Reliability and Validity Study of the Turkish Version of the COVID-19 Peritraumatic Distress Index

ABSTRACT

Objective: The Coronavirus Disease 2019 (COVID-19) pandemic, affecting people worldwide, negatively affects the mental health of people. During this situation, accurate and reliable tools are needed to evaluate mental state. The aim of this study was to translate the COVID-19 Peritraumatic Distress Index (CPDI) into Turkish, and analyze it for validity and reliability.

Methods: The original form of the CPDI was translated into Turkish using the back translation method. It was then applied to over 400 individuals, randomly selected from patients and their relatives, between the ages of 18 and 70, who presented to the outpatient clinics of Mustafa Kemal University Research Hospital. Data were collected with a demographic data form. Exploratory and confirmatory factor analyses were done. Construct validity, item content validity index, and content validity were analyzed. Cronbach's alpha vs. Spearman-Brown reliability analyses were done.

Results: Cronbach's alpha coefficient for the CPDI was found to be 0.842, which is quite high. Cronbach's alpha coefficient for the subscales ranged from 0.670 to 0.780. The Spearman-Brown reliability coefficient was 0.730. The confirmatory factor analysis revealed good fit indices (χ^2/df = 1.94; root mean square error of approximation = 0.05; Comparative Fit Index = 0.93; Adjusted Goodness of Fit Index and Tucker-Lewis Index = 0.91). The mean total score was 27.26 (SD = 12.28), while the mean subscale scores ranged from 4.83 to 10.26.

Conclusion: The Turkish version of the CPDI is valid and reliable, and can be used in studies evaluating the COVID-19 peritraumatic stress.

Keywords: COVID-19, trauma, traumatic stress disorders, validity, reliability

Introduction

The Coronavirus Disease 2019 (COVID-19), one of the most severe pandemics the world has faced, was first announced as a new viral pneumonia by the World Health Organization on December 31, 2019. The epidemic has quickly spread worldwide. With 134 957 021 confirmed cases and 2 918 752 deaths worldwide, COVID-19 has been declared a severe public health emergency.[1] In Turkey, the first case was registered on March 11, 2020, and there have been 3 849 011 cases as of April 11, 2021, and a total of 33 939 individuals have died.[2]

As in several countries, certain steps have been taken in Turkey, such as restrictions on going out of the home and on intercity travel, mandatory flexible employment, closure of schools, care of all coronavirus patients, and treatment of symptoms with free diagnostic testing.[3]

The COVID-19 has been shown to affect the respiratory, cardiovascular, and nervous systems.[4] Around the world, scientists have concentrated on the diagnostic and therapeutic aspects of COVID-19 therapy. There are an increasing number of studies about the physical effects of COVID-19, while on the other hand, there are only a limited number of studies on the psychological impact of COVID-19.[5,6]

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In previous studies about flu epidemics, critical and long-lasting psychological effects were demonstrated among the community and health workers. The COVID-19 pandemic has induced fear and anxiety in almost all people due to its unknown and pandemic nature.[7] It is thought that many people in Turkey, as well as all over the world, have also been psychologically affected by the epidemic. In an online survey conducted with 518 COVID-19 patients, it was found that 16.6% of the patients in Turkey had depression.[8]

In another study, it was shown that emotional trauma was related to anxiety, fear, and depression in individuals with experience of confirmed or suspected viral infection.[9] In China, in a study on 52 730 people, 35% of the participants had symptoms of peritraumatic distress.[10] In an Italian study which focused on the mental health status of the general population during the lockdown period, sampling 18 147 individuals, 37.1% of the respondents had high posttraumatic stress values and 20.8% had severe anxiety symptoms.[11]

Measuring psychological distress in the early phases of a natural disaster, such as phase one of a pandemic, plays an important role in predicting and preventing the development of post-traumatic stress disorder (PTSD) later in life.[12]

