



## TURKISH VALIDITY AND RELIABILITY OF COVID-19 STRESS SCALES (CSS) COVID-19 STRES ÖLÇEKLERİ'NİN (CSS) TÜRKÇE GEÇERLİLİK VE GÜVENİRLİĞİ

Rabia Çağlayan<sup>1</sup> , Serpil Özdemir<sup>1\*</sup> 

<sup>1</sup>Department of Public Health Nursing, Gülhane Faculty of Nursing, University of Health Sciences, Ankara, Turkey

### ABSTRACT

**Objective:** It is considered that evaluation of the stress level, in crisis situations, will provide a valuable source of the crisis intervention. The aim of the study was to test the Turkish validity and reliability of the COVID-19 Stress Scales.

**Method:** This methodological study was conducted between December 2020 and January 2021 with 841 nursing students and online. The data collection form included socio-demographical characteristics of the participants, COVID-19 Stress Scales, Perceived Stress Scale, Scale of Fear of COVID-19, and Scale of Coronavirus Phobia. Translations and intercultural adaptation process were used for the Turkish version of the COVID-19 Stress Scales. Content, construct and criterion validity analyzes were performed for the validity of the Scale. Internal consistency and intra-class correlation coefficients values were calculated for the reliability of the scale.

**Results:** The mean age of the participants was 23.63±8.5. The Content Validity Index of the COVID-19 Stress Scales was calculated as 0.98. According to suggestions of the experts, the subscale of "xenophobia" was excluded from the scale. In Confirmatory Factor Analysis, fit indices were calculated at acceptable levels and good fits. The five factors were reported in the original study of the scale, was confirmed in the Turkish version. The Cronbach's  $\alpha$  value was 0.94 for the scale total. Strong and positive correlations was found between the test and retest scores of the total scale (ICC=0.799; p=0.001).

**Conclusion:** COVID-19 Stress Scales with 30 items and five subscales was a valid and reliable measurement tool for Turkish society.

**Key Words:** COVID-19 Stress Scales, Validity and Reliability, Nursing

### ÖZ

**Amaç:** Kriz durumlarında stres düzeyinin değerlendirilmesinin, krize müdahale etmek için önemli bir kaynak sağlayacağı düşünülmektedir. Bu çalışmanın amacı COVID-19 Stres Ölçeklerinin Türkçe geçerlilik ve güvenilirliğini test etmektir.

**Yöntem:** Bu metodolojik çalışma, Aralık 2020 ile Ocak 2021 tarihleri arasında 841 hemşirelik öğrencisi ile çevrimiçi olarak yapıldı. Veri toplama formu, katılımcıların sosyo-demografik özelliklerini, COVID-19 Stres Ölçekleri, Algılanan Stres Ölçeği, COVID-19 Korku Ölçeği ve Koronavirüs Fobisi Ölçeği'ni içermektedir. COVID-19 Stres Ölçekleri'nin Türkçe versiyonunda "Çeviriler ve Kültürlerarası Adaptasyon Süreci" kullanıldı. Ölçeğin geçerliği için kapsam, yapı ve ölçüt geçerlik analizleri yapıldı. Ölçeğin güvenirliliği için iç tutarlılık ve sınıf içi korelasyon katsayıları hesaplandı.

**Bulgular:** Katılımcıların yaş ortalaması 23.63±8.5'ti. COVID-19 Stres Ölçeklerinin Kapsam Geçerlilik İndeksi 0.98 olarak hesaplandı. Uzmanların önerileri doğrultusunda "yabancı düşmanlığı" alt ölçeği, ölçekten çıkarıldı. Doğrulayıcı Faktör Analizinde uyum indekslerinin iyi uyum ve kabul edilebilir uyum düzeyinde olduğu hesaplandı. Orijinal ölçek çalışmasında bildirilen beş faktör, ölçeğin Türkçe versiyonunda doğrulandı. Ölçek toplamı için Cronbach's  $\alpha$  değeri 0.94'tür. Ölçeğin toplam test ve tekrar test puanları arasında güçlü ve pozitif yönde korelasyon olduğu bulundu (ICC=0.799; p=0.001).

**Sonuç:** Türk toplumu için 30 madde ve beş alt ölçekten oluşan COVID-19 Stres Ölçekleri, geçerli ve güvenilir bir ölçme aracıdır.

**Anahtar Kelimeler:** COVID-19 Stres Ölçekleri, Geçerlik ve Güvenirlilik, Hemşirelik

### INTRODUCTION

COVID-19 infection affecting individual, family and community health suddenly and negatively regarding as biological, psychological, sociological and economic aspects at a global level is a public health crisis [1-7]. COVID-19 pandemic has caused a common and high-level mortality and morbidity as from the day when it has started until the present day [2,4,8]. It is envisaged that COVID-19 infection that is the greatest pandemic of the last century will continue with the impact of the limitations in the dissemination of immunization program, behavioral causes, international and

national journeys, socio-economic inequalities, climatic conditions and other diseases [9]. Biological epidemics negatively affect both the physical and mental health of the community [10-12]. The biological health outcomes of the COVID-19 pandemic are more addressed in the literature however, its psychological impacts which could sustain for months even for years are not emphasized adequately [13]. The arithmetical increase in the number of cases occurring every day and the feeling of helplessness in response to the infection has increased the fear and stress levels of the individuals [13]. The stress affecting the biopsychosocial health directly and indirectly is a factor that has become an important part of the daily life and impairs the life

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**\*Sorumlu yazar/Corresponding author:** University of Health Sciences, Gulhane Faculty of Nursing, Department of Public Health Nursing, Ankara, Turkey

<sup>2</sup>Email: serpil.ozdemir@sbu.edu.tr, <sup>1</sup>Email: akkaya06rabia@gmail.com

quality of people [14,15]. Long-term stress could exposure stimulates the emergence of many health problems [16]. It was mentioned in the studies carried out that the COVID-19 pandemic affects the psychological health of the community and accordingly, it was worried about the triggering and emergence of many diseases [1,17,18].

