Scientific Research Publishing

Open Journal of Social Sciences, 2022, 10, 98-112
https://www.scirp.org/journal/jss
ISSN Online: 2327-5960
ISSN Print: 2327-5952

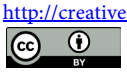
Developing a Scale of Public Stigma towards Infected People with COVID-19 in Saudi Arabia: A Confirmatory Factor Analysis

Tarek Attia Abdelrahman[1], Roshdy Shawky Eladawy[2]

[1]Rural Sociology Department, Kafrelsheikh University, Kafr El Sheikh, Egypt
[2]Agricultural Economics Department, Kafrelsheikh University, Kafr El Sheikh, Egypt
Email: trahman2050@gmail.com, dr.roshdyaladawy@gmail.com

How to cite this paper: Abdelrahman, T. A., & Eladawy, R. S. (2022). Developing a Scale of Public Stigma towards Infected People with COVID-19 in Saudi Arabia: A Confirmatory Factor Analysis. *Open Journal of Social Sciences, 10,* 98-112.
https://doi.org/10.4236/jss.2022.1011008

Received: September 12, 2022
Accepted: October 11, 2022
Published: October 14, 2022



Abstract

The Stigmatization of people is an important research point of social sciences. Stigma has a major impact on an individual's life and society, as it can cause suffering greater than the physical disorders. This study aimed to develop a public stigma scale to people infected with COVID-19 in Saudi and examine the factorial structure and other aspects of the scale validity and reliability. **Methods**: The scale was distributed electronically on the study sample (518 adults)—due to the lockdown under the spread of COVID-19—through the social networking website "Twitter". The data were analyzed using exploratory factor analysis, descriptive statistics and confirmatory factor analysis using IBM SPSS 26 and AMOS 25. **Results**: Exploratory factor analysis revealed that the final version of the scale consists of 15 items and 3 components: cognitive, affective and behavioral stigma, which explained 65.43% of the total variance. Confirmatory factor analysis supported a 3-factor structure, which was satisfactory. The scale was also reliable with Cronbach's α for the total scale was .92, and that of each subscale was .77 - .86. The scale showed adequate convergent and discriminant validity. Overall, the scale is a reliable and valid measure, which may be useful in preventing and recovering COVID-19 stigma.

Keywords

Social Stigma, COVID-19, Exploratory Factor Analysis, Confirmatory Factor Analysis, The Saudi Arabia Kingdom

1. Introduction

COVID-19 is a health and social phenomenon with human aspects. It revealed

the necessity of collaboration of the world for self-preservation and human existence. Donthu & Gustafsson (2020) indicate that the COVID-19 pandemic has drastically transformed the life patterns of people throughout the globe since its first appearance in China's Wuhan in the closing month of the year 2019. The affliction of this pandemic, its mortality rate and its expanse had an exceptional impact on the economies' health and financial systems without any exception.

The stigma towards corona virus patients may be in complex. Initially it might be distressed for the COVID-19 patients' assistance looking for practices, prompting superfluous deferrals in examining, treatment and advancing proceedings with transmission of virus (Millett et al., 2020). Secondly, nevertheless as such, in the patients of the corona virus build the mental stress due to this the clinical results would be affected. Third, in any incident, for those patients who survive with this condition it might be hesitate to being connected with other people, about prohibition and exclusion and in the long undermining their physical, obsessive, and psychological comfort (Linschoten, Asselbergs et al., 2021). Besides, given sociodemographic contrasts (e.g., in light of race/identity, and period) of virus frequency and mortality, public defamation towards COVID patients can exaggerate the all around certain mindset in the public arena, and disruption social combination and worldwide fortitude which matters significantly extreme during the emergency of COVID (Richardson et al. 2020).

Given the serious wave of virus across the globe, people were in the stigma of the COVID-19 is bound and to be danger rather than the actual sickness. Confusions and lack of information about the virus, along the anxiety of high degrees of COVID-19, have been affirmed to be related with additional demonizing perspectives towards individuals related with the setting of COVID-19 (Cassiani-Miranda et al., 2021). The public overview in Bangladesh general prospects of the attitudes identified with COVID-19 in everybody was fundamentally connected with marital status, educational level, living styles, and hazards perceptions. Research on open stigma set that publically impression of criticized maligned conditions was related with their intellectual attributions and emotional reactions (Alahdal, Basingab, & Alotaibi, 2020). As indicated by Weiner's attribution hypothesis, in the consequence that people are seen to be fit for controlling the incidence of their sicknesses and to be answerable for their own contaminations, they are bound to be slandered. Nevertheless, the causal acknowledgments about the regulation and obligation, people's worse reactions are likely to the connected with demonization (Weiner, 1993). Such connections have been found in various examinations about open demonization towards dysfunctional behavior, HIV/AID, and incapacities. Inside the structure of attribution hypothesis and earlier observational examinations, it recommended that public stigma towards individuality and the corona virus would be connected with various attributions and destructively emotion connections (Lau, Tsui, & Phil 2003).

