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Validity and reliability of the Turkish version of the COVID-19 stress scale

Ibrahim Gundogmus[1], Taha Takmaz[2], Sabri Berkem Okten[3], Anil Gunduz[4]

¹Kırıkkale Yuksek Ihtisas Hospital, Department of Psychiatry, Kırıkkale, Turkey
²Bezmialem University Hospital, Department of Obstetrics and Gynecology, Istanbul, Turkey
³Acıbadem Kozyatağı Hospital, Department of Obstetrics and Gynecology, Istanbul, Turkey
⁴Kent University, Department of Clinical Psychology, Istanbul, Turkey

Abstract

It has been shown that the coronavirus disease 2019 (COVID-19) pandemic has negative effects on individuals' mental health. It has been seen that various measurement tools used in evaluating these effects tend to be uni-dimensional and have limited psychometric evaluation. This study aims to show the reliability and validity of the Turkish version of COVID Stress Scales (CSS), which evaluates the distress associated with COVID-19 in six different dimensions. The sample of the study consists of 457 volunteering adults who met the inclusion criteria via an online form. Sociodemographic data form, CSS, Depression-Anxiety-Stress Scale-21 (DASS-21), and Fear of COVID-19 Scale (FCS) were applied to the participants. The scale had a Cronbach alpha coefficient of 0.947. Total-item correlation coefficients of the scale items were found to range between 0.381 and 0.730 (p<0.01) and Cronbach's Alpha values were found to range between 0.944 and 0.946 if an item is reduced. Cronbach alpha coefficients of scale sub-dimensions were found as 0,849 for danger sub-dimension, as 0,896 for socio-economic consequences sub-dimension, as 0.916 for xenophobia sub-dimension, as 0.920 for contamination sub-dimension, as 0.882 for traumatic stress sub-dimension and as 0.804 for compulsive checking sub-dimension. Exploratory Factor Analysis and Confirmatory Factor Analysis applied while evaluating the factor structure of the CSS showed the reliability of the six-dimensional structure of the scale. A positive statistically significant association was found between CSS total and sub-scale scores and DASS-21 sub-scale and total scores and FCS (p<0.001). The present study shows that the Turkish version of CSS can be used reliably in both clinical practice and academic studies. Our results also show that the Turkish version of CSS has good psychometric properties.

Keywords: Coronavirus, COVID-19, COVID stress scale, validity, reliability, Turkish

Introduction

Coronavirus disease 2019 (COVID-19) is a novel, highly contagious respiratory disease with a high mortality rate which was declared as a pandemic by the World Health Organization [1]. Currently, approximately 344 million cases and 4.95 million confirmed deaths have been reported in the world; [2] while approximately 7.85 million cases and 69.112 deaths have been reported in Turkey [3]. In addition to the negative effects of the disease, the COVID-19 pandemic affects individuals negatively in many areas such as economy, nutrition, housing, social and physical functions [4]. It is also a known fact that it affects mental health negatively [5-7]. Disease anxiety, increased need for hygiene, quarantine, reorganization of interpersonal relations, social media/news follow-up, economic and social problems are some of the many factors that affect mental health [8-11].

In this context, it has become important to determine the nature and level of COVID-19 related negative psychological effects on both healthy and clinical populations.

Researchers have developed various measurement tools to evaluate the effects of COVID-19 on individuals' mental health [12-15]. However, it can be seen that these measurement tools be based on the limited psychometric evaluation [12-14]. It is noteworthy that these scales tend to evaluate only one aspect of COVID-19-related stress, such as fear, anxiety, phobia, and traumatic stress [12-15]. However, it is known that COVID-19 affects individuals in many ways. Therefore, "the COVID Stress Scales" (CSS) was developed by Taylor et al. who realized that there was a need for a multi-dimensional and reliable measurement tool in the evaluation of COVID-19 related stress and anxiety symptoms [16]. Following clinical observations and researches, CSS was developed to better understand and evaluate the COVID-19 related distress in six different areas as fear of contamination, fear of strangers who are likely to be infected (xenophobia related to the disease), socioeconomic problems related to the pandemic, search for control and assurance against pandemic-related threats, fear of contact with possibly contaminated objects or surfaces and

