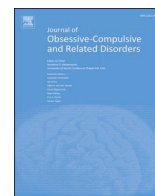




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## The Persian COVID stress scales (Persian-CSS) and COVID-19-related stress reactions in patients with obsessive-compulsive and anxiety disorders

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### ABSTRACT

The COVID Stress Scales (CSS) were designed to assess stress related to the COVID-19 pandemic. Emerging evidence indicates that people with anxiety disorders (ADs) and obsessive-compulsive disorder (OCD) may be more negatively impacted by COVID-19 than those with mood disorders or healthy individuals. Accordingly, this study sought to validate the Persian CSS (Persian-CSS) and to compare COVID-19-related stress reactions among patients with specific ADs and OCD. Patients with OCD ( $n = 300$ ) and ADs ( $n = 310$ ) completed the Persian-CSS and other scales developed to assess anxiety-related traits and COVID-19-related distress. The Persian-CSS replicated a five-factor structure similar to the original CSS in OCD and ADs. The total CSS and its scales had good reliability and validity. Patients with generalized anxiety disorder, panic disorder, and OCD had higher COVID-19 stress reactions than patients with social anxiety disorder and specific phobia. Patients with panic disorder had higher danger and contamination fears and xenophobia than patients with OCD. The study suggests that the Persian-CSS is a valid scale to be used in patients with OCD and ADs, each of whom differs in their specific patterns of COVID-19-related stress reactions.

### 1. Introduction

Numerous studies have documented that COVID-19 has been associated with heightened levels of anxiety (Huang and Zhao, 2020), stress (Taylor et al., 2020a; Wang et al., 2020), and health anxiety (Asmundson and Taylor, 2020a). COVID-19 may be associated with a multidimensional stress reaction referred to as COVID Stress Syndrome and assessed using the COVID Stress Scales (CSS; Taylor et al., 2020a). The CSS has 36 items derived through exploratory and confirmatory factor analyses to examine COVID-19-related stress across five factors, including danger and contamination fears (12 items), fears of socio-economic consequences (6 items), xenophobia (6 items), compulsive checking and reassurance-seeking (6 items), and traumatic stress symptoms (6 items). Taylor et al. (2020a) confirmed the reliability and validity of the CSS in Canadian and American samples.

The CSS warrants further investigation in different communities, including clinical samples with anxiety disorders (ADs) and obsessive-

compulsive disorder (OCD) (Rivera and Carballa, 2020), given that COVID-19 may have deleterious impacts on those with anxiety-related disorders (Asmundson et al., 2020) and OCD (Khosravani, Ardestani, Aardema, & Bastan, under revision; Wheaton et al., 2021). Studies have shown that the pandemic has exacerbated OCD symptom severity (Abba-Aji et al., 2020; Benatti et al., 2020; Matsunaga et al., 2020; Tanir et al., 2020) as well as symptoms of generalized anxiety disorder (GAD) and panic disorder (PD) (Frohman et al., 2020a, 2020b; Javelot and Weiner, 2020; Huang and Zhao, 2020; Kaba and Sari, 2020; Li et al., 2020), given the increased tendency to catastrophize about respiratory or physical symptoms related to COVID-19 in these two recent disorders (Javelot and Weiner, 2020; Perna and Caldirola, 2020). Asmundson et al. (2020) also found that individuals with anxiety-related disorders experience higher COVID-19-related stress than individuals without mental health disorders and those with mood disorders.

The COVID-19 pandemic may be stressful, in part, due to unpredictability and uncertainty about the disease and the seriousness of risk

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(Zandifar and Badrfam, 2020). Patients with ADs and OCD typically have a high degree of intolerance of uncertainty (Gillett et al., 2018; Hezel et al., 2019), high levels of health anxiety (Abramowitz et al., 2007; Solem et al., 2015), and tend to overestimate threat (Bragdon and Coles, 2017; Duits et al., 2016; Niemyer et al., 2013; Peschard and Philippot, 2017) and worry (Khosravani et al., 2020a). These characteristics are associated with COVID-19-related anxiety (Jungmann and Witthöft, 2020) which, in turn, are associated with ADs (Asmundson et al., 2020; Lee et al., 2020) and OCD (Tanir et al., 2020). It remains to be determined whether the CSS provided a psychometrically sound assessment of COVID-19-related stress in patient groups who, as a consequence of pre-existing ADs and OCD, are more negatively impacted emotionally by the pandemic (Asmundson et al., 2020; Khosravani, Ardestani, et al., under revision). Likewise, it remains to be determined whether there are differences between patients with ADs and OCD in their experiences of COVID-19-related stress.

Accordingly, the present study aimed to validate the Persian-CSS in Iranian patients with ADs and OCD (because COVID-19 is very highly prevalent in Iran and has caused high stress in Iranian society, especially in patients with pre-existing anxiety disorders; Zareie, 2020) and to compare COVID-19-related stress responses as measured on the CSS among patients with specific ADs and OCD. Based on the extant literature, we predicted that the Persian-CSS would have a five-factor structure, good reliability, and good convergent and discriminant validity in patients with ADs and OCD. Finally, we expected that there would be differences in CSS scores between patients with OCD and specific ADs.