In Saudi Arabia, March 2, 2020, was the fateful day when its Ministry of Health (MOH) announced the first COVID-19 case on Saudi land. 154 new COVID-19 cases were confirmed (MOH, 2020). As per the data provided by the Saudi Center for Disease Prevention and Control (SCDC), the number of confirmed cases had risen to 373,368 by 17 February 2021, while the percentage of the recovered persons remained 97.57%, and deaths 1.73% (SCDC, 2021).

The rapid spread of the Corona pandemic has led many countries of the world, including Saudi Arabia, to take preventive procedures to avoid the outbreak of the COVID-19 disease, which has led to anxiety and fear of infection and stigma in local communities. In this regard, (Chopra & Arora 2020; Hasan et al., 2020) pointed out serious consequences were carried by the stigma, including fear, anger, and intolerance towards other people. Stigmatized persons are usually reluctant to go for treatment or procrastinate, ultimately leading to higher morbidity and mortality. Such people may also face worse psychological well-being, harassment, violence, victimization, poor quality of life and disability, increased socioeconomic problems, and feelings of shame, disgust, and insecurity.

Stigma as a "term" is widely used and has a long history in the literature of social and medical sciences. However, Silke (2016) noted that researchers had not presented a single common concept of stigma. Link & Phelan (2001) has pointed out that the existence of many definitions of stigma is that stigma has many components, and every one of them is called stigma. They deduced a definition of stigma in the confluence of interrelated components. They showed that stigma arises when its components of labelling, stereotyping, separation, status loss, and discrimination occur together in a state of power that allows them to do so. Ali, Naji, & Zeitoun (2014: p. 333) restricted stigmatization as the unsolicited and uncalled-for tags and metaphors associated with an individual by others that deprive him of social acceptance or community support he is a person different from other people in society. The difference lies in one of his physical, mental, psychological or social characteristics that makes him excluded from and rejected from the society he lives in. In the context of health, as per WHO, the phenomena of social stigma means a person or group of people start sharing a certain characteristic and a specific disease, which is negatively associated to them by others as if they were the cause or they were active and conscious agents to catch it. In an epidemic, this could mean that the people are stereotyped, labelled, discriminated against, maltreated and experience loss of social status because of a (mis)perceived link with a disease (Chopra & Arora, 2020).

Most researchers considered stigmatizing a "social attitude" to conceptualize stigma. At the same time, attitudes consist of three interrelated components: cognition, affect and behavior. Many conceptual models of stigma have been adapted and emerged from theoretical models about attitudes formation. One of the common theoretical conceptualizations of stigma in relevant literature is the social cognitive model. Stigma is a social cognitive phenomenon with psychological and social aspects in this model. Although stigma is socially constructed,

it is argued that people's cognitive systems and processes restrict how they think about the world. This model proposes that stigma comprises three distinct cognitive, emotional, and behavioral elements: stereotypes, prejudice, and discrimination. These mechanisms are thought to work together to create a social outcome stigma forming and preservation. Although other conceptual models specify that other factors, such as labelling, loss of status, and knowledge of stereotyping, classification abilities, and power dynamics are significant in the stigmatization, at the measurement level, the three attitudes components are increasingly recognized as components of stigma (Silke, 2016).

Yassin & Al-Sayed (2018) and Pavelko (2017) pointed out that the wise component (stereotypes) signifies the dominant stereotypes or beliefs that occur when imagining a particular group. Stereotypes are components of the social groups open to classification. Stereotypes reflect stigma's perceptive or cognitive profile to classify group members based on trait classification and societal roles. The affective component (Prejudice) is intolerance based on uncompromising and false judgement. This concept is an oversimplified conclusion about a person based on his group. Since prejudice attaches a value-judgement or favorability component to the classification process, it effectively expresses stigma. The discrimination component is the social indicator of stigma, which arises due to stereotypes and prejudices. Denying people equal treatment based on their group membership is a process known as discrimination. Often, the goal of differentiating actions is to designate an individual's group characteristics as superior to those of the external group.

In this study, stigma towards people infected with COVID-19 is defined as a term that describes what community members feel and act towards the infected person of the COVID-19 or their family in a way that affects his reputation or status. It means a loss of respect, personal dignity, shame, failure or personal defect. This can manifest through cognitive, affective and behavioral forms.

Measurement is an important topic in scientific research that deals with variables that must be rigorously measurable to study the relationships between them. DeVellis argues that measurement is a fundamental science activity and vital across many social research contexts (DeVellis, 2017). To understand the nature of the coronavirus stigma, its causes, and effective interventions to reduce it, it is essential that researchers first have a reliable and valid scale.

