validation of the stress scale in the epidemic of covid 19 Covid-19 Stress Scale Validation

Abstract

Studies show that during an epidemic, many people experience a lot of stress or anxiety. The Covid-19 Stress Scale with 36 items is deliberately designed to be used for future epidemics. This research evaluates the validity and reliability of the Covid-19 stress scale. This is descriptive survey research. We selected 408 adults including subjects 18 to 95 years old at convenience. We used exploratory factor analysis to evaluate the validity of this scale and Cronbach's alpha method to evaluate the reliability. The findings of the factor analysis section showed that, through factor analysis of items and rotation of results by the Varimax method, the revealed six components had a high factor load. They are largely consistent with the findings of the authors of this scale. Due to the strength of the factor structure and the appropriate psychometric properties, the final scale of covid-19 can be of use by various researchers to measure stress in all epidemics, including covid-19 and the new monkeypox epidemic.

Keywords: *Validation, Coronavirus stress, adults, factor analysis*

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Introduction

Clinical researches and observations show that stress or anxiety is one of the most common outcomes in a large population during epidemics (Taylor et al., 2020). Covid-19, a global epidemic (Clerkin et al., 2020), started in late 2019 as viral pneumonia in China and by March 2020, had become epidemic and spread rapidly to most parts of the world. This disease declared the sixth emergency in global health has caused many great social, economic, and psychological problems such as anxiety, depression, post-traumatic stress disorder (Nourisaeid et al., 2020

) as well as increased stress-related disorders (Li et al., 2020). Conditions such as ease of disease transmission, the impossibility of immunizing the population, as well as delays in preparing test results, lack of medical equipment, the need for social distance, and limitation of contacts, create unpredictable stress in all societal aspects (Li et al., 2020). In a recent discussion that focused on health studies, the researchers found that the stress, fear, and anxiety caused by a possible illness are harmful. They can cause mental and physical disorders in people because fear and stress through stimulation of the hypothalamus in the brain increases the secretion of the hormone cortisol from the adrenal cortex and stimulates the sympathetic nerves, and in long run, it weakens the immune system and reduces the body's ability to fight diseases including corona. Consequently, people constantly exposed to stressors may be at a higher risk of developing stress-related diseases (Allahtavakoli, 2020).

Epidemics show that stress, anxiety, and related symptoms are important factors in behavior (Taylor, 2019). Findings show that more than 25 percent of China's total population experienced varying levels of moderate to severe stress or anxiety in response to Covid-19 (Qiu et al., 2020). These findings are similar to research conducted during the SARS outbreak (Cheng, Wong, Tsang, & Wong, 2004) and the 2009 H1N1 virus epidemic (Rubin, Amlot, Page, & Wessely, 2009; Wheaton, Abramowitz, Berman, Fabricant and Olatunji, 2012). Clinical researches and observations show (Taylor, 2019) that during epidemics, many people face anxiety and anxious concerns. Among them is fear of getting infected, fear of contact with a probably contaminated surface or object, probably infected strangers (like xenophobia related to the disease), socioeconomic consequences of the epidemic (such as job loss), compulsory check-ups in the hope of re-contracting the disease, and post-traumatic stress disorder (for example intrusive). Therefore, considering the role that stress or anxiety plays in shaping behavioral responses to viral outbreaks, public health decision makers, health officials, and health care providers must consider the negative psychological responses to the current Covid-19 crisis along with physical symptoms.

