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THE DEVELOPMENT OF PANDEMIC FEAR SCALE (PAFES)

Research article

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Abstract

The aim of this study is to develop a scale to determine the fear effects of epidemics and similar disasters such as COVID-19. The study was conducted with 1309 participants of Exploratory Factor Analysis (EFA) and 735 participants of Confirmatory Factor Analysis (CFA). The data were collected via the Internet-based method. "Pandemic Fear Scale (PAFES)", prepared by the researcher, was used as a means of data collection. The scale consisted of 5 subscales and 25 Likert style items. The stages of the study were; 1: Varimax rotated EFA was used as scale development statistics to ascertain sub-dimensions. Item-total correlation coefficient and item-remainder correlation coefficient, Cronbach and Rulon coefficient were calculated to determine the reliability. 2: After the scale was structured with EFA and item analysis, the construct validity was tested with CFA (Confirmatory Factor Analysis). Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) fit indices were used to test the CFA model's suitability. Considering these criteria, CFA models were created for scales. The scale was found to be valid, reliable and available as a result of statistical procedures.

Keywords: Covid-19, Coronavirus, Fear, Pandemic, Developing scale

1. Introduction

While life was in its normal course, everything changed in an instant and the whole world was affected by a virus. Many people resisted with defenses such as "Nothing happens to me" or "exaggerated". No special efforts were made to protect themselves from the virus, as there was no danger considered. One of the disasters faced by humanity is undoubtedly epidemics. Epidemic diseases have deeply affected societies throughout history and paralyzed social life. Today, the new corona virus epidemic that has emerged in Wuhan, China continues to affect the world by spreading rapidly.

In December 2019, a coronavirus began to threaten human life in Wuhan (China). The name of the 2019-nCoV disease was considered to be COVID-19, and the virus was called SARS-CoV-2. Due to the scale of the threat, it is labeled as a “pandemic” by World Health Organization (WHO) in 11th of March. It is the first pandemic announcement by WHO which is caused by a type of coronavirus. On February 11, the International Committee for the Classification of Viruses officially called the "New Corona virus" "SARS-CoV-2". Later, WHO called this virus-infected outbreak “COVID19”. (Demirbilek et al. 2020, Ekiz et al. 2020; Özer, 2020;). Throughout the history of humanity, health problems that have suddenly entered the world agenda and concern all humanity have emerged. Pandemic infectious diseases have had important social consequences. Due to its psychosocial structure, infectious diseases have become one of the subjects of medicine, psychology and social sciences. Outbreak diseases such as SARS (2003), H5N1 (2004) and H1N1 (2009), which have emerged in the world in recent years, attract the attention of social scientists as well as health scientists. (Çırakoğlu 2011)

Even in the 21st century, no country is immune to an infectious disease epidemic. there is an urgent need to understand the possible psychosocial effects of a rapidly spreading infectious disease (Wu et al., 2009). The behaviors of people in the face of an epidemic threat are important in order to minimize the prevalence or speed of spread of the epidemic, and to reduce casualties. Having information about these behaviors is important for administrations to effectively respond to outbreaks. Studies show that it is effective in methods such as quarantine and travel restrictions as well as medical methods used to control outbreaks.

People tend to have negative psychological reactions when their survival is threatened by events such as disasters or pandemics. Research shows that anxieties of the public and healthcare workers are rising during epidemics. In a study conducted in Hong Kong during the SARS outbreak in 2003, it was found that psychological reactions such as high levels of stress, helplessness and post-traumatic symptoms were common in the participants. The results of another study showed that participants who perceived a high probability of getting SARS disease or dying due to this, had higher anxiety levels. It was seen that the anxiety levels of the participants increased at the beginning of the epidemic and decreased over time. Research shows that the level of anxiety experienced during an epidemic is related to the perceived mortality of the disease and the risk of developing the disease. (Çırakoğlu 2011; Jeong et al. 2016)

