Development and Validation of Coronavirus Disease 2019-Induced Perceived Stigmatization in Physicians Scale

ABSTRACT

Background: It is well-established that healthcare professionals are stigmatized by the society during infectious disease outbreaks. The present study aimed to develop a scale to measure the coronavirus disease 2019–induced perceived stigmatization in physicians and investigate its validity and reliability.

Methods: The present methodological type of study was carried out with 303 physicians working with a university hospital. The researchers drafted a 5-point Likert-type "Coronavirus Disease 2019–Induced Perceived Stigmatization in Physicians Scale" by using an item pool consisting of 35 items upon a review of the relevant literature. The internal consistency (Cronbach's alpha coefficient), item-total correlation coefficient, and test-retest analyses were used to assess the reliability of the scale. Exploratory factor analysis and confirmatory factor analysis were performed with an aim to evaluate the construct validity of the scale.

Results: The scale consisted of 10 items and 2 domains (environmental perceived stigmatization and personally perceived stigmatization) upon completion of the scale development step. The items on the scale explained 61.66% of the total variance, where the factor loads were between 0.66 and 0.85. The Cronbach's alpha coefficient of the scale was 0.88, and the item-total correlation coefficients were all above 0.3. As a result of confirmatory factor analysis, the resultant model had goodness-of-fit indices with sufficient fit.

Conclusion: The Coronavirus Disease 2019–Induced Perceived Stigmatization in Physicians Scale was a reliable and valid tool for the physicians.

Keywords: COVID-19, physician, reliability, stigmatization, validity

Introduction

Following coronavirus disease 2019 (COVID-19) spread worldwide and identified as a pandemic, its social effects and psychological outcomes were reported in the relevant literature.[1] Among several psychological outcomes of COVID-19 is stigma.[2] Stigma refers to several social processes used to label, separate, and discriminate against others in a way that interferes with the life chances and opportunities of exposed individuals or groups.[3] While countries focus on decreasing the likelihood of new COVID-19 infections, increased stigma in infected individuals and survivors has been reported.[4,5] In pandemics, special groups including older adults or healthcare workers and infected groups and their families may be discriminated against and/or stigmatized. Stigmatization occurs particularly when there are various pandemic-related uncertainties, such as in the case of COVID-19.[6,7]

Pandemics and epidemics, including severe acute respiratory syndrome, Ebola virus disease, human immunodeficiency virus/acquired immunodeficiency syndrome, have led to ongoing stigmatization and discrimination despite global measures.[8] Stigma can take the form of social rejection, exclusion, abandonment, and harassment. Furthermore, it may manifest in the form of violence against individuals or groups, who are believed to

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be carriers infected by or recovered from infection.[9] During the pandemic, it has been reported that Asians in the United States and Europe were treated with suspicion and blamed for COVID-19 occurrence. Furthermore, in Jordan and Mexico, there were incidences of stigmatization inflicted on individuals, who had but recovered from COVID-19.[10-12]

During common infectious disease outbreaks, including COVID-19, healthcare professionals are frequently stigmatized because of living together in the same community. Owing to societal fears and concerns that they were the source of infection, healthcare workers were intimidated, excluded, or rejected.[2] Stigmatization and negative attitudes lead to isolation among healthcare workers, which increase their psychological difficulties. Studies conducted in previous outbreaks among healthcare workers have reported that they experience high levels of stress, anxiety, and depression, fear of contracting the disease and infecting their relatives, and feelings of being stigmatized. It has been reported that these symptoms affect the quality of life of healthcare workers and may lead to anxiety disorders, depression, and post-traumatic stress disorder in the long term. In a study conducted in Iran, it was determined that healthcare workers and their family members were exposed to serious COVID-19-related stigma. In addition to stigma, depression, anxiety, and stress were also reported to be common.[7,13]