Symptoms of peritraumatic distress, seen in responses such as behaviors, emotions, thoughts, and other stress-related symptoms (e.g. fear of losing control and/or dying, dissociative symptoms, tachycardia, dizziness) can be seen during the course of the traumatic situation, immediately, or with a slight delay. Peritraumatic distress can be assumed as an important predictor for PTSD.[13]

To determine and measure peritraumatic distress during a pandemic crisis, an accurate instrument, which is brief and simple to apply, is greatly required. The COVID-19 Peritraumatic Distress Index (CPDI) is an online practical compilation tool (10 minutes) that is easy to use. There is no equivalent Turkish tool to determine the peritraumatic distress associated with COVID-19 in our country. The aim of this study is to translate the COVID-19 CPDI developed by Qiu et al[10] in China into Turkish, and test its reliability and validity, in order to provide an instrument that measures the emotional effects related to COVID-19 in Turkey.

Methods

Study Design and Sample Size
The purpose of this methodological study is to adapt the COVID-19 CPDI scale to Turkish and to evaluate its validity and reliability.

MAIN POINTS

- An instrument that measures the emotional effects related to COVID-19 is needed.
- COVID-19 Coronavirus Peritraumatic Distress Index (CPDI) is translated into Turkish, and tested for its reliability and validity.
- It is found that The Turkish version of the COVID-19 CPDI is valid and reliable, and can be used to measure the level of COVID-19-induced anxiety, depression, specific phobias, physical symptoms and loss of social functions.
- This study shows that CPDI can be used safely in studies evaluating the COVID-19 peritraumatic stress.

Participants were between the ages of 18 and 70, and they were among the patients and their relatives at the outpatient clinics of Hatay Mustafa Kemal University Research Hospital. A simple randomization method was used to include participants. The study was conducted between November 2020 and February 2021. All participants filled an informed consent form. While collecting the datasheets, a self-administered questionnaire method was used. Ethical approval for this study was received from Hatay Mustafa Kemal University Ethics Committee on October 22, 2020 (no: 2020/124). Permission was then obtained from the authors who developed the CPDI to translate the scale into Turkish and to conduct validity and reliability analyses.

The population of this study was comprised of the patients and their relatives who applied to the outpatient clinics of Hatay Mustafa Kemal University Training and Research Hospital in the last year. Previous studies have demonstrated that the prevalence of traumatic stress in society was 0.35.[10,12] The sample size in our study to represent the population was calculated as 350, using the equation $(p(1-p)\left(\dfrac{z}{E}\right)^2 E: desired\ margin\ of\ error)$.[14] A total of 400 individuals were reached and analyzed.

Data Collection Tools
The participants completed an information form comprising 2 parts. In the first part, the authors aimed to determine the sociodemographic characteristics of patients and their relatives using questions they prepared in line with the literature. The second part consisted of the translated form of the CPDI scale in Turkish. The CPDI scale was developed by Qui et al.[10] The original scale comprises 24 items and has 4 domains: negative mood (5 items), changes in behavior and cognitive abilities (7 items), fatigue and hyperreactivity (7 items), and somatization (5 items).[15] According to the authors, the total score ranges from 0 to 96. A score between 28 and 51 indicates mild to moderate distress, and a score of 52 and above indicates severe distress. The CPDI scale has already been adapted in Iran, Peru, and China.[15,16] It has also been applied in Nepal, Brazil, India, and Italy.[17-19]

Process

Adaptation of CPDI to Turkish and Content Validity
Language Validity: First, the scale questions were translated into Turkish by an expert whose native language is Turkish and whose second language is English. In the second step, the Turkish version was back-translated into English by an expert whose native language is English and who is fluent in Turkish. In the third step, the consistency between the original scale items and the items obtained by back translation were checked by an expert whose native language is English. It was determined that the translation and the original scale were compatible. In the final step, the Turkish form of the scale was applied to 30 people as a pilot, and feedback was received in terms of comprehensibility, perception, and rationality of the questions. The Turkish CPDI scale which we obtained was then applied to all participants because the feedback received demonstrated that the questions were clear and perceptible.[20]