The healthcare professionals described as a high-risk group in terms of COVID-19 infection and students studying at the healthcare field were the groups that were mostly affected by the stress caused by this infection [19,20]. Factors such as increasing working hours in healthcare organizations, staying away from home and family, environmental changes, being in close contact with the infected persons had led to an increase in the stress level of healthcare professionals during the pandemic [20]. In a study of the literature where 960 healthcare personnel participated, it was reported that about 4/5 of the participants had depression, 3/5 had anxiety and 1/2 had psychological symptoms like insomnia [21]. In the COVID-19 pandemic, it was expected from the students who are studying at the healthcare field to have covered their physical and psychological requirements by adapting to the difficulties they faced particularly during the clinical and field practices and to the pandemic conditions [19]. Student nurses were generally affected by the restrictions primarily developed due to the pandemic. Once the pandemic process would be long-term; it is foreseen that the factors such as the anxiety of contact with the virus in clinical and field practices, the vaccination anxiety and limitations in access to vaccination, problems caused by distance education, concern for the future, decrease in social relations and feeling of loneliness would lead to an increase in the stress level of the student nurses [19,22]. The psychological problems such as uncertainty, despair, helplessness, fear, and stress caused by the pandemic have become epidemic in the students who are studying in the healthcare field [20,23,24].

It is considered that determining the stress levels of student nurses due to COVID-19 during the pandemic is important for the management of the process. Standard measurement tools are needed for measuring the stress level of the student nurses who are in contact with and bear the potential of being in contact with patients/healthy individuals during the pandemic process depending on COVID-19 [25]. COVID-19 Stress Scales (CSS) was developed by Taylor et al. (2020) and consists of six subscales and 36 items and Scale of Fear of COVID-19 (FCV-19S) was developed by Ahorsu et al. (2020) and consisting of one-dimensional scale with seven items are available in the literature [26,27]. When these two scales are compared, it is reported that both of which have utility served in measuring the stress; however, FCV-19S is one dimensional and approaches to the general fear aspects, CSS provides more integrated results since it evaluates the stress fields multi-dimensionally and it is a more comprehensive scale [25]. It is concluded that an objective evaluation of the stress level particularly in crisis situations will provide source for the formalization of the crisis intervention. In this context, it was aimed to test the Turkish validity and reliability of "COVID-19 Stress Scales" in this study.

## METHOD

### Study Settings

This methodological study was conducted between December 2020 and January 2021 with 841 nursing students and online. The study was applied to 841 nursing students who studied in undergraduate and postgraduate education in the faculty of nursing at a state university in 2020-2021 academic year and participated into the research voluntarily. The size of the sampling was calculated in G Power 3.1.9.2 package program. The size of the research sample was calculated as 804 at least it was taken into consideration that the incidence of COVID-19 related stress is 50% in the community, provided that the level of significance was  $\alpha=0.05$  and the effect size was  $d=0.3$  and 134 for each subscale at a power interval of 95% and confidence interval of 95%. The inclusion criteria were being a volunteer to participate into the research, having an active enrollment in the undergraduate and

postgraduate education, using WhatsApp (Meta INC, California, USA) application in this study.

Data collection form was prepared by the researchers' base on the literature [14,28,29]. In the data collection form; there were questions related with the various socio-demographical characteristics of the participants such as age, gender, marital status, educational background and experiences of COVID-19 during the pandemic process (17 questions). COVID-19 Stress Scales (CSS) (30 items), Perceived Stress Scale (PSS) (14 items), Scale of Fear of COVID-19 (FCV-19S) (7 items), and Scale of Coronavirus Phobia (C19P-S) (20 items) were included into the data collection form.

### Data Collection Tools

*COVID-19 Stress Scales (CSS):* It was developed by Taylor et al. (2020), and consisted of 36 items and 6 subscales [27]. Items numbered 1, 2, 3, 4, 5 and 6 constitute the "danger" subscale, items numbered 7, 8, 9, 10, 11 and 12 constitute the subscale of "socio-economic consequences" items numbered 13, 14, 15, 16, 17, and 18 constitute the "xenophobia" subscale, items numbered 19, 20, 21, 22, 23 and 24 constitute the "contamination" subscale, items numbered 25, 26, 27, 28, 29 and 30 constitute the "traumatic stress" subscale, item numbered 31, 32, 33, 34, 35 and 36 constitute the "compulsive checking" subscale.

The danger, socio-economic consequences, xenophobia, and contamination subscales of the scale are scored as "0=Not at all, 1=Slightly, 2=Moderately, 3=Very, 4=Completely"; the subscales of the traumatic stress and compulsive checking are scored as "0=Never, 1=Rarely, 2=Sometimes, 3=Often, 4=Almost Always", it is a five-point Likert scale. The total score of the scale ranges from "0" to "144" and the total score obtained represents how high the stress level of the individuals is. In this study, five scales of CSS which is consisted of 30 items were included. The score range of these five scales is "0" to "120".

*Perceived Stress Scale:* The scale was developed by Cohen et al. (1983) and consisted of 14 items [30]. Turkish validity and reliability of the PSS was performed by Eskin et al. (2013) [14]. Each item is rated in 5-point Likert Type scale ranging between "0=not at all" and "4=very frequently". Total score of the scale ranges from "0" to "56". The high score obtained from the scale represents that the stress perception of the person is high.

*Scale of Fear of COVID-19:* FCV-19S was developed by Ahorsu et al. in 2020 [26]. The Turkish validity and reliability of the FCV-19S was carried out by Satici et al in 2020 [29]. FCV-19S is a one-dimensional scale and consisted of seven items. In the scale featuring five-point Likert type, each item is scored as "1=Strongly disagree", to "5=Strongly Agree" [26,29]. Total score of the scale ranges from 7 to 35. The high scores obtained from the scale represent that the fear of COVID-19 is high.

*COVID-19 Phobia Scale:* The scale was developed by Arpacı et al. (2020) [28]. The C19P-S consists of 20 items four subscales and is a five-point Likert type. The items of the scale are scored between "1=Strongly disagree" and "5=Strongly agree". While the scores of subscale are found with the total score of the responses given to the items of that subscale; total C19P-S score ranges from 20 to 100. High scores show that the person's phobia is high.