Physicians at the forefront of the healthcare system have played a crucial role in the COVID-19 pandemic. However, owing to uncertainties in the pandemic, preparedness for the pandemic, health infrastructure, and fear and anxiety about the disease, physicians experienced significant stigmatization and psychiatric problems. In the literature, it has been reported that physicians were detected with higher levels of stigma than other healthcare workers during the COVID-19 pandemic.[7,14] Moreover, young physicians, physicians who personally deal with patients with COVID-19, and physicians who are in quarantine were observed to have a higher perception of stigmatization. Additionally, it was noted that perceived stigma is one of the strongest predictors of psychological distress among physicians.[15]

Studies have shown that physicians are a significant group among healthcare workers in terms of stigmatization during the COVID-19 pandemic. Therefore, appropriately measuring the stigmatization of this group is important. To the best of our knowledge, the worldwide scales intended for measuring the COVID-19-related stigmatization were developed for use in the general population.[16,17] Regarding healthcare professionals, the previous stigma scales intended for different diseases were adapted to the COVID-19 setting.[18-20] This study aimed to develop a scale to measure the COVID-19-related perceived stigmatization in physicians and investigate its validity and reliability.

MAIN POINTS

- *Perceived Stigmatization in Physicians Scale is reliable and valid for the physicians.*
- *The scale can be used in both clinical and intervention research and public health research.*
- *The scale can raise awareness about the importance of stigma in physicians and other healthcare professionals.*

Material and Methods

Study Design and Participants

This study was designed as a methodological research to develop a COVID-19-Induced Perceived Stigmatization in Physicians Scale and test its validity and reliability between April and June 2021. Required permission for the conduct of COVID-19-related scientific studies was obtained via the Scientific Research Platform of the Turkish Ministry of Health along with the permission of the Eskişehir Osmangazi University Non-Interventional Clinical Research Ethics Committee. Ethics Committee Approval was obtained from Eskişehir Osmangazi University Non-Interventional Clinical Research Ethics Committee. The ethics approval number is 2021/26. It was aimed to form a study group of a minimum of 300 individuals during the calculations of the sample size because, reportedly, the number of participants should be 5-10 times the number of items or that factor analysis should be performed with a minimum of 300 individuals.[21] The study group consisted of 303 physicians working in a university hospital. During the COVID-19 pandemic, physicians and other healthcare workers experienced similar physical and mental problems together. Based on the work of Sahin and Gedik,[22] physicians were considered to be a proxy group representing other healthcare workers. Therefore, they were selected to represent healthcare workers in the study.

Data Collection Tools

In this study, a questionnaire form was used as a data collection tool, which was developed upon a literature review.[23-28] The questionnaire form consisted of 2 domains. The first domain included items on the sociodemographic characteristics of the individuals (e.g., age, gender, and years in the profession) and certain factors, which were considered to have been associated with COVID-19 (e.g., being diagnosed with COVID-19 and considering resignation during that process), whereas the second domain included the Stigma Scale and the COVID-19-Induced Perceived Stigmatization in Physicians Scale under development by the researchers.

Stigma Scale

It was developed by Yaman and Güngör in 2013. The scale consists of 22 items and the overall score from the scale ranges from 22 to 110 points. It was reported that individuals who scored below and above 55 points on the scale had a low- and high-stigma tendency, respectively.[29] This scale was used for equivalent criterion validity.

Coronavirus Disease 2019-Induced Perceived Stigmatization in Physicians Scale

This self-report type of scale was developed to assess how the physicians perceived the stigma they may have encountered or may encounter owing to COVID-19 during the pandemic. The 5-point Likert-type scale included positive and negative items. The available responses to each item were "strongly disagree," "disagree," "no idea," "agree," and "strongly agree." Responses to negative propositions were scored between 1 and 5 points, and responses to positive propositions were scored between 5 and 1 points, where the COVID-19-induced perceived stigmatization in physicians was considered to increase as the score increased.

Procedures

The questionnaire was completed online using Whatsapp and corporate mail. Participation in the study was voluntary, and all participants provided informed consent.