*Corresponding Author: Ibrahim Gundogmus, Kırıkkale Yuksek Ihtisas Hospital, Department of Psychiatry, Kırıkkale, Turkey, E-mail: dribrahim06@gmail.com

traumatic stress symptoms (such as nightmares) [10, 16, 17]. It is thought that this multi-dimensional scale fills an important gap in the literature. Therefore, it has become a necessity to adapt CSS into Turkish since there are limited numbers of measurement tools evaluating the mental effects of COVID-19 [13, 18].

This study aims to evaluate the psychometric properties of the Turkish version of CSS and to find out the factor structure, internal consistency, reliability, and validity of the scale.

Materials and Methods

Participants and Ethics

The sample of the present cross-sectional study consists of 457 volunteers who participated in the study between December 01 and 21, 2020 via an online form created by the researchers in line with the literature. The participants were invited to the study with Google Form Survey methods from social media platforms. Volunteers who completed the forms fully, who provided online consent, who were between 18 and 65 years of age, who had no known significant psychiatric diagnosis, and who had the cognitive capacity to fill in the surveys were included in the study. In addition, since the study focused on coronavirus stress levels, individuals who followed the coronavirus news and who thought on this news for the past two weeks were invited to the study.

Before starting the study, approval was obtained from Bezmialem Ethics Committee (IRB:2020 22/424) and all the stages of the study were carried out under the terms of the Declaration of Helsinki. The study was carried out under the coordination of Department of Psychiatry, Kırıkkale Yüksek İhtisas Hospital. Before data were collected from the participants, informed consent was obtained electronically. A blocking system was created over the electronic system to prevent repeated participation. All participants were provided with anonymity and confidentiality of their data, they were informed about the nature, purpose, and procedure of the study and about their right to withdraw their data whenever they wanted.

Data collection tools

Sociodemographic data form; was created by the researchers to evaluate the sociodemographic information of the participants such as age, gender, and socioeconomic status, following the aims of the study and in line with the literature.

The Covid Stress Scale (CSS); was developed by Taylor et al. to comprehensively determine the stress levels related to the Covid-19 pandemic after a theoretical review of the literature on the psychological aspects of the pandemic [16]. The scale is developed after participant interviews, expert evaluations, a comprehensive review of various valid scales, and psychometric analyses and consists of 36 items in which every 6 items represent one sub-dimension. These are 1; "Danger" (Items 1-6), 2; "Socio-economic consequences" (Items 7-12), 3; "Xenophobia" (Items 13-18), 4; "Contamination" (Items 19-24), 5; "Traumatic stress" (Items 25-30) and 6; "Compulsive checking" (Items 31-36). CSS is a self-report, Likert type scale in which the items are scored from 0 to 4. The total score ranges from 0 to 24 for the sub-scales and from 0 to 144 for the whole scale. Higher scores are associated

with higher stress levels. The scale was developed on a large sample from the United States of America and Canada [16].

The Depression-Anxiety-Stress Scale-21 (DASS-21); was developed to evaluate the depression, anxiety, and stress symptoms of the participants. The scale was developed in 1995 by Lovibond et al. [19]. The scale has three sub-scales of depression, anxiety, and stress which include 7 items each. The total number of items on the scale is 21 and it is a 4-Likert type self-report scale. Turkish validity and reliability study of the scale was conducted in 2018 [20].

The Fear of COVID-19 Scale (FCS); was developed by Ahorsu et al. in 2020 to find out Covid-19 related fears of the participants [12]. It is a 7-item, single dimension, 5 Likert-type self-report scale. The score ranges from 7 to 35. Higher scores from the scale show high Covid-19 related fears. Turkish validity and reliability study of the scale was conducted [18].