A review of the literature revealed various attempts to measure attitudes toward different infectious diseases stigma, the majority of which have concentrated mental illness. There have been far fewer attempts to assess stigma explicitly with COVID-19. In Saudi Arabia, many studies have been concerned with studying people's awareness of COVID-19 and how it spreads and reduces infection, such as (Al-Shugair, 2020; Khoshaim et al., 2020; Alahdal et al., 2020; Alrasheedy et al., 2021). However, a lack of studies has addressed the stigma towards people with COVID-19 and the development of a scale for this purpose. Therefore, this study attempts to answer the following question: What is the factorial

structure of the public stigma towards people infected with COVID-19 in Saudi Arabia society using exploratory and confirmatory factor analysis? In addition, testing this hypothesis: Social stigma towards people infected with COVID-19 in Saudi Arabia is a latent multidimensional construct composed of three dimensions: cognitive, affective, and behavioral.

2. Research Methodology

This study includes a multiphase procedure to develop a scale as suggested by Netemeyer et al., (2003) and DeVellis (2017). Inside the first phase, a review of previous public stigma definitions and their measures was done to generate initial items pool (Netemeyer, Bearden, & Sharma, 2003). Then within the second phase, for data reduction and factor structure examination, exploratory factor analysis was done to determine the essential factors and to the institution the items into factors (EFA). Confirmatory factor analysis (CFA) was done in the third phase to verify factor structure, reliability, and validity factors.

2.1. Initial Items Pool Development

Since there is no proposed scale to measure the stigma of COVID-19 in the Saudi context, researchers selected items from the previous scales and different mixed items to develop the scale. The initial items pool was developed based on a conceptual analysis of social stigma definition and dimensions. As shown above, the conceptual analysis revealed that the scale consisted of three dimensions: affective, cognitive and behavioral factors. It was obtained using a review of previous measures of public stigma (Dar et al., 2020; Jeyaseelan et al., 2013; Wright et al., 2007). 21 items represent an initial items pool. These items have been modified following the local environment for Saudi society. According to Haghighat (2005), questions asked to respondents in the form of how "most people in the community" think and not themselves feel and interact with a COVID-19 patient. This is to elicit the participants' perception of stigmatization by society.

In the second step, the response format was determined. Each item was measured on a five-point Likert scale and had five possible answers: (Strongly agree, agree, neutral, disagree, and strongly disagree). A score of 1 was given the lowest and 5 for most stigmatization perception. Experts and peer group researchers reviewed the initial item pool for content validity before data collection in the third step. They reviewed and evaluated each scale item to determine clarity, accuracy, and suitability. Three items have been deleted, some items that required small changes were modified, and some were reworded as suggested by them. After content validity, only 18 items related to the proposed dimensions of public COVID-19 stigma remained.

2.2. The Participants and Data Collection

The study used a web-based cross-sectional and anonymous survey using non-

probability sampling known as a convenience sample. The convenience sample depends on collecting data from the available population to participate in the study. Although this type of sampling has disadvantages such as selection bias and high sampling error, it was adopted in this research due to the curfew imposed by the Saudi authorities to prevent the spread of the COVID-19 pandemic. The researchers based on what Tabachnick & Fidell (2013) suggested for factor analysis to determine the appropriate sample size. They considered 50 very weak samples, 100 weak, 200 sufficient, 300 good, 500 very good and 1000 and above excellent (Tabachnick & Fidell, 2013).

By using the self-filled form online using the (google drive) program. The respondents filled out the available questionnaires from July 11 to August 28, 2020. The link to the questionnaire was sent to the respondents via the social networking program "Twitter". (518) Saudi citizens aged 18 years and over responded. According to the criteria mentioned above, 518 respondents provided acceptable data to determine the sample size for the factor analysis.

2.3. Statistical Analysis Plan

The data used IBM SPSS (v. 26) and the AMOS (v. 25) software. We used frequencies, means, and standard deviations to describe the data. Exploratory factor analysis (EFA) and confirmatory factor analysis were used to assess structural validity. The primary objective of factor analysis, according to Hair, is to identify the underlying structure among the variables in the analysis. Exploratory factor analysis is used to doubt how many factors can exist in a set of variables. This method summarizes the data from many original items into a limited number of new variables with minimal information loss (Hair et al., 2014).

After accomplishing exploratory factor analysis, Tabachnick & Fidell (2013) indicated that confirmatory factor analysis could be used to verify the validity of a determined set of variables. In this study, CFA was used to test whether or not the three factors discovered in the EFA could predict the latent assemble of public COIVD-19 stigma. AMOS (v.25) software was used to specify and estimate this confirmatory factor model. Maximum Likelihood (ML) was used to estimate model parameters.

In CFA, if χ^2/df (CMIN/df) was less than 5, CFI was higher than .9, GFI, NFI, IFI, TLI were higher than .9 [48], and RMSEA was less than .08, the CFA model was considered acceptable or good fit (Shiau, Sarstedt, & Hair, 2019; Hair et al., 2014). The Average Variance Extracted (AVE) is used to determine convergent validity Hair suggested that an AVE value greater than .5 indicated sufficient convergent validity (Hair et al., 2014).