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Creating the Item Pool for COVID-19-Induced Perceived Stigmatization in Physicians Scale

First, a 35-item pool was prepared. Four specialists reviewed the item pool. Incorrect propositions, false statements, inexpedient propositions, and similar statements were corrected or otherwise removed from the item pool. Accordingly, the item pool consisted of 23 items upon review. Moreover, the linguistic suitability of the items was also evaluated by Turkish linguists.

Content Validity

The draft scale consisted of 23 items; to assess the content validity of the draft scale, 14 specialists (12 public health specialists and 2 psychiatrists) were consulted. Since the minimum content validity ratio as reported for the 14 consulted specialists was 0.51, 5 items below the said value were excluded from the draft scale. The content validity index, which was calculated on the basis of the remaining 18 items was 0.69.

Preliminary Application

The draft scale, which then consisted of 18 items upon the content validity assessment, was preliminarily applied to 32 individuals to observe whether incomprehensible or misunderstood items were presented. Two items were removed from the scale because the intended meaning was misunderstood by the physicians.

Reliability Analyses

Internal Consistency and Item Analyses: To assess the internal consistency of the COVID-19-Induced Perceived Stigmatization in Physicians Scale, Cronbach's alpha and item-total correlation coefficients for the entire scale and for each domain were reviewed. In the draft scale, which was reduced to 16 items, 3 items with a total item correlation coefficient of 0.30 were eliminated, and 13 items remained. Furthermore, the difference in the total scores from the scale between the upper and lower 27% groups was investigated by using the Mann–Whitney U test. The abovementioned comparison was repeated for each item.

Test-Retest: The scale was applied to a group of 30 physicians twice at a 2-week interval to evaluate the stability. The Wilcoxon test was used to evaluate the significant difference between test and retest.

Validity Analyses

Construct Validity

Factor Analysis: To evaluate the construct validity of the scale, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed. Regarding the EFA, the factor-loading cutoff value was considered as 0.30, whereas factors with eigenvalues of >1, which accounted for >5% of the additional variance, were considered for deciding the number of factors. The direct oblimin rotation method was used. To evaluate the construct validity of the scale after it was limited to 13 items, the EFA was performed. Upon the initial analysis, 1 cross-loading item was removed after the factor loads were reviewed. The EFA was repeated with the remaining 12 items. It was noted that 2 items did not resemble the other items in the same sub-dimension, accordingly, those 2 items were removed from the scale and the EFA was repeated. LISREL v8.80 (Student) software was used for the CFA. Goodness-of-fit indexes were calculated, and acceptable values were determined according to the literature.[30,31]

Differential Validity: To assess the differential validity of the scale, the score distribution from the scale by certain groups was investigated. To test whether the scores from the scale varied by being diagnosed with COVID-19, the presence of individuals diagnosed with COVID-19 in their immediate vicinity, considering resignation during the pandemic process, and the cutoff value of the Stigma Scale, the Mann–Whitney U test was used.

Criteria Validity: The Stigma Scale was used for criteria validity. Spearman's correlation coefficient between the COVID-19-Induced Perceived Stigmatization in Physicians Scale and Stigma Scale scores was calculated.

Statistical Analysis

Data were subsequently entered into the computer and analyzed by Statistical Package for Social Sciences version 15.0 (SPSS Inc.; Chicago, IL, USA) and LISREL v8.80 (Student) statistical package program. Descriptive statistics were presented as median (minimum-maximum) or median (Q1, Q3) for non-normally distributed variables, mean ± standard deviation for the normally distributed variables. Categorical variables were reported as frequencies and percentages. The probability value $P < .05$ was considered statistically significant.

Results

Of the 303 participants, 59.1% (n = 179) and 40.9% (n = 124) were female and male physicians, respectively. They aged between 25 and 65 years, with a mean age of 35.5 (SD = 8.6) years.

Reliability

Internal Consistency Analyses: Based on the final version of the scale, Cronbach's alpha coefficients of factors 1 and 2 were 0.875 and 0.766, respectively, and the total Cronbach's alpha coefficient of the scale was 0.886. The item-total correlation coefficients were all >0.30. Cronbach's alpha coefficient did not substantially increase after deleting any item.