## 2. Methods

### 2.1. Participants

Individuals with a primary diagnosis of OCD ( $n = 300$ ; age range = 17–67 years) or ADs ( $n = 310$ , age range = 15–65 years) were recruited to participate in this study from psychiatric hospitals and several clinical centers in Iran. These patients had psychiatric records in which a principal diagnosis of OCD or ADs during recent years had been reported and previously diagnosed by expert clinical psychologists and psychiatrists based on the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)-Research Version (SCID-5-RV; First et al., 2014). Although the principal diagnosis of OCD or ADs of these patients was determined by their psychiatric records during recent years, they were still in the active phase of their disorders at the time of assessment. Other required information pertinent to inclusion and exclusion criteria was also available in the files. Inclusion criteria were a primary diagnosis of OCD or ADs whereas exclusion criteria for both groups included having substance use disorders, intellectual disabilities, psychotic disorders, physical (other than coronavirus) or neurological diseases, and personality disorders. All participants agreed to participate and signed written informed consent. The present study was approved by the Medical Ethics Committee of Shahid Beheshti University of Medical Sciences. Patients completed questionnaires online (28%), by telephone (18%), or in-person (54%) between 1st June to 15<sup>th</sup> August 2020, during which time the pandemic was highly prevalent in Iran.

ADs included PD ( $n = 80$ , 25.8%), GAD ( $n = 142$ , 45.8%), special phobia (SP;  $n = 27$ , 8.7%), social anxiety disorder (SAD;  $n = 53$ , 17.1%), and agoraphobia ( $n = 8$ , 2.6%). Some patients with primary OCD ( $n = 126$ ; 42%) had common comorbid disorders of major depressive disorders ( $n = 72$ , 24%) and ADs ( $n = 54$ , 18%). Also, some patients with primary ADs had comorbid OCD ( $n = 100$ , 32.3%). Approximately 27% of patients with ADs ( $n = 83$ ) and 32% of patients with OCD ( $n = 96$ ) had a history of psychotherapy (mostly cognitive behavioral therapy). Other demographic and clinical characteristics are represented in Table 1.

**Table 1**  
Socio-demographic and clinical characteristics of ADs and OCD groups.

Characteristics	ADs, Mean $\pm$ S.D or $n$ (%)	OCD, Mean $\pm$ S.D or $n$ (%)	
Age, years	35.6 $\pm$ 10.9	35.76 $\pm$ 11.86	
Education	13.9 $\pm$ 3.1	13.62 $\pm$ 3.10	
Gender,			
Male	125 (40.3%)	124 (41.3%)	
Female	185 (59.7%)	176 (58.7%)	
Marital status			
Single	120 (38.7%)	127 (42.3%)	
Married	177 (57.1%)	154 (51.3%)	
Divorced	13 (4.2%)	19 (6.4%)	
Age of onset	29.8 $\pm$ 10.2	26.49 $\pm$ 8.50	
Illness duration	5.8 $\pm$ 4.3	9.42 $\pm$ 6.87	
FCV-19S	27.99 $\pm$ 4.20	–	
C19P-S	79.02 $\pm$ 9.70	–	
SHAI	33.62 $\pm$ 10.33	–	
PHQ-4	7.62 $\pm$ 2.17	7.51 $\pm$ 1.77	
VOCI checking	17.06 $\pm$ 3.52	–	
VOCI contamination	29.67 $\pm$ 7.06	–	
XS	24.83 $\pm$ 3.42	–	
HCQ-54	17.81 $\pm$ 2.41	–	
OCI-R washing	–	8.53 $\pm$ 2.01	
OCI-R checking	–	8.32 $\pm$ 2.19	
OCS	–	10.50 $\pm$ 2.95	
CSS and its scales	ADs, Mean $\pm$ S.D	OCD, Mean $\pm$ S.D	Skewness and Kurtosis, (ADs), (OCD)
Total CSS	99.27 $\pm$ 18.54	106.31 $\pm$ 16.54	(-0.42/-0.59), (-0.20/0.21)
DAN	35.08 $\pm$ 6.19	37.90 $\pm$ 5.48	(-0.40/-0.50), (-0.26/0.34)
SEC	13.94 $\pm$ 5.51	15.59 $\pm$ 4.95	(-0.33/-0.35), (-0.69/-0.05)
XEN	17.23 $\pm$ 3.75	18.59 $\pm$ 3.17	(-0.56/-0.46), (0.36/0.14)
TSS	15.51 $\pm$ 3.67	16.24 $\pm$ 3.51	(-0.53/-0.63), (0.52/0.27)
CHE	17.06 $\pm$ 3.52	18.41 $\pm$ 4.41	(-0.26/-0.65), (-0.02/-0.02)

Note: ADs = anxiety disorders; OCD = obsessive-compulsive disorder; COVID-19 = coronavirus disease 2019; CSS=COVID Stress Scales; DAN = danger and contamination fears; SEC = socio-economic consequences fears; XEN = xenophobic fears; TSS = traumatic stress symptoms; CHE = compulsive checking; FCV-19S = Fear of COVID-19 Scale; C19P-S=COVID-19 Phobia Scale; SHAI=Short Health Anxiety Inventory; PHQ-4 = Patient Health Questionnaire-4; VOCI=Vancouver Obsessional-Compulsive Inventory; HCQ-54 = Health Concerns Questionnaire-54 (physical scale); OCI-R=Obsessive-Compulsive Inventory-Revised; OCS=Obsession with COVID-19 Scale; ADs = anxiety disorders; OCD = obsessive-compulsive disorder.

### 2.2. Self-report measures

#### 2.2.1. Scales completed by patients with ADs and OCD

The COVID Stress Scales (CSS; Taylor et al., 2020a) is a self-report measure designed to assess COVID-19-related danger and contamination fears, fears of socio-economic consequences, xenophobia, compulsive checking and reassurance-seeking, and traumatic stress symptoms. Each item is rated on a five-point Likert scale from 0 to 4. The scale was originally developed in English. We translated this scale to Persian following Brislin's (1986) method. Scale items were translated into Persian, back-translated into English, and then compared with the original English version. The back-translation was evaluated by a group of individuals who were not associated with the study, who observed no inconsistencies between the translated and original English versions. After these processes, the final Persian version of the scale was administered to patients with OCD ( $n = 20$ ) and ADs ( $n = 20$ ) to test the understandability of the items. We found that the items were understandable to all 40 patients.