To assess reliability, we calculated internal consistency using Cronbach's alphas α. According to DeVellis, If α is between .7 - .8, reliability is good, and .8 - .9 is very good. In addition, we calculated the composite reliability index (CRI). Kline (2000) suggested that if (CRI) value greater than .7 have been deemed desirable (DeVellis, 2017).

3. Results

3.1. Sociodemographic Characteristics of Participants

518 participants filled the online survey, whereas 79.7% were male and 20.3% were female. Most of the respondents (78.2%) resided in the Central Region (Riyadh). Representing 67.6%, the majority of the respondents were married. In terms of age groups, more than half of them were between 30 - 39 and 40 - 49 years, representing 36.5% and 24.5%, respectively. More than half of the respondents (53.9%) were Bachelor degree holders. Most of the respondents (70.1%) were employed in the government sector (see Table 1).

3.2. Scale's Psychometric Properties

3.2.1. Exploratory Factor Analysis

Before testing the study hypothesis, an exploratory factor analysis (EFA) was used to reduce the number of items for each sub-latent variable and improve the statistical power of the hypothesized research model. The factors extracted from the EFA were subjected to confirmation factor analysis (CFA) to test the hypothesis.

To test the suitability of the data for factor analysis, we used Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The results indicated that Bartlett's test was statistically significant ($\chi^2 = 5516.60$,

Table 1. Socio-demographic characteristics of the research sample (n = 518).

Characteristics	No.	%	Characteristics	No.	%
Residence area			**Age**		
Central	405	78.2	**18 - 29**	116	22.4
North	13	2.5	**30 - 39**	189	36.5
Eastern	36	6.9	**40 - 49**	127	24.5
Western	46	8.9	**50 - 59**	73	14.1
Southern	18	3.5	**60+**	13	2.5
Sex			**Educational level**		
Male	413	79.7	High school or less	62	12.0
Female	105	20.3	Bachelor's degree	279	53.9
			Postgrad degree	177	34.2
Employment status			**Marital status**		
Government sector	363	70.1	Single	161	31.1
Private sector	33	6.4	Married	350	67.6
Retired	18	3.5			
Unemployment	44	8.5			
Student	60	11.6			

$p < .000$), and the KMO value were above .60 (KMO = .892). Thus, the data are considered suitable for factor analysis (Hair et al., 2014). We used principal component analysis with varimax rotation to determine the number of extracted factors to be retained. The number of holding factors was based on Eigenvalue > 1 and the Scree plot examination. For item retention, the minimum acceptable load factor was ≥±.50, without significantly loading the item on more than one factor. Factors containing only three or more items have been retained.

First, the EFA was run with all 18 items. Two items were detached from the 18 items; two, ×10 and ×11, were discarded, as they did not load onto any factor (<.50). In this first phase, three components emerged with an eigenvalue ≥ 1. The remaining 16 items passed through the same process again while the second phase of the analysis brought the total number of items to 16, and three components still emerged with an eigenvalue > 1, But item (×2) was found to cross-load onto the first and second factors, so it was removed from further analyses. The third round of the EFA with the remaining 15 items (see **Table 2**) resulted in 15 items, and three components still emerged with an eigenvalue > 1. Results in **Table 1** and scree plot (see **Figure 1**) suggested that a three-factor solution would best suit the data. This three-factor was found to account for 65.43% of the total variance.

From the remaining items, sex items were found to load onto the first factor, called the cognitive stigma (explaining 44.22% of the variance). Five items were found to load onto the second factor, conceptualized as the effective stigma (explaining 13.34% of the variance). Four items were found to load onto the third factor, which was named behavioral stigma (explaining 7.87% of the variance).

In sum, the results of the EFA revealed that public stigma towards people infected with COVID-19 is a concept comprised of three distinct factors.

3.2.2. Confirmatory Factor Analysis

Confirmatory factor analysis was used to test hypothesized three-factor model for public stigma towards people infected with COVID-19.

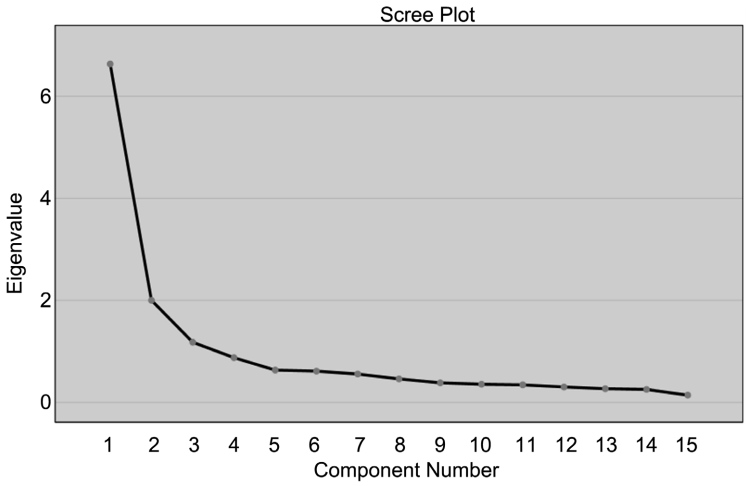


Figure 1. Scree plot for a three-factor solution.