Comparison of Item Medians Between the Lower and Upper 27% Groups

The total scores from the COVID-19-Induced Perceived Stigmatization Scale in Physicians were sorted in descending order from the higher to the lower scores; accordingly, the median scores of the upper and lower 27% groups were compared using the Mann–Whitney U test. The score of the upper 27% group (median = 33 Q1 = 31, and Q3 = 37) was higher than that of the lower 27% group (median = 16 Q1 = 13, and Q3 = 17) ($P < .001$).

The final version of the COVID-19-Induced Perceived Stigmatization in Physicians Scale consisted of 10 items and 2 subdomains. The responses were provided on the basis of the 5-point Likert-type questionnaire, and the overall score from the scale varied between 10 and 50 points. It was considered that higher scores on the scale indicated greater COVID-19-induced perceived stigmatization in physicians.

Test-Retest Reliability

The COVID-19-Induced Perceived Stigmatization in Physicians Scale was applied twice to a group of 30 physicians with a 2-week interval for the test-retest procedure intended for the reliability assessment. The scores obtained from the first test ranged from 14 to 46 points, with a mean of 24.7 (SD = 7.1) points. The scores obtained from the

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posttest ranged from 14 to 41 points, with a mean of 25.5 (SD = 6.8) points. No significant difference was noted between the scores obtained from the 2 tests (P = .125).

Construct Validity

Exploratory Factor Analysis: During the last EFA with the remaining 10 items, the Kaiser-Meyer-Olkin value, which was indicative of the sample size adequacy, was 0.879, and the Barlett test P-value was < .001.

Through the EFA, it was concluded that the scale consisted of 2 sub-domains of "environmental perceived stigmatization" (6 items) and "personal perceived stigmatization" (4 items), with a total of 10 items. The variances accounted for by factors 1 and 2 on the scale were 50.46% and 11.09%, respectively, with a total variance of 61.56%. The item factor loadings varied between 0.660 and 0.853. The item factor-loadings and reliability values for the COVID-19-Induced Perceived Stigmatization in Physicians Scale are presented in Table 1.
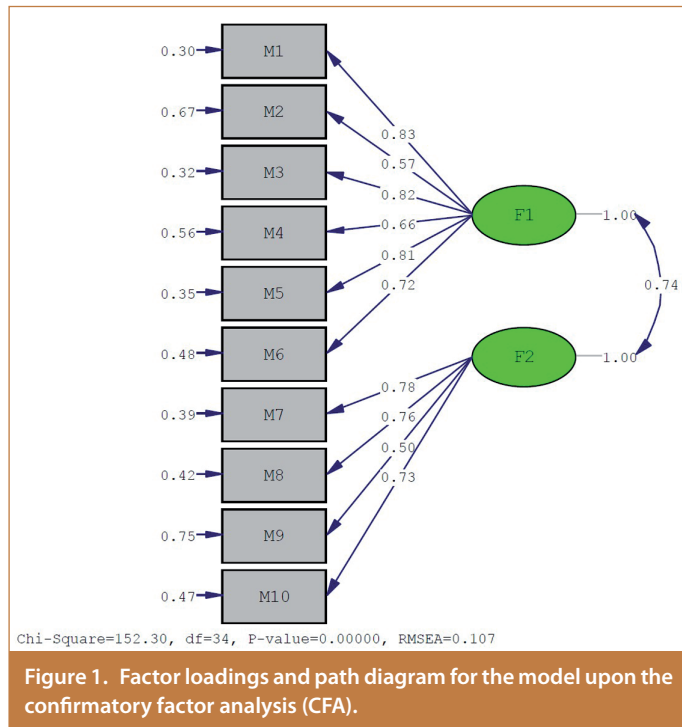
Confirmatory Factor Analysis: The 2-factor construct obtained during the EFA was confirmed using the CFA. Chi-squared/*df*, RMSEA (Root Mean Square Error of Approximation), NFI (Normed Fit Index), NNFI (Non-Normed Fit Index), PNFI (Parsimony Normed Fit Index), CFI (Comparative Fit Index), IFI (Incremental Fit Index), RFI (Relative Fit Index), RMR (Root Mean Square Residuel), SRMR (Standardized Root Mean Square Residual), GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), PGFI (Parsimony Goodness of Fit Index) criteria were examined. NFI (Normed Fit Index), NNFI (Non-Normed Fit Index), PNFI (Parsimony Normed Fit Index), CFI (Comparative Fit Index), IFI (Incremental Fit Index), RFI (Relative Fit Index), RMR (Root Mean Square Residual), SRMR (Standardized Root Mean Square Residual), GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), PGFI (Parsimony Goodness of Fit Index) were found suitable. Chi-squared/*df*, RMSEA (Root Mean Square Error of Approximation) were not suitable. The goodness-of-fit indices of the COVID-19-Induced Perceived Stigmatization in Physicians Scale are shown in Table 2.