### Ethical Issues

The written implementation consents were obtained from the Dean's office of the related faculty and, Director of health sciences institute. Then an "ethical approval" from the Gülhane Scientific Researches Ethical Committee (Ethical Approval Number: 46418926/2020-491) was obtained prior to the practice of the research.

Personal consent was taken from the participants who volunteered for participating into the research. Written consent for the implementation

for all scales employed in this study was taken from the responsible authors.

## Procedures

Forward and backward translations and intercultural adaptation process

This process of the study was based on the criteria which Beaton et al. (2000) reported in relation with the inter-cultural adaptation process of the self-report scales in the adaptation process of CSS into Turkish language and culture [31]. Consisting of six stages Turkish language adaptation processes of CSS was schematized in Figure 1.

**Stage 1.** In the first phase of this study (forward translation), the original scale was translated from English to Turkish by three independent persons who were expert in nursing, whose native language were Turkish and who had lived in the United States of America for a while.

**Stage 2.** In the second phase (synthesis of translations); these three forward translation texts were compared by the first translation team, researchers, and a Turkish linguist, a common decision was taken on the translation of each item and the first Turkish scale draft was obtained.

**Stage 3.** In the third phase (backward translation); the scale was translated back to English by three persons who were expert in nursing, whose native language were English and who had lived in Turkey for a while in order to confirm the accuracy of the draft translation of this Turkish scale. Subsequently, the second translation team and researchers gathered compared three translation texts, and reached a consensus over an English scale draft.

**Stage 4.** In the fourth phase (expert committee), the second translation team and researchers primarily compared the English scale draft and its original scale. Differences between two scales were compared. Then, a consensus was built by making corrections deemed necessary by the whole translation team in order to provide the meaning and cultural equivalency in each item. The scale draft to be used in the pilot practice was created at the end of this phase.

**Stage 5.** In the fifth phase (test of pre and post-version), 20 students were subjected to the pilot practice and the results were evaluated. The students attending the pilot practice were excluded from the research.

**Stage 6.** In the final phase that is the sixth phase (submission of documents to the evaluation committee), it was observed and reported whether the students had difficulty in filling out the scale and understanding each item in the scale draft tested with 20 students or not. The reports obtained in the pilot practice were examined by the first and second translation groups and the scale was put into its final form for the Expert opinion.

## Content Validity Process

The scale draft was submitted to the expert opinion of 11 experienced academicians in order to test its content and scope validity. These experts compared each item's Turkish draft and original text in terms of content and scope and scored as "1=Not applicable, 2=Somewhat applicable (revision of expression is necessary), 3=Applicable, 4=Extremely applicable". In line with the suggestions of the experts, the subscale of "xenophobia" which is the third subscale of the scale was excluded from the scale on the grounds that it may lead to intercultural conflicts (items numbered: 13, 14, 15, 16, 17 and 18).

## Implementation

The flow chart of the study was illustrated in Figure 2. The participants were added to the created WhatsApp group. The participants were informed in writing about the aim of the research, how the form would be filled out, the fact that personal information would not be used out of the research and voluntariness is essential. Data collection form was shared in digital forms in these groups. The first question of the form

was the consent seeking for being voluntary for participating in the research. Participants who marked this question as "I am a volunteer" filled out the data collection form online. Access to the digital data collection form was limited to once and multi-participation was denied. Following the first practice, the digital data collection form was reapplied on 122 participants who participated into the first practice two weeks later and volunteer for participating into retest for the purpose of determining the uniformity of the scale by the time.

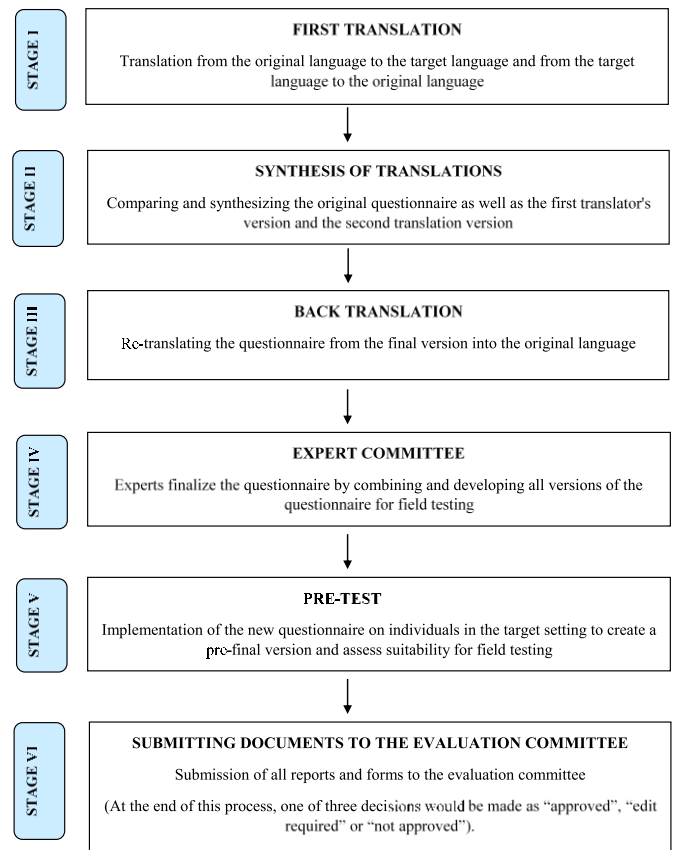
## Statistical Analysis

Data obtained in the study; variables identified by counting were shown in number and percentage calculation and variables identified by measuring were shown in mean±standard deviation. The numeric variables were presented in mean, standard deviation, minimum and maximum values, the categorical variables were presented in numbers and percentages.