The Patient Health Questionnaire-4 (PHQ-4; Kroenke et al., 2009) comprises 4 items designed to measure current anxiety (2 items) and

depression (2 items) during the past week. Each item is rated on a 4-point Likert scale ranging from 0 (not at all) to 3 (almost every day). The PHQ-4 has been standardized in Iran by [Ahmadi et al., 2020](#). In the current study, McDonald's Omega coefficients of the PHQ-4 for patients with ADs and OCD were 0.77 and 0.80, respectively.

### 2.2.2. Scales completed by patients with ADs

The fear of COVID-19 scale (FCV-19S; [Ahorsu et al., 2020](#)) comprises 7 items measuring fear related to COVID-19, with each item rated on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). The scale has been validated in Iranian samples ([Ahorsu et al., 2020](#)). The Omega coefficient for the scale was 0.87 in the present study.

The COVID-19 Phobia Scale (C19P-S; [Arpaci et al., 2020](#)) comprises 20 items designed to measure COVID-19-related phobia. Participants determine their response on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). The Persian version of the C19P-S, which is being assessed in another study by the researchers of the current study, was used in this study. In this study, the Omega coefficient for the C19P-S was 0.93.

The Short Health Anxiety Inventory (SHAI; [Salkovskis et al., 2002](#)) comprises 18 items measuring health anxiety independently of physical health status. On this scale, each item is rated from 0 to 3, and participants are asked to choose the phrase that best describes their situation over the past six months. The scale has been validated in Iran ([Karimi et al., 2015](#)). In this study, the Omega coefficient for the SHAI was 0.96.

The Vancouver Obsessional-Compulsive Inventory (VOCI; [Thordarson et al., 2004](#)) comprises 55 items and includes six subscales of obsessive-compulsive symptoms. In this study, we used the contamination (11 items) and checking (7 items) subscales. Each item is graded on a 5-point Likert ranging scale from 0 (not at all) to 4 (very much). The VOCI is a valid scale in the Iranian population ([Khosravani et al., 2020c](#)). In this study, the Omega coefficients were 0.94 for the contamination subscale and 0.95 for the checking subscale.

The xenophobia scale (XS; [van Zalk, Kerr, van Zalk and Tattin, 2013](#)) comprises 12 items that measure negative attitudes toward immigrants. Also, one item of the XS ("Immigrants abuse the health system and fill up our emergency rooms"; [Wilson-Daily et al., 2018](#)) that is related to COVID-19 was added to the scale. Each item is graded on a 4-point Likert scale ranging from 1 (completely disagree) to 4 (completely agree). In this study, the Omega coefficient for the XS was 0.70.

The Health Concerns Questionnaire-54 (HCQ-54; [Spath and Dush, 1988](#)) contains 54 items to assess health concerns. Each item is graded on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). We used only items related to physical concerns (5 items). [Delavar, Baratian, Bejani, and Masoudian \(2012\)](#) validated the scale in Iran. The Omega coefficient for physical concerns subscale was 0.75 in the present study.

### 2.2.3. Self-report measures completed by patients with OCD

The Obsessive-Compulsive Inventory-Revised (OCI-R; [Foa et al., 2002](#)) is an 18-item scale designed to assess obsessive-compulsive symptoms. Each item is rated on a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely). In this study, we used items related to washing (3 items) and checking (3 items) subscales. The OCI-R has been validated in Iranian patients with OCD ([Khosravani et al., 2020b](#)). In the current study, the Omega coefficients of the washing and checking subscales were 0.96 and 0.97, respectively.

The obsession with COVID-19 scale (OCS; [Lee, 2020](#)) contains 4 items measuring obsessive thoughts regarding COVID-19. The OCS items are rated on a 5-point Likert scale ranging from 0 (not at all) to 4 (every day). The psychometric properties of this scale have been confirmed ([Lee, 2020](#)). In this study, the Omega coefficient of the OCS was 0.89.

## 2.3. Statistical analyses

To confirm the five-factor structure of the Persian-CSS, confirmatory factor analyses (CFAs) using maximum likelihood (ML) with robust standard errors were performed on data from patients with OCD ( $n = 300$ ) and ADs ( $n = 310$ ). These analyses were conducted using Mplus in Jeffrey's Amazing Statistics Program (JASP) from the University of Amsterdam ([Love et al., 2019](#)). In this program, model fit is assessed through Chi-square ( $\chi^2$ ) divided by degrees of freedom (CMIN/DF < 3 = acceptable fit), the root mean square error of approximation and the standardized root mean square residual (RMSEA and SRMSR < 0.08 = acceptable fit), the Tucker Lewis Index (TLI > 0.90 = acceptable fit), the comparative fit index (CFI > 0.90 = acceptable fit), and the goodness-of-fit index (GFI > 0.90 = acceptable fit) ([Kline, 2015](#); [MacCallum et al., 1996](#); [Schermelleh-Engel et al., 2003](#)).