Table 2. Rotated component matrix of extracted factors of public stigma towards people infected with COVID-19 and items& factors scores.

Item No	Items	Components			Extraction	M (SD)	M (SD)
		1	2	3			
x17	If a person has COVID-19, most people in the community will behave differently for the rest of his life.	.805			.70	2.15 (1.2)	
x15	Most people discriminate against a person if a family member is infected with COVID-19.	.782			.64	2.30 (1.2)	
x16	Most people think that people with COVID-19 are unclean.	.73			.57	2.17 (1.2)	2.44 (1.0)
x9	Having a family member with COVID-19 negatively impacts him and his family.	.698			.71	2.84 (1.3)	
x7	A person's reputation is damaged because a family member is infected with COVID-19.	.676			.66	2.65 (1.3)	
x8	Most people's perception of a person will change for the worse if a family member has COVID-19.	.664			.68	2.56 (1.3)	
x1	Most people feel inferior because one of their family members is infected with COVID-19.		.845		.73	4.04 (1.2)	
x4	Most people feel sad because they have a family member with COVID-19.		.822		.72	4.12 (1.0)	
x5	Most people worry if other people would know they have a family member with COVID-19.		.787		.67	3.98 (1.1)	3.74 (.88)
x6	Most people feel embarrassed if they have a family member with COVID-19.		.76		.69	3.46 (1.2)	
x3	Most people feel helpless for having a family member with the Corona virus		.573		.48	3.11 (1.0)	
x18	Most people are not comfortable when they are near those with COVID-19.			.823	.69	4.22 (1.1)	
x14	Most people keep their distance from those with COVID-19			.72	.69	3.71 (1.1)	3.85 (.85)
x13	Most people stay away from others who can make harmful comments or jokes because they are close to a coronavirus patient.			.647	.58	3.52 (1.1)	
x12	Most people reduce interacting and dealing with a person with COVID-19.			.634	.61	3.94 (1.0)	
	overall scale						3.34 (.76)
	Eigenvalues	6.63	2.01	1.18			
	% of Variance	44.22	13.34	7.87			
	Cumulative %	44.22	57.56	65.43			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization

The CFA results for the three-factor model indicated the model was less than a good fit: [χ^2 = 754.159, DF. = 87, p < .000, χ^2/DF = 8.668, CFI = .846, GFI = .827, TLI = .814, RMSEA = .122, NFI = .830, IFI = .847]. Therefore, a modification made to the model by examining the residuals and modification indices provided by the AMOS program, taking into account the theoretical and logical aspect in ensuring the correctness of the modification.

Examination of modification indices revealed several pairs of error terms if correlation would significantly reduce the chi-square value. Correlating error terms is allowed if the correlations are not high and do not change estimates of the remaining parameters. Ten pairs of error terms were correlated, as shown in Figure 2. After correlating the error terms, all fit indices indicated a good fit for the modified three-factor measurement model [χ^2 = 303.373, DF. = 77, p < .000, χ^2/DF = 3.940, CFI = .948, GFI = .930, TLI = .929, RMSEA = .075, NFI = .932, IFI = .948].