Table 1. The Item Factor Loadings and Reliability Values for the COVID-19-Induced Perceived Stigmatization in Physicians Scale

COVID-19-Induced Perceived Stigmatization in Physicians Scale	Factor Loadings		Item Total Correlation Coefficient
	Factor 1	Factor 2	
Environmental Perceived Stigmatization Subdomain Accounted for variance, 50.46%; Cronbach's alpha coefficient, 0.875%			
1. My friends feel discomfort when they're in the same environment with me, even if they wanted to betray no emotion.	0.853		0.699
2. I feel my neighbors are uncomfortable because they live in the same building with me.	0.808		0.718
3. I think my relations with my relatives are weakened because they know I am a healthcare professional.	0.793		0.702
4. People can feel discomfort if I go into crowded environments with my work clothes/badges etc. on indicating that I am a healthcare professional.	0.734		0.552
5. Parents are uneasy about their children meeting the medical staff.	0.724		0.644
6. Even if I pay attention to personal protective measures, I don't think people will want to be with me.	0.713		0.673
Personal Perceived Stigmatization Subdomain Accounted for variance, 11.09%; Cronbach's alpha coefficient, 0.766			
7. I'm hiding that I'm a healthcare professional in my daily life out-of-work.		0.823	0.399
8. It bothers me that I am known as a healthcare professional involved in the COVID-19 process.		0.709	0.627
9. My self-esteem decreased during the pandemic due to the way my social circle treated me.		0.698	0.596
10. I regret being a healthcare professional because of the way the community treated healthcare professionals during the pandemic.		0.660	0.624

Total accounted for variance: 61.56%; total Cronbach's alpha coefficient: 0.886.

Table 2. Goodness-of-Fit Values of the COVID-19-Induced Perceived Stigmatization in Physicians Scale

Goodness-of-Fit Indices	Actual Values	Acceptable Values	Description
Chi-squared/*df*	4.47	≤3	High for goodness of fit
RMSEA (Root Mean Error of Approximation)	0.107	<0.08	Mediocre fit
NFI (Normed Fit Index)	0.95	>0.90	Good fit
NNFI (Non-Normed Fit Index)	0.95	>0.90	Good fit
PNFI (Parsimony Normed Fit Index)	0.72	0-1	Acceptable goodness of fit
CFI (Comparative Fit Index)	0.96	>0.95	Perfect goodness of fit
IFI (Incremental Fit Index)	0.96	>0.90	Good fit
RFI (Relative Fit Index)	0.93	>0.90	Good fit
RMR (Root Mean Square Residual)	0.068	<0.08	Good fit
SRMR (Standardized Root Mean Square Residual)	0.051	<0.08	Good fit
GFI (Goodness of Fit Index)	0.91	>0.90	Good fit
AGFI (Adjusted Goodness of Fit Index)	0.85	>0.85	Acceptable goodness of fit
PGFI (Parsimony Goodness of Fit Index)	0.56	>0.50	Acceptable goodness of fit

Figure 1. Factor loadings and path diagram for the model upon the confirmatory factor analysis (CFA).

