

RESEARCH ARTICLE

The Effect of Perceived Risk of COVID-19 on Anxiety: Developing a Scale

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ABSTRACT

Background: The emergence of COVID-19 and its pandemic nature have increased fears and anxieties that have led to stigmatization worldwide. This fear and anxiety are directly related to the rate of transmission of the disease, its invisible presence in the environment, its spread, morbidity and mortality. The aim of this study is to develop a data collection tool (a scale) which will evaluate perceived risk and anxiety of people living in Turkey regarding COVID-19, to propose a research model to describe the relationship between perception of risk and anxiety, and to form hypotheses.

Methods: The number of participants from each province of Turkey was determined by considering the number of COVID-19 positive cases in the provinces and their populations. The study was conducted between April 2020 with the participation of 661 individuals through a link created on the internet.

Results: The fit of the proposed model and the test of hypotheses were performed by using structural equation modelling. As a result of the study, it was determined that one unit increase in perceived health risk related to COVID-19 would lead to a 0.47 unit increase in anxiety, and one unit increase in perceived economic risk and inability to socialize would cause an increase of 0.18 and 0.15 units in anxiety, respectively.

Conclusions: As a result of the study, it was determined that the variable that most affects people's anxiety is perceived health risk. COVID-19 scale can be used as a valid and reliable scale. It should be applied in larger and different sample groups.

KEYWORDS: COVID-19, Anxiety, Perceived Risk, Scale.

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INTRODUCTION

The epidemic, which was detected in the city of Wuhan in China with pneumonia clusters in a Chinese citizen who had allegedly eaten bat meat and consequently got sick in the early days of December 2019, started to be seen in Turkey in early March 2020. The epidemic, known as COVID-19 or SARS-CoV-2 infectious disease, affected a large number of people in China, and the majority of infected cases were determined to be in the 30-79 age range[1]. While the epidemic was taken under control in China after 3 months with intense isolation and quarantine measures taken, it started to be seen in

increasing numbers in our country and in many countries, jumped to Italy, Spain and the USA, and infected a large number of people and caused deaths. In March, the World Health Organization (WHO) evaluated the situation and declared the outbreak as a pandemic [2].

According to WHO data, as of April 5, 2020, COVID-19 has infected 307.318 people in the USA, 130.759 people in Spain, 128.948 people in Italy, 83.005 people in China, and 27.069 people in Turkey. It is reported that having spread to more than 100 countries in the world, COVID-19 has infected 1.214.971 people and led to 67.840 deaths [3].

After the first case was detected in a male patient in Turkey on March 11, 2020, the Ministry of Health and the Science Board established for COVID-19 swiftly started to take measures. The day after the first case was detected, schools and universities were closed, and public events (weddings, associations, meetings, congresses, etc.) were restricted. Two days later, extensive travel and transportation restrictions were introduced. On March 15, 2020, public places such as cafes, restaurants, diners, hairdressers where people are gathered were temporarily closed. As of March 21, 2020, a curfew was introduced for people over 65 years of age, who were exposed to a great risk of illness. On 5 April 2020, a curfew was introduced for people under the age of 20 to reduce the spread of the virus by young people.

As soon as the first cases were seen in Turkey, the Minister of Health and Science Board members called out to the whole population to stay in their homes, to isolate themselves, and not to go out into the streets unless there is an urgency. People were motivated with the slogan "Stay at Home", "Life is Possible at Home" and "Coronavirus is not stronger than the measures we will take". The state provided financial aid to people in distress [4]. In addition, while local health authorities were trying to control the virus and reduce the harmful effects, it was expected that the anxiety and stress levels of the society would increase with the intensive use of social media and communication networks [5]. No study has been conducted that reveals the thoughts, behaviours, anxiety and perceptions of the people regarding the COVID-19 pandemic which is still ongoing in our country and the transmission of which is increasing. In this respect, it is thought that our study will contribute to the literature in terms of the applicability of the data collection tool that reveals the attitude and behaviour of individuals related to the COVID-19 outbreak.

The aim of this study is to develop a data collection tool (a scale) which will evaluate perceived risk and anxiety of people living in Turkey regarding COVID-19, to propose a research model to describe the relationship between perception of risk and anxiety, and to form hypotheses.