For the content validity assessment of the scale, we consulted 7 specialist physicians from the psychiatry branch and 3 from the infectious diseases branch. The physicians evaluated the questions in the scale translated them into Turkish. For each item, they were asked to select

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one of 4 options: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant. Then the item content validity index (I-CVI) was calculated for each item.[21] Items scoring 3 or 4 were recoded as relevant and items scoring 1 or 2 as not relevant. The I-CVI value was calculated as the number of experts giving a rating of "relevant" for each item, divided by the total number of experts. Items with an I-CVI value between 0.80 and 1 remained on the scale, while items with an I-CVI value of 0.80 were excluded from the scale.[22]

Statistical Analysis

The structural validity of the psychometric properties of the CPDI scale translated into Turkish was examined using the explanatory and confirmatory factor analyses (CFA). Principal component analysis (PCA) and varimax rotation were used in the explanatory factor analysis. In the CFA, a cut-off of ≤0.08 for root mean square error of approximation (RMSEA) and >0.90 for the Goodness of Fit Index (GFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI) were acceptable fit indicators.[23,24] All univariate analyses and the explanatory factor analysis were performed using SPSS version 23.0 (IBM Corp., Armonk, NY, USA) CFA was performed using SPSS AMOS package, Version 22.0 (IBM Corp., Armonk, NY, USA). A two-sided P value of <.05 was considered to be statistically significant.

Values of Cronbach's alpha, which is an internal consistency coefficient, were calculated for the scale and its sub-dimensions while performing the reliability analysis. The Spearman-Brown test for split-half reliability and the intraclass correlation coefficient (ICC) analysis for test-retest reliability were performed. Test-retest was performed by retesting 120 participants, corresponding to 30% of the sample, 2 weeks after the first test. In the test-retest review, the issue of changes in the CPDI index over time was analyzed. The calculated ICC value of >0.70 was sufficient to show that the CPDI index did not change over time. The internal consistency and reliability of the items of the index were analyzed using the Spearman-Brown split-half methods.[25]

Results

Sample Identifying Findings

The mean age of the study sample was 39.17 (SD = 13.11), with the youngest individual being 18 years old and the oldest being 70 years old. Note that ~50% of the participants (49.3%) were women, more than two-thirds (76.5%) were married, and about two-thirds (70%) had children. A quarter of the participants were working as laborers and civil servants, and >50% lived in the town. Approximately two-fifths were primary school graduates, and one-third were high school graduates. About two-thirds were COVID-19 contacts, and only 1 in 20 received psychological support during the pandemic (Table 1).

With the evaluations of specialist physicians, the I-CVI was calculated for each item. There were 5 items with I-CVI values below 0.8. The I-CVI value of the fourth item was 0.5, the sixth item was 0.6, the seventh item was 0.4, the twenty-third item was 0.6, and the twenty-fourth item was 0.6, and these items were excluded from the scale. The original scale with 24 items was evaluated and the number of items brought to 19 after this stage.

Table 2 lists the factor loadings matrix of all items, Cronbach's alpha values at the subscale level, and descriptive statistics values. The results show that the scale has structural validity when factor loadings of the items in each factor are considered.

Table 1. Descriptive Information of the Participants

Feature	n (%)
Male	197 (49.3)
Female	203 (50.7)
18-30 years old	140 (35)
31-60 years old	220 (55)
60 + years old	40 (10)
Single	85 (21.3)
Married	306 (76.5)
Widow	9 (2.3)
Having children	280 (70.0)
Self-employed	58 (14.5)
Civil servant	94 (23.5)
Laborer	94 (23.5)
Farmer	10 (2.5)
Retired	42 (10.5)
Other	8 (2.0)
Province	167 (41.8)
Town	213 (53.5)
Rural	20 (5.0)
Not educated	18 (4.5)
Primary school	155 (38.8)
Middle school	84 (21.0)
High school	129 (32.3)
Bachelor's degree	14 (3.5)
COVID-19 contact	250 (62.5)
Smoker	86 (21.5)
Psychological support in the pandemic	20 (5.0)