The compatibility of data set to normal distribution was assessed by Kolmogorov-Smirnov Test. It was determined that the data obtained from the study did not feature normal distribution. In this study, the CSS was defined as 30 items and five subscales. The compatibility of the factor analysis on data set to the factor analysis was examined by Kaiser-Meyer-Olkin (KMO) and Bartlett's test. A Confirmatory Factor Analysis (CFA) based on Polycoric Correlation was performed while assessing the validity of the Turkish version of CSS. Non-weighted least squares estimation methods were used as a parameter estimation method.

Internal consistency coefficient Cronbach  $\alpha$  value was calculated for the reliability of the scale and intra class correlation (ICC) analysis was performed for the assessment of the test-retest test reliability.

The data analysis was performed by using SPSS ver. 23.0 statistical package program in the study. LISREL 8.8 package program was used for the validity analyses of CSS. The statistically significant level was taken as  $p < 0.05$ .



**Figure 1.** Forward and backward translations and intercultural adaptation process flow chart

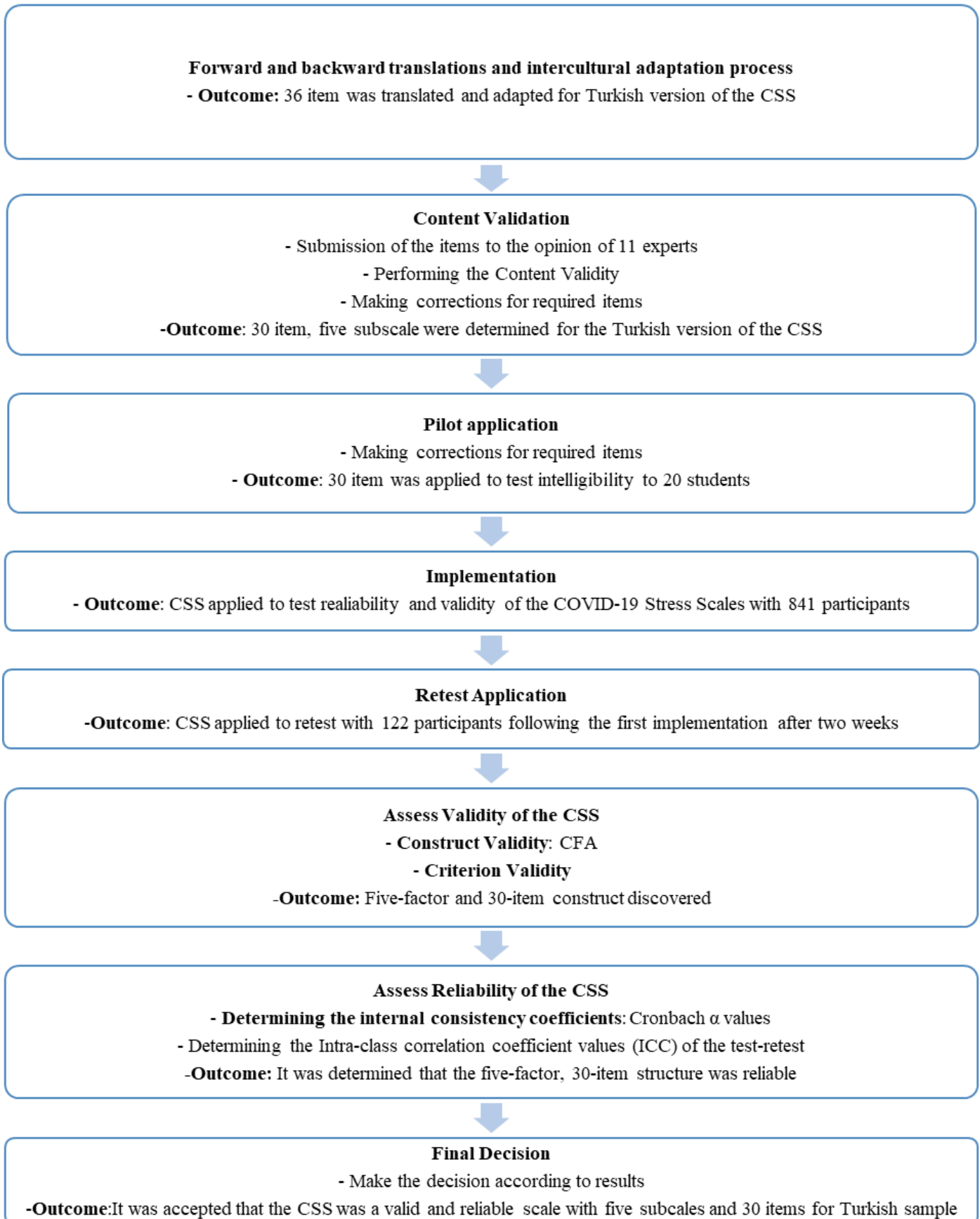


Figure 2. Flow chart of the study

**RESULTS**

In this part, the results obtained from 841 participants were given. The mean age of the participants was 23.63±8.5 (min:18; max:47). Ninety-point two percent (n=759) of the participants of the study were female and 85.1% (n=716) were undergraduate students. Distribution of the participants according to their socio-demographical characteristics is shown in Table 1.

**The Content Validity of CSS**

The content validity index (CVI) was calculated through Davis technique [32]. The point of each item was found by dividing the number of an expert who gave "3" and "4" points to each item into the total expert number in accordance with the opinions of the expert. The points of all items were summed up, divided into the total item number in the scale and CVI value of the Turkish version of the scale was calculated as 0.98. In accordance with the suggestions of the experts, the five subscales of the scale determined suitable for Turkish culture was analyzed for validity and reliability (30 items).