METHODS

Data collection and sample: "COVID-19 Perceived Risk" measurement tool used in the study consisted of 2 parts including demographic information and statements that evaluate the public's attitudes towards COVID-19. The demographic information section includes information about the participants such as gender, age, marital status, presence of a chronic disease, employment status (occupation) etc. In the second part, a 7-point Likert-type scale (1- Totally disagree, 7- Totally agree) consisting of 24 statements in which attitudes towards COVID-19 are evaluated was employed. For the content validity of the scale, it was presented to 5 public health experts.

They were asked to assess the items in four groups: "essential", "somewhat convenient - the revision of the item is

re-quired", "It is quite appropriate - but minor changes are necessary", or "unnecessary". The content validity index of items in the scale was 0.80. A group of 10 persons were tested for clarity by applying scale.

A sample volume which is 20 times more than the number of questions in the measure will be used in accordance with the literature knowledge, which was determined as a minimum of 480 individuals [6]. The number of participants from each province of Turkey was determined by considering the number of COVID-19 positive cases in the provinces and their populations. The study was conducted between 3-5 April 2020 with the participation of 661 individuals through a link created on the internet. This study was carried out in accordance with the principles of the Helsinki Declaration.

Validity and reliability: In the study, Explanatory Factor Analysis (EFA) was performed on 300 data to investigate the structures in the measurement tool, and a 5-factor structure (X: Trust: Items 1-3; A: Perceived Health Risk: Items 4-9; B: Perceived Economic Risk: Items 10-13; C: Inability to socialize: Items 14-19; D: Anxiety: Items 20-24) and a variance explained by 71% were determined. The sample adequacy criterion KMO value for EFA was found to be 0.818, and Bartlett's Test of Sphericity value was found to be statistically significant at 0.01 significance level, which indicates that significant factors may emerge from the research data. As a result of the Explanatory Factor Analysis (EFA), items **7, 8, 9, 19, 22, 23 and 24** were removed from the scale since their factor loads were below 0.30. In addition, Confirmatory Factor Analysis (CFA) was performed for the measurement tool, and although items **14** and **18** were kept in the scale as a result of EFA, they were removed from the scale as their factor loads in CFA were determined to be lower than 0.40 and statistically insignificant [7,8]. Root Mean Square Error of Approximation, calculated for the model fit related to CFA, was found as (RMSEA)=0.023, Goodness of Fit Index as (GFI)=0.97, Normed Fit Index as (NFI)=0.98, Adjusted Goodness of Fit Index as (AGFI)=0.96, Comparative Fit Index as (CFI)=0.99, Relative Fit Index as (RFI)=0.97, $\chi^2/df=107.37/48= 1.34 < 3$. When the results of the proposed models are examined, it can be said that the model fits well [8]. As a result of the analyses, the measurement tool consisted of 16 items and a five-factor structure.

In the measurement tool, minimum and maximum values for each factor were calculated. These values obtained were (3-21) for X (Trust), (3-21) for A (Perceived Health Risk), (4-28) for B (Perceived Economic Risk), (3-21) for C (Inability to Socialize), (2-14) for D (Anxiety). All of the standardized factor loads calculated for EFA, CFA and SEM in Table 4 were above 0.50 and statistically significant. Besides, the Cronbach's Alpha (α) internal consistency coefficient of the scale was calculated as 0.71. After EFA, the discriminant validity of the measurement tool was investigated, and the results are given in (Table 1).

Table 1.Discriminant validity

	X	A	B	C	D
X (Trust)	(0.71)				
A(Perceived Health Risk)	0.24	(0.73)			
B (Perceived Economic Risk)	0.03	0.34	(0.69)		
C (Inability to Socialize)	0.01	0.06	0.09	(0.91)	
D (Anxiety)	0.10	0.54	0.35	0.20	(0.78)

Cross elements in the matrix in Table 1 show the square root of average variance extracted (AVE) values, while the other elements show the correlation of the factors with each other. When Table 1 is examined, it is seen that the cross elements are higher than the correlation coefficients in the row and column to which they belong. This result indicates that the discriminant validity of the factors in the measurement tool was achieved.

