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Marzieh Aslani[1], Abbas Ebadi[2], Masoumeh Rostami[3], Selman Repišti[4], José Manuel Hernández-Padilla[5], Reza Ghanei Gheshlagh[6]

VALIDATION OF THE PERSIAN VERSION OF THE COVID-19 PREVENTION, RECOGNITION AND HOME-MANAGEMENT SELF-EFFICACY SCALE

[1]Department of Nursing, Asadabad School of Medical Sciences, Asadabad, Iran
[2]Behavioral Sciences Research Center, Life Style Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran
[3]Department of Nursing, Asadabad School of Medical Sciences, Asadabad, Iran
[4]Psychiatric Clinic, Clinical Centre of Montenegro, Podgorica, Montenegro
[5]Nursing Science, Physiotherapy and Medicine Department, Faculty of Health Sciences, University of Almería, Spain
[6]Spiritual Health Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran

ABSTRACT

INTRODUCTION. Adopting preventive behaviors and following the guidelines for controlling the COVID-19 epidemic depend on people's self-efficacy in carrying out these behaviors and instructions. The aim of this study was to investigate the psychometric properties of the Persian version of the COVID-19 Self-Efficacy Scale (COVID-19 SES, Hernández-Padilla et al., 2020).

MATERIAL AND METHODS. This cross-sectional study was performed in a group of 400 people who were residents of the city of Asadabad in western Iran from December 2020 to January 2021. The participants were selected using a convenience sampling method. Face and content validity was assessed qualitatively based on feedback from the participants and experts, and the necessary changes were applied to the final version of the questionnaire. For construct validity, exploratory factor analysis (n=200) and confirmatory factor analysis (n=200) were performed. Internal consistency was expressed as Cronbach's alpha coefficient. Relative stability was assessed using the intraclass correlation coefficient (ICC), and absolute stability was calculated through examination of standard error of measurement (SEM).

RESULTS. In exploratory factor analysis, three factors of prevention, symptom recognition, and home-management of COVID-19 were extracted that together explained 71.35% of the total variance. The internal consistency of the whole instrument was 0.955 and its three dimensions were 0.894, 0.916 and 0.955, respectively. In addition, an ICC of 0.986 (95% CI: 0.975-0.993, p=0.001) was found. In the confirmatory factor analysis, comparative and parsimonious fit indices were excellent, and absolute fit indices were moderate.

CONCLUSIONS. The Persian version of the COVID-19 SES has good validity and reliability and can be used to measure self-efficacy in prevention, symptoms recognition, and home-management of COVID-19.

Key words: *psychometric properties, COVID-19, self-efficacy, COVID-19 self-efficacy scale*

INTRODUCTION

The outbreak of pneumonia with an unknown etiology was first reported in Wuhan, China in December 2019 (1). Shortly after, the new coronavirus, SARS-CoV-2, was confirmed as the virus causing the pandemic in China and many parts of the world (2). On January 30, 2020, the World Health Organization (WHO) declared it a public health emergency (3). On March 24, the number of confirmed cases and deaths due to COVID-19 were 372,755 and 16,231, respectively, which increased to 2,160,207 and 146,088 by April 18, 2020 (4).

COVID-19 is more contagious than severe acute respiratory syndrome (SARS-CoV) and Middle East respiratory syndrome (MERS) (5). The disease was first reported in Iran on February 19, and so far Iranians have experienced several waves of disease

that have resulted in many deaths (6). The clinical manifestations of COVID-19 can be very different. Most patients were asymptomatic or had mild to moderate respiratory distress, but some developed severe viral pneumonia with respiratory failure that sometimes resulted in death (7).

To prevent the spread of COVID-19, governments implemented sanitation, quarantine, and travel bans (8, 9). People were also encouraged to maintain physical distance, identify symptoms, and manage mild symptoms at home to prevent the spread of COVID-19 (7-9). The positive effect of these measures depends on the ability of people to adopt protective behaviors (such as hand hygiene and social distancing) (9-11). It seems that some of these measures can disrupt people's daily lives, so people's behavioral responses and their confidence in following these guidelines (self-efficacy) should be examined (12).

