values of the factors in the group without a diagnosis of physical illness were 0.880 for difficulty coping with illness, 0.670 for medical services inadequacy, 0.660 for the perceived likelihood of illness, and 0.730 for the severity of illness, respectively. In the group diagnosed with physical illness, the Cronbach α values of the factors were found as 0.870 for difficulty coping with illness, 0.640 for medical services inadequacy, 0.720 for the perceived likelihood of illness, and 0.760 for the severity of illness, respectively. The test-retest reliability of the Turkish version of the Health Cognitions Questionnaire (HCQ) was assessed by re-administering the scale to 57 patients with physical disease and 44 patients without physical disease, 2-3 weeks apart. The correlation coefficient values between the 2 treatments in the group without a physical illness diagnosis were 0.70 for "difficulty in coping with the disease," 0.45 for "the inadequacy in health services," 0.47 for "the perceived probability of the disease," and 0.45 for "the severity of the disease," respectively. The correlation coefficient values in the group diagnosed with physical illness were 0.62 for difficulty in coping with the illness, 0.51 for inadequacy of health services, 0.58 for the perceived probability of illness, and 0.35 for the severity of the illness, respectively.[23]

Translation Process

First, the scale developer was contacted via e-mail and obtained translation permission. Later, 2 researchers translated the scale from English to Turkish. The scale items were translated back from Turkish to English by another researcher who was unaware of the original version of the scale, and an English language specialist. By comparing these 4 texts with each other, an agreed-upon translation was obtained. This translation was sent to 20 people before it was used in the study, and they were asked to fill it in and evaluate it in terms of the presence of items that were difficult to understand. At this stage, there was no need to change the scale items.

Statistical Analysis

Demographic and clinical data were presented as mean ± SD for normally distributed data, while frequencies of the descriptive data were presented as n (%). The Kolmogorov-Smirnov test was used to assess the normality of the data. Due to the non-normal distribution of some variables, non-parametric tests, such as the Mann-Whitney *U* test and Spearman correlation analyses, were also utilized. Exploratory factor analysis (EFA) was conducted using FACTOR 10.8.04 software to identify the underlying factor structure of the FIVE-ARF.[24] The Kaiser-Meyer-Olkin (KMO) statistics indicated that the sample size was adequate for factor analysis (KMO = 0.900), and Bartlett's test of sphericity was significant ($P < .001$). The unweighted least squares method was employed for factor extraction, with oblique rotation (direct oblimin).[25] In addition to EFA, a confirmatory factor analysis (CFA) was performed using AMOS software to validate the factor structure identified by EFA. Confirmatory factor analysis is critical for assessing the model fit and confirming the construct validity of the Turkish version of the FIVE-ARF. Model fit was evaluated using several fit indices, including the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). Acceptable model fit criteria were set as follows: CFI and TLI values ≥0.90, RMSEA ≤0.08, and SRMR ≤0.08. The results of the CFA showed a good model fit: CFI = 0.92, TLI = 0.91, RMSEA = 0.06, and SRMR = 0.05. These values support the 3-factor structure proposed by the EFA. Factor loadings for all items were significant and above the recommended threshold of 0.40, indicating that the Turkish adaptation of the FIVE-ARF has a robust and well-fitting factor structure. The resampling method and bias-corrected robust analyses with a 95% CI were preferred for all calculations. For the scale's internal consistency, Cronbach α values corrected item-total correlations and Cronbach α values if the item is deleted, explained variance, eigenvalues, and loading coefficients of items on factors, and common factor variances were calculated. Pearson correlation coefficients were used for the concurrent and discriminant validity of the scales. The *t*-test was used in independent groups to compare the groups' mean scores according to mental distress. The Cohen *d* value was calculated for the effect size. MedCalc 17.2 software was used for these analyses. A *P*-value of $< .05$ was accepted for statistical significance.