**The Construct Validity of the COVID-19 Stress Scales**

KMO value belonging to the dataset of this study was found as 0.94 and the result of Bartlett test was calculated as  $\chi^2=17260,45$ ;  $p<0.001$ . In this study, CFA was performed for the purpose of identifying the compatibility values and testing the accuracy of the reported factor structure in the original scale for evaluating the construct validity of CSS. The model compatibility was assessed by using the fit indices [chi-square/sd ( $\chi^2/sd$ ), RMSEA, RMR, CFI, GFI, AGFI and NFI] as a result of CFA performed. It was found out in CFA that CFI, NFI, RMSEA and RMR fit indices have good fits and GFI and AGFI fit indices obtained are at acceptable levels (Table 2). Once the model statistics pertaining to CFA analyses performed for confirming the five subscales structure of CSS were examined, it was found that " $\chi^2/sd$ " index did not fit. The model obtained at the end of CFA applied on the dataset of this study was presented in Figure 3. The CFA model fit was also examined by the power, direction of the factor loads estimations and statistical significance. The correlation levels among the factor loadings of the five subscales structure tested by CFA was calculated as 0.67. This value was a moderate value and found as statistically significant ( $t=32.28$ ;  $p<0.001$ ). The analysis result, five factors reported in the original study of the scale, was identically confirmed in the Turkish version of the CSS.

**The Criterion Validity**

PSS, FCV-19S and C19P-S were included into this study as gold standards for evaluating the criterion validity of CSS. In the correlation analysis performed, once the subscale and total scores of CSS and subscale and total scores of PSS, FCV-19S and C19P-S were compared, it was found that there were no statistically significant correlations between them ( $p>0.05$ ) (Table 3.).

**The Reliability of CSS**

Initially, an item analysis was performed for the purpose of establishing the internal consistency of CSS. As a result of the item analysis, it was found that each item was positively correlated with the total of the scale scores at an interval ranging from 0.44 to 0.74 and it was determined that there was no need for removing item from the scale. The Cronbach  $\alpha$  value was calculated as 0.94 for the scale total of CSS. It was determined that once any item of CSS was deleted, there was no change in the reliability coefficient of the scale (Table 4). In this context, no item of the scale was removed. CSS and subscales' reliability coefficients, item number, minimum and maximum values obtained from the scale and distribution of the mean scores were presented in Table 5. In accordance with the ICC analysis performed in the study, it was found that there were statistically significant differences, strong and positive correlations between the test and retest of the CSS total and subscale scores ( $p<0.05$ ) (Table 5.).

**Table 1.** Distribution of the participants according to their socio-demographic characteristics (n=841)

Characteristics	n	%	
Gender	Female	759	90.2
	Male	82	9.8
Marital status	Single	759	90.2
	Married	82	9.8
Education status	Undergraduate student	716	85.1
	Master/PhD student	125	14.9
Form of education	Distance learning	669	79.5
	Both distance and face-to-face education	172	20.5
Monthly income status	Income equals expense	513	61.0
	Income less than expenses	181	21.5
	Income more than expenses	147	17.5
How would you rate your general health status?	Very well	147	17.5
	Well	505	60.0
	Moderate	140	16.6
	Worst	49	5.8
How would you rate your mental health status?	Well	288	34.2
	Moderate	291	34.6
	Worst	162	31.1
Do you have a chronic disease identified as at risk for COVID-19?	Yes	46	5.5
	No	795	94.5
Does anyone you come in close contact with have a chronic disease identified as risky for COVID-19?	Yes	337	40.1
	No	504	59.9
Has anyone close to you been diagnosed with COVID-19?	Yes	766	91.1
	No	75	8.9
Have you shown any symptoms of COVID-19?	Yes	541	64.3
	No	280	33.3
	Don't remember	20	2.4
Have you ever been in quarantine due to COVID-19?	Yes	554	65.9
	No	287	34.1
Have you ever given PCR for COVID-19?	Yes	523	62.2
	No	318	37.8
Have you had further diagnostic testing for COVID-19?	Yes	481	57.2
	No	360	42.8
Have you ever been diagnosed with COVID-19 during the pandemic?	Yes	497	59.1
	No	344	40.9

**Table 2.** Distribution of CFA fit index values

Fit indices	Acceptable Values	Calculated Values	Compliance Level
$\chi^2/sd$	<5	1270.79	Not compatible
GFI	>0.85	0.895	Acceptable
AGFI	>0.85	0.875	Acceptable
CFI	>0.90	0.938	Good fit
NFI	>0.90	0.918	Good fit
RMSEA	<0.08	0.057	Good fit
RMR	<0.08	0.059	Good fit

$\chi^2/sd$ : Chi-Square, GFI: Goodness of Fit Index, AGFI: Adjusted Good of Fit Index, CFI: Comparative Fit Index, NFI: Normed Fit Index, RMSEA: Root Mean Square of Approximation, RMR: Root Mean Square Residual

**Table 3.** Relationship between COVID-19 Stress Scales and Perceived Stress Scale, COVID-19 Fear Scale and COVID-19 Phobia Scale (n=841)

Variable	CSS	
	r	p
PSS	0.019	0.573
FCV-19S	0.013	0.705
C19P-S	0.004	0.899

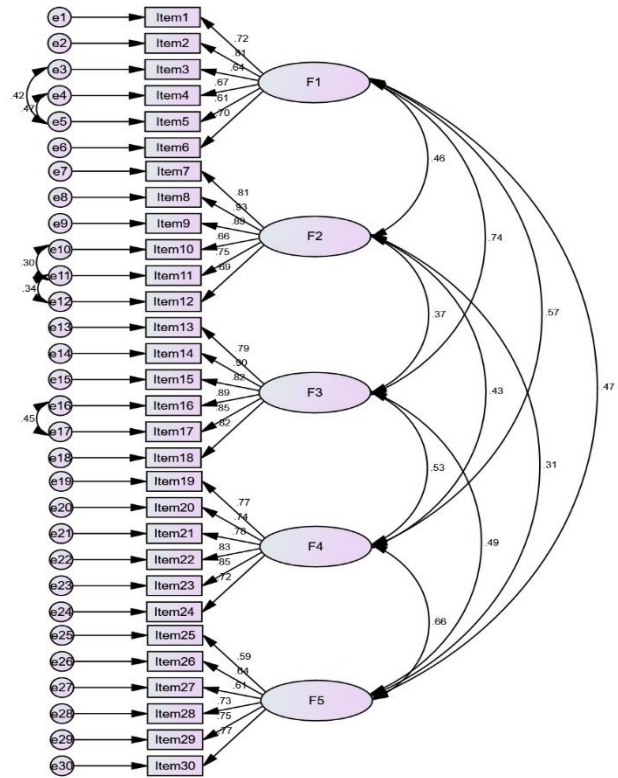
CSS: COVID-19 Stress Scales, PSS: Perceived Stress Scale, FCV-19S: COVID-19 Fear Scale, C19P-S: COVID-19 Phobia Scale, r: Spearman's Correlation, p<0.05