Self-efficacy shows the extent to which one believes that they are competent to cope with tasks and stressors (13, 14). Wong and Yang (2020) believe that self-efficacy affects how we feel, think, and act in the face of risky behaviors (15). People with a high level of self-efficacy take better care of themselves and have more successful preventive behaviors (16, 17). Using a valid and reliable tool to measure self-efficacy in carrying out preventive behaviors, healthcare professionals can monitor these behaviors in the general population during pandemics. The COVID-19 prevention, detection, and home-management self-efficacy scale (COVID-19-SES) measures self-efficacy of the general population in prevention, sign recognition, and management of COVID-19 (18). Due to the shortage of research evidence on self-efficacy in COVID-19 management in the general population of Iran, and given the fact that assessing this variable requires a valid and reliable measurement tool, this study aims to translate the original version of COVID-19-SES (SES, Hernández-Padilla et al., 2020) into Persian and validate it in the selected population of inhabitants of the city of Asadabad.

MATERIAL AND METHODS

Type of study and setting. This cross-sectional, methodological study was conducted in a group of 400 people who were residents of the city of Asadabad in western Iran from December 2020 to January 2021.

Sample size and procedure. The recommended sample size for exploratory factor analysis of a questionnaire is at least 5 to 10 participants per item. Considering that the COVID-19-SES had 19 items, 200 participants were selected. It is also recommended that the sample size for confirmatory factor analysis should not be less than 200 participants (19-21). Therefore, in this study, 400 participants were selected using a convenience sampling method. Incomplete questionnaires were excluded from the analysis. Participants were recruited in the study using an anonymous online survey and a convenience sampling method. The items of the translated questionnaire were entered into Porsline (an Iranian site equivalent to Google Form) and distributed through messaging apps like Telegram and WhatsApp among residents of Assadabad. Two researchers also distributed questionnaires in person in public places such as markets and parks.

Instrument. Data collection was performed using a demographic information form and COVID-19-SES. COVID-19-SES was designed by Hernández-Padilla et al. (2020), and includes 19 items and the three following dimensions: prevention of COVID-19 contagion and spread, recognition of COVID-19 symptoms and home-management of people with COVID-19 symptoms. These items measure a person's confidence in their ability to prevent, detect symptoms, and manage the spread of COVID-19. Each item had a score of 0 to 100, with a score of 0 indicating the inability to do so and a score of 100 indicating the ability and complete confidence of the person to perform the item. Internal consistency (Cronbach's alpha coefficient) of the three dimensions of the questionnaire was 0.726, 0.852 and 0.912, respectively, and overall consistency was 0.906 (18).

Translation process. After obtaining permission of its author, the COVID-19-SES was translated from English to Persian by two independent translators using the forward and backward method (22). Then, the final Persian version was developed by the research team after reviewing both the translated versions. In the next step, the Persian version was back-translated into English by two other translators. The final Persian version is provided in Supplementary 1.

Face and content validity. Face and content validity were assessed qualitatively. For face validity, 10 participants were asked to read the items and identify the ambiguous ones. For content validity, five experts (two nurses, one healthcare professional, and two methodologists) were asked to review the Persian version of the questionnaire in terms of content.

Data analysis. Data analysis was performed with SPSS software version 26 and LISREL 8.8. Independent samples t-test, analysis of variance (ANOVA), and Pearson correlation coefficient were used to investigate the relationship between the mean self-efficacy scores and demographic variables. Latent relationships between the variables were investigated by using exploratory factor analysis. Sampling adequacy was assessed by the Kaiser-Meyer-Olkin (KMO) measure. KMOs ranging from 0.7 to 0.8 are

considered good and from 0.8 to 0.9 excellent, and a KMO greater than 0.7 indicates that factor analysis is appropriate for the data (23). Bartlett's test of sphericity was used to evaluate the significance of the correlation matrix between variables. Due to the normal distribution of variables, latent factors were extracted using maximum likelihood and Varimax rotation. The presence of each item in the factor was determined based on communalities above 0.4 in the exploratory factor analysis.

In the confirmatory factor analysis, chi-square goodness of fit test (χ^2=781.64, df=132, p=0.001) was calculated. The root mean square error of approximation (RMSEA), minimum discrepancy function divided by degrees of freedom (CMIN/DF), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), incremental fit index (IFI), relative fit index (RFI), normed fit index (NFI), and parsimony normed fit index (PNFI) were also examined. Internal consistency was evaluated based on Cronbach's alpha coefficient, which is acceptable above 0.70 (24).