In line with previous research during viral epidemics COVID-19-related research found evidence of increasing levels of fear worldwide (Alyami *et al* 2020; Knipe et al. 2020). Present study results, based on multiple psychological, mental health, and substance use factors evidence the negative impact of quarantine. (Gritsenko *et al.* 2020). It is known that restrictions on outbreak increase psychological negative effects such as sadness, anxiety, fear, anger, distress, frustration, guilt, helplessness, loneliness, irritability as well as economic and welfare concerns. (Bhuiyan *et al, 2020).* One of the first effects of the epidemic is a change in lifestyle and dietary habits. Because of the concern of the future food shortage, it makes sense for people to buy packaged and long-lasting foods rather than fresh foods. This leads to weight gain and reduced antioxidant intake (Mattioli et al. 2020).

It can be said that there are stress factors in the pandemic process: (Akdeniz 2020; Brooks et al. 2020);

- The duration of the quarantine (long / short)
- Fear of infection (to himself / his relations)
- Boredom (sense of imprisonment / disruption of routines / physical distance)
- Insufficiency in meeting basic needs (food / clothes [mask, gloves] / accommodation)
- Insufficient information (clear / unclear)
- Financial loss (during / after quarantine)
- Labeling (for quarantined persons / healthcare workers).

The main purpose of public health measures to reduce the outbreak is to prevent the spread of disease from person to person. Related methods are isolation and quarantine and social distance. There is no medicine or vaccine to prevent COVID-19 yet. Therefore, public health measures such as isolation, social distance and quarantine are the only objective way. Isolation is the separation of symptomatic patients. Quarantine is the restriction of healthy people, whose suspicion of contact with cases is suspected. "Social distance" means reducing the interaction between people in a community that has not yet been diagnosed. Social distance is an

intervention applied to the whole society, city or region (Desclaux et al. 2017; Güner et al. 2020, Wilder-Smith and Freedman, 2020).

The covid-19 outbreak that started in China in December turned into a pandemic in a short time. With the outbreak, quarantine is actively implemented in many countries in order to reduce the pace of spread. Although quarantine applications are a very effective method of struggle in pandemic situations, it is also necessary to consider their sociological and psychological effects. Quarantine is the separation and restriction of the movements of potentially infectious people. Isolation is to reduce the likelihood that people who have been diagnosed with the disease will leave the society and spread the disease. The concept of "social isolation-social distance" is a different expression of the concept of "self-quarantine". In the fight against Covid-19, "physical isolation" and "social isolation" are practiced almost all over the world. (Gökçe 2020; Mattioli et al. 2020; Nussbaumer-Streit et al. 2020)

Quarantined individuals have been found to have negative psychological effects such as emotional difficulties, anxiety, depression, post-traumatic stress disorder, depression, irritability, insomnia, anger, emotional exhaustion, fear of infection, frustration and distress. These studies highlight potential psychological difficulties but do not provide sufficient information about socioeconomic difficulties and differences due to individual factors. (Brooks et al. 2020; Cava et al. 2005; Gritsenko et al. 2020; Nussbaumer-Streit et al. 2020; Sorokin et al. 2020). According to the researches, quarantine has negative effects on psychology. Emotions such as intense anxiety, anger, or unexpected, unreal thoughts can be examples. To successfully overcome this process, it is necessary to recognize stress factors and supportive resources. (Akdeniz 2020).

Quarantine can cause unpleasant experiences for those exposed. During similar quarantine experiences, signs of aggression, insomnia, poor concentration, suicidal tendency, burnout and negative mood have been reported. In addition, depression, anxiety disorders, post-traumatic stress disorder (PTSD) are higher in people exposed to quarantine. Being exposed to quarantine as well as psychological symptoms can create permanent behavioral changes. (Gökçe 2020; Wilder-Smith and Freedman, 2020). Some factors such as insufficient supply, insufficient information, financial issues and social stigmatization are sources of stress specific to epidemic periods. Fear of infection is an important element of stress during quarantine. Individuals under quarantine are very afraid of getting infected and infecting others. Difficulties in accessing basic resources during quarantine are additional sources of stress. A decrease in social interaction during quarantine causes an individual feeling of loneliness and boredom. Quarantine periods often accompany financial losses. The ability to resist these losses, that is, having more income also provides an advantage in resisting the quarantine's psychological effects. (Gökçe 2020; Ling et al. 2020)

Although it concerns many different disciplines such as behavioral science, social science, economics and disaster management, studies investigating the subject are very lacking. Research is needed to understand the risks and protective factors associated with the socio-psychological effects of infectious disease outbreaks. (Arafat et al. 2020; Wu et al. 2009).