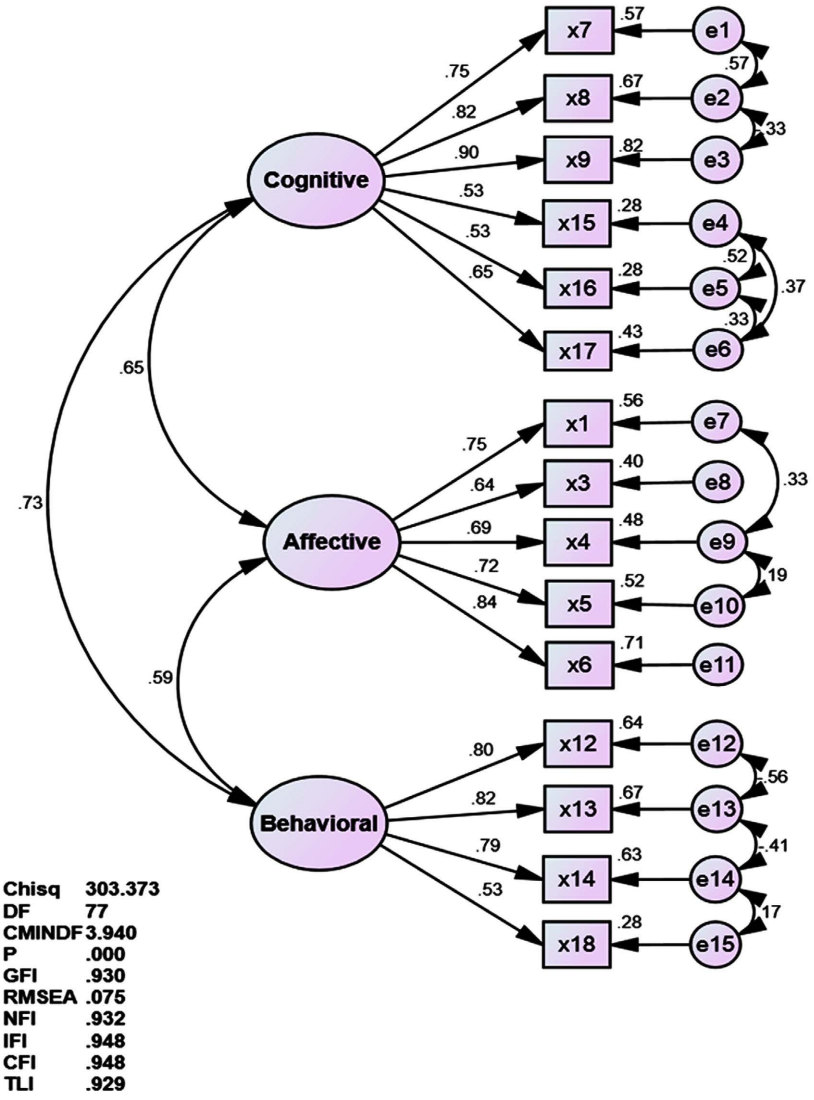


Figure 2. Modified model for the confirmatory factor analysis.

3.2.3. Construct Reliability and Validity

To assess the construct's reliability and validity (convergent and discriminant validity). We calculated the composite reliability index (CRI) and average variance extracted (AVE). Table 3 demonstrates that the CRI values of all constructs ranged from .829 to .855, exceeding the recommended cut-off value of .70, and Cronbach's alphas ranged from .798 to .879 is very good According to with DeVellis (2017), so the constructs' study is reliable. Moreover, the previous table results reveal that all of the constructs' AVEs value is above .50, which is consistent with Hair et al., (2014) recommendations.

According to Fornell & Larcker (1981) recommendation, the AVEs value was compared to the squared variances shared between constructs in the model to evaluate the discriminant validity. The results demonstrate that AVEs value was higher than the relevant squared variances shared between constructs (Table 3). As a result, discriminant validity was supported.

3.3. Items and Factors Scores

The means and standard deviations were calculated for each item, factor, and the overall scale. It is clear from Table 2 that the mean of the overall scale is (3.34) and the standard deviation (.76). It is also evident that the behavioral dimension of stigma comes in the first, followed by the affective dimension, and finally, the cognitive dimension, where the means (3.85, 3.74, 2.44) respectively.

4. Discussion and Implications

A stigma has been associated with different infectious diseases. Because of the rapid spread of COVID-19 globally and contradictory information about its transmission and prevention, COVID-19 stigma is emergent in many societies. The emergence of COVID-19 stigma in the community can threaten the efforts to prevent the spread of COVID-19. To understand COVID-19 stigma and overcome it to avoid its negative effects, its dimensions must be determined and measured. Therefore, the main objective of this study was to develop a scale for public stigma towards people infected with COVID-19 in Saudi Arabia and test its validity and reliability. To our knowledge, this is the first study to measure public COVID-19 stigma in the Saudi Arabia Kingdom.

Public stigma towards people infected with COVID-19 is the negative feeling and interaction between a person and a COVID-19 patient in the community. According to the literature and previous studies, this study proposed a three-

Table 3. Construct's reliability and validity.

Construct	CRI	AVE	Alpha	Cognitive	Affective	Behavioral
Cognitive	.855	.505	.879	**.711**		
Affective	.851	.534	.863	.65**	**.731**	
Behavioral	.829	.554	.798	.73**	.59**	**.744**

The square root of AVE values is expressed by diagonal elements (bold) in the correlation matrix, and it must be greater than off-diagonal values for discriminant validity.

dimensional model of public stigma towards people infected with COVID-19: cognitive, affective, and behavioral dimensions.

Confirmatory factor analysis results showed that the scale retained the same factorial structure, and the three components fit well and met the criteria for goodness of fit indices (>.90) and (RMSEA < .08). The reliability co-efficient obtained by the Cronbach's alpha for the three components of the scale was above .70, indicating that the internal consistency of the developed scale was satisfactorily reliable. As a result, the reliability and validity of the developed measurement tool were ensured and can be regarded as adequate.

In Saudi Arabia, the empirical test of the Public stigma towards people infected with the COVID-19 scale showed good psychometric properties in terms of dimensionality, reliability, and construct validity.

As a theoretical contribution, the empirical support of the literature review, the expectation was to obtain three dimensions. This result encourages the use of the scale to investigate the societal stigma of COVID-19 and its constructs.

The results of this study support the previous studies results (Karthik et al. 2014; Mak & Cheung, 2008; Zhang et al., 2020), that stigma is a latent variable with three dimensions: cognitive, emotional, and behavioral.