Although several studies have recently worked on Covid-19 fear and anxiety (Ahorsu et al., 2020; McKay, Yang, Elhai, & Asmundson, 2020), most tend to be one-sided. For example, one study focused on aspects of Covid-19 general fear; it is limited to psychometric assessments. For the sake of an experimental measure of stress and anxiety-related symptoms caused by Covid-19, Taylor et al. (2020) developed a valid and reliable scale for adults (18-94 years); it is suitable and usable to assess Covid-19 stress and anxiety and to prevent many disorders in adults. We can use the purposefully designed scales for other epidemics, such as Monkeypox, a new epidemic. Because the detected cases of the disease have spread in some cases without a clear source of infection, the virus may have spread in an unknown way. Although the disease is not as serious as Covid-19, it is understandable that the growing prevalence of the disease around the world is creating a feeling similar to the early outbreak of the Covid-19 virus and causing stress and anxiety for some people (Le Page, 2022).

Because the assessment of Covid-19 stress is limited due to the lack of a valid and reliable scale (Taylor et al., 2020), the Covid-19 stress scale is for measuring these characteristics as well as a better understanding of Covid-19 distress. Since no standard tool has existed for the assessment of Covid-19 stress in Iran so far, the existence of such a tool for this purpose seems appropriate and necessary to help examine the consequences of Covid-19 stress in Iran more accurately. It is also usable in future psychological planning. In the process of cultural translation and adaptation of the Covid-19 stress scale, it is important to maintain the psychometric properties of the original scale in the new cultural environment. Therefore, this research seeks to investigate the psychometric properties of the Covid-19 Stress Scale (CSS), which can be applicable among nations with a common cultural background with Iran. In particular, we validate the factor structure of the Iranian version of this scale among the members of the Iranian society.

Method

The present research is descriptive and correlational. Its statistical population was all adults (18 to 94 years old) in Tehran in 2020. According to the recommendations of some researchers, the ideal sample for factor analysis for each item is 5 or more (Alii, 2010). Many researchers stated that a sample size of 300 people is in most cases suitable for factor analysis (Comrey and Lee, 2013). Our research sample consisted of 400 adults aged 18 to 94 years who participated online in the research and completed the Covid-19 Stress Scale (CSS) online due to travel restrictions, social interactions, and quarantine conditions. We prepared the scale online and disseminated it through social networks (WhatsApp and Telegram). Inclusion criteria included age over 18 years and residence in Tehran. We excluded from the study those who were under 18 years and did not live in Tehran, as well as we removed the incomplete materials. We calculated the internal stability of the Covid-19 stress scale by Cronbach's alpha coefficients. We implemented the research as follows: First, the researcher and a professor of clinical psychology fluent in English translated the Covid-19 scale into Persian. We translated the Persian translation into English again. Then we compared the two English versions. After fixing the existing defects, we asked five psychologists to review the content validity of the scale. Finally, we made the final corrections and distributed the Covid-19 stress scale online in the Telegram and WhatsApp groups.

In the present research, we used the Covid-19 Stress Scale (CSS), compiled by reviewing Taylor's (2019) research and in consultation with experts on health-related anxiety. Thus, we identified the following domains: Danger and fear of infection 2. Fear of economic consequences 3. Xenophobia 4. Forced follow-up with the hope of reassurance 5. Symptoms of Covid-19 post-traumatic stress disorder. The scales worked well on different indicators of reliability and validity, and were consistent, providing evidence of Corona stress syndrome. These scales offer a tool for better understanding of Covid-19 anxiety and for identifying people in need of mental health services. We evaluated this scale for 7 weeks, because fears about Covid-19 may change over time. This 7-day period makes possible the evaluation of these changes.

To simplify the instructions on this scale, we referred to Covid-19 as a "virus". The guidelines for the fear items were as follows: The following questions are about the types of concerns you may have about the virus over the past seven days ... We ranked items on a 5-score scale of zero (not at all) to Four (many). We used the term *concern* in this scale to evaluate the predicted outcome of fear. We ranked traumatic stress assessment on a five-score scale from zero (never) to four (about always) (Taylor et al., 2020).

The scales had good validity and performance based on different indicators. In a research conducted by Taylor et al. (2020), they evaluated reliability as internal compatibility with Cronbach's alpha coefficient and performed correlation analysis to evaluate different validity indices. According to the number of statistical analyzes reported in this study, the level of statistically significant alpha was 0.01. To interpret the true significance of correlations, we used Cohen criteria (1988): small: r = 0.10, medium: 0.30, large: 0.50.