**Table 4.** CSS item-total correlation analysis

Items	Item-total Correlation	Cronbach $\alpha$ if item deleted
1. I am worried about catching the virus.	0.61	0.94
2. I am worried that basic hygiene (e.g. handwashing) is not enough to keep me safe from the virus.	0.65	0.94
3. I am worried our healthcare system is unable to keep me safe from the virus.	0.51	0.94
4. I am worried that I can't keep my family safe from the virus.	0.58	0.94
5. I am worried that our healthcare system won't be able to protect my loved ones.	0.53	0.94
6. I am worried that social distancing is not enough to keep me safe from the virus.	0.59	0.94
7. I am worried about grocery stores running out of food.	0.46	0.94
8. I am worried about grocery stores running out of cold or flu remedies.	0.56	0.94
9. I am worried about pharmacies running out of prescription medicines.	0.55	0.94
10. I am worried about grocery stores running out of water.	0.45	0.94
11. I am worried about grocery stores running out of cleaning or disinfectant supplies.	0.57	0.94
12. I am worried that grocery stores will close down.	0.44	0.94
13. I am worried that people around me will infect me with the virus.	0.74	0.94
14. I am worried that if I touched something in a public space (e.g., handrail, door handle), I would catch the virus.	0.70	0.94
15. I am worried that if someone coughed or sneezed near me, I would catch the virus.	0.67	0.94
16. I am worried that I might catch the virus from handling money or using a debit machine.	0.66	0.94
17. I am worried about taking change in cash transactions.	0.64	0.94
18. I am worried that my mail has been contaminated by mail handlers.	0.67	0.94
19. I had trouble sleeping because I worried about the virus.	0.60	0.94
20. I had bad dreams about the virus.	0.53	0.94
21. I thought about the virus when I didn't mean to.	0.67	0.94
22. Disturbing mental images about the virus popped into my mind against my will.	0.64	0.94
23. I had trouble concentrating because I kept thinking about the virus.	0.64	0.94
24. Reminders of the virus caused me to have physical reactions, such as sweating or a pounding heart.	0.53	0.94
25. Checked social media posts concerning COVID-19.	0.44	0.94
26. Checked YouTube videos about COVID-19.	0.46	0.94
27. Sought reassurance from friends or family about COVID-19.	0.48	0.94
28. Checked your own body for signs of infection (e.g., taking your temperature).	0.52	0.94
29. Asked health professionals (e.g., doctors or pharmacists) for advice about COVID-19.	0.50	0.94
30. Searched the Internet for treatments for COVID-19.	0.49	0.94

**DISCUSSION**

It is reported in the literature that a standard translation process should be available in the translation of the measurement tools produced in different languages in order to provide the adaptation from the aspects not only language but also culture. In adaptation process of CSS into Turkish language and culture, a six-phase standard directive was applied [31] (Figure 1). As a result of the back translation of the scale from original language to Turkish and back translation from Turkish to the original language, a Turkish text of CSS was created. In this context, it was concluded that CSS met the criteria of the language validity and its Turkish version was comprehensible and applicable.



**Figure 3.** CSS's CFA model

It is mentioned that the opinions of the experts are required for assessing whether the measurement tools accurately measure the target subject or not in determination of the content validity of any scale [33]. In accordance with the expert opinion, a subscale in the original scale (the xenophobia subscale) was removed on the grounds that there are individuals from different cultures in Turkey and accordingly, it might be led to intercultural conflicts. The CVI of the remaining 30 items was calculated and evaluated in the scale. Any CVI above 0.80 demonstrates that that scale has a content validity [34]. The CVI value obtained in this study showed that the content validity of CSS was quite high.

The construct validity is a process of identifying in a statistical method where how much realistic the measurement performed by the measurement tool is (35). KMO coefficient varies between 0 and 1 and any KMO coefficient at 0.90 and above is evaluated as "excellent" for sampling efficacy result [34]. Barlett's test is an assessment performed for examining whether there is a correlation among the items used in the scale or not. In the study, KMO value and Barlett's test results demonstrated that the size of sampling for factor analysis was "excellent" and the correlation among the items were appropriate [36,37].

**Table 5.** CSS test-retest reliability analysis correlation analysis

CSS	Items	Test				ICC	p	Re-test	Cronbach $\alpha$		
		Min	Max	Cronbach $\alpha$	Mean $\pm$ SD						
Danger subscale	6	0	24	0.87	12.43 $\pm$ 5.45	0.718	0.001	11.75 $\pm$ 5.33	0	23	0.88
Socio-economic Consequences subscale	6	0	24	0.91	5.04 $\pm$ 5.26	0.718	0.001	4.17 $\pm$ 5.22	0	21	0.95
Contamination subscale	6	0	24	0.94	12.31 $\pm$ 6.23	0.731	0.001	12.07 $\pm$ 6.27	0	24	0.94
Traumatic Stress subscale	6	0	24	0.90	4.42 $\pm$ 4.63	0.791	0.001	3.96 $\pm$ 4.35	0	17	0.90
Compulsive Checking subscale	6	0	24	0.84	7.87 $\pm$ 4.88	0.726	0.001	8.32 $\pm$ 4.82	0	20	0.84
Total CSS	30	0	120	0.94	42.06 $\pm$ 19.91	0.799	0.001	40.26 $\pm$ 21.13	0	92	0.96

SD: Standard Deviation, Min: The lowest value, Max: The highest value, ICC: Intra Class C