RESULTS

The Demographic and Clinical Characteristics of the Participants and the Scores They Got from the Assessment Tools

In the current study, 65.66% of participants (n = 466) were female (n = 306), while 34.34% of participants were male (n = 160). The mean age of the participants was 31.60 ± 10.54 years. Of the 466 participants, 208 (44.63%) were married, 239 (51.28%) lived in large cities, and 285 (61.15%) had a college degree. For the percentage scores, we relied on the provisional subscales as suggested by the developers of the FIVE-ARF.[17] The score distributions for each scale are described below, focusing on individual item characteristics rather than overall subscale scores. Regarding DASS-21, item-level means ranged from 0.50 to 3.10, with standard deviations between 0.60 and 1.20, reflecting varying levels of emotional distress among participants. Regarding Cognitive Behavioral Process Questionnaire (CBPQ), the

cognitive process items ranged from 2.00 to 4.20 (SD: 0.70-1.10). In contrast, behavioral process items ranged from 1.80 to 3.90 (SD: 0.65-1.15), indicating moderate cognitive and behavioral strategies engagement. Regarding HCQ, items assessing difficulty coping with illness and perceived inadequacy of medical services had means between 2.10 and 4.00 (SD: 0.50-1.05). In contrast, items on awfulness and perceived likelihood of illness ranged from 2.50 to 4.20 (SD: 0.60-1.00). Regarding FIVE-ARF fears about contamination and illness (Items 1-9), means ranged from 2.60 to 3.40 (SD: 0.75-1.10), indicating high concern levels. Regarding FIVE-ARF fears about social distancing (items 10-19): Item means varied from 2.40 to 3.20 (SD: 0.70-1.05), highlighting prevalent fears related to social interactions. Regarding FIVE-ARF behaviors related to illness and virus fears (items 20-33), means were between 2.80 and 3.50 (SD: 0.80-1.20), showing significant behavioral responses. In terms of the FIVE-ARF impact of illness and virus fears (items 34-35), these items had means of 3.00 and 3.30 (SD: 0.65 and 0.85), underscoring the perceived impact on daily life (Table 2).

Psychometric Properties of the Turkish Version of the Adult Form of the Scale for Evaluation of Fear of Disease and Virus

An explanatory factor analysis was conducted to evaluate the psychometric characteristics of the Turkish version of the FIVE-ARF. The results showed that items 1-9 from the Fear of Contamination and Illness subscale, items 10-19 from the Fear of Social Distancing subscale, items 20-33 evaluating behaviors related to fear of illness and viruses, and items 34-35 assessing the impact of these fears, all loaded onto the factor concerning contamination and illness fears. The scale accounted for 44.5% of the total variance. Internal consistency values were 0.902 for contamination and illness fears, 0.905 for social distancing fears, 0.777 for behaviors related to illness and virus fears, and 0.916 for the overall scale. These findings support the 3-factor structure of the scale, establishing it as a valid and reliable instrument for use in the Turkish population (Table 3).

The Correlation Between the Scales Used

Upon examining the correlation coefficients between the scales, a positive relationship was observed between the HCQ-difficulty coping with illness subscale and the subscale scores of the other scales, except for the FIVE-ARF's fears of contamination and illness and fears of social distancing (Table 4). Given that concerns about contamination, illness, and social distancing are common stressors during the pandemic, the widespread perception of difficulty in coping with the COVID-19 outbreak, which resulted in high scores among participants, may account for the absence of a correlation. However, it can be interpreted that virus-related behaviors are concentrated in people who have more difficulties in coping. All analyses were repeated using Spearmen correlations, and no different results were observed. All results of the non-parametric correlation analysis are presented in Table 4.