Findings

The present research validates the Covid-19 stress scale. We selected at convenience 408 subjects. Demographic findings showed that 209 (51%) were male and 199 (49%) were female, of which 299 (73%) were married and 109 (27%) were single.

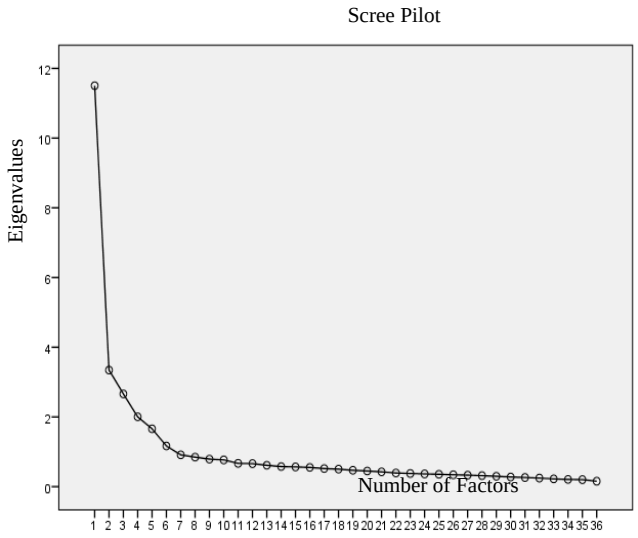
The age range of the subjects was between 10 and 70 years. In terms of education, 197 (48%) had a diploma and under diplomas, 147 (36%) had BSc, 54 (13%) had MSc and 10 (2.5%) had Ph.D. 98 (24%) of the subjects were housekeepers, 47 (11.5%) were students, 76 (18.6%) were employees, and 186 (45.6%) were free occupations. Meanwhile, in terms of ethnicity, 214 (52.5%) were Persian, 122 (29.9%) were Azari, 19 (4.7%) were Kurdish, 15 (3.7) were Lor, and 38 (9.3). 9%) were others.

To investigate whether the Covid-19 stress scale would replicate the six-factor structure, we performed exploratory factor analysis by rotating the Varimax on the data. As for factor analysis, we calculated first the adequacy test of sample size whose coefficient was satisfactory. Then, since the correlation between the test questions is the basis of factor analysis, we used the Bartlett sphericity test to determine whether the correlation between the variables is zero; Table 1 shows its results. As we can see in Table 1, the KMO value is 0.923, which indicates the adequacy of the selected sample. Bartlett's sphericity test is equal to 8130.362, which is significant at the level of 95% confidence; it shows that the correlation of data in the population is not zero.

In this analysis, using Varimax rotation, we obtained six factors that had specific values higher than one and their materials had a factor load greater than 0.45.

Table 1: Results of Bartlett sphericity and adequacy test of sample size for determining the validity of Covid-19 stress scale

Adequacy test of vector sample	Bartlett test	Degree of freedom	Sig.
0.923	8130.362	630	0.000



ure 1. Pebble diagram for determining the number of dimensions of the questionnaire

The rock diagram in Figure 1 shows that in the second-factor analysis, six factors have a specific value greater than one, and this number of extracted factors confirms the number of subtests construed by the authors of the scale. Table 2 shows the eigenvalues, the percentage of explained variance, and the cumulative variance percentage of each factor. As shown in Table 2, these factors explain 62% of the variance of Covid-19 stress.

In Table 3, the factor loads of each of the Covid-19 Stress Scale questions are identifiable on the six extracted components. We considered the factor loads of about 0.45 and above to assign each question to a component.