Two methods frequently used for the factor analysis are Explanatory and Confirmatory Factor Analyses. If there is any factor structure which has been already statistically described for any scale, such a view is adopted regarding that the confirmation of factor structure is generally adequate in the scale validity studies [38,39]. In this study, CFA was performed for confirming the factor structure in the Turkish version of CSS whose factor structure was explained in the original scale study. It was targeted in CFA to determine the accuracy of the existing structure instead of building a new structure. This analysis method was generally used in the scale development and validity studies [39]. Any researcher should build a scale model based on a theoretical foundation in the first phase of CFA, this model is defined and the sampling through which it will be tested is determined in the second phase, necessary data are collected. In the third phase, the fitness of the model established with the data obtained is examined. There are many fit indices testing the fitness of the model. The fit indices examined were evaluated by using  $\chi^2$ /sd, RMSEA, RMR, CFI, GFI, AGFI and NFI in the study. It was found out in CFA performed on the dataset of this study that GFI, AGFI, CFI, NFI, RMSEA and RMR were at values that are acceptable and have a good fitness range. However, it was detected that  $\chi^2$ /sd had an incompatible value ( $\chi^2$ /sd=1270.8). Once the size of the sampling is above 200 participants, Chi-square /sd ( $\chi^2$ /sd) test takes too high values and it is generally ignored in the evaluation of the compatibility [40]. Since the size of the sampling was consisted of 841 participants in the study, the result of this index was ignored on the grounds that it caused the  $\chi^2$ /sd test took a high value. In the model obtained as a result of CFA performed in this study, a five-factor structure as in the original scale was identically obtained. There was a moderate correlation between the factor scores of the five subscales structure tested with CFA. In accordance with these justifications, the original scale structure was conserved and no item was removed from the scale.

Criterion validity is one of the methods reinforcing the validity of any scale. The study investigated any correlation among PSS, FCV-19S, and C19P-S scales that were envisaged to be the gold standard by the characteristic of CSS. In the study, any correlation among PSS, FCV-19S and C19P-S scales that were envisaged to be gold standard by the characteristic of CSS was investigated. It was found in this study that there were no correlations between the scales included as gold standards and CSS. This result obtained was interpreted that the scales envisaged to be gold standard were not the right options for comparing CSS in terms of content and scope. Once PSS was evaluated, it was considered that CSS and PSS might not be a gold standard for each other because the stress and its characteristics experienced during COVID-19 process differed from the stress felt in daily life under normal conditions [14]. On the other hand, CSS focuses on situations such as the perception of danger, socio-economic behaviors, fear of contamination, traumatic stress and compulsive control caused by COVID-19 infection specifically [27].

According to the findings obtained similarly, it was interpreted that CSS and FCV-19S might not be a gold standard for each other on the grounds that FCV-19S consisting of seven items did not fully meet the items of CSS in terms of scope and content. On the other hand, it was concluded that while C19P-S principally evaluates the behavioral and physical effects that COVID-19 brings about as to the content, CSS generally evaluates the psychological influences and they did not fully correspond to each other as to the content. In this context, it was contemplated that CSS and C19P-S might not be a gold standard for each other.

Internal consistency is a condition where the items of any scale are completely consistent with the whole scale. Primarily, an item analysis based on item-total correlation should have been performed. Each scale item was compared with the total scale score in the item total correlation analysis and the correlation between them was investigated. While the item total correlation coefficient was not a precise reference value, it is generally suggested in the literature to be above 0.30 [36]. It was found out that there was a positive correlation between the total score of the scale and the total scale of each scale item in the item correlation analysis of this study and no item was excluded from the scale. The findings obtained are considered as one of the major parameters demonstrating the reliability of the Turkish version of CSS. Another parameter in which the reliability was demonstrated in the scale reliability studies was the internal consistency coefficient. Cronbach  $\alpha$  coefficient found for the scale total and sub-scales demonstrates that the reliability level of CSS was quite high. The test-retest method was applied for demonstrating the uniformity of the responses given to the scale by the time by applying the evaluated scale on the same group after a certain time interval, in other words, for demonstrating the internal consistency of the scale. In the test-retest ICC analysis conducted in this study, the statistically significant, strong and positive correlation found between the total and subscale scores of CSS demonstrate that the Turkish version of the scale was constant by time, in other words, the scale had an internal consistency. Besides, Cronbach  $\alpha$  values obtained in the retest showed similarity to the Cronbach  $\alpha$  values obtained in the first practice. These findings were deemed to have supported the reliability of the scale. As a result of the findings obtained, it was concluded that the Turkish COVID-19 Stress Scales consisting of 30 items (CSS) was a reliable and valid measurement tool.

#### Limitations and Generalizability of the Study

The following issues are considered as a limitation for the study; carrying out of the practice of the study through online method, data based on the declaration of the participants and management of the study from a single center.

## CONCLUSION

The findings obtained within the scope of the study prove that Turkish validity and reliability of CSS were provided. It is anticipated that the validity and reliability of the scale would be improved as long as CSS is applied on different community groups in our country or others. Nevertheless, it is suggested to repeat the criterion validity analysis by using a more extensive and relevant measurement tool as a gold standard. Once it is considered that the studies investigating the perceived stress levels of nursing students are limited in the literature, similar studies containing different cultures, broader masses and intervention content, evaluating the stress levels and investigating its impact on psychological health are needed.