The research model and hypotheses: The structural model proposed in the study is given in (Figure 1).

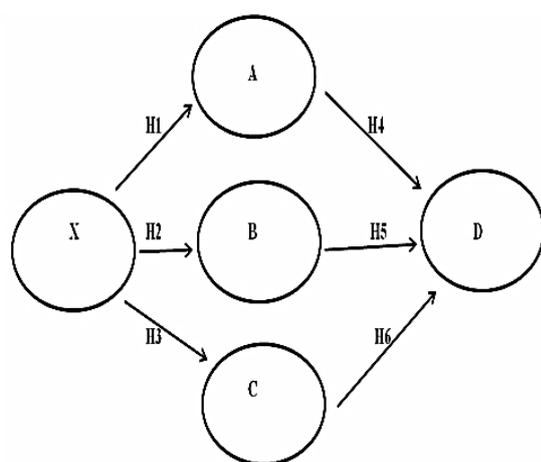


Figure 1. The research model (X: Trust; A: Perceived Health Risk; B: Perceived Economic Risk; A: Inability to Socialize; D: Anxiety)

The hypotheses related to the research model were formed based on the studies conducted by [9-14]. H₅ and H₆ hypotheses designed for the relationship of Perceived Economic Risk and Inability to Socialize with Anxiety were put forward by the authors. The hypotheses created based on the research model are given below:

H₁: There is a negative relationship between Trust and Perceived Risk regarding COVID-19.

H₂: There is a negative relationship between Trust and Perceived Economic Risk regarding COVID-19.

H₃: There is a negative relationship between Trust and Inability to Socialize regarding COVID-19.

H₄: There is a positive relationship between Perceived Risk and Anxiety regarding COVID-19.

H₅: There is a positive relationship between the Perceived Economic Risk and Anxiety regarding COVID-19.

H₆: There is a positive relationship between Inability to Socialize and Anxiety regarding COVID-19.

RESULTS

Participants from different provinces in Turkey were included in the study. Demographic characteristics of the people participating in the research are given; Female

(N=286,43.3%), Male (N=375, 56.7%), Age (20-29, N=240, 21.2%; 30-39, N=153, 23.1%; 40-49, N=177, 26.8%; 50-59, N=165, 25.0%; 60+, N=26, 3.9%), Married (N=456, 69.0%), Single (N=235, 31.0%). The distribution of the answers given by the participants to the statements in the data collection tool is given in (Table 2). The statements which more than 90% of participants stated that they agreed on are the items 4, 5, 6, 7, 9, 10, 11, 12, 13 and 21. The statements which more than 50% of the participants stated that they did not agree on are the items 16, 17 and 18.

The results of structural equation modelling:

First, the suitability of the data to the multivariate normal distribution was tested for the selection of the appropriate parameter estimation technique. As the chi-square value for multivariate normality symmetry and kurtosis was calculated as 0931.622 ($p < 0.01$), it was concluded that the data set was not distributed with multivariate normality. For this reason, robust maximum likelihood (Robust ML) method was used as parameter estimation method. In (Figure 2), standardized parameter estimates of the research model are given.

As a result of SEM, factors of the research model, construct validity of the factors (CR) and average variance extracted values (AVE), standard loads, R² values and hypothesis test results are given in (Table 3).