Evidence has shown that Cronbach's alpha has several problems, and so evaluating Omega is better than alpha ([Dunn et al., 2014](#); [McNeish, 2018](#)). Accordingly, we evaluated McDonald's Omega coefficient ([McDonald, 1985](#)) in JASP to assess the reliability of the total CSS and its scales in patients with ADs and OCD. Also, test-retest reliability was examined through the intraclass correlation coefficient (ICC) to further evaluate the reliability of the CSS in ADs only. To assess test-retest reliability, a subset of 50 patients with ADs completed the CSS on two occasions separated by a 4-week interval.

Given that COVID-19 is strongly associated with fear, anxiety, and health anxiety ([Ahorsu et al., 2020](#); [Nikčević and Spada, 2020](#); [Tull et al., 2020](#)), the scales of COVID-19-related fear (the FCV-19S and the C19P-S) and anxiety-related traits (the SHAI, the VOCI, the HCQ-54, and the PHQ-4) were used to evaluate the CSS convergent validity. To assess discriminant validity, we compared the correlations of the CSS and/or its scales 1) with COVID-19 fear than those with anxiety traits; 2) with anxiety traits than those with depression (the PHQ-4 depression); 3) with obsessive-compulsive symptoms (the OCI-R or the VOCI), COVID-19 obsession (the OCS), and COVID-19 fear than those with general distress (the total PHQ-4); and 4) with general xenophobia (the XS) than those with other measures. Pearson's correlations and *Steiger's Z test* ([Steiger, 1980](#)) were performed to assess the convergent and discriminant validity of the CSS and inter-correlations among the CSS scales. According to [Cohen \(1977\)](#), correlation coefficients are considered as strong (higher than 0.50), moderate (between 0.30 and 0.49), and weak (between 0.10 and 0.29).

Finally, to compare COVID-19-related stress on the CSS between patients with specific ADs and OCD, multivariate analysis of variance (MANOVA) and post-hoc test of Tukey's honestly significant difference (HSD) test were performed.

## 3. Results

### 3.1. CSS factor structure

CFAs were performed to confirm the five-factor latent structure of the CSS in patients with ADs and OCD. The results showed that the 5-factor structure of the scale had an acceptable model fit in patients with ADs ( $\chi^2 = 1022.08$ , DF = 584, CMIN/DF = 1.8, CFI = 0.94, GFI = 0.94, TLI = 0.95, SRMSR = 0.045, RMSEA = 0.051 (90% confidence interval 0.048–0.056) and OCD ( $\chi^2 = 997.83$ , DF = 584, CMIN/DF = 1.7, CFI = 0.95, GFI = 0.94, TLI = 0.95, SRMSR = 0.044, RMSEA = 0.050 (90% confidence interval: 0.046–0.054). Standardized factor loadings of items were higher than 0.40 for patients with ADs (between 0.50 and 0.98) and OCD (between 0.56 and 0.94) (see [Table 2](#)). The inter-correlations between the CSS scales were significant in both patients with ADs and OCD ( $p < 0.01$ ) (see [Table 3](#)). Collectively, the results of the CFAs confirmed the study hypothesis regarding the 5-factor structure for the CSS.

**Table 2**  
Standardized factor loadings for the CSS via confirmatory factor analyses in patients with ADs and OCD.

The CSS scales and their items	ADs			OCD		
	$\omega$	Factor loadings	Z value	$\omega$	Factor loadings	Z value
DAN	0.92			0.95		
Q1. I am worried about catching the virus.		0.50	14.40		0.56	14.92
Q2. I am worried that I can't keep my family safe from the virus.		0.50	14.31		0.59	15.59
Q3. I am worried that our healthcare system won't be able to protect my loved ones.		0.51	14.66		0.60	16.39
Q4. I am worried that our healthcare system is unable to keep me safe from the virus.		0.53	13.83		0.60	16.25
Q5. I am worried that basic hygiene (e.g., hand washing) is not enough to keep me safe from the virus.		0.56	14.09		0.61	17.16
Q6. I am worried that social distancing is not enough to keep me safe from the virus.		0.52	12.38		0.66	16.20
Q19. I am worried that if I touched something in a public space (e.g., handrail, door handle), I would catch the virus.		0.62	16.96		0.67	17.86
Q20. I am worried that if someone coughed or sneezed near me, I would catch the virus.		0.53	16.43		0.65	16.77
Q21. I am worried that people around me will infect me with the virus.		0.56	14.24		0.68	18.41
Q22. I am worried about taking change in cash transactions.		0.63	12.38		0.68	16.82
Q23. I am worried that I might catch the virus from handling money or using a debit machine.		0.59	14.26		0.70	18.28
Q24. I am worried that my mail has been contaminated by mail handlers.		0.55	15.12		0.70	17.97
SEC	0.94			0.94		
Q7. I am worried about grocery stores running out of food.		0.92	18.12		0.92	14.94
Q8. I am worried that grocery stores will close down.		0.97	20.16		0.94	15.04
Q9. I am worried about grocery stores running out		0.98	23.94		0.77	12.25