Group Comparisons According to Depression Anxiety Stress Scale-21 Subscale Scores

Groups with and without psychological distress were compared using only the proposed cut-off points for the Turkish version of the DASS-21.[26,27] Participants with higher psychological distress (above the cut-off scores) scored significantly higher on all FIVE-ARF subscales, including fears about contamination and illness, social distancing concerns, and virus-related behaviors. These results confirm that individuals experiencing more significant psychological distress are more prone to elevated fears and

Table 2. Participant Scores on the Scales Used in the Current Study

	n	Mean	SD	Median	IQR	Min	Max
DASS-21 depression	466	6.40	5.79	5.00	9.00	0	21
DASS-21 anxiety	466	4.10	4.53	2.00	5.00	0	21
DASS-21 stress	466	6.62	5.82	6.00	8.00	0	21
CBPQ cognitive process	466	32.70	12.03	32.00	14.00	0	64
CBPQ behavioral process	466	23.77	11.07	24.00	14.00	0	56
HCQ difficulty coping with illness	466	24.81	5.22	25.00	5.00	8	38
HCQ medical services inadequacy	466	11.20	2.77	11.00	3.00	4	20
HCQ awfulness of illness	466	12.90	3.75	13.00	6.00	4	20
HCQ perceived likelihood of illness	466	12.15	3.80	12.00	5.00	4	20
FIVE-ARF fears about contamination and illness	466	21.17	6.55	20.00	9.50	9	36
FIVE-ARF fears about social distancing	466	21.20	7.82	20.00	12.00	10	40
FIVE-ARF behaviors related to illness and virus fears	466	37.03	7.43	37.00	10.00	14	56
FIVE-ARF impact of illness and virus fears	466	4.45	1.98	4.00	3.00	2	8

CBPQ, Cognitive and Behavioral Processes Questionnaire; DASS-21, Depression Anxiety Stress Scale-21; FIVE-ARF, Fear of Illness and Virus Evaluation-Adult Report Form; HCQ, Health Cognitions Questionnaire; IQR, interquartile range; SD, standard deviation.

Table 3. Factor Loadings, Eigen Values, Commonalities, Distribution of Explained Variances, Internal Consistency Coefficients, Corrected Item-Total Correlation Coefficients, Item-Total Correlations When Items Are Removed

	Behaviors Related to Illness and Virus Fears	Fears about Social Distancing	Fears about Contamination and Illness	Commonality (h^2)	Corrected Item-Total Correlation Coefficients	Item-Total Correlations When Items Are Removed
Item 1	0.061	−0.061	**0.806**	0.636	0.728	0.889
Item 2	−0.038	−0.038	**0.870**	0.702	0.751	0.888
Item 3	−0.077	0.000	**0.727**	0.496	0.616	0.895
Item 4	−0.035	−0.016	**0.814**	0.632	0.717	0.889
Item 5	−0.052	0.211	**0.320**	0.132	0.398	0.909
Item 6	0.170	0.154	**0.493**	0.446	0.659	0.893
Item 7	0.160	0.159	**0.517**	0.476	0.680	0.891
Item 8	0.143	0.259	**0.472**	0.505	0.689	0.891
Item 9	0.152	0.191	**0.496**	0.472	0.657	0.893
Item 10	−0.043	**0.789**	−0.007	0.603	0.703	0.892
Item 11	−0.016	**0.830**	−0.012	0.674	0.749	0.890
Item 12	−0.015	**0.735**	−0.133	0.450	0.611	0.898
Item 13	0.044	**0.814**	−0.070	0.623	0.715	0.892
Item 14	0.005	**0.531**	0.129	0.373	0.611	0.898
Item 15	0.044	**0.604**	0.169	0.521	0.661	0.895
Item 16	-0.051	**0.648**	0.223	0.604	0.728	0.891
Item 17	0.006	**0.697**	−0.015	0.476	0.654	0.896
Item 18	0.044	**0.484**	0.150	0.351	0.594	0.899
Item 19	0.033	**0.478**	0.168	0.354	0.585	0.900
Item 20	**0.353**	0.023	0.082	0.157	0.397	0.763
Item 21	**0.382**	0.072	0.170	0.169	0.383	0.765
Item 22	**0.345**	0.184	0.044	0.152	0.346	0.784
Item 23	**0.357**	0.035	−0.023	0.129	0.316	0.772
Item 24	**0.630**	−0.012	−0.045	0.377	0.540	0.749
Item 25	**0.779**	−0.012	−0.106	0.559	0.597	0.744
Item 26	**0.678**	−0.002	0.026	0.472	0.560	0.748
Item 27	**0.602**	−0.018	0.137	0.430	0.527	0.751
Item 28	**0.639**	−0.019	0.056	0.409	0.512	0.756
Item 29	**0.541**	0.007	0.071	0.326	0.441	0.760
Item 30	**0.509**	0.132	−0.051	0.285	0.417	0.762
Item 31	**0.334**	0.160	−0.079	0.139	0.317	0.777
Item 32	**0.307**	0.016	0.186	0.174	0.398	0.763
Item 33	**0.317**	0.178	−0.123	0.137	0.335	0.793
Item 34	0.089	0.162	**0.550**	0.472	0.638	0.894
Item 35	0.016	0.278	**0.449**	0.420	0.582	0.897
Eigen value	10.1	3.4	2.1			
Explained variance	31.1	10.4	6.4	44.5[a]		
Internal consistency coefficients (Cronbach's α)	0.777	0.905	0.902	0.916[aa]		