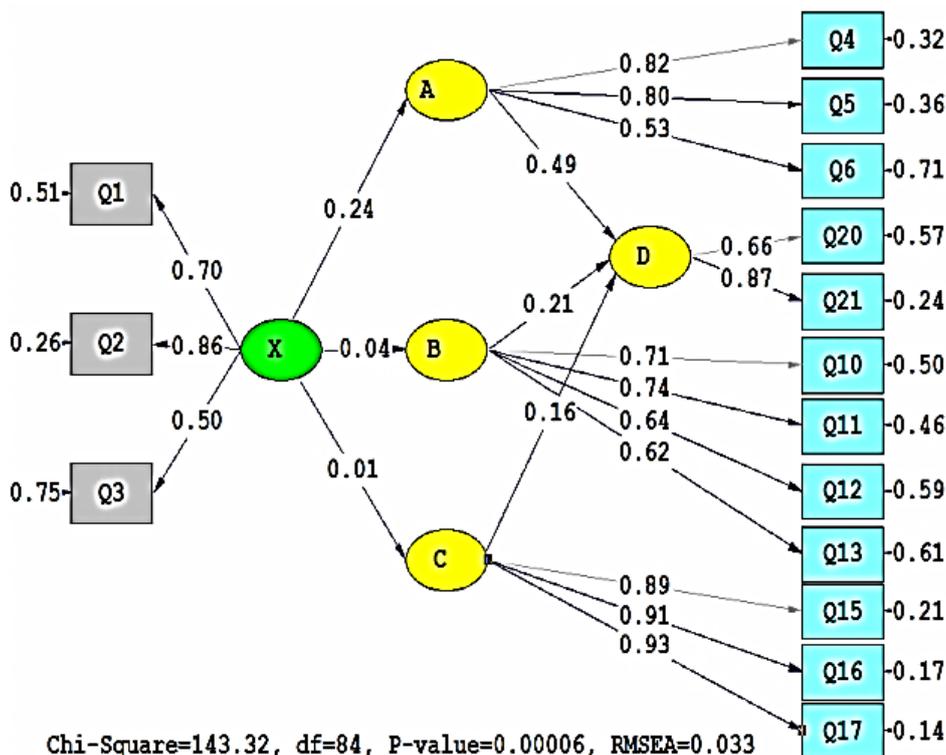
As a result of the t test performed, all hypotheses except H₂ and H₃ were supported. RMSEA calculated for the model fit was found as 0.033, GFI=0.96, NFI=0.98, AGFI=0.95, RMR=0.07, CFI=0.99, RFI=0.96, $\chi^2=143.32$, $\chi^2/df=143.32/84= 1.70 < 3$. When the results of the proposed models are examined, it can be said that the model fits well.

Equations related to the structural model regarding the coefficients found significant as a result of SEM analysis $A = 0.24X$; $D = 0.47A + 0.21B + 0.16C$ were calculated as Trust factor explains 11% of Perceived Risk, and perceived health risk, perceived economic risk and inability to socialize factors explain 35% of Anxiety regarding COVID-19 epidemic.

When the results in Table 3 and Figure 2 are examined, Trust \rightarrow Perceived Risk; one unit increase in trust related to COVID-19 results in an increase of 0.24 unit in perceived risk. Perceived Health Risk \rightarrow Anxiety; one unit increase in perceived health risk regarding COVID-19 causes an increase in anxiety by 0.49 unit. Perceived Economic Risk \rightarrow Anxiety; one unit increase in perceived economic risk as regards COVID-19 causes an increase in anxiety by 0.21 unit. Inability to socialize \rightarrow Anxiety; one unit increase in the perception of inability to socialize in regard to COVID-19 causes an increase of 0.16 unit in anxiety.

Table 2. Distribution of the answers given by the participants to the scale questions