**Table 2 (continued)**

The CSS scales and their items	ADs	OCD			
of cleaning or disinfectant supplies.					
Q10. I am worried about grocery stores running out of cold or flu remedies.	0.97	21.81	0.88	17.34	
Q11. I am worried about grocery stores running out of water.	0.97	23.11	0.89	17.34	
Q12. I am worried about pharmacies running out of prescription medicines.	0.85	16.23	0.72	15.51	
XEN	0.90		0.95		
Q13. I am worried that foreigners are spreading the virus in my country.	0.68	17.16	0.70	18.05	
Q14. If I went to a restaurant that specialized in foreign foods, I'd be worried about catching the virus.	0.69	17.92	0.71	17.64	
Q15. I am worried about coming into contact with foreigners because they might have the virus.	0.62	14.40	0.75	19.98	
Q16. If I met a person from a foreign country, I'd be worried that they might have the virus.	0.59	15.93	0.72	18.68	
Q17. If I was in an elevator with a group of foreigners, I'd be worried that they're infected with the virus.	0.63	18.23	0.69	19.75	
Q18. I am worried that foreigners are spreading the virus because they're not as clean as we are.	0.58	14.18	0.72	21.14	
TSS	0.89		0.92		
Q25. I had trouble concentrating because I kept thinking about the virus.	0.54	16.30	0.62	14.09	
Q26. Disturbing mental images about the virus popped into my mind against my will.	0.60	13.68	0.75	19.86	
Q27. I had trouble sleeping because I worried about the virus.	0.65	15.76	0.68	15.07	
Q28. I thought about the virus when I didn't mean to.	0.56	13.83	0.68	18.26	
Q29. Reminders of the virus caused me to have physical reactions, such as	0.61	12.51	0.85	16.93	

(continued on next page)

**Table 2 (continued)**

The CSS scales and their items	ADs	OCD		
sweating or a pounding heart.				
Q30. I had bad dreams about the virus.	0.68	14.42	0.84	15.60
CHE	0.88		0.95	
Q31. Searched the Internet for treatments for COVID-19.	0.53	12.21	0.67	16.56
Q32. Asking health professionals (e.g., doctors or pharmacists) for advice about COVID-19.	0.52	12.36	0.71	15.76
Q33. YouTube videos about COVID-19.	0.59	14.11	0.67	18.24
Q34. Checking your own body for signs of infection (e.g., taking your temperature).	0.53	12.71	0.67	20.23
Q35. Seeking reassurance from friends or family about COVID-19.	0.63	16.02	0.77	22.46
Q36. Social media posts concerning COVID-19.	0.61	18.65	0.79	23.55

Note:  $\omega$  = Omega coefficients; CSS=COVID Stress Scales; OCD = obsessive-compulsive disorder; ADs = anxiety disorders; DAN = danger and contamination fears; SEC = socio-economic consequences fears; XEN = xenophobic fears; TSS = traumatic stress symptoms; CHE = compulsive checking. All Z values are significant ( $p < 0.001$ ).

### 3.2. CSS reliability

The reliability of the CSS and its scales was assessed using the Omega and test-retest coefficients. The Omega coefficients for the total CSS in patients with ADs (0.97) and OCD (0.98) were higher than 0.70, confirming good reliability (Nunnally, 1978). Also, the Omega coefficients for the CSS scales in patients with OCD and ADs (see Table 2) were higher than 0.70. Test-retest coefficients using ICC for the CSS and its scales of danger and contamination, socio-economic consequences, xenophobia, traumatic stress, and compulsive checking were

**Table 3**

Correlations of the total CSS and its scales with the scales of COVID-related fear and anxiety-related traits in patients with ADs as well as inter-correlations among the CSS scales in patients with OCD and ADs.

	COVID 19-related fear		Anxiety-related traits				
	FCV-19S	C19P-S	SHAI	VOCI checking	VOCI contamination	HCQ-54 physical concerns	PHQ-4
Patients with ADs							
Total CSS	0.60	0.68	0.46	0.57	0.63	0.41	0.44
DAN	0.49	0.59	0.44	0.49	0.57	0.38	0.35
SEC	0.41	0.54	0.34	0.51	0.55	0.32	0.40
XEN	0.61	0.59	0.35	0.48	0.54	0.32	0.36
TSS	0.64	0.67	0.43	0.51	0.49	0.40	0.42
CHE	0.56	0.50	0.36	0.40	0.47	0.30	0.36
Inter-correlations	1	2	3	4	5		
1- DAN	-						
2-SEC, ADs/OCD	0.74/0.67	-					
3-XEN, ADs/OCD	0.81/0.89	0.71/0.67	-				
4- TSS, ADs/OCD	0.62/0.84	0.55/0.59	0.61/0.80	-			
5- CHE, ADs/OCD	0.60/0.74	0.45/0.53	0.54/0.70	0.69/0.78	-		

Note: COVID-19 = coronavirus disease 2019; CSS=COVID Stress Scales; DAN = danger and contamination fears; SEC = socio-economic consequences fears; XEN = xenophobic fears; TSS = traumatic stress symptoms; CHE = compulsive checking; FCV-19S = Fear of COVID-19 Scale; C19P-S=COVID-19 Phobia Scale; SHAI=Short Health Anxiety Inventory; PHQ-4 = Patient Health Questionnaire-4; VOCI=Vancouver Obsessional-Compulsive Inventory; HCQ-54 = Health Concerns Questionnaire-54; ADs = anxiety disorders; OCD = obsessive-compulsive disorder. All correlations are significant ( $p < 0.01$ ).

respectively 0.95, 0.92, 0.91, 0.89, 0.92, and 0.92 ( $p < 0.001$ ), showing good temporal stability of the CSS. Generally, the study hypothesis regarding good reliability for the CSS was confirmed.