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## REFERENCES

- Kim SW, Su KP: Using psychoneuroimmunity against Covid-19. *Brain Behav Immun.* 2020;87(5):4-5.
- Mo Y, Deng L, Zhang L, et.al. Work stress among Chinese nurses to support Wuhan for fighting against the Covid- 19 epidemic. *J Nurs Manag.* 2020;28(5):1002-1009.
- Rajkumar RP. Ayurveda and Covid-19: where psychoneuroimmunology and the meaning response meet. *Brain Behav Immun.* 2020;87(5):8-9.
- Shanafelt T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the Covid-19 pandemic. *JAMA.* 2020;323(21):2133-2134.
- Sheraton M, Deo N, Dutt T, Surani S, Hall-Flavin D, Kashyap R. Psychological effects of the Covid-19 pandemic on healthcare workers globally: a systematic review. *Psychiatry Research.* 2020;292:113360.
- Yu H, Li M, Li Z, et.al. Coping style, social support and psychological distress in the general Chinese population in the early stages of the Covid-2019 epidemic. *Research Square.* 2020;20(426):1-11.
- Zhou F, Yu T, Du R, et.al. Clinical course and risk factors for mortality of adult inpatients with Covid-19 in Wuhan, China: a retrospective cohort study. *Lancet.* 2020;395(10229):1054-1062.
- World Health Organization (WHO). WHO Coronavirus Disease (Covid-19) Dashboard. 2022. Last Accessed Date: 23.09.22 Available from: <https://covid19.who.int/table>.
- Gates B. Responding to Covid-19-a once-in-a-entury pandemic? *N Engl J Med.* 2020;382(18):1677-1679.
- Holmes E, O'Connor R, Perry H, et.al. Multidisciplinary research priorities for the Covid-19 pandemic: a call for action for mental health science. *Lancet Psychiatry.* 2020;7(6):547-560.
- Rubin GJ, Potts HWW, Michie S. The impact of communications about swine flu (influenza A H1N1v) on public responses to the outbreak: results from 36 national telephone surveys in the UK. *Health Technol Assess.* 2010;14(34):183-266.
- Wang D, Hu B, Hu C, et.al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA.* 2020;323(11):1061-1069.
- Askin R, Bozkurt Y, Zeybek Z. Covid-19 pandemic: psychological effects and therapeutic interventions. *Istanbul Commerce University Journal of Social Sciences Covid-19 Social Sciences Special Issue.* 2020;19(37):304-318.
- Eskin M, Harlak H, Demirkiran F, Dereboy C. Adaptation of perceived stress scale to Turkish: reliability and validity analysis. *New Symposium.* 2013; 51(3):132-140.
- White HA. Need for cognitive closure predicts stress and anxiety of college students during Covid-19 pandemic. *Pers Individ Dif.* 2022;187:111393.
- Tillu G, Chaturvedi S, Chopra A, Patwardhan B. Public health approach of ayurveda and yoga for Covid-19 prophylaxis. *J Altern Complement Med.* 2020;26(5):360-364.
- Kempuraj D, Selvakumar GP, Ahmed ME, et.al. Covid-19, mast cells, cytokine storm, psychological stress, and neuroinflammation. *Neuroscientist.* 2020;26(5-6):402-414.
- Patel JA, Nielsen FBH, Badiani AA, et.al. Poverty, inequality and Covid-19: the forgotten vulnerable. *Public Health.* 2020;183:110-111.
- Ozer M. Educational policy actions by the ministry of national education in the times of Covid-19. *Kastamonu Education Journal.* 2020;28(3):1124-1129.
- Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to the Covid-19 pandemic a review. *Asian J Psychiatr.* 2020;51:102119.
- Sahin MK, Aker S, Sahin G, Karabekiroglu A. Prevalence of depression, anxiety, distress and insomnia and related factors in healthcare workers during Covid-19 pandemic in Turkey. *J Community Health.* 2020;45(6):1168-1177.
- Holt-Lunstad J. The potential public health relevance of social isolation and loneliness: Prevalence, epidemiology, and risk factors. *Public Policy & Aging Report.* 2017;27(4):127-130.
- Sim K, Chan YH, Chong PN, Chua HC, Soon SW. Psychosocial and coping responses within the community health care setting towards a national outbreak of an infectious disease. *J Psychosom Res.* 2010;68(2):195-202.
- Wu P, Fang Y, Guan Z, et.al. The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry.* 2009;54(5):302-311.
- Pakpour AH, Griffiths MD, Lin CY. Assessing psychological response to the Covid-19: the fear of Covid-19 scale and the Covid-19 stress scales. *Int J Ment Health Addict.* 2021;19(6):2407-2410.
- Ahorsu DK, Lin CY, Imani V, Saffari M, Griffiths MD, Pakpour AH. The fear of Covid-19 scale: development and initial validation. *Int J Ment Health Addict.* 2022;20(3):1537-1545.
- Taylor S, Landry CA, Paluszek MM, Fergus TA, McKay D, Asmundson GJG. Development and initial validation of the Covid-19 stress scales. *J Anxiety Disord.* 2020;72:102232.
- Arpaci I, Karatas K, Baloglu M. The development and initial tests for the psychometric properties of the Covid-19 Phobia Scale (C19P-S). *Pers Individ Dif.* 2020;164:110108.
- Satici B, Göcet Tekin E, Deniz ME, Satici SA. Adaptation of the fear of Covid-19 Scale: Its association with psychological distress and life satisfaction in Turkey. *Int J Ment Health Addict.* 2020;19(6):1980-1988.
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* 1983;24(4):385-396.
- Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine.* 2000;25(24):3186-3191.
- Davis LL. Instrument review: getting the most from a panel of experts. *Applied Nursing Research.* 1992;5(4):194-197.
- Scherbaum CA. Synthetic validity: past, present, and future. *Personnel psychology.* 2005;58(2):481-515.
- Karakoc FY, Donmez L. Basic principles in scale development studies. *The World of Medical Education.* 2014;40:39-49.
- Louangrath, PI, Sutanapong, C. Validity and reliability of survey scales. *International Journal of Research & Methodology in Social Science.* 2018;4(3):99-114.
- Ercan I, Kan I. Reliability and validity of scales. *Journal of Uludag University Faculty of Medicine.* 2004;30(3):211-216.
- Kartal M, Bardakci S, Dilmen Y. Reliability and validity analyzes with SPSS and AMOS applied examples, Ankara, 2018.
- Erkorkmaz U, Etikan I, Demir O, Ozdamar K. Confirmatory factor analysis and fit indices. *Turkey Clinics Journal of Medical Sciences.* 2013;33(1):210-223.
- Capik C. Use of confirmatory factor analysis in validity and reliability studies. *Anatolian Journal of Nursing and Health Sciences.* 2014;17(3):196-205.
- Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures. *MPR-online.* 2003;8(8):23-74.