	Disagree		Agree	
	N	%	N	%
1. I trust the research and reports of scientists about the C19 epidemic.	68	10.3	474	71.7
2. I think that the treatment protocol applied by doctors in health institutions related with C19 epidemic is reliable.	82	10.4	364	70.2
3. I think the media is reliable as regards conveying developments related to C19 epidemic.	306	46.3	225	34.0
4. C19 epidemic poses a great danger for public health.	9	1.3	629	95.2
5. C19 epidemic can infect many people in the community and make them sick.	13	2.0	608	95.3
6. C19 epidemic causes more deaths in people with chronic illness.	14	2.2	613	92.7
7. C19 epidemic negatively affects people's mental health.	9	1.4	628	95.0
8. I think C19 disease can cause permanent damage to humans.	80	12.1	474	71.7
9. I do not want to go to the hospital during C19 epidemic, even for a different disease from C19.	23	3.4	613	92.8
10. C19 epidemic negatively affects people's economic life.	8	1.3	645	97.4
11. Economic crises may emerge in countries in the aftermath of C19 epidemic.	8	1.3	643	97.2
12. C19 epidemic has lowered people's standards of living.	10	1.6	585	95.4
13. C19 epidemic will increase the number of unemployed people.	20	1.1	617	96.8
14. When C19 epidemic is over and life turns to normal, I am not planning to go to the movies and theaters.	312	47.3	215	32.4
15. When C19 epidemic is over and life turns to normal, I am not planning to go to weddings, gatherings and recreational activities.	317	48.0	212	32.0
16. When C19 epidemic is over and life turns to normal, I am not planning to go to diners and restaurants.	355	53.7	197	28.8
17. When C19 epidemic is over and life turns to normal, I am not planning to go to shopping centers.	359	54.4	200	30.2
18. When C19 epidemic is over and life turns to normal, I am not planning to go to friend gatherings and family trips.	444	67.2	137	20.7
19. I may be at risk of being unemployed/fired after C19 epidemic.	291	44.1	264	39.9
20. During C19 epidemic, I am concerned that people in my close environment will die.	72	10.9	544	82.3
21. I am concerned that C19 virus will infect me and my family.	29	4.4	600	90.8
22. I think a vaccine for C19 disease will be developed.	57	8.6	524	79.3
23. I think that new drugs for C19 disease will be discovered.	39	5.9	552	83.5
24. After this epidemic is over, life will be normalized, and we will live as we did before.	118	17.9	419	63.3



X: Trust; A: Perceived Health Risk; B: Perceived Economic Risk; C: Inability to Socialize; D: Anxiety

Figure 2. SEM results of the relationship between trust-risk perception and anxiety regarding COVID-19

Table 3. Standardized loads, Item Total Correlation and CA Item deleted values

Factor and Item	CFA Loading	EFA Loading	Item Total Corr.	CA if Item deleted
X (Trust) (Mean=4.66; CR=0.74; AVE=0.50)				
Q1.	0.70	0.85	0.258	0.709
Q2.	0.86	0.81	0.279	0.707
Q3.	0.50	0.72	0.109	0.735
A (Perceived Health Risk) (Mean=6.60; CR=0.77; AVE=0.54)				
Q4.	0.82	0.94	0.391	0.699
Q5.	0.80	0.93	0.343	0.703
Q6.	0.54	0.92	0.322	0.706
B (Perceived Economic Risk) (Mean=6.65; CR=0.76; AVE=0.47)				
Q10.	0.71	0.80	0.248	0.710
Q11.	0.72	0.77	0.263	0.708
Q12.	0.65	0.72	0.322	0.704
Q13.	0.63	0.63	0.263	0.709
C (Inability to Socialize) (Mean=3.36; CR=0.94; AVE=0.83)				
Q15.	0.89	0.83	0.486	,679
Q16.	0.91	0.82	0.509	,675
Q17.	0.93	0.75	0.454	,684
D (Anxiety) (Mean= 6.12; CR=0.76; AVE=0.61)				
Q20.	0.67	0.87	0.336	0.701
Q21.	0.88	0.85	0.414	0.693
Hypotheses	Path	Result		
H1: X → A	0.24 ^{***}	Supported		
H2: X → B	0.04 ^{NS}	Not Supported		
H3: X → C	0.01 ^{NS}	Not Supported		
H4: A → D	0.49 ^{***}	Supported		
H5: B → D	0.21 ^{***}	Supported		
H6: C → D	0.16 ^{***}	Supported		

DISCUSSION

In this study, a scale was developed to evaluate people's perceived risks and concerns in relation to COVID-19, and a research model that describes the relationship between risk perception and anxiety was proposed. When the results of the proposed models are examined, it can be said that the model fits well [7,8]. As a result of the analyses, the measurement tool consisted of 16 items and a five-factor structure. All of the standardized factor loads were above 0.50 and statistically significant. Besides, the Cronbach's Alpha (α) internal consistency coefficient of the scale was calculated as 0.71. This value indicates that the internal consistency of the measuring tool is sufficient [8].