2. Materials and Method

The aim of this study is to develop a scale to determine the fear effects of epidemics and similar disasters such as covid-19. The study aimed to develop self-report instrument to describe the impact of quarantined individuals rather than isolated infected individuals.

2.1. Materials

The study was conducted with 1309 (EFA) and 735 (CFA) participants. Internet-based method was used to collect data. "Pandemic Fear Covid19 Scale (PAFEC)", prepared by the researcher, has been used as a means of data collection. The scale consists of 5 subscales and 25 Likert style items. Factor scores were calculated by taking the mean of the items. Scale score was calculated by taking the mean of the factor. All these scores range from 1 to 4.

2.2. Method

Study 1: Varimax rotated EFA (exploratory factor analysis) was used as scale development statistics to determine sub-dimensions (n=1309). To determine reliability, item-total correlation coefficient and item-remaining correlation coefficient, Cronbach and Rulon coefficient were calculated. Similarly, t-test was performed between the upper and lower quarters to determine the strength of discrimination. As a result of statistical operations, the scale consisting of 5 factors proved to be valid, reliable and usable.

Study 2: After the scale was structured with EFA (exploratory factor analysis) and item analysis, the construct validity was tested (n=**735**) with CFA (Confirmatory Factor Analysis). CFI (Comparative Fit Index) and RMSEA (Root Mean Square Error of Approximation) fit indices were used to test the CFA model's suitability. Considering these criteria, CFA models were created. The scale was found to be valid, reliable and usable as a result of statistical procedures.

2.3. Limitations

In our study, 65 years and older could not be found enough. In addition, primary and secondary school students were not sufficiently represented in the research. Other ways of collecting data from the internet could not be used due to social isolation.

3. Results

3.1. Study 1

The sample of the first study used for EFA consists of 1309 university students. 50.27% of the participants are 21-23 years old, 77.46% are women and 30.71% are first class students. The population of the place where the participants live 24,60% is between 51,000-250.00, the place where 64.94% live is under quarantine.

Exploratory factor analysis was used to determine the construct validation of the scale. The suitability of the data for factor analysis was assessed with KMO (0,947) and Barlett (Chi-Square=17122,752 df=300 sig. 0.000) tests and it was detected that they are statistically appropriate. In the analysis performed in such a way that the components with an Eigen value of 1 and above were selected, 5 factors occurred. Principal component analysis was used as extraction method. 5 factors explain 62,232percent of the total variance.

Table 1. Rotated component matrix

		Component				
	items	1	2	3	4	5
i02	Fear of not protecting family	0,722				
i03	Fear of inability to deal with families' health problems	0,735				
i07	Thought of devastation in hospitals	0,587				
i10	Fear of desertion	0,523				
i11	Fear of death	0,469				
i14	Doubt to have permanent health problems	0,443				
i16	Thought of staying close to my relatives / parents etc.	0,699				
i17	Fear of losing relatives / friends etc.	0,770				
i18	Fear of disconnecting with my friends/family/relatives	0,527				
i08	Fear of not keeping the standards of life same		0,451			
i13	Worry of losing mental health		0,701			
i20	Fear of losing level of life		0,686			
i21	Doubt of changing lifestyle radically		0,714			
i22	Feeling under threat of life		0,579			
i01	Fear of famine			0,440		
i06	Fear of not sheltering			0,587		
i09	Fear of unemployment			0,724		
i12	Fear of poverty			0,734		
i15	Fear of losing wealth			0,681		
i19	Fear of not finding food or drink			0,538		
i23	Fear that this pandemic is biological war				0,783	
i24	Fear that this pandemic is the end of the world				0,794	
i25	Doubt of having another health problem except for this pandemic				0,479	
i04	Doubt not to have same relationships with others					0,656
i05	Thought of disconnecting with others because of technical problems					0,632