Factor loadings and path diagrams for the model as a result of CFA are presented in Figure 1.

Differential Validity

The physicians, who were diagnosed with COVID-19, had individuals diagnosed with COVID-19 in their immediate environment, considered resignation during the pandemic, scored 55-points and

Table 3. A Comparison of the Scores of the Physicians in the Study Group from the COVID-19-Induced Perceived Stigmatization in Physicians Scale by the Factors Associated with Perceived Stigma

Associated Variables	n (%)	Total Score from Scale Median (min-max)	P
Age			
30 and above	121 (39.9)	23 (10-49)	.071
31 and above	182 (60.1)	25 (10-50)	
Gender			
Female	179 (59.1)	25 (10-50)	.084
Male	124 (40.9)	22.5 (10-46)	
Diagnosed with COVID-19			
Yes	73 (24.1)	25 (10-46)	**.002**
No	230 (75.9)	23 (10-50)	
Had individuals diagnosed with COVID-19 in their immediate environment			
Yes	233 (76.9)	25 (10-50)	**.002**
No	70 (23.1)	21 (10-49)	
Considered resignation during the pandemic			
Yes	92 (30.4)	28 (12-49)	**<.001**
No	211 (69.6)	22 (10-50)	
Stigma Scale Score			
54 and below	214 (70.6)	22 (10-46)	**<.001**
55 and above	89 (29.4)	26 (10-50)	

above on the Stigma Scale, and had higher scores on the COVID-19-Induced Perceived Stigmatization in Physicians Scale. The distribution of the physicians' scores from the COVID-19-Induced Perceived Stigmatization Scale in Physicians Scale by the factors associated with the perceived stigma is presented in Table 3.

Criteria Validity

The median score obtained from the COVID-19 Perceived Stigmatization in Physicians Scale (min.-max.) was 24.0 (10.0-50.0) points, with a mean score of 24.3 (SD = 7.9) points. The median score from the Stigma Scale was 49.0 (22.0-88.0) points with a mean score of 48.1 ± (SD = 12.4) points. Spearman's correlation coefficient between the scores from the COVID-19-Induced Perceived Stigmatization Scale in Physicians and the Stigma Scale was 0.345 ($P < .001$).

The physicians included in the study used the "Strongly disagree" response most frequently (47.2%) in responding to the "I hide that I am a healthcare professional in my daily life out-of-work" item on the COVID-19-Induced Perceived Stigmatization in Physicians Scale. The physicians used the "Disagree" response most frequently (43.9%) in responding to the "I regret being a healthcare professional because of the way the community treated healthcare professionals during the pandemic" item and the "No idea" response most frequently (38.0%) for the "It bothers me that I am known as a healthcare professional involved in the COVID-19 process," and the "Agree" and "Strongly agree" responses most frequently (47.9% and 12.5%, respectively) for the "My self-esteem decreased during the pandemic due to the way my social circle treated me" item. The distribution of the study group's responses to the items of the COVID-19-Induced Perceived Stigmatization in Physicians Scale is shown in Table 4.

Discussion

There are studies in the relevant literature on the stigmatization of physicians during the COVID-19 pandemic. However, there is only a limited number of stigma scales intended for physicians. To the best of our knowledge, several scales have been adapted for use in our country; however, no specific scale has been developed for COVID-19 infection. Accordingly, a scale for COVID-19 stigma has been developed for physicians, and its validity and reliability were verified.

The process of developing the COVID-19-Induced Perceived Stigmatization in Physicians Scale started with the development of an item pool consisting of 35 items. The scale was finalized upon receipt of expert opinions, content validity evaluation, preliminary application of the scale, internal consistency and item analyses, and EFA. The final version of the scale consisted of 10 items and the following 2 subdomains: "environmental perceived stigmatization" (6 items) and "personal perceived stigmatization" (4 items).