Distribution Properties and Reliability Analysis of the Scale

Table 2 lists the mean, standard deviation, median, Cronbach's alpha value, and other reliability values of the CPDI and its sub-dimensions. The mean total score of the CPDI was 27.6 (SD = 12.28), and the median value was 26. The value for Cronbach's alpha was 0.842 for the CPDI. Moreover, the CPDI scale adapted to Turkish indicated factorization in 4 dimensions, similar to the original. Calculated at sub-dimensional level, Cronbach's alpha was 0.706 for "negative mood," 0.667 for "changes in behavior and cognitive abilities," 0.780 for "fatigue and hyper-reactivity," and 0.701 for the final domain "somatization." Cronbach's alpha values of the factors were between 0.667 and 0.780, and these values were above the desired level of 0.60.[26] Moreover, the test-retest ICC values of the scale were calculated as 0.723, which was above the acceptable level of 0.70.[25] The Spearman-Brown split-half reliability result (0.730) was at a level above the generally accepted value.

Validity Analysis Explanatory and Confirmatory Factor Analyses

Structural validity was first examined by the explanatory factor analysis. The Kaiser-Meyer-Olkin measure was 0.862 and provided adequacy for factor analysis. The determinant of the correlation matrix calculated to evaluate the feasibility of factor analysis was 43.3, and Bartlett's test of sphericity was significant (χ^2 = 1821.27; P < .001). These evaluations demonstrated that the model is suitable for explanatory and CFA. Factor extraction was performed using PCA and varimax rotation. Using the Kaiser Criterion (eigenvalues higher than 1) method, the number of subscales of the Turkish version of the CPDI was determined as 4, as in the original scale. In 4 dimensions

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Table 2. Reliability Analysis, Variance Extracted, and Factor Loading Matrix of the Turkish Version of the CPDI

Measures	Mean (SD)	Factor loads	Cronbach's α	Eigen values	VE
Factor I (Negative mood)	10.26 (3.77)		0.706	5.09	15.53
Item I	2.15 (1.37)	0.713			
Item 2	2.41 (1.41)	0.780			
Item 3	2.27 (1.42)	0.803			
Item 4	3.41 (0.93)	0.413			
Factor II (Changes in behavior and cognitive abilities)	6.11 (3.82)		0.667	1.61	29.71
Item 5	1.80 (1.40)	0.508			
Item 6	1.16 (1.31)	0.625			
Item 7	1.49 (1.34)	0.809			
Item 8	0.52 (0.92)	0.407			
Item 9	1.15 (1.29)	0.456			
Factor III (Fatigue and hyper-reactivity)	6.07 (4.70)		0.780	1.37	40.24
Item 10	0.75 (1.05)	0.415			
Item 11	1.91 (1.45)	0.689			
Item 12	1.12 (1.27)	0.707			
Item 13	1.24 (1.36)	0.753			
Item 14	1.04 (1.28)	0.737			
Factor IV (Somatization)	4.83 (3.93)		0.701	1.13	50.46
Item 15	0.76 (1.13)	0.470			
Item 16	0.90 (1.20)	0.401			
Item 17	1.60 (1.44)	0.771			
Item 18	0.81 (1.19)	0.632			
Item 19	0.74 (1.14)	0.442			
Total CPDI	27.6 (12.28)		0.842		
Test–Retest ICC: 0.723					
Spearman–Brown split-half reliability: 0.730					

ICC, intra-class correlation coefficient; SD, standart deviation; VE, variance extracted.

obtained by exploratory factor analysis, 50.46% of the total variance was explained (Table 2).