### 3.3. CSS convergent and discriminant validity

The CSS and its scales had significant and medium-to-large correlations with the measures of anxiety-related traits and COVID-19-related fear in patients with ADs ( $p < 0.01$ ), confirming the study hypothesis regarding the convergent validity of the CSS (see Table 3). The correlations of the total CSS with the scales of COVID-19-related fear (the FCV-19S and the C19P-S) were stronger than that with the measures of anxiety-related traits, including the SHAI (the FCV-19S:  $Z = 2.98$  and the C19P-S:  $Z = 5.2$ ), the HCQ-54 (the FCV-19S:  $Z = 3.62$  and the C19P-S:  $Z = 5.65$ ), and the PHQ-4 (the FCV-19S:  $Z = 3.2$  and the C19P-S:  $Z = 5.18$ ) in patients with ADs ( $p < 0.001$ ). The total CSS and its scales had greater correlations with the measures of anxiety-related traits than the correlations with the scale of depression in patients with ADs and OCD ( $p < 0.05$ ) (Table A in the supplement). The CSS scales of danger and contamination fears and compulsive checking had higher correlations with the OCI-R washing and checking subscales and COVID-19 obsessions than the correlations with general distress ( $p < 0.001$ ) (Table B in the supplement). The correlations of the CSS and most of its scales with the scales of COVID-19 fear and specific obsessive-compulsive symptoms were higher than those correlations with general distress ( $p < 0.05$ ) (Table C in the supplement). These findings supported the study hypothesis regarding the discriminant validity of the CSS.

CSS xenophobia was not correlated with the general xenophobia as assessed by the XS ( $r = 0.04$ ,  $p > 0.05$ ). However, the CSS and its scales, including CSS xenophobia had stronger correlations with the scales of COVID-19-related fear and anxiety-related traits than with the general xenophobia ( $p < 0.05$ ) (Table D in the supplement). CSS xenophobia showed strong correlations with the scales of COVID-19-related fear (the C19P-S;  $r = 0.59$ ,  $p < 0.01$ ) and fear (the FCV-19S;  $r = 0.61$ ,  $p < 0.01$ ). CSS xenophobia had greater correlations with the scales of COVID-19-related fear than with the scales of anxiety-related traits ( $p < 0.01$ ) (Table E in the supplement). Thus, the xenophobia items may display “fear of being contaminated by foreigners” rather than general xenophobia.

### 3.4. Comparison of CSS between patients with ADs and OCD

Leven’s test confirmed that the data were normally distributed. The results of MANOVA showed significant differences between patients

with specific ADs and OCD (Wilks  $\lambda = 0.83$ ,  $F = 4.57$ ,  $p < 0.001$ ). The results of Tukey's HSD test showed that the CSS and its scales of danger and contamination fears and xenophobia were significantly higher in patients with GAD, PD, and OCD than patients with SAD and SP. Also, patients with PD had significantly higher danger and contamination fears and xenophobia than patients with OCD ( $p < 0.001$ ). Regarding CSS socio-economic consequences, patients with PD and OCD scored significantly higher than patients with SAD and SP, and patients with GAD had significantly higher scores than patients with SAD ( $p < 0.001$ ). Regarding the CSS traumatic stress, patients with GAD, PD, and OCD had significantly higher scores than patients with SAD ( $p < 0.001$ ). Regarding CSS compulsive checking, patients with GAD and PD had significantly higher scores than patients with SAD, and patients with OCD exceeded patients with SAD and SP significantly ( $p < 0.001$ ) (see Table 4). Thus, the study hypothesis was confirmed regarding differences between patients with OCD and specific ADs in experiencing COVID-19-related stress.

#### 4. Discussion

The present study examined the psychometric properties of the Persian-CSS in large samples of patients with OCD and ADs and compared COVID-19-related stress reactions between these patient groups. A five-factor structure of the Persian-CSS was confirmed in patients with ADs and OCD, with findings in line with the original CSS (Taylor et al., 2020a). The present study indicates that Iranian patients with OCD and ADs experience distress related to COVID-19 in a similar manner to that shown by Taylor et al. (2020a) in community samples from Canada and the United States, with COVID-19-related increases in threat and fear of being contaminated, fear of economic and social effects of COVID-19, fear of foreigners due to the possibility of being infected (i.e., xenophobia), traumatic stress symptoms (i.e., experiencing disturbing thoughts and images), and performing compulsive behaviors of checking and reassurance-seeking. In short, the results of this study suggest that COVID Stress Syndrome is a cross-cultural condition.

The present study also showed that the total Persian-CSS and its scales had good reliability in both patients with OCD and ADs. Similar to these findings, Taylor et al. (2020a) reported good reliability for the CSS in samples drawn from the general population of Canada and the United States. While Taylor et al. (2020a) did not assess the temporal stability of the scale, the present study provided evidence to support the temporal stability of the scale over a 4-week interval. Moreover, the total CSS and its scales had strong correlations with measures of COVID-19-related fear and the anxiety-related traits, supporting the convergent validity

of the CSS in patients with ADs and OCD. The total CSS and its scales had stronger correlations with corresponding than non-corresponding measures, confirming the discriminant validity of the CSS in patients with ADs and OCD.

CSS xenophobia was not associated with general xenophobia in the present study; but, Taylor et al. (2020a) found a significant relationship in this regard. There may be several reasons for these divergent findings. First, the CSS xenophobia items focus primarily on "the fear of being infected by foreigners" as opposed to absolute and general xenophobia (i.e., negative attitudes towards all aspects of immigrants, such as crime, well-being, job, and health facilities). In this regard, our results showed that CSS xenophobia had a stronger correlation with COVID-19-related phobia than anxiety-related traits and general xenophobia. Second, because the original scale was developed in Canadian and American samples, and given that many people living in those countries have migrated from other countries, the respondents in the Taylor et al. (2020a) study may have had more contact with immigrants relative to Iranian respondents. In short, general as well as pandemic-specific factors may increase xenophobia in these countries, while, in Iran, the limited number of immigrants may account for lower xenophobia and the lack of association between CSS xenophobia and general xenophobia. Further research is needed to better understand cultural differences in pandemic-specific xenophobia.