The validity and reliability study of the scale was performed with a sufficient-size study group following the principles specified in the relevant literature. As a result of the EFA, which aimed to assess the factor structure, 61.56% of the risk of COVID-19-induced perceived stigmatization in physicians can be detected using the COVID-19-Induced Perceived Stigmatization in Physicians Scale. Total variance rates ranging from 40.0% to 60.0% are considered adequate in multi-factor scales, including the COVID-19-Induced Perceived Stigmatization in Physicians Scale.[21] Furthermore, the

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Table 4. Distribution of the Study Group's Responses to the Items of COVID-19-Induced Perceived Stigmatization Scale in Physicians

COVID-19-Induced Perceived Stigmatization in Physicians Scale	Strongly Disagree	Disagree	No Idea	Agree	Strongly Agree
			n (%)		
Environmental Perceived Stigmatization Subdomain					
1. My friends feel discomfort when they're in the same environment with me, even if they wanted to betray no emotion.	63 (20.8)	111 (36.6)	53 (17.5)	56 (18.5)	20 (6.6)
2. I feel my neighbors are uncomfortable because they live in the same building with me.	82 (27.1)	121 (39.9)	49 (16.2)	34 (11.2)	17 (5.6)
3. I think my relations with my relatives are weakened because they know I am a healthcare professional.	92 (30.4)	118 (38.9)	42 (13.9)	36 (11.9)	15 (4.9)
4. People can feel discomfort if I go into crowded environments with my work clothes/badges etc. on indicating that I am a healthcare professional.	31 (10.2)	60 (19.8)	53 (17.5)	113 (37.3)	46 (15.2)
5. Parents are uneasy about their children meeting the medical staff.	33 (10.9)	63 (20.8)	74 (24.4)	107 (35.3)	26 (8.6)
6. Even if I pay attention to personal protective measures, I don't think people will want to be with me.	49 (16.2)	101 (33.3)	67 (22.1)	67 (22.1)	19 (6.3)
Personal Perceived Stigmatization Subdomain					
7. I'm hiding that I'm a healthcare professional in my daily life out-of-work.	77 (25.4)	107 (35.3)	49 (16.2)	53 (17.5)	17 (5.6)
8. It bothers me that I am known as a healthcare professional involved in the COVID-19 process.	96 (31.7)	117 (38.6)	39 (12.9)	41 (13.5)	10 (3.3)
9. My self-esteem decreased during the pandemic due to the way my social circle treated me.	131 (43.2)	130 (42.9)	25 (8.3)	11 (3.6)	6 (2.0)
10. I regret being a healthcare professional because of the way the community treated healthcare professionals during the pandemic.	141 (46.5)	96 (31.7)	39 (12.9)	16 (5.3)	11 (3.6)

item factor-loadings of the sector regarding the EFA ranged from 0.66 to 0.85 in the physicians. It was suggested in the relevant literature that an item loading of at least 0.30 for each item was acceptable. Again, factor loadings of 0.71 (which accounts for 50% of the variance) and 0.63 (which accounts for 40% of the variance) are considered excellent and very good, respectively.[21] A study reported that a COVID-19 Stigma Scale intended for physicians as adapted from another scale accounted for 60.46% of the total variance, wherein the item factor-loadings ranged from 0.41 to 0.84.[19] The validity and reliability study of the COVID-19 Patient's Social Stigmatization Scale for use in the healthcare professionals reported that the scale accounted for 63.00% of the total variance and that the item factor-loadings varied between 0.72 and 0.85.[20] The results of the EFA on the COVID-19-Induced Perceived Stigmatization in Physicians Scale are consistent with those reported in other studies. The scale meets the required criteria regarding the abovementioned variance and factor-loading results. Confirmatory factor analysis was used to verify the 10-item and 2-factor scales as a model based on the EFA. The goodness-of-fit index values, which were obtained as a result of the CFA, indicated an adequate model-data fit.