Items loaded on the factors are indicated in bold.
[a]Total variance explained by the whole scale.
[aa]Internal consistency of the whole scale.

Table 4. Examination of the Relations Between the Scales

	DASS-21 Depression	DASS-21 Anxiety	DASS-21 Stress	CBPQ Cognitive Process	CBPQ Behavioral Process	HCQ Difficulty Coping with Illness	HCQ Medical Services Inadequacy	HCQ Awfulness of Illness	HCQ Perceived Likelihood of Illness
FIVE-ARF Fears about contamination and illness	$r = 0.450^{***}$ $P < .001$	$r = 0.490^{***}$ $P < .001$	$r = 0.540^{***}$ $P < 0.001$	$r = 0.300^{***}$ $P < .001$	$r = 0.360^{***}$ $P < .001$	$r = 0.030$ $P = .096$	$r = 0.220^{***}$ $P < .001$	$r = 0.510^{***}$ $P < .001$	$r = 0.360^{***}$ $P < .001$
	$r = 0.488^{***}$ $P < .001$	$r = 0.498^{***}$ $P < .001$	$r = 0.549^{***}$ $P < .001$	$r = 0.293^{***}$ $P < .001$	$r = 0.361^{***}$ $P < .001$	$r = -0.070$ $P = .078$	$r = 0.165^{***}$ $P < .001$	$r = 0.484^{***}$ $P < .001$	$r = 0.325^{***}$ $P < .001$
FIVE-ARF fears about social distancing	$r = 0.480^{***}$ $P < .001$	$r = 0.460^{***}$ $P < .001$	$r = 0.510^{***}$ $P < .001$	$r = 0.260^{***}$ $P < .001$	$r = 0.310^{***}$ $P < .001$	$r = 0.050$ $P = .081$	$r = 0.160^{***}$ $P < .001$	$r = 0.320^{***}$ $P < .001$	$r = 0.240^{***}$ $P < .001$
	$r = 0.482^{***}$ $P < .001$	$r = 0.426^{***}$ $P < .001$	$r = 0.493^{***}$ $P < .001$	$r = 0.277^{***}$ $P < .001$	$r = 0.318^{***}$ $P < .001$	$r = 0.038$ $P = .072$	$r = 0.163^{***}$ $P < .001$	$r = 0.313^{***}$ $P < .001$	$r = 0.227^{***}$ $P < .001$
FIVE-ARF behaviors related to illness and virus fears	$r = 0.190^{***}$ $P < .001$	$r = 0.170^{***}$ $P < .001$	$r = 0.230^{***}$ $P < .001$	$r = 0.150^{***}$ $P < .001$	$r = 0.210^{***}$ $P < .001$	$r = 0.200^{***}$ $P < .001$	$r = 0.210^{***}$ $P < .001$	$r = 0.270^{***}$ $P < .001$	$r = 0.220^{***}$ $P < .001$
	$r = 0.197^{***}$ $P < .001$	$r = 0.208^{***}$ $P < .001$	$r = 0.248^{***}$ $P < .001$	$r = 0.106^{*}$ $P < .05$	$r = 0.178$ $P = .125$	$r = 0.107^{*}$ $P < .05$	$r = 0.116^{*}$ $P < .05$	$r = 0.226^{***}$ $P < .001$	$r = 0.173^{***}$ $P < .001$