Study Design

Permission was taken from the developers of the scale for the Turkish validity and reliability study. Turkish translation of the scale was already done by the developers and obtained from their website as recommended. After the participants approved the informed consent form via the online system, they were asked to fill in a form including sociodemographic data form, CSS, DASS-21, and FCS. The forms obtained were examined and the participant forms which were planned to be excluded and those which were thought to be filled in incompletely and inappropriately were excluded from the study.

Statistical Analysis

SPSS statistical software version 22.0 for windows (IBM Corp) and AMOS 24 were used in the statistical analysis of the study. Descriptive statistics were presented as frequency and percentage for categorical variables and as mean and standard deviation for continuous variables. Item structures were evaluated with item mean, item-total correlation, and Cronbach's Alpha if Item Deleted. Internal consistency was tested with Cronbach's alpha. While evaluating the factor structure of CSS, the sample size was evaluated with Kaiser-Meyer-Olkin (KMO), while the association required for factor analysis between the items was evaluated with Barlett test. Structural validity of the Turkish version of the scale was evaluated first with Exploratory Factor Analysis (EFA) and Oblique Oblimin rotation was used because of the possibility of a high correlation between the factors. Confirmatory Factor Analysis (CFA) was applied to confirm the structural validity of the six-factor structure obtained. Before the analysis, the conformity of the continuous variables to the normal distribution was evaluated with the Shapiro-Wilk-W test and the kurtosis-skewness test. The association between two numerical variables was tested with Pearson correlation analysis. $p \leq 0.05$ was considered statistically significant in all analyses.

Results

73.3% (n=335) of the participants in the study were female and the mean age was 33.01 ± 8.78 (18-65) years. In terms of marital status, %46.6 (n=213) of the patients were unmarried, 47.9% (n=219)

were married and 5.5% (n=25) were divorced. Table 1 shows the descriptive features of the participants.

Table 1. Sociodemographic characteristics of the participants

Age (year, mean±SD)	33.01±8.78
Gender, n(%)	
Female	335 (73.3%)
Male	122 (26.7%)
Education status, n(%)	
Primary School	8 (1.8%)
High School	42 (9.2%)
University	246 (53.6%)
Post-hoc	161 (35.2%)
Marital status, n(%)	
Un-married	213 (46.6%)
Married	219 (47.9%)
Divorced	25 (5.5%)
Live with, n(%)	
Alone	73 (16.0%)
Family	366 (80.1%)
Other	18 (3.9%)
Employment status, n(%)	
Full time working	277 (60.6%)
Part time working	33 (7.2%)
Retired	16 (3.5%)
Student	54 (11.8%)
Not working	77 (16.8%)
Income status, n(%)	
Income less than the expense	81 (17.7%)
Expense equals income	174 (38.1%)
Income more than the expense	202 (44.2%)

Reliability analysis

Internal consistency analyses: In reliability analysis, Cronbach alpha coefficient was found as 0.947; in the semi-reliability analysis, Guttman Split Half coefficient was found as 0.851 and Spearman-Brown coefficient was found as 0.851.

Item analyses: Means of the item scales, corrected Item-Total Correlation, and Cronbach's Alpha, if Item Deleted, are shown in Table 2. Total-item correlation coefficients of the scale items were found to range between 0.381 and 0.730 (p<0.01) and Cronbach's Alpha values were found to range between 0.944 and 0.946 if an item is reduced.