Factors and the items they contain were identified according to Varimax rotated factor analysis. It has been ascertained that scale has 5 factors. (Table 1). The factors determined by factor analysis are as follows; F1-Fear of loss about family and health, F2-Worry about change of lifestyle, F3-Worry about economy, F4-Fear of disaster, F5-Fear of isolation and total scale FT-Pandemic Fear.

Item-total correlation and item remainder coefficients were calculated in order to the relations between factors with the sum of scale. Cronbach α (0.82) and Rulon (0.81) coefficients were also calculated to determine the internal consistency between the factors. According to these analyzes, all factors included in scale were found to have internal consistency.

Item-total correlation and item remainder coefficients were calculated in order to the relations between items with the sum of the factor. Cronbach α and Rulon coefficients were also calculated to determine the internal consistency between the items. According to these

statistical analyzes, which are repeated separately for each factor, it was found that all items in all factors had internal consistency. (Table 2)

Table 2. The analysis of internal consistency

	Item-total correlation coefficient			Item-remainder correlation coefficient				
	r	df	sig.	r	Df	sig.	Rulon	Cronbach
Fear of loss about family and health	0,92	1307	p<.01	0,79	1307	p<.01	0,92	0,90
Worry about change of lifestyle	0,89	1307	p<.01	0,80	1307	p<.01	0,85	0,87
Worry about economy	0,79	1307	p<.01	0,66	1307	p<.01	0,85	0,80
Fear of disaster	0,72	1307	p<.01	0,63	1307	p<.01	0,66	0,71
Fear of isolation	0,66	1307	p<.01	0,59	1307	p<.01	0,74	0,74
Pandemic Fear (Total)							0,81	0,82

The scale sum is calculated according to the average of the 5 factors it contains. According to the total of the scale, the participants were ranked in descending order and the participants contained by the upper and lower quartiles were identified. t- test was used to analyze the difference among upper and lower quartiles. According to these results, it was observed that all factors were found to be distinctive among high and low level affected participants. (Table 3).

Table 3. Discriminant coefficients for factors

		Upper Quadrille			Lower Quadrille					
		N	Mean	Std.dev.	n	Mean	Std.dev.	t	df	sig.
F1	Fear of loss about family and health	353	31,88	2,95	353	16,08	3,31	66,89	704	0,00
F2	Worry about change of lifestyle	353	17,29	2,31	353	8,03	2,09	55,88	704	0,00
F3	Worry about economy	353	15,23	3,34	353	7,63	1,76	37,76	704	0,00
F4	Fear of disaster	353	9,77	1,85	353	5,31	1,65	33,79	704	0,00
F5	Fear of isolation	353	5,89	1,61	353	2,86	1,12	28,95	704	0,00

The factor sum is calculated according to the average of the items it contains. According to the total of the factor, the participants were ranked in descending order and the participants contained by the upper and lower quartiles were identified. t- test was used to analyze the difference among upper and lower quartiles. The same process was repeated for all 5 factors. According to these results, it was observed that all items were distinctive among high and low level affected participants in all factors.

3.2. Study 2

The sample of the second research used for CFA consists of 735 people. 62,18% of the participants were 21-39 years old, 81,50% were women, 84,63% were undergraduate students. The population of the place where the participants live 27,62% is more than 4 million, the place where 77,41% live is under quarantine.

As a result of CFA (Confirmatory Factor Analysis), scale 5 sub-dimensional structure has been confirmed. The model was verified when ($\chi^2(258)$ = 1187,336 p<.001 $\chi 2/df$=4,602

CFI=0,893 RMSEA=0,070 (90% CI 0,066 -0,074) GFI = 0,89 AGFI = 0,86) indexes compared with criteria. All items were significantly loaded on 5 factors of scale. Covariance has occurred between some items (eg between item 20 and item 21). Figure 1 shows all factors, items and values of scale.