Table 2: Extracted components of the final factor analysis of the Covid-19 stress scale

Initial eigenvalues				Extracted values of Squares			Eigenvalues after Varimax rotation		
Factor	Eigenvalues	Explained variance	Cumulative percentage of explained variance	Eigenvalues	Explained variance	Cumulative percentage of explained variance	Eigenvalues	Explained variance	Cumulative percentage of explained variance

1	11.505	31.958	31.958	11.505	31.958	31.958	5.304	14.734	14.734
2	3.345	9.291	41.249	3.345	9.291	41.249	3.973	11.036	25.769
3	2.661	7.392	48.641	2.661	7.392	48.641	3.950	10.971	36.740
4	2.002	5.562	54.203	2.002	5.562	54.203	3.523	9.787	46.527
5	1.658	4.606	58.810	1.658	4.606	58.810	3.396	9.433	55.960
6	1.167	3.242	62.052	1.167	3.242	42.052	2.193	6.092	62.052

Table 3: Factor loads matrix of Covid-19 stress scale questions on the extracted component

Row	Item	Factor load
1	I'm worried about getting the virus	0.764
2	I'm worried about not being able to protect my family from the virus.	0.748
3	I'm worried that our health care system will not be able to protect my loved ones.	0.744
4	I'm worried that our healthcare system will not be able to protect me against the virus.	0.705
5	I'm concerned that public health (for example, hand washing) is not enough to protect me against the virus.	0.697
6	I'm worried that social distance is not enough to protect me from the virus.	0.672
7	I'm worried about running out of foodstuffs stores.	0.829
8	I'm worried that foodstuffs stores will close.	0.818
9	I'm worried that foodstuffs stores will be empty of disinfectants	0.817
10	I'm worried that stores (pharmacies) will run out of cold and flu medicines.	0.621
11	I'm worried about running out of mineral water in foodstuffs stores.	0.577
12	I'm worried that pharmacies will no longer sell over-the-counter drugs.	0.458
13	I am worried that foreigners will spread the virus in my country.	0.809
14	If I go to a restaurant that specializes in foreign food, I will be worried about getting the virus.	0.742
15	I'm worried about contacting strangers because they may have virus.	0.733
16	If I meet someone from a foreign country, I am worried about his/her infection.	0.725
17	If I am in the elevator with a group of strangers, I'm worried they're infected with the virus.	0.663
18	I'm worried that strangers will spread the virus because they are not as pure as we are.	0.660
19	I'm worried that if I touch something in public (for example, a fence, a door handle), I catch the virus.	0.710
20	I'm worried that if someone near me coughs or sneezes, I'll catch the virus.	0.707
21	I'm worried that people around me will infect me with the virus.	0.683
22	I'm worried about changes in cash transactions.	0.640
23	I'm worried about catching virus through shaking hands with some body, money or using an ATM.	0.605
24	I'm worried that my mailboxes will be infected by postmen.	0.577
25	I have trouble concentrating because I'm thinking about the virus.	0.809
26	Disturbing mental images of the virus appear involuntarily.	0.777
27	I have trouble sleeping because I'm worried about the virus	0.741
28	I thought about this virus when I did not want to.	0.659
29	The reminder of the virus caused me to have physical reactions such as sweating or heart palpitations.	0.591
30	I had bad dreams about the virus.	0.541
31	I searched the internet for Covid-19 treatment.	0.709
32	I asked health professionals (such as doctors or pharmacists) for advice on Covid-19.	0.684
33	I saw YouTube videos (Telegram and Instagram) about Covid-19.	0.612
34	I examine my body for signs of infection (for example, taking my temperature).	0.586

35	I inquire about Covid-19 to reassure friends or family.	0.501
36	(I read) Social media posts about Covid-19	0.469

After determining the extracted factors according to the confirmation of the obtained factors in the research, we named each factor. Six sub-tests designed by the authors confirmed the results of this stage. Table 4 presented the titles of these tests along with the number and related years.