The novelty of this study was also to show that patients with GAD, PD, and OCD had higher COVID-19-related stress responses than those with SAD and/or SP, specifically with regard to fear of danger and contamination, socio-economic consequences, xenophobia, traumatic stress, and compulsive checking symptoms. Previous studies have similarly reported negative effects of COVID-19 on GAD and PD (Frohm et al., 2020a, 2020b; Huang and Zhao, 2020; Javelot and Weiner, 2020; Kaba and Sari, 2020; Li et al., 2020). Patients with GAD, PD, and OCD may show more fear of a dangerous situation or have a greater bias in the perception of a threatening situation (Antony et al., 1998; Buff et al., 2016; Cooper et al., 2018; Duits et al., 2016; Thomas et al., 2013; Weidt et al., 2016) than patients with SP and SAD. Also, patients with PD had higher danger and contamination fears and xenophobia than those with OCD in the current study. Patients with PD feel higher threat and danger increasing panic attacks and psychological distress than patients with OCD and other anxious patients, especially during threatening situations (Cucchi et al., 2012; Dias et al., 2018; Duits et al., 2016; Klahn et al., 2017; Nardi et al., 2002; Pittig et al., 2013; Wiedemann et al., 2001) including the COVID-19 pandemic (Perna, G., & Caldirola, 2020).

This study has some limitations that might inform future research directions. First, the validation of the Persian-CSS was based solely on patients with OCD and ADs. Assessment of factor structure and

**Table 4**

The comparison of the total CSS and its scales between patients with specific ADs and OCD.

Characteristics	Anxiety disorders					OCD		F <sup>a</sup>	Post-hoc <sup>b</sup>
	PD	GAD	SAD	Ag	SP	OCD			
Total CSS	106.31 ±16.54	99.27 ±18.54	83.55 ±21.88	101.88 ±21.08	85.11 ±18.39	106.31 ± 16.54	10.02	GAD, PD, OCD > SAD, SP.	
DAN	37.90 ± 5.48	35.08 ±6.19	30.28 ±7.12	35.50 ±7.87	30.30 ±6.72	37.90 ± 5.48	9.06	PD, GAD, OCD > SAD, SP. PD > OCD.	
SEC	15.59 ±4.95	13.94 ±5.51	9.81 ±6.42	15.75 ±5.68	10.85 ±4.94	15.59 ± 4.95	9.84	PD, OCD > SAD, SP. GAD > SAD.	
XEN	18.59 ±3.17	17.23 ±3.75	14.64 ±3.83	17.75 ±4.68	14.37 ±4.40	18.59 ± 3.17	8.45	GAD, PD, OCD > SAD, SP. PD > OCD.	
TSS	16.24 ±3.51	15.51 ±3.67	13.51 ±4.33	16.25 ±1.98	14.00 ±3.06	16.24 ± 3.51	4.84	GAD, PD, OCD > SAD.	
CHE	18.00 ±3.44	17.50 ±3.30	15.30 ±3.56	16.63 ±3.34	15.59 ±3.32	18.41 ± 4.41	7.76	GAD, PD > SAD. OCD > SAD, SP	

Note.

<sup>a</sup> Multivariate analysis of variance (MANOVA).

<sup>b</sup> With the Tukey HSD, ADs = anxiety disorders; OCD = obsessive-compulsive disorder; CSS = COVID Stress Scales; DAN = danger and contamination fears; SEC = socio-economic consequences fears; XEN = xenophobic fears; TSS = traumatic stress symptoms; CHE = compulsive checking; PD = panic disorder; GAD = generalized anxiety disorder; SAD = social anxiety disorder; Ag = agoraphobia; SP = special phobia, All F values are significant ( $p < 0.001$ ).

psychometric properties using different clinical samples as well as a sample from the general Iranian population is warranted. Second, while necessitated by research limitations imposed by the pandemic, the use of self-report scales may result in response biases. Additional evaluation incorporating clinical interviews and behavioral measures of distress may advance our understanding of COVID-19-related stress in patients with ADs and OCD. Third, the study sample included treatment-seeking patients. Medications or psychotherapy may improve the severity of distress of these patients. Fourth, this study was based on a cross-sectional design. Longitudinal studies during the pandemic may further advance understanding of the impacts of COVID-19-related stress in patients with ADs and OCD. Fifth, since patients with primary OCD and ADs had comorbid ADs or OCD, the magnitude of differences between these groups regarding COVID-19 stress may be influenced by comorbidity. Finally, lack of a comparison group of healthy individuals or patients with mood disorders limits conclusions regarding the degree to which the COVID-19-related stress reported by patients with OCD and ADs differs from that of non-clinical individuals or patients with other clinical diagnoses; although, the findings of [Asmundson et al. \(2020b\)](#) suggest that these differences are substantial.

Notwithstanding the aforementioned limitations, this study has a number of important implications. First, this study showed that the CSS is a valid and reliable scale that can be used to assess COVID-related stress in individuals with various clinical diagnoses. Second, this study showed that patients with OCD, GAD, and PD experience specific patterns of stress in reaction to COVID-19 relative to those with other ADs, putting them at high risk for COVID Stress Syndrome ([Asmundson et al., 2020](#); [Khosravani, Ardestani, et al., under revision](#); [Taylor et al., 2020b](#)) and COVID Stress Disorder (i.e., high levels of COVID-related stress combined with functional limitations; [Asmundson and Taylor, 2020b](#)).

## Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jocrd.2020.100615>.