Ceiling and floor effects were also calculated and reported. Ceiling and floor effects occur when more than 15% of respondents have the highest or lowest possible scores on a tool, respectively. The presence of these effects indicates the validity of inappropriate content (25, 26). Cronbach's and McDonald's omega alpha coefficients were used to determine the internal consistency of the questionnaire. Values between 0.7 and 0.9 indicate good reliability (27, 28). Relative and absolute stability were evaluated by interclass correlation coefficient (ICC) and standard error of measurement (SEM), respectively. SEM was calculated using the following formula: $SEM = SD_{baseline} \times \sqrt{(1 - ICC)}$. The minimum amount of changes that are most likely not due to measurement error was evaluated with Minimal Detectable Change (MDC), which is calculated based on Formula $DC = 1.96 \times \sqrt{2} \times SEM$ (29).

Ethical considerations. According to research ethics, the objectives of the study were explained to the participants, and their informed consent to participate in the research was obtained. In addition, they were assured that their personal information would remain confidential. The ethical approval for the present study was obtained from the Ethics Committee at the Aadabad School of Medical Sciences (No. IR.ASAUMS.REC.1399.027).

RESULTS

The sample included 201 women and 199 men with a mean age of 39.88 years (standard deviation [SD]=16.39) and an age range of 18 to 88 years. Most of the participants were employed, had college education, were married, had good general health, and had no underlying disease. Demographic information is presented in more detail in Table 1.

Table 1. Demographic description of the participants

Variables	n	%
Education level		
Primary school	94	23.5
High school	94	23.5
Higher education	212	53
Occupation		
Employed	203	50.7
Unemployed	197	49.3
Marital status		
Single	182	45.5
Married	218	54.5
Have you experienced COVID-19 symptoms?		
Yes	133	33.3
No	267	66.7
Have your family experienced COVID-19 symptoms?		
Yes	183	45.8
No	217	54.2
General Health		
Good	298	74.5
Normal	86	21.5
Poor	16	4
Comorbidity		
Yes	96	24
No	304	76

In the examination of face and content validity, two long phrases were divided into simpler sentences based on the feedback received from experts and participants. The ceiling and floor effects were both 0%.

Exploratory factor analysis. A KMO of 0.911 was found, and the Bartlett's test of sphericity was significant (χ^2= 3510.634, df=153 and p=0.0001). The first factor had 9 items (items 11 to 19), the second factor had 6 items (items 1-6), and the third factor had 4 items (7-10). These three factors explained 33.82%, 23.83%, and 13.69% of the total variance, respectively. The eigenvalues of these factors were 10.39, 2.10, and 1.12, respectively (Table 2).

Table 2. Exploratory factor analysis of the COVID-19 efficacy scale (COVID-19-SES) (n=200)

Factors	Items	h^2	Factor loading	% variance	Eigenvalue	Cronbach alpha
Prevention of COVID-19 contagion and spread	5. Avoid large gatherings even if my social or professional life is at risk.	0.773	0.784	23.834	2.102	0.916
	4. Always keep a distance of at least one meter from others.	0.755	0.772			
	6. Leave the house only if it is allowed by the authorities and following protocols.	0.636	0.784			
	3. Never touch my eyes, nose, or mouse.	0.688	0.726			
	2. Cover my mouse and nose with a tissue or by bending my elbow when I cough or sneeze.	0.611	0.629			
	1. Anywhere I go, regularly clean my hands with soap and water or use a hand sanitizer.	0.539	0.616			
Recognition of COVID-19 symptom	8. According to experts' recommendations, recognize when my symptoms require me to call the emergency or see my doctor.	0.975	0.927	13.695	1.121	0.894
	10. Call the phone number that the health authorities in my region have dedicated to COVID-19 emergencies.	0.731	0.682			
	7. Recognize the symptoms immediately after they appear.	0.673	0.678			
	9. According to the experts' recommendations, I recognize when my situation requires me to call the COVID-19 emergency or continue with my normal life.	0.652	0.660			
Home-management of people with COVID-19 symptom	14. Always keep the door to the room of the person who experiences the symptoms closed.	0.795	0.840	33.823	10.391	0.955
	12. Make sure that waste from the person who has the symptoms go to a sealed bag in a bin with self-closing lid which is not shared with other members of the household.	0.817	0.830			
	15. Limit the movement of the person who has the symptoms in the house, no matter how difficult it may be.	0.796	0.816			
	11. No matter how difficult it may be, isolate the person who experiences the symptoms in a separate room with proper ventilation.	0.784	0.789			
	19. Remove the waste from the person who has the symptoms according to experts' recommendations.	0.771	0.775			
	17. Make sure that the person who has the symptoms wears a mask and gloves every time they leave their room without exception.	0.668	0.765			
	16. Always maintain at least one-meter distance from the person who has the symptoms.	0.637	0.760			