Methodologically, we believe that this study contributes to consolidating good practices for evaluating, adapting, and using social scales, thus contributing to their theoretical development and management applications.

5. Conclusion and Limitations

Despite the consistent and promising results, the study presents limitations related to the research method and sampling. To select the study's respondents, we used a non-random sampling, which makes this study's results probabilistic. To the generalizability of study results, future research would need to use larger and diversified random samples.

In this study, internal consistency was used to determine the scale reliability; future studies should evaluate the scale's test-retest reliability. Furthermore, no known indicator of public stigma has been compared to the scale.

Moreover, future research can verify the factorial structure of the scale by re-studying other societies. In addition, future research can use several statistical methods to investigate the scales validity to present a clear picture of the nature of these scales in light of the different societies' cultures.

In sum, EFA and CFA results for the scale of public stigma towards people infected with COVID-19 suggest that cognitive, affective, and behavioral represent public COVID-19 stigma dimensions. We suggest that this scale can be used in scientific research. We hope that this scale will aid future studies into the causes and effects of public stigma towards people infected with COVID-19 and the reduction in the communities.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Alahdal, H., Basingab, F., & Alotaibi, R. (2020). An Analytical Study on the Awareness, Attitude and Practice during the COVID-19 Pandemic in Riyadh, Saudi Arabia. *Journal of Infection and Public Health, 13,* 1446-1452. https://doi.org/10.1016/j.jiph.2020.06.015

Ali, S. M., Naji, A. F., & Zaitoun, A. (2014). The Relationship between Receiving Social Solidarity Services and Stigma. *Fayoum University's Journal of Educational and Psychological Sciences, 3,* 307-343.

Alrasheedy, A., Abdulsalim, S., Farooqui, M., Alsahali, S., & Godman, B. (2021). Knowledge, Attitude and Practice about Coronavirus Disease (COVID-19) Pandemic and Its Psychological Impact on Students and Their Studies: A Cross-Sectional Study among Pharmacy Students in Saudi Arabia. *Risk Management and Healthcare Policy, 14,* 729-741. https://doi.org/10.2147/RMHP.S292354

Al-Shugair, A. A. (2020). Environmental Health Security in Light of the Spread of the Novel Coronavirus: An Analytical Descriptive Study of Some Health Practices in the Kingdom of Saudi Arabia. *Arab Journal for Security Studies, 36,* 143-157. https://doi.org/10.26735/PCBC1154

Cassiani-Miranda, C. A., Campo-Arias, A., Tirado-Otalvaro, A. F., Botero-Tobon, L. A., Upegui-Arango, L. D., Rodriguez-Verdugo, M. S., Scoppetta, O. et al. (2021). Stigmatisation Associated with COVID-19 in the General Colombian Population. *International Journal of Social Psychiatry, 67,* 728-736. https://doi.org/10.1177/0020764020972445

Chopra, K. K. & Arora, V. K. (2020). Covid-19 and Social Stigma: Role of Scientific Community. *Indian Journal of Tuberculosis, 67,* 284-285. https://doi.org/10.1016/j.ijtb.2020.07.012

Dar, S. A., Khurshid, S. Q., Wani, Z. A., Khanam, A., Haq, I., Shah, N. N. et al. (2020) Stigma in Coronavirus Disease-19 Survivors in Kashmir, India: A Cross-Sectional Exploratory Study. *PLoS ONE, 15,* e0240152. https://doi.org/10.1371/journal.pone.0240152

DeVellis, R. F. (2017). *Scale Development: Theory and Applications* (Vol. 26). Sage Publications.

Donthu, N., & Gustafsson, A. (2020). Effects of COVID-19 on Business and Research. *Journal of Business Research, 117,* 284-289. https://doi.org/10.1016/j.jbusres.2020.06.008

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measure. *Journal of Marketing Research, 18,* 39-50. https://doi.org/10.1177/002224378101800104

Haghighat, R. (2005). The Development of an Instrument to Measure Stigmatization: Factor Analysis and Origin of Stigmatization. *European Journal of Psychiatry, 19,* 144-154. https://doi.org/10.4321/S0213-61632005000300002

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis.* Pearson Education Limited.

Hasan Shiri, F., Mohtashami, J., Manoochehri, H., Nasiri, M., & Rohani, C. (2020). Care Plan for Reducing Stigma in Cancer Disease. *Open Journal of Nursing, 10,* 1142-1154. https://doi.org/10.4236/ojn.2020.1011081

Jeyaseelan, L., Kumar, S., Mohanraj, R., Rebekah, G., Rao, D., & Manhart, L. E. (2013). Assessing HIV/AIDS Stigma in South India: Validation and Abridgement of the Berger HIV Stigma Scale. *Aids and Behavior, 17,* 434-443. https://doi.org/10.1007/s10461-011-0128-3

Karthik, L., Kumar, G., Kirthi, A. V., Rahuman, A. A., & Bhaskara Rao, K. V. (2014).