Pearson correlation coefficients and statistical significance are presented in the upper row. In the lower row, results for the Spearman correlation coefficients and statistical significance are presented.
CBPQ, Cognitive and Behavioral Process Questionnaire; DASS-21, Depression Anxiety Stress Scale-21; HCQ, Health Cognitions Questionnaire; FIVE-ARF, Fear of Illness and Virus Evaluation-Adult Report Form; *r*, correlation coefficient.
* p < 0.001.
*** p < 0.0001.

behaviors related to COVID-19. The analysis was verified using non-parametric tests to ensure consistency, and no differences were observed compared to the parametric results. The simplified Table 5 presents these findings using only the proposed cut-off points.

The Confirmatory Factor Analysis Findings

The CFA results demonstrate a strong 3-factor structure for the scale, supported by robust factor loadings and excellent model fit indices. Specifically, the factor loadings were 0.902 for "Fears about Contamination and Illness," 0.905 for "Fears about Social Distancing," and 0.777 for "Behaviors Related to Illness and Virus Fears," indicating high internal consistency and reliability. The model fit indices further validate the scale's structure, with a CFI of 0.92 and a TLI of 0.91, exceeding the 0.90 threshold for good model fit. Additionally, the RMSEA and the SRMR were 0.06 and 0.05, respectively, signifying a well-fitting model. These findings confirm that the scale is valid and reliable for assessing psychological dimensions related to fears of illness, contamination, and virus-related behaviors (Figure 1).

DISCUSSION

Despite extensive research on the prevalence of specific psychiatric disorders during the COVID-19 pandemic, little is known about how the pandemic affects a large population, how social distancing, fear of contamination and illness, virus-related behaviors, and health-related cognitions relate to all these factors. The present study aimed to investigate the cross-sectional level of fear of disease, contamination, virus, health-related cognitions, depression, anxiety, and stress levels and the validity and reliability of the FIVE-ARF in Turkish society.

When we look at the sociodemographic data of the participants regarding the epidemic period, the rate of those who were diagnosed with COVID-19 during the epidemic was 1.3%, the rate of those who lost a loved one was 5.6%, and those who received psychotherapy or drug treatment after the epidemic were 9%. The proportion of participants who lived in metropolitan cities was 51.3%, the proportion of those with a college degree was 61.2%, and the proportion of those who were away from their workplace/school because of the epidemic was 71.2%.

The validity and reliability analysis of the FIVE-ARF revealed a 3-factor structure consisting of fears of contamination and illness, fears of social distancing, and behaviors associated with illness and virus fears. The scale demonstrated strong internal consistency (Cronbach $\alpha = 0.916$) and is a 35-item self-report Likert-type tool suitable for use within the Turkish population. The subtitles in the scale form are essential in bringing together and evaluating the fears and behaviors frequently observed during the pandemic. To demonstrate the effects

Table 5. Group Comparisons According to DASS-21 Subscale Scores for FIVE-ARF Subscales