CFA was performed in the second step of the construct validity analysis. The P values obtained from the t-values of all items were significant ($P < .05$). While evaluating the results of CFA on the model, which was established without making any changes in the number of dimensions in the original scale, many different criteria were considered. The results of CFA were compared using the cut-off values suggested by Ahmad et al[26] (Table 3). The value of $\chi^2/df = 1.94$ was below the acceptable value of 3. The RMSEA was 0.05, which was less than the acceptable level of 0.08. Similarly, GFI = 0.93, Adjusted Goodness of Fit Index (AGFI) = 0.91, CFI = 0.92, Tucker-Lewis Index (TLI) = 0.91, and NFI = 0.91, and these values were observed to be higher than the acceptable threshold of 0.90. These evaluations demonstrated that the fit outcomes of the CFA for Turkish CPDI were at an acceptable level, and the second stage of construct validity was sufficiently achieved.

Known Groups Validity
Univariate analysis demonstrated that the CPDI values of women and men were statistically significantly different ($P < .05$). The mean CPDI score of women (29.00 [SD = 12.47]) was significantly higher compared to the mean CPDI score of men (25.46 [SD = 11.85]). The CPDI scores of primary and middle school graduates were significantly lower compared to those of high school graduates ($P < .05$).

Discussion

The psychological, social, and neuroscientific aspects of the COVID-19 outbreak that emerged in December 2019 and turned into a global health crisis require to be addressed in more detail.[27] The authors adapted the CPDI to Turkish and analyzed it for its validity and reliability. This index will meet the requirement to measure the post-traumatic stress levels caused by the pandemic in the Turkish society. The psychometric properties of the CPDI scale were evaluated from 3 aspects: validity, reliability, and scores of the Turkish CPDI scale.

The authors collected the information forms from 400 individuals, calculating that the sample large enough to represent the society of individuals exposed to traumatic stress would be 350. In scale development studies, the literature suggests that it is necessary to reach 5-10-fold more individuals than the number of items on the scale.[28] The sample size of this study was large enough for both approaches.

The Turkish version of the CPDI scale contains 19 items and comprises 4 domains, as in the original scale. The mean total score is 27.6 (SD = 12.28). The mean score of the original CPDI was 23.65 (SD = 15.45), which is lower than that of the Turkish CPDI.[10] The Iranian mean score was 34.54 (SD = 14.92), and the Indian mean score was 20.66 (SD = 12.03).[16,18]

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Table 3. Analysis Assessing the Differences in Mean Scores on the Total Score of the CPDI Turkish Version, According to Basic Participant Characteristics (n = 400)

Feature	n	Mean (SD)	Range	P
Male	197	25.46 (11.85)	2-66	.004
Female	203	29.00 (12.47)	3-60	
18-30 years old	140	26.80 (12.03)	2-58	.237
31-60 years old	220	27.02 (12.46)	2-66	
60 + years old	40	30.15 (12.11)	6-60	
Single	85	29.59 (12.98)	5-58	.132
Married	306	26.58 (11.99)	2-66	
Widow	9	28.22 (14.18)	14-48	
Having children	280	26.98 (12.20)	2-66	.492
No children	120	27.90 (12.52)	5-62	
Self-employed	58	23.67 (12.36)	5-66	.102
Civil servant	94	27.96 (11.48)	2-57	
Laborer	94	29.29 (12.55)	5-62	
Farmer	10	23.60 (14.65)	4-47	
Retired	42	28.19 (12.62)	6-56	
Other	8	21.75 (7.78)	10-32	
Unemployed	94	27.17 (12.33)	2-60	
Province	167	28.55 (12.85)	5-66	.181
Town	213	26.45 (11.82)	2-60	
Rural	20	25.05 (11.84)	4-48	
Not educated	18	31.67 (13.47)	3-60	.041
Primary school	155	25.74 (11.32)	2-56	
Middle school	84	25.27 (11.57)	8-66	
High school	129	29.67 (13.44)	2-62	
Bachelor's degree	14	28.29 (10.36)	8-42	
COVID-19 contact	250	27.82 (12.45)	3-66	.232
COVID-19 no contact	150	26.31 (11.98)	2-57	
Smoker	86	29.47 (13.38)	5-66	.060
Non smoker	314	26.65 (11.92)	2-60	
Psychological support in the pandemic	20	30.95 (15.71)	4-56	.168
No Psychological support in the pandemic	380	27.06 (12.07)	2-66	

Range: min-max.