## Appendix A. The Persian COVID Stress Scales (Persian-CSS)

به شدت	زیاد	تقریباً	کم	اصلی	عواملها و آیتم های آن
<b>ترس از خطر</b>					
4	3	2	1	0	1- من نگران ابتلا به ویروس کرونا هستم
4	3	2	1	0	2- من نگران هستم که نتوانم خانواده ام را از ویروس کرونا محافظت کنم
4	3	2	1	0	3- من نگران هستم که سیستم بهداشت و درمان قادر به محافظت از عزیزان من نباشد
4	3	2	1	0	4- من نگران هستم که سیستم بهداشت و درمان قادر به محافظت از من در برابر ویروس کرونا نباشد
4	3	2	1	0	5- من نگران هستم که رعایت بهداشت عمومی (به عنوان مثال، شستشوی دست) به اندازه ای نباشد که- من را در برابر ویروس کرونا محافظت کند
4	3	2	1	0	6- نگران این هستم که فاصله گذاری اجتماعی برای حفظ امنیت من در برابر ویروس کرونا کافی نباشد
<b>ترس از نتایج اقتصادی-اجتماعی</b>					
4	3	2	1	0	7- من نگران تمام شدن مواد غذایی موجود در فروشگاه ها هستم
4	3	2	1	0	8- من نگران هستم که فروشگاه های مواد غذایی بسته شوند
4	3	2	1	0	9- من نگران تمام شدن مواد شوینده و ضد عفونی کننده در فروشگاه ها هستم
4	3	2	1	0	10- من نگران این هستم که داروهای سرم اخوردگی یا آنفولانزا در داروخانه ها تمام شوند
4	3	2	1	0	11- من نگران این هستم که آب در فروشگاه ها تمام شود
4	3	2	1	0	12- من نگران این هستم که داروهای تجویز شده در نسخه در داروخانه ها تمام شوند
<b>بیگانه هراسی</b>					
4	3	2	1	0	13- من نگران این هستم که خارجی ها ویروس کرونا را در کشور من انتشار دهند
4	3	2	1	0	14- در صورتی که بخواهم به رستوران غذاهای خارجی بروم، نگران ابتلا به ویروس کرونا خواهم بود
4	3	2	1	0	15- من نگران تماس با افراد خارجی هستم زیرا ممکن است ویروس کرونا داشته باشند
4	3	2	1	0	16- در صورتی که با شخصی خارجی ملاقات کنم، نگران هستم که ویروس کرونا داشته باشند
4	3	2	1	0	17- اگر با گروهی از افراد خارجی در آسانسور باشم، نگرانم که آن ها آلوده به ویروس کرونا باشند
4	3	2	1	0	18- من نگران هستم که خارجی ها ویروس کرونا را بخش کنند زیرا آن ها به اندازه ما تمیز نینسند
<b>ترس از آلودگی</b>					
4	3	2	1	0	19- من نگرانم که اگر در مکان های عمومی چیزی را لمس کنم (مثلاً نرده، دستگیره درب)، به ویروس کرونا مبتال شوم
4	3	2	1	0	20- من نگرانم که اگر کسی کنار من سرفه یا عطسه کند، به ویروس کرونا مبتال شوم
4	3	2	1	0	21- من نگران این هستم که افراد اطرافم مرا به ویروس کرونا آلوده کنند
4	3	2	1	0	22- من نگران این هستم که مبادله پول در معاملات نقدی باعث آلوده شدن من به ویروس کرونا شود

(continued on next page)



(continued)

به شدت	زیاد	تقریباً	کم	اصلاً	عوامله و ایتم های آن
<b>ترس از خطر</b>					
4	3	2	1	0	من نگران این هستم که با دست زدن به پول یا استفاده از دستگاه خودپرداز یا کارت خوان، به ویروس 23- کرونا مبتلا شوم. من نگران این هستم که بسته پستی من توسط ماموران اداره پست به ویروس کرونا آلوده شده 24- باشد.
<b>نشانیگان استرس ترسناکی</b>					
4	3	2	1	0	25- من در تمرکز مشکل داشتم زیرا دائماً به ویروس کرونا فکر می کردم.
4	3	2	1	0	26- تصاویر ذهنی مزاحم در مورد ویروس کرونا بر خلاف میل من به ذهنم می آمدند.
4	3	2	1	0	27- من در خوابیدن مشکل داشتم زیرا در مورد ویروس کرونا نگران بودم.
4	3	2	1	0	28- با اینکه دلم نمی خواست، اما باز هم به ویروس کرونا فکر می کردم.
4	3	2	1	0	29- عواملی که ویروس کرونا را به یاد من می آوردند باعث می شدند که واکنش های جسمی مانند عرق کردن 29- یا تپش قلب داشته باشم.
4	3	2	1	0	30- من در مورد ویروس کرونا خواب های بد می دیدم.
<b>چک کردن اجباری</b>					
4	3	2	1	0	31- جستجوی درمان های ویروس کرونا در اینترنت.
4	3	2	1	0	32- درخواست مشاوره درباره ویروس کرونا از متخصصان سلامت (نظیر پزشکان و داروسازها).
4	3	2	1	0	33- دیدن ویدیوهای در مورد ویروس کرونا در شبکه های اجتماعی، تلویزیون و غیره.
4	3	2	1	0	34- بررسی بدنناتان برای علائم عفونت (به عنوان مثال، گرفتن درجه حرارت بدنناتان).
4	3	2	1	0	35- تلاش برای اطمینان یافتن از سلامت دوستان و خانواده در برابر ویروس کرونا.
4	3	2	1	0	36- خواندن و چک کردن پست ها و پیام های شبکه های اجتماعی درباره ویروس کرونا.

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