Validity Analyses

Construct validity: While evaluating the factor structure of CSS, the sample size was evaluated with Kaiser-Meyer-Olkin (KMO), while the association required for factor analysis between the items

was evaluated with Barlett tes¬t. According to the analysis, KMO coefficient 0.921 and Barlett test (χ2=11232.787, df=630, p<0.001) result were found to be statistically significant. EFA results of the scale and factor loads of the items were shown in Table 3 and Figure 1. According to EFA results, it was found that CSS could explain 65.55% of the total variance in six sub-dimensions. When Oblimin method was used as a rotation method in factor analysis, it was found that 36 items contributed to the six factors in the original scale with a structure as seen in Table 3. It was found that all factor loads of scale items were above 0.3 (0.346-0.888). Cronbach alpha coefficients of scale sub-dimensions were found as 0,849 for danger sub-dimension, as 0,896 for socio-economic consequences sub-dimension, as 0.916 for xenophobia sub-dimension, as 0.920 for contamination sub-dimension, as 0.882 for traumatic stress sub-dimension and as 0.804 for compulsive checking sub-dimension.
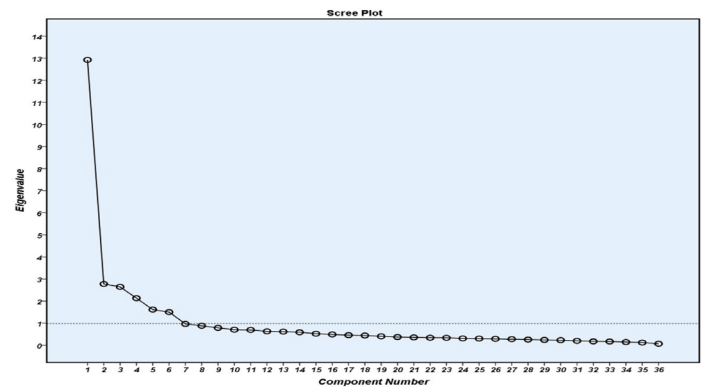

Figure 1. Scree plot of Exploratory Factor Analysis of the COVID Stress Scale.

According to EFA, the factor structure of the Turkish version of CCS was tested with confirmatory factor analysis and shown in Figure 2. As a result of the analysis conducted for the construct validity of the scale, CMIN value obtained for the six-dimensional structure was 1414; while Df value was 577; χ2/Df value was 2.452; GFI value was 0,853; CFI value was 0.923; RMSEA value was 0,056 and the scale was found to have acceptable model fit values.
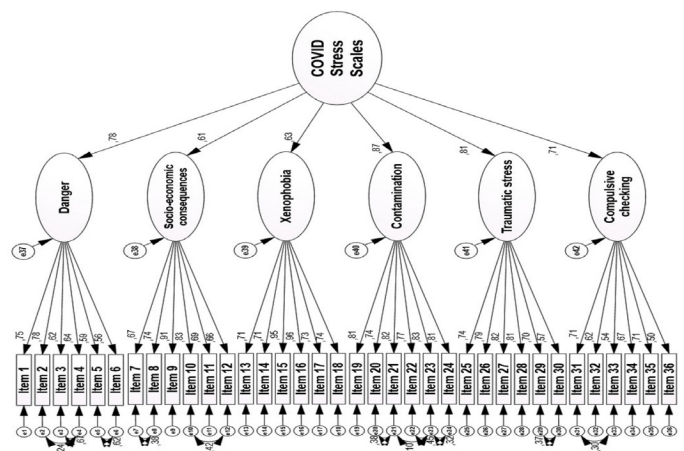

Figure 2. Path Diagram for the COVID Stress Scale

Table 4 shows the total and sub-dimension correlations of the scale. All correlations between the sub-dimensions and the correlations between sub-dimensions and total scale scores were found to be statistically significant. (p<0.001)