Comparison Category	DASS-21 Subscales (Cut-Off Scores/(+) Group n)	FIVE-ARF Subscales	Psychological Distress (+) Group	Psychological Distress (−) Group	*P*
Mean scores of the Turkish DASS-21	Depression (≥11/n=103)	Fears about contamination and illness	30.85 ± 7.55	24.14 ± 7.37	<.001
			31.00 (12.25)	23.00 (10.00)	<.001
		Fears about social distancing	26.88 ± 8.07	19.57 ± 6.95	<.001
			27.00 (12.00)	18.00 (10.00)	<.001
		Behaviors related to illness and virus fears	39.25 ± 8.20	36.41 ± 7.09	<.001
			40.50 (11.25)	37.00 (10.00)	<.001
	Anxiety (≥11/n=55)	Fears about contamination and illness	33.04 ± 7.98	24.63 ± 7.36	<.001
			32.00 (15.00)	24.00 (11.00)	<.001
		Fears about social distancing	28.91 ± 8.53	20.16 ± 7.12	<.001
			30.00 (15.00)	19.00 (11.00)	<.001
		Behaviours related to illness and virus fears	40.38 ± 8.37	36.59 ± 7.19	<.001
			41.00 (10.00)	37.00 (10.00)	<.001
	Stress (≥12/n=99)	Fears about contamination and illness	32.30 ± 7.55	23.82 ± 6.99	<.001
			32.00 (14.00)	22.00 (10.00)	<.001
		Fears about social distancing	27.81 ± 8.00	19.40 ± 6.74	<.001
			29.00 (11.00)	18.00 (10.00)	<.001
		Behaviors related to illness and virus fears	40.16 ± 8.01	36.19 ± 7.04	<.001
			42.00 (10.00)	37.00 (9.00)	<.001
Recommended cut-off scores	Depression (≥10/n=123)	Fears about contamination and illness	30.09 ± 7.74	24.02 ± 7.34	<.001
			30.00 (13.00)	22.00 (10.00)	<.001
		Fears about social distancing	25.94 ± 8.08	19.49 ± 6.98	<.001
			26.00 (13.25)	18.00 (10.00)	<.001
		Behaviors related to illness and virus fears	38.99 ± 7.83	36.34 ± 7.17	<.001
			40.00 (11.00)	37.00 (10.00)	<.001
	Anxiety (≥8/n=88)	Fears about contamination and illness	31.58 ± 8.03	24.23 ± 7.22	<.001
			32.00 (13.75)	23.00 (10.00)	<.001
		Fears about social distancing	27.01 ± 8.22	19.84 ± 7.07	<.001
			27.50 (13.50)	19.00 (10.00)	<.001
		Behaviors related to illness and virus fears	39.23 ± 8.31	36.52 ± 7.13	.002
			40.00 (10.75)	37.00 (10.00)	<.001
	Stress (≥15n=58)	Fears about contamination and illness	32.84 ± 7.83	24.59 ± 7.37	<.001
			32.50 (14.25)	24.00 (11.00)	<.001
		Fears about social distancing	28.38 ± 8.60	20.17 ± 7.14	<.001
			29.50 (15.00)	19.00 (9.00)	<.001
		Behaviors related to illness and virus fears	39.47 ± 8.75	36.69 ± 7.17	.008
			41.50 (12.00)	37.00 (10.00)	<.001

In the upper rows, resulted are presented as mean ± standard deviation and in the lower rows results are presented as median (interquartile range).
DASS-21, Depression Anxiety Stress Scale-21; FIVE-ARF, Fear of Ilness and Virus Evaluation-Adult Report Form.

of the COVID-19 pandemic on people's mental health are listed by Banerjee identifies several factors contributing to fear and anxiety: concerns about facing another epidemic worries about financial stability due to travel and social restrictions, fear of leaving home, anxiety linked to social and physical distancing, which reduces contact with distant family and friends, and a sense of insecurity for oneself and loved ones. Additional stressors include heightened anxiety over symptoms like coughing or sneezing, the compulsion to stock up on items such as antibiotics, painkillers, anti-allergy medications, face masks, and disinfectants, as well as the increasing psychological strain amplified by various