Validity Analysis

Explanatory and confirmatory factor analyses were used for the validity analysis of the scale. The items of the scale were analyzed using another validity analysis, the content validity (I-CVI). Because the I-CVI evaluation demonstrated that the values of items 4, 6, 7, 23, and 24 in the original scale were not sufficient, these items were excluded from the scale. The translation, adaptation, and expert validation study of the CPDI scale for the Peruvian language found the content validity output of item 7 as meaningless and excluded it from the scale.[15]
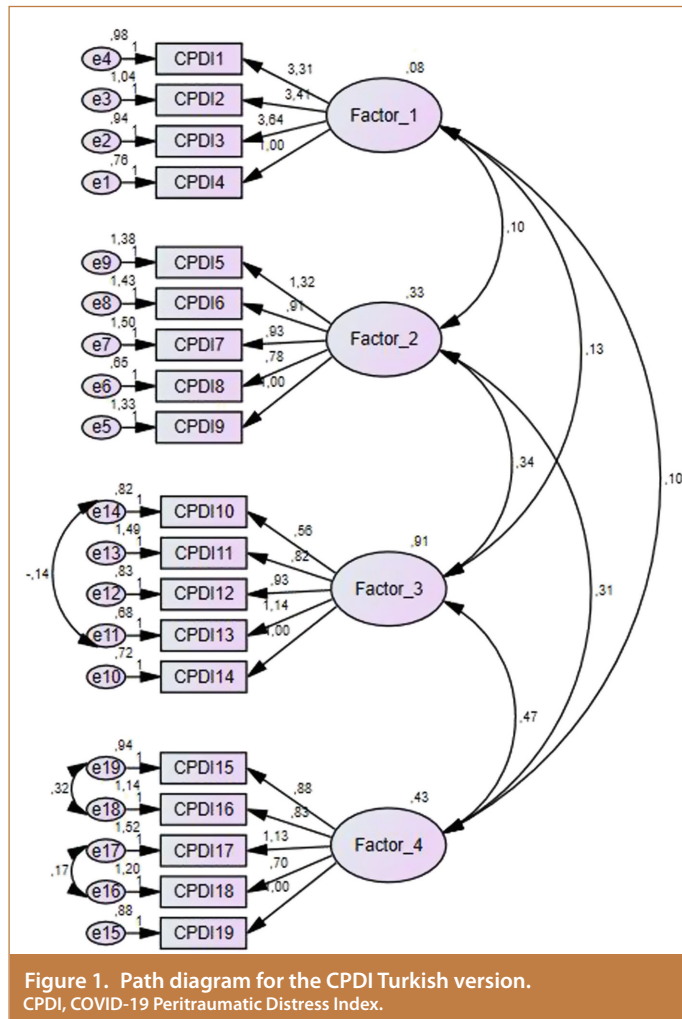
The explanatory factor analysis showed that the Turkish CPDI comprises 4 domains as in the original scale, and is compatible as a whole. Note that >50% of the total variance (50.46%) was explained, and the results were in line with the original scale (Table 2). In the literature of explanatory factor analysis, a variance between 40% and 60% is stated as acceptable.[29] Factor loadings are coefficients explaining the relationship of the items with the domains (factors). Factor loadings are expected to have high values in the domains to which they belong. The accepted view is that to say that an item measures a structure or a factor, the minimum magnitude of this factor load

should be 0.30. A negative factor load indicates that the relationship between the variable and the factor is in a negative direction.[25] In the Turkish version of the CPDI, all factor loads received positive values and the lowest factor load (401) belonged to the 16th item in the fourth dimension.