In the confirmatory factor analysis, the results of the goodness test of chi-square fit were obtained (X^2=44.31, p=0.01). The comparative and parsimonious fit indices (CFI=0.97, IFI=0.97, RFI=0.95, NFI=0.96, PNFI=0.83) were very good and the absolute fit indices (RMSEA=0.11, CMIN/DF=5.9, GFI=0.82, AGFI=0.77) were moderate. A Cronbach's alpha of 0.955 was found for the whole instrument, and alphas of 0.894, 0.916, and 0.955 were found for the three dimensions of disease prevention, cognition, and management, respectively. Relative stability of the scale with a two-week interval was found to be

0.986 (95% CI: 0.975-0.993). Examination of absolute stability revealed a SEM of 3 and a MDC of 4.8.

Sub-findings showed that the mean self-efficacy score was higher in healthy individuals than in those with COVID-19 (p=0.001). Also, the mean score of self-efficacy in people with higher education was higher than people with high school education (p=0.001) and primary/secondary education (p=0.017). There was also a significant negative correlation between self-efficacy and participants' age (r= -0.167 and p=0.018).

DISCUSSION

The COVID-19 pandemic and the spread of the second and third waves in some countries have increased public concern. People should follow the guidelines for prevention of the virus, recognition and home-management of its symptoms. The COVID-19-SES enables researchers and health care providers to measure and evaluate the general population's self-efficacy in preventing, recognizing the symptoms, and managing COVID-19. Because several waves of the COVID-19 pandemic have already hit Iran, it seems necessary to identify the general population's level of self-efficacy in the management of COVID-19.

In assessing the construct validity of the Persian version of the COVID-19-SES, as in the original version, three factors (with the same items) were extracted. These three factors together explained 71.35% and 52.12% of the total variance in the Persian version and the original version of the questionnaire, respectively (18). The highest variance explained in the Persian version was related to home-management of COVID-19 symptoms and in the original version to the prevention of COVID-19 (18). This finding can be attributed to differences between the two communities in terms of the pandemic's level of impact. There have been several waves of COVID-19 epidemics in Iran, which have caused the hospitalization and death of a large number of people. It is necessary for people who have already experienced the epidemic to focus on managing the symptoms of COVID-19. But in many other countries at a different stage of the epidemic, COVID-19 prevention has become more important due to better epidemic control, and their overall policy has focused on prevention.

In the present study, in the factors of prevention, symptom recognition, and management, item #5 (Avoid large gatherings even if my social or professional life is at risk'), item #8 (According to experts' recommendations, recognize when my symptoms require me to call the emergency or see my doctor) and item #14 (Always keep the door to the room of the person who experiences the symptoms closed) had the highest factor loadings, respectively. While in the original version, in the three aforementioned factors, items #1 (Anywhere I go, regularly clean my hands with soap and water or use a hand sanitizer), #7 (Recognize the symptoms immediately after they appear) and #11 (No matter how difficult it may be, isolate the person who experiences the symptoms in a separate room with proper ventilation) had the highest factor loadings, respectively. This difference may be related to cultural differences between the two communities. Zwart et al. (2009) showed that direct experience of the SARS epidemic outbreak increases one's self-efficacy, and leads to taking precautionary measures (30). People's reactions can also vary depending on previous experience with other epidemics/or another epidemic. The ceiling and floor effects were both 0%, indicating that items representing the maximum and minimum intensity of the phenomenon were included in the tool, and that content validity was acceptable (26). The reliability estimates found for the whole instrument and the three dimensions of disease prevention, cognition, and management were all higher in the Persian version of the questionnaire than in the original version (18). In contrast to the original version, the absolute stability of the Persian version using SEM and MDS was found to be 3 and 4.8, respectively. SEM=3 shows that if there is a 3-point change in the total score after the intervention, we can be 95% confident that a true change has occurred in the COVID-19 Self-Efficacy Scale.

The mean self-efficacy score was higher in people who had never contracted COVID-19 than in those who had contracted it. This finding suggests that self-efficacy is an important element in promoting health-related behaviors. The results of a study showed that attitudes, norms, and self-efficacy have a causal effect on intention and behavior, and show that interventions that successfully change these can change health behavior (31). Bandura's theory suggests that high levels of self-efficacy are associated with better preventive behaviors and better mental health in outbreaks (32, 33).