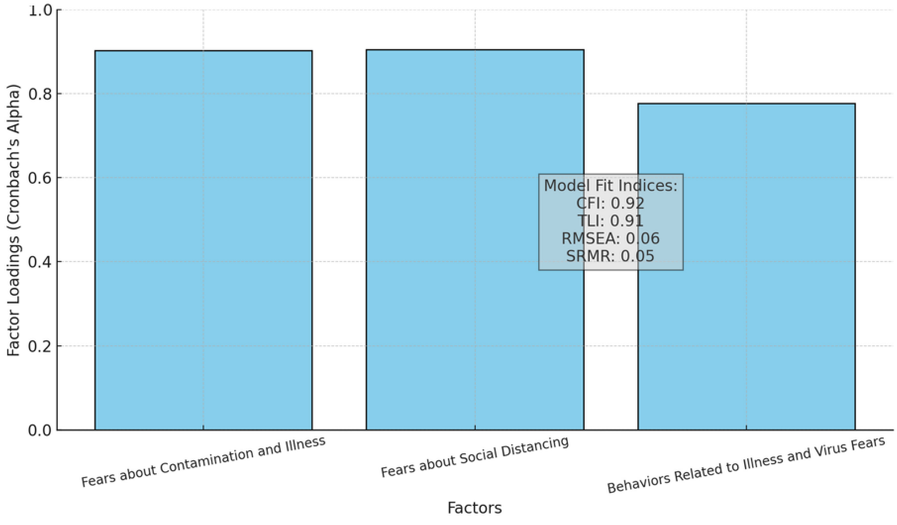

Figure 1. The confirmatory factor analysis findings.

media platforms.[28] The items in the scale form similarly reflect the common fears and anxieties seen based on society during the pandemic. In this respect, it can be said that it is a practical and comprehensive assessment tool.

The correlation analysis between the scales revealed that as fears of contamination and illness, social distancing concerns, and behaviors related to illness and viruses increased, there was a corresponding rise in dysfunctional cognitive and behavioral strategies, as well as heightened levels of anxiety, stress, and depression. In addition, health-related cognitions were positively related to the frightfulness of illness, the inadequacy of medical services, perceived likelihood of illness, fear of contagion and illness, fear of social distancing, illness-related behaviors, and fear of viruses. Although many factors affect stress and anxiety levels, health-related factors come first. Knowing the anxiety and stress perception that may arise during the epidemic is essential for the spread and control of the epidemic. It is thought that the fear of contagion and getting sick may lead to feeling more anxious about hygiene and may pave the way for the development of anxiety disorders in mentally sensitive people.[29]

When examining the correlation between the scales, a positive correlation was found between the subscales of the other scales, except for the subscales of the HCQ, Difficulty Coping with Illness, and the subscales of the FIVE-ARF (Fears of Infection and Illness, Fears of Social Distancing, Behaviors Related to Illness, and Fears of Viruses). Considering the pandemic process, fears about contamination and illness, as well as social distancing, are a source of concern for the general population. The fact that the thought of the difficulty in coping with the disease is thought to be caused by the COVID-19 epidemic and the high overall score of the participants may explain the lack of a correlation. However, it can be interpreted that virus-related behaviors are concentrated in people who have more difficulties in coping.

It was found that individuals with higher levels of depression, anxiety, and stress exhibited significantly lower fears related to contamination and illness, social distancing, and virus-related behaviors compared to those with lower levels of depression, anxiety, and stress. Psychosocial factors such as disrupting their usual activities, routines, and livelihoods are likely to increase depression, anxiety, and stress levels, especially during social isolation.[30] The fact that 71.2% of the participants in our study were away from their work/education due to the epidemic may also contribute to the increase in depression, anxiety, and stress levels.

Teaching methods such as behavioral activation, acceptance-based coping, awareness practices, advocacy steps such as adding meaning to the epidemic process of individuals, increasing their tolerance to stress, strengthening social support resources, and taking goal-oriented goals and steps will make it easier to deal with problems such as uncertainty brought by the process, economic problems, loneliness, isolation, and hopelessness. Finally, in addition to the adverse effects of the COVID-19 epidemic period, it is predicted that the so-called post-traumatic growth, people's ability to look at the negativities brought by stress and traumatic events more wisely after trauma, to learn lessons, to strengthen their relations with their loved ones, to accept against the uncertainties brought by life and open to new experiences, to be resistant to strain.[31]