This table has presented the Cronbach's alpha coefficients used to check the reliability of sub-test scores. As we can see, the values of all sub-tests are at a high level. It is noteworthy that we calculated the value of Cronbach's alpha coefficient for the whole questionnaire.

Table 4: Questions of the scale six components and Cronbach's alpha coefficients of sub-tests

Component	Feature under measurement	Number of questions	Questions	Cronbach's alpha coefficients
First	Risk	6	1-6	937.0
Second	Socio-economic consequence	6	7-12	837.0
Third	Xenophobia	6	13-18	878.0
Fourth	Fear of infection	6	19-24	853.0
Fifth	Posttraumatic stress	6	25-30	859.0
Sixth	Compulsory follow-up	6	31-36	884.0
Total questionnaire	Covid-19 stress	36	-	852.0

Discussion

This research evaluated the reliability and validity indices as well as the standardization of the Covid-19 stress questionnaire in Iran. Findings of factor analysis showed that 36 questions of the questionnaire have factor loads with 6 identified components. The number of discovered components confirms the number of factors influencing the Covid-19 stress according to Taylor et al. (2020). In addition to agreeing on the number of extracted final factors, the results show that the combination of the questions of six factors obtained from the findings of our research is very consistent with the results of factor analysis of the studies of Taylor et al. (2020). Covid-19 scale is for measuring 5 dimensions which includes 1. Covid-19 risk and fear of infection 2. Covid-19 caused fear of economic consequences 3. Covid-19 xenophobia 4. Compulsory examination of Covid-19 and reassurance and 5. Traumatic Stress Symptoms of Covid-19.

Taylor et al. (2020) designed it originally as a 36-item questionnaire and distributed it virtually among 408 volunteer participants. After standardization, we followed the same process of correcting the scales, with the additional aim of reducing the number of items to 30 items for each of the 5 scales. This led to a version of the 36-item questionnaire that covers all five dimensions. As confirmed, all the dimensions identified and defined in the experimental literature appeared in the participants' descriptions along with the anxiety and stress caused by Covid-19. Considering that most states of emotional arousal can increase stress, and therefore responding to traumatic stress symptoms can be a natural biological response to stress, we can show a tendency to stress in participants experiencing stress, even in mild illness and in close relatives of patients.

conclusion

A recent discussion that has drawn the attention of health studies, has found that stress is traumatic with the fear and anxiety of a possible infection and can lead to mental disorders and stress in individuals. Thus, due to stimulation of the hypothalamus in the brain, fear and stress increases the secretion of cortisol from the adrenal cortex and stimulate the sympathetic nerves, which in the long-run is destructive and leads to a weakened immune system and reduced ability of the body to fight diseases like a corona. Consequently, people constantly exposed to stressors may be at a higher risk of developing stress-related diseases. One of the reasons for making the Covid-19 Stress Questionnaire is to make it easier to research the contribution of individual differences, such as individuals' responding to stressful and anxious situations. In this study, we did not encounter scattered data, contrary to the probable reasons, to indicate a high risk of experimenters catching Covid-19. Questionnaires such as the Covid-19 Stress Standardization Scale should be used to conduct large-scale studies to investigate the relationship between stress and resilience in the event of an outbreak of disease with the aim of more feasible and practical planning. It is also possible that differences in response styles to similar conditions of the virus are also global, which can increase the risk of infection.

The lack of a protocol for interviewing based on the DSM-5 principles to examine the diagnostic validity of this test and determine the cut-off points was one of the limitations of our research.

Finally, we suggest that in future studies, the factor structure of this scale be repeated in another group of epidemics that may occur in Iran in the future. We also should investigate the effectiveness of this scale in evaluating the results of psychological therapies and interventions based on reducing corona stress in future researches.

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Conflict of interest disclosure

The authors declare that they have no conflict of interest.

Ethics approval statement

The current research was done knowingly, freely, and in compliance with the principles of confidentiality.

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