Table 4. Fit Indices of the Model

Fit Indices	Acceptable Fit	Model
Chi-square		278.14
P		.001
Chi-square/df	<3	1.94
RMSEA	0.08	0.05
GFI	>0.90	0.93
AGFI	>0.90	0.91
CFI	>0.90	0.92
TLI	>0.90	0.91
NFI	>0.90	0.91

AGFI, Adjusted Goodness of Fit Index; CFI, Comparative Fit Index; GFI, Goodness of Fit Index; NFI, Normed Fit Index; RMSEA, the root mean square error of approximation; TLI, Tucker-Lewis Index.

Figure 1. Path diagram for the CPDI Turkish version.
CPDI, COVID-19 Peritraumatic Distress Index.

CFA was performed on the CPDI to test the conformity of the conceptual structure determined by explanatory factor analysis to the measurement model. The χ^2/df value, which shows the model fit in the analysis performed on the CPDI scale adapted to Turkish, is below the acceptable range of 3.[1,9] Furthermore, the comparative goodness of fit (CFI = 0.92) was >0.90, and the suggested RMSEA value (0.05) was below the acceptable limit of 0.08.[26] The CFA results of the structure created according to the 3 sub-dimensions obtained from the explanatory factor analysis in the original scale show that the fit between the measurement model and the conceptual model is acceptable (Table 4). Moreover, all sub-dimensions of the scale were conceptually consistent with the structure they represented and could explain the structure of each sub-dimension harmoniously.

Reliability Analysis

The value of Cronbach's alpha calculated for the whole scale was 0.84. This result was slightly lower than Cronbach's alpha (0.95) calculated in the original scale. This was lower than Cronbach's alpha (0.92) in the validity and reliability study for the CPDI Peru and Cronbach's alpha in the Italian validity study (0.91).[12,15] While the first value for Cronbach's alpha calculated for the Turkish version of the original 24-item CPDI scale was 0.85, the value of Cronbach's alpha of the scale was 0.84 when 5 items with insufficient I-CVI were excluded from the scale. In the validity and reliability study of the CPDI scale conducted in Peru, no significant change was observed in Cronbach's

alpha value when item number 16 was removed from the scale.[15] Cronbach's alpha values obtained from the adaptation and reliability analysis of CPDI in different languages were reported to be >0.92 in the Italian version, 0.90 in the Nepalese version, 0.88 in the Hindi version, and 0.90 in the Persian version.[12,16-18] CPDI studies in India, Iran, and Italy were performed over the internet using online forms because of the pandemic. The fact that Cronbach's alpha values of online forms differ from printed survey analyses is an issue studied in the literature.[30] The Spearman-Brown split-half reliability value calculated for reliability was above acceptable limits. Test-retest reliability is the degree to which test scores remain unchanged when measuring a stable individual characteristic on different occasions. The test–retest value of the CPDI Turkish version was above the acceptable limits. Validity results showed that the scale provided generalizability and time invariance validity.

In our study, the mean scores of female participants were statistically significantly higher compared to men. As in our study, statistically significant differences were observed between men and women in terms of CPDI in the Italian version.[12] Literature data showing that women are more vulnerable to stress and are more likely to develop post-stress symptoms over time is in line with Chinese data.[10] While this study showed significant differences between the CPDI scores of the participants with different educational backgrounds, the Nepalese version demonstrated that the scores of these groups were at a similar level.[17]

There are some limitations to this study. The Turkish version of the CPDI differs from the original CPDI scale in terms of the number of items. While the original CPDI scale had 24 items, the Turkish version consisted of 19 items because of the validity and reliability analysis. Therefore, the original CPDI cut-off ratings (score between 28 and 51 indicating mild to moderate distress, and score ≥52 indicating severe distress) could not be used for the Turkish version.

The CPDI was evaluated in terms of reliability and construct validity after it was translated and adapted to Turkish, and concluded to be a valid tool for use in Turkey. The 19-item Turkish version of the CPDI can be safely used to measure the level of COVID-19-induced anxiety, depression, specific phobias, physical symptoms, and loss of social function.

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