Streptomyces sp. LK3 Mediated Synthesis of Silver Nanoparticles and Its Biomedical Application. *Bioprocess and Biosystems Engineering, 37,* 261-267. https://doi.org/10.1007/s00449-013-0994-3

Khoshaim, H. B., Al-Sukayt, A., Chinna, K., Nurunnabi, M., Sundarasen, S., Kamaludin, K., Baloch, G. M., & Hossain, S. F. A. (2020). Anxiety Level of University Students during COVID-19 in Saudi Arabia. *Frontiers in Psychiatry, 11,* Article ID: 579750. https://doi.org/10.3389/fpsyt.2020.579750

Kline, P. (2000). *The Handbook of Psychological Testing* (2nd ed.). Routledge.

Lau, J. T., Tsui, H. Y., & Phil, M. (2003). Surveillance of Discriminatory Attitudes toward People Living with HIV/AIDS among the General Public in Hong Kong from 1994 to 2000. *Disability and Rehabilitation, 25,* 1354-1360. https://doi.org/10.1080/0963828031000161634 9

Link, B. G., & Phelan, J. C. (2001). Conceptualizing Stigma. *Annual Review of Sociology, 27,* 363-385. https://doi.org/10.1146/annurev.soc.27.1.363

Linschoten, M., Asselbergs; F. W., Capacity-COVID Collaborative Consortium, & LEOSS Study Group (2021). Clinical Presentation, Disease Course and Outcome of COVID-19 in Hospitalized Patients with and without Pre-Existing Cardiac Disease—A Cohort Study across Sixteen Countries. *European Heart Journal*.

Mak, W. S., & Cheung, R. Y. M. (2008). Affiliate Stigma among Caregivers of People with Intellectual Disability or Mental Illness. *Journal of Applied Research in Intellectual Disabilities, 21,* 532-545. https://doi.org/10.1111/j.1468-3148.2008.00426.x

Millett, G. A., Jones, A. T., Benkeser, D., Baral, S., Mercer, L., Beyrer, C., Sullivan, P. S. et al. (2020). Assessing Differential Impacts of COVID-19 on Black Communities. *Annals of Epidemiology, 47,* 37-44. https://doi.org/10.1016/j.annepidem.2020.05.003

Ministry of Health (MOH) (2020). *Kingdom Has Abundant Quantities of Basic Food Commodities, COVID-19 Monitoring Committee Stresses*. https://www.moh.gov.sa/en/Ministry/MediaCenter/News/Pages/News-2020-03-30-006.aspx

Netemeyer, R. G., Bearden, W. O., & Sharma, S. (2003). *Scaling Procedures: Issues and Applications*. Sage Publications. https://doi.org/10.4135/9781412985772

Pavelko, R. L. (2017). *Beyond Stigma: Developing and Testing a Scale of Perceived Trivialization of Mental Illness*. PhD Thesis, Indiana University.

Richardson, S., Hirsch, J. S., Narasimhan, M., Crawford, J. M., McGinn, T., Davidson, K. W., & Northwell COVID-19 Research Consortium (2020). Presenting Characteristics, Comorbidities, and Outcomes among 5700 Patients Hospitalized with COVID-19 in the New York City Area. *JAMA, 323,* 2052-2059. https://doi.org/10.1001/jama.2020.6775

Saudi Center for Disease Prevention and Control (SCDC) (2021). https://covid19.cdc.gov.sa/daily-updates

Shiau, W. L., Sarstedt, M., & Hair, J. F. (2019). Internet Research Using Partial Least Squares Structural Equation Modeling (PLS-SEM). *Internet Research, 29,* 398-406. https://doi.org/10.1108/IntR-10-2018-0447

Silke, C. (2016). *An Investigation into Public Stigma towards Depression: Measuring, Predicting and Reducing Negative Responses among Adolescents*. PhD Thesis, National University of Ireland.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics* (6th ed.). Pearson.

Weiner, B. (1993). On Sin versus Sickness: A Theory of Perceived Responsibility and Social Motivation. *American Psychologist, 48,* 957.

https://doi.org/10.1037/0003-066X.48.9.957

Wright, K., Naar-King, S., Lam, P., Templin, T., & Frey, M. (2007). Stigma Scale Revised: Reliability and Validity of a Brief Measure of Stigma for HIV+ Youth. *Journal of Adolescent Health, 40,* 96-98. https://doi.org/10.1016/j.jadohealth.2006.08.001

Yassin, M. H., & Al-Sayed, H. A. (2018). The Main Predictors of Stigma among Mothers of Down Syndrome. *Journal of Scientific Research in Education, Ain Shams University, 19,* 439-467.

Zhang, H., Penninger, J. M., Li, Y., Zhong, N., & Slutsky, A. S. (2020). Angiotensin-Converting Enzyme 2 (ACE2) as a SARS-CoV-2 Receptor: Molecular Mechanisms and Potential Therapeutic Target. *Intensive Care Medicine, 46,* 586-590. https://doi.org/10.1007/s00134-020-05985-9