Table 2. Descriptive statistics for items in the scale

	Item Mean±SD	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. I am worried about catching the virus	2.22±1.05	.600	.945
2. I am worried that I can't keep my family safe from the virus	2.69±1.06	.542	.945
3. I am worried that our healthcare system won't be able to protect my loved ones	2.56±1.15	.429	.946
4. I am worried that our healthcare system is unable to keep me safe from the virus	2.24±1.19	.467	.946
5. I am worried that basic hygiene (e.g., handwashing) is not enough to keep me safe from the virus	1.84±1.15	.510	.945
6. I am worried that social distancing is not enough to keep me safe from the virus	1.77±1.16	.525	.945
7. I am worried about grocery stores running out of food	0.75±1.04	.454	.946
8. I am worried that grocery stores will close down	0.60±0.93	.457	.946
9. I am worried about grocery stores running out of cleaning or disinfectant supplies	0.73±1.04	.600	.945
10. I am worried about grocery stores running out of cold or flu remedies	0.80±1.06	.582	.945
11. I am worried about grocery stores running out of water	0.81±1.10	.487	.946
12. I am worried about pharmacies running out of prescription medicines	0.93±1.10	.547	.945
13. I am worried that foreigners are spreading the virus in my country	1.92±1.45	.573	.945
14. If I went to a restaurant that specialized in foreign foods, I'd be worried about catching the virus	1.28±1.40	.559	.945
15. I am worried about coming into contact with foreigners because they might have the virus	1.61±1.41	.631	.944
16. If I met a person from a foreign country, I'd be worried that they might have the virus	1.47±1.33	.647	.944
17. If I was in an elevator with a group of foreigners, I'd be worried that they're infected with the virus	1.99±1.27	.638	.944
18. I am worried that foreigners are spreading the virus because they're not as clean as we are	1.35±1.34	.545	.945
19. I am worried that if I touched something in a public space (e.g., door handle), I would catch the virus	2.38±1.15	.674	.944
20. I am worried that if someone coughed or sneezed near me, I would catch the virus	2.45±1.12	.629	.944
21. I am worried that people around me will infect me with the virus	2.26±1.06	.730	.944
22. I am worried about taking change in cash transactions	1.91±1.28	.641	.944
23. I am worried that I might catch the virus from handling money or using a debit machine	1.90±1.26	.689	.944
24. I am worried that my mail has been contaminated by mail handlers	1.81±1.22	.678	.944
25. I had trouble concentrating because I kept thinking about the virus	1.59±1.24	.687	.944
26. Disturbing mental images about the virus popped into my mind against my will	1.02±1.14	.638	.944
27. I had trouble sleeping because I worried about the virus	0.77±0.99	.604	.945
28. I thought about the virus when I didn't mean to	1.17±1.11	.684	.944
29. Reminders of the virus caused me to have physical reactions, such as sweating or a pounding heart	0.53±0.88	.544	.945
30. I had bad dreams about the virus	0.33±0.66	.447	.946
31. Searched the Internet for treatments for COVID-19	1.83±1.19	.501	.945
32. Asking health professionals (e.g., doctors or pharmacists) for advice about COVID-19	1.52±1.22	.388	.946
33. YouTube videos about COVID-19	1.24±1.17	.381	.946
34. Checking your own body for signs of infection (e.g., taking your temperature)	1.87±1.18	.565	.945
35. Seeking reassurance from friends or family about COVID-19	1.47±1.14	.505	.945
36. Social media posts concerning COVID-19	1.08±1.19	.395	.946

Content validity

To test the content validity of the scale, the correlations between DASS-21 depression, anxiety, and stress sub-dimensions and FCS and CSS total sub-scales were examined. The correlations between CSS and other scales were shown in Table 5. According to the results, positive statistically significant correlations were found between CSS total and sub-scales and DASS-21 sub-scale and total scores and FCS (p<0.001).