Reliability refers to obtaining close results upon repeated measurements on a scale. Particularly, reliability demonstrates the ability of the scale to measure accurately and its immutability over time.[21] Cronbach's alpha reliability coefficient is used to assess the internal consistency. Cronbach's alpha indicates the degree of consistency of the items on a scale in itself and with the entire scale. For a reliable scale, Cronbach's alpha values are required to be a minimum of 0.70.[32] Cronbach's alpha reliability coefficients for Factor 1 and 2 were 0.87 and 0.76, respectively, and 0.88 for the entire scale upon assessment of the internal consistency of the scale. The adequate

levels of Cronbach's alpha values of each factor and the 10 items that comprise the entire scale indicate the consistency of the items. Based on the above values, it can be suggested that the scale had internal consistency and was reliable. Regarding the COVID-19 Stigma Scale, which was adapted from another scale intended for physicians, Cronbach's alpha reliability coefficient for the entire scale was 0.91 and that of the validity and reliability study of the COVID-19 Patients Social Stigmatization Scale was 0.74, whereas that of the COVID-19 Public Stigma Scale developed for the public was 0.85 and that of the COVID-19 Infection Stigma Scale developed for patients with COVID-19 was 0.82.[16,17,19,20]

As a component of reliability, stability is investigated using the test-retest method. Based on the application of the scale to the same individuals twice with a certain time interval in between and the calculation of the correlation coefficient between the 2 measurement results, the high correlation coefficients in the test-retest method indicate the stability of the measurement. A correlation coefficient and an intra-class correlation coefficient value of 0.70 and above indicate that test-retest reliability is achieved.[32] The correlation coefficient obtained as a result of the application of the COVID-19-Induced Perceived Stigmatization in Physicians Scale to the same physician group at a 2-week interval was 0.91. This result was interpreted as the fact that the scores obtained from the scale did not change over time and that the scale was stable in repeated measurements and provided similar results; therefore, the test-retest reliability was achieved. The validity and reliability study of the COVID-19 Patients Social Stigmatization Scale intended for healthcare professionals reported the correlation coefficient of the scale as 0.89.[20] The test-retest correlation coefficients of the COVID-19 Public Stigma Scale developed for the public and the COVID-19 Infection Stigma Scale developed for patients with COVID-19 were 0.94 and 0.89, respectively.[16,17]

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A group known to have a certain feature is expected to score higher on the scale, which is intended to measure that feature.[32] In the present study, the physicians who were diagnosed with COVID-19, had individuals diagnosed with COVID-19 in their immediate environment, considered resignation during the pandemic period, and scored 55 or above on the Stigma Scale were expected to have higher scores from the COVID-19-Induced Perceived Stigmatization in Physicians Scale. Expectedly, the scores of the specified groups from the scale were higher during an analysis aimed to compare the groups. These results suggest that the differential and construct validities of the scale using group differences are achieved.

This study has some limitations. First, this study was conducted on physicians working at a single university hospital. Second, the scale used for correlation was not originally intended for COVID-19 and physicians. Lastly, the scale was designed as a self-report scale. In self-report scales, the respondents are asked questions about themselves, and the score is calculated on the basis of the respondent's statement. The level of respondents' sincerity in answering the questions affects the accuracy and reliability of the data.

Nevertheless, this study had its strengths. First, to the best of our knowledge, this was the first nationwide scale intended for physicians with COVID-19-related stigmatization. At the same time, this is one of the few scales in the relevant literature on the subject matter of this research. Lastly, this scale includes only 10 items; therefore, it is easy to apply and can be incorporated into different studies on the subject.

The 10-item and 2-subdomain COVID-19-Induced Perceived Stigmatization in Physicians Scale is a reliable and valid tool for evaluating the COVID-19-induced stigma in physicians. The scale can help practitioners and researchers with the early identification of physicians, who experience COVID-19-related stigma and facilitate targeted interventions and services intended for the stigma. Moreover, the scale can be used in larger groups and different areas. Furthermore, it can raise awareness regarding the significance of stigma in physicians and other healthcare professionals. It is suggested that the application of the scale in healthcare professionals other than physicians would be beneficial. Lastly, the scale can be used in other cultures after being translated into the respective languages.

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