The EFA conducted in this study revealed several noteworthy issues related to the psychometric properties of the FIVE-ARF. Specifically, item 5 demonstrated a low communality value ($h^2 = 0.132$) and a relatively weak factor loading, suggesting that this item does not contribute effectively

to the "Fears about Contamination and Illness" construct. Reliability analysis further indicated that removing item 5 would increase Cronbach's α from 0.902 to 0.909, signifying an improvement in the internal consistency of the subscale. This finding implies that item 5 may undermine the reliability of this dimension and warrants consideration for modification or removal in future revisions of the scale. A similar pattern was observed in dimension 3, where several items showed suboptimal item-total correlations. The internal consistency coefficients for these items were lower compared to the other dimensions, possibly due to variations in how participants interpret virus-related behaviors. Such discrepancies might be explained by cultural or linguistic nuances that influence item comprehension, as well as the multidimensional nature of pandemic-related fears. Addressing these inconsistencies could involve revising or replacing problematic items to enhance the overall reliability and validity of the scale. It is essential to evaluate the trade-offs between content coverage and psychometric robustness to ensure the scale remains comprehensive and reliable.[32,33]

Another critical finding from the EFA is that the percentage of variance explained by the 3-factor model remains below 50%, specifically accounting for only 44.5% of the total variance. This suggests that the scale may not adequately capture a single overarching construct, or if it aims to measure multiple dimensions of fear and anxiety related to illness and viruses, it may lack comprehensive coverage. The relatively low explained variance indicates that there may be additional latent factors influencing responses that are not captured by the current factor structure. This limitation is particularly relevant for psychological scales, as a higher percentage of explained variance is typically desired to ensure the tool's adequacy in representing the underlying constructs. Further refinement of the scale, such as reevaluating and potentially revising or adding items, might be necessary to improve construct validity and ensure a more robust measurement model. Recent literature emphasizes that explained variance below 50% can hinder the practical applicability of a scale, especially in complex psychological constructs, and suggests that continuous validation efforts are essential for improving scale utility.[34,35]

The present research has several limitations. One major limitation is the demographic profile of our study, which consisted of a relatively young population with a high level of education. This may limit the generalizability of the results to the broader population, including older adults and individuals with lower education levels. Furthermore, the sample had a gender imbalance, with 65.66% of participants being female, which could also affect the generalizability of the findings and should be critically acknowledged. Considering their heightened susceptibility to COVID-19, further research is needed to explore mental health outcomes, particularly among older populations. Additionally, the low prevalence of participants diagnosed with COVID-19 in our study indicates a need for more targeted psychiatric research within this subgroup. The study's reliance on self-report scales, rather than evaluations by mental health professionals, presents another limitation, as it may have introduced bias or inaccuracies. The use of online data collection, while necessary due to pandemic restrictions, could have impacted the quality of the responses and limited the depth of assessment compared to in-person evaluations. Lastly, ethical requirements on confidentiality prevented the collection of personal contact information, making it impossible to conduct a test-retest study of the FIVE-ARF.

In summary, our study provides preliminary evidence that the FIVE-ARF may be a valid and reliable tool for assessing the psychological impact of the COVID-19 pandemic within Turkish society. It shows potential for helping to identify mental health care needs in non-clinical populations, including individuals who have not received a formal diagnosis. However, the results should be interpreted cautiously, as the findings are not definitive and require further validation. Our observations suggest that addressing depression, anxiety, stress, fears related to social distancing and contamination, and dysfunctional cognitive and behavioral strategies remains important. Psychotherapeutic interventions, such as cognitive-behavioral therapy, could be beneficial, especially when adapted for remote delivery methods like telepsychiatry and artificial intelligence applications, given the ongoing risk of disease transmission. Future research should explore the mental health effects of the pandemic on special populations, such as children, adolescents, and older adults, and consider introducing and validating additional scales for diverse groups in Turkish society.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author upon reasonable request.

Ethics Committee Approval: This study was approved by the Ethics Committee of Sakarya University (Approval no.: 715224073/050.01.04/502, Date: 22/09/2020).

Informed Consent: Informed consent was obtained from the patients who agreed to take part in the study.

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