Table 3. Exploratory Factor Analysis with Oblimin Rotation of COVID Stress Scale

	Factor 1 (D)	Factor 2 (SE)	Factor 3 (X)	Factor 4 (C)	Factor 5 (TS)	Factor 6 (CH)
Item 1	.349					
Item 2	.578					
Item 3	.875					
Item 4	.801					
Item 5	.743					
Item 6	.702					
Item 7		.800				
Item 8		.888				
Item 9		.822				
Item 10		.790				
Item 11		.721				
Item 12		.647				
Item 13			-.736			
Item 14			-.749			
Item 15			-.897			
Item 16			-.892			
Item 17			-.635			
Item 18			-.787			
Item 19				.685		
Item 20				.689		
Item 21				.638		
Item 22				.802		
Item 23				.814		
Item 24				.752		
Item 25					-.389	
Item 26					-.655	
Item 27					-.804	
Item 28					-.587	
Item 29					-.782	
Item 30					-.735	
Item 31						.798
Item 32						.767
Item 33						.753
Item 34						.470
Item 35						.636
Item 36						.475
Explain Cumulative Variance (65.552%)						
Cronbach's alpha value Total value: 0.946						

D = danger, SE = socio-economic consequences, X = xenophobia, C = contamination, T = traumatic stress, CH = compulsive checking.

Table 4. Correlations between domains and overall COVID Stress Scale score

COVID Stress Scale		D	SC	X	C	TS	CC	Total
Danger	r	1						
	p							
Socioeconomic consequences	r	0.415*	1					
	p	<0.001						
Xenophobia	r	0.343*	0.427*	1				
	p	<0.001	<0.001					
Contamination	r	0.579*	0.422*	0.580*	1			
	p	<0.001	<0.001	<0.001				
Traumatic stress	r	0.543*	0.500*	0.474*	0.603**	1		
	p	<0.001	<0.001	<0.001	<0.001			
Compulsive checking	r	0.408*	0.348*	0.400*	0.468**	0.547**	1	
	p	<0.001	<0.001	<0.001	<0.001	<0.001		
Total	r	0.719**	0.683*	0.754**	0.826**	0.802**	0.693**	1
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	

D = danger, SE = socio-economic consequences, X = xenophobia, C = contamination, T = traumatic stress, CH = compulsive checking, *:p<0.01.

Table 5. Correlations between subscale-overall CSS score with DASS-21and Fear of COVID Scale

COVID Stress Scale		Fear of COVID Scale	DASS-21		
			Anxiety	Depression	Stress
Danger	r	0.578*	0.421*	0.443*	0.478*
	p	<0.001	<0.001	<0.001	<0.001
Socioeconomic consequences	r	0.398*	0.327*	0.292*	0.326*
	p	<0.001	<0.001	<0.001	<0.001
Xenophobia	r	0.429*	0.218*	0.251*	0.293*
	p	<0.001	<0.001	<0.001	<0.001
Contamination	r	0.571*	0.301*	0.330*	0.371*
	p	<0.001	<0.001	<0.001	<0.001
Traumatic stress	r	0.678*	0.572*	0.446*	0.526*
	p	<0.001	<0.001	<0.001	<0.001
Compulsive checking	r	0.372*	0.313*	0.202*	0.306*
	p	<0.001	<0.001	<0.001	<0.001
Total	r	0.670*	0.464*	0.431*	0.505*
	p	<0.001	<0.001	<0.001	<0.001

DASS-21: Depression-Anxiety-Stress Scale-21, CSS: COVID Stress Scale, *:p<0.01.

Discussion

In the present study, the CSS developed to test and examine COVID-19-related stress was translated using an appropriate sample and method, and its validity and reliability were tested in Turkish. Internally, CSS was reliable, as demonstrated by the standardized Cronbach alpha, Guttman Split Half, Spearman-Brown coefficients. In addition, the factor structure of the Turkish version of the scale was confirmed to be compatible with the original. The measurement showed robust concurrent validity due to positive correlation with DASS-21 and FCS. The present study which aims to show the validity and reliability of the Turkish

version of CSS, which is a tool that can be used in the evaluation of coronavirus-related stress levels of individuals, supports the idea that CSS can be used to describe the compounds related to COVID-19 Stress in Turkish adult population. We believe that the result that the Turkish version of CSS is valid and reliable is important since it can be a measurement tool that can be used in evaluating the negative effects of the COVID-19 pandemic on mental health and developing action plans against these negative effects.