The results of a study in the Netherlands that aimed to examine the perceptions and behaviors of the general public in the early stages of the influenza A (H1N1) epidemic showed that the perceived severity and anxiety decreased over time. Although health officials in the Netherlands at the time initially estimated high mortality rates, the general public remained calm and had a relatively high intention of taking precautionary measures (32). In a descriptive correlational study, Yıldırım and Güler (2020) examined the relationship between mental health and the severity of COVID-19 disease, self-efficacy, knowledge, and preventive behaviors in the general population in Turkey. The findings showed that these variables were able to

predict mental health (33). Also, those with a higher education had higher scores on the COVID-19-SES. People with a higher level of education are more likely than less educated people to apply the guidelines for prevention of COVID-19, and detect and manage COVID-19 symptoms. Various studies have shown that people with a higher level of education have higher self-efficacy, and feel more confident in their abilities (34-36). There was a negative correlation between age and the mean score on the COVID-19-SES. Due to experiencing more physical and psychological problems, older people seem to have less confidence in their ability to follow guidelines for management of COVID-19.

CONCLUSIONS

Overall, the findings of this study showed that the Persian version of the COVID-19-SES has acceptable face, content, and construct validity as well as internal consistency. Therefore, the scale can be used in future studies in Iran. The mean score of self-efficacy was higher in healthy people than in COVID-19 patients and in people with university education than in less educated individuals.

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Address for correspondence:
Reza Ghanei Gheshlagh
Spiritual Health Research
Center,Research Institute for Health Development,
Kurdistan University of Medical Sciences, Sanandaj, Iran
Tel: +98 9144050284
E-mail: rezaghanei30@gmail.com

SUPPLEMENTARY 1

به هنگام پیشگیری و تشخیص علائم کووید ۹۱، من مطمئنم که همیشه می توانم...	نمره صفر تا 100
1. هر جا می روم، به طور منظم و کامل دستهایم را با آب و صابون بشویم یا با ضدعفونی کننده الکلی تمیز کنم.	
2. به هنگام سرفه یا عطسه دهان و بینی خود را با یک دستمال یا با آرنج خمیده خود بپوشانم.	
3. تحت هیچ شرایطی چشم ها، بینی یا دهان خود را لمس نکنم.	
4. همواره فاصله حداقل یک متری خود را با دیگران حفظ کنم.	
5. حتی اگر زندگی اجتماعی یا حرفه ای من به خطر افتد، از تماس با تجمعات بزرگ افراد اجتناب کنم.	
6. تنها در صورت مجازبودن و با رعایت دستورات دولتی از خانه خارج شوم.	
7. بلافاصله پس از بروز علائم کووید ۹۱ آن ها را تشخیص دهم.	
8. تشخیص دهم که با توجه به توصیه های مسئولین بهداشت و درمان، چه زمانی علائمم ایجاب می کند با واحد اورژانس کرونا تماس بگیرم یا به پزشک مراجعه کنم.	
9. با توجه به توصیه های مقامات بهداشتی ، تصمیم میگیرم که چه شرایطی من را ملزم می کند که با شماره تلفن اضطراری COVID-19 تماس بگیرم یا به زندگی عادی خود ادامه دهم.	
10. ۱با شماره تلفنی که مسئولین بهداشت و درمان برای موارد اورژانسی کرونا در منطقه من فعال کردهاند، تماس بگیرم.	
11. هر چقدر هم که سخت باشد، فرد دارای علائم را در اتاقی انحصاری و با تهویه مناسب قرنطینه کنم.	
12. اطمینان دهم که زباله های فرد دارای علائم داخل پلاستیک کاملا در بسته و سطلی می شوند که درب آن به صورت خودکار بسته می شود و با دیگر اعضای خانه مشترک نیست.	
13. در صورت امکان، سرویس بهداشتی جداگانه ای جهت استفاده انحصاری فرد دارای علائم اختصاص دهم.	
14. همواره درب اتاق فرد دارای علائم را بسته نگه دارم.	
15. تردد فرد دارای علائم را در خانه محدود کنم، حتی اگر گاهی اوقات کار مشکلی باشد.	
16. همواره فاصله حداقل یک متر از فرد دارای علائم را حفظ کنم.	
17. اطمینان دهم که فرد دارای علائم بدون استثنا به هنگام هر بار خروج از اتاق، ماسک و دستکش می پوشد.	
18. روزانه نظافت کاملی مطابق توصیه های متخصصان در مورد مواد، محصولات ضد عفونی کننده، دمای آب و سطوح مهم انجام دهم.	
19. زباله های فرد دارای علائم را مطابق توصیه های کارشناسان خارج کنم.	