In this study, while creating the items of the scale, the effects of SARS and MERS-CoV diseases which were recently experienced were taken into consideration and the literature was reviewed. In the study in South Korea, it was determined that trust in the government was low as regards the control of MERS-CoV and generally negative attitudes towards quarantine emerged [15]. It was observed that there were decreasing tendencies in perceived severity and perceived anxiety due to the decrease in influenza over time in the Netherlands [11]. In Hong Kong study, it was revealed that only 28.1% of the secondary school students knew all 3 main ways of H1N1 transmission, and that 58.1% perceived H1N1 infection as a high risk. In the study, a significant

correlation was determined between infection knowledge and perceived risk of infection in females [16].

In the study of Ibuka et al., it was stated that the course of the infectious disease epidemic was affected by the behavior of individuals and that the behavior was related to the perceived risk [17]. In another study, the public health response related to SARS, the role of the media and government agencies were demonstrated, and policy and research priorities were proposed to establish a system in order to better deal with the next global infectious disease outbreak [18]. The study in the Netherlands, a positive correlation was found between the perceived risks of the public regarding SARS and their anxiety [10]. In the study of Wu et al., it was provided an estimate of the extent of the outbreak in Wuhan, China, and made an estimation about the extent of local and global public health risks of outbreaks [19].

The emergence of COVID-19 and its pandemic nature have increased fears and anxieties that have led to stigmatization worldwide. This fear and anxiety are directly related to the rate of transmission of the disease, its invisible presence in the environment, its spread, morbidity and mortality. In addition, individual perceptions and concerns have not yet been fully taken into account as health authorities have been focusing on the treatment, control and effective vaccination of COVID-19 worldwide [20]. One of the reasons for this situation is that there is no suitable measurement tool or

new studies have recently started in certain groups [21,22].

In this study, it was seen that the perceived health, economic and inability to socialize risks were quite high according to the participants' response percentages. In addition, it can be said that the effect of perceived health risk on anxiety about COVID-19 is higher than the other two risks. Similar to the study result, They also found in the study in which they investigated the risk perceptions of people infected with H1N1 influenza and SARS that behaviour was related to perceived risk [10,17].

When structural relations are examined, one unit increase in the perception of trust towards COVID-19 positively affects the perceived health risk related to COVID-19 with an increase of 0.24 unit. In fact, this coefficient would be expected to be negative, meaning that the perceived health risk would decrease as trust increases. This may have resulted from the questionnaire being conducted in the acute period of COVID-19. Although trust in scientists and doctors increases, this trust cannot decrease the perception of health risk; however, it was determined that anxiety increases as the health risk increases. One unit increase in perceived risk regarding COVID-19 positively affects anxiety with an increase of 0.47 unit. One-unit increase in perceived economic risk related to COVID-19 positively affects anxiety by 0.18-unit increase. The fact that people think that their economic and living standards will be negatively affected or even they will be unemployed due to COVID-19 also increases their anxiety levels. One unit increase in the risk of inability to socialize as regards COVID-19 positively affects anxiety with 0.15 unit increase. The individualization of people due to the epidemic, their thoughts of not participating in organizations such as weddings, gatherings etc. even after the epidemic is over, and their thoughts of not going to diners, restaurants and

shopping malls when life becomes normal further increase their anxiety levels about COVID-19.

CONCLUSIONS

It can be said that the effect of perceived health risk on anxiety about COVID-19 is high. The study may contribute to the literature in terms of being a study that reveals the attitudes of people towards COVID-19 epidemic, and that has a scale with high validity and reliability developed for this purpose. In this study, 4 factors that affect public anxiety about COVID-19 epidemic were discussed. In future studies, new factors can be investigated by adding different factors to the model, which may affect the anxiety and hopes of the society. In addition, the effects of this outbreak on holiday preferences, financial and shopping behaviours etc. of the public can be investigated. This study was carried out online at the initial stage of the epidemic. It should be remembered that the increase in the impact of the epidemic or its ending in a short time can change the effects of the factors discussed on anxiety.

AUTHORS' CONTRIBUTIONS:

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the conduct, Reporting and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. All the authors have actively participated in the redaction, the revision of the manuscript and provided approval for this final revised version.

DECLARATION OF INTEREST:

The authors reports no conflicts of interest.

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