The validity and reliability study of a tool that will be used as a scale should have certain criteria. First of all, our study has the sufficiency required by statistical analysis in terms of sample size [21]. In addition, Cronbach alpha coefficient which tests internal consistency, Guttman Split Half coefficient, and Spearman-Brown coefficient show that the scale has a good to excellent internal consistency. The alpha coefficient of the different domains ranged from 0.84 to 0.92 with a total scale coefficient of 0.94. Internal consistencies of scale sub-dimensions were also sufficient. These findings are comparable to the calculated alpha coefficients of both Canadian and US populations in the original scale, ranging from 0.80 to 0.93 [16].

In the development study of the scale, it was planned to conduct COVID-19 related stress evaluation in six different areas based on literature information and theoretical grounds [16, 17]. However, in the EFA conducted in the original scale, "danger" and "contamination" sub-scale items were clustered together and the scale was analyzed as five sub-dimensions [16]. In the present study, in EFA, items are clustered in six different dimensions as planned during the development of the scale. Although this result is different from the original study, it is consistent with the Spanish validity study of CSS [22]. The most possible reason for this result can be the fact that the original study was conducted on two different populations [16]. On the other hand, CFA results of the six-dimensional model also support the Turkish version of CSS. When evaluated in the light of all this information, it is thought that the 36-item and 6 sub-dimensional models of the Turkish version of CSS have sufficient construct validity as planned in the original scale.

When studies conducted in different contexts are examined, it is seen that there are many scales used to assess COVID-related stress. However, since these scales are mostly one-dimensional, it is seen that more than one scale is used in studies [12-15]. This causes various difficulties in terms of both the clinician and the applied population. In this context, our study provides strong evidence that the Turkish version of the CSS can be a practical tool that can be used in Turkish studies and clinical practice. In addition, since it is a tool developed specifically for the pandemic, it should be considered that it can be used as a supportive tool in identifying individuals at risk for stress during or after the pandemic [16].

One of the most important reasons for the development of CSS is the evaluation of COVID-19 related stress [16]. In this context, COVID-19 fear, anxiety, depression, and stress symptoms were also evaluated simultaneously to evaluate the content validity of the scale. As expected, a positive association was found between both total and all sub-dimensions of the CSS Turkish version and Covid-19 fear, anxiety, depression, and stress symptoms. Although

CSS evaluates six different dimensions, this result provides evidence that the Turkish version of CSS is useful in evaluating COVID-19 related stress in accordance with its purpose.

Limitations

The results of our study should be evaluated within some limitations. First of all, it is an important limitation that the study was conducted online and with a self-report survey. Although some characteristics (for exp. presence of psychiatric disease) were determined online and exclusions were made, it won't be the same as face-to-face interviews. It is also a limitation that using the online method reaches people with technology and internet access. Lastly, it can be thought that anxiety, depression, stress, and COVID fear used for evaluating the content validity of the scale are not sufficient because CSS makes evaluations in six different dimensions. Despite these limitations, the results of the study support the use of the Turkish version of CSS in the multi-dimensional evaluation of COVID-19 related stress and anxiety.

Conclusion

It is a fact that pandemic negatively affects the mental health of people [5, 23]. In the light of experiences gained in previous pandemics, it can be predicted that there will be an increase in the mental health needs of individuals after this period ends [15, 22]. A multi-dimensional scale specific for the present pandemic will provide a high benefit in determining and grading individuals' mental needs. For this reason, it is important that the validity and reliability of the Turkish version of CSS have been shown and that it can be used in both clinical practice and academic studies. It should also be remembered that using the Turkish version of CSS can shed a light on the management and planning of COVID-19 related stress. Therefore, it is important for future studies to focus on studies that will evaluate the effects of socio demographic factors such as age, gender and occupation on COVID-related stress.

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