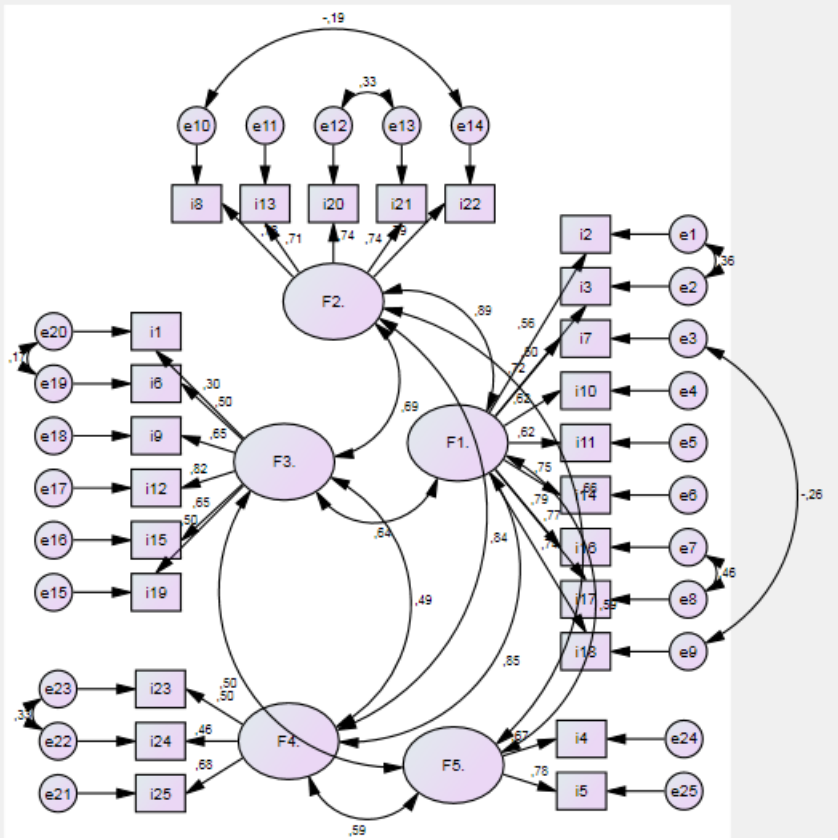

Figure 1. CFA *results*

All Pearson correlation coefficients between all factors are significant. Tests of normality suggested that kurtosis and skewness coefficients ranged within the threshold values of ±}3, and therefore, the data was normally distributed (Table 4).

Table 4. Pearson correlation coefficient matrix of factors and descriptive statistics

	F1	F2	F3	F4	F5	FT	Mean	Std. Deviation	Skewness	Kurtosis
F1	1,000	,742**	,533**	,546**	,446**	,831**	3,147	0,652	-1,028	0,732
F2	,742**	1,000	,542**	,555**	,517**	,868**	2,993	0,756	-0,705	-0,064
F3	,533**	,542**	1,000	,307**	,378**	,693**	2,228	0,645	-0,009	-0,732
F4	,546**	,555**	,307**	1,000	,373**	,722**	2,908	0,742	-0,274	-0,620
F5	,446**	,517**	,378**	,373**	1,000	,738**	2,546	0,893	-0,038	-0,874
FT	,831**	,868**	,693**	,722**	,738**	1,000	2,764	0,568	-0,704	0,286

**. Correlation is significant at the 0.01 level (2-tailed).
N=735

4. Conclusion

This study aimed to develop a self-report scale to determine the fear effects of the new coronavirus covid-19 and similar epidemics. The study aimed to develop self-report instrument to describe the impact of quarantined individuals rather than isolated infected individuals.

EFA suggests 5 subscales: fear of loss about family and health, worry about change of lifestyle, worry about economy, fear of disaster, fear of isolation. The factor structure found in study 1 (n=1309) with EFA was then confirmed in study 2 (n=735). Statistical results show that the scale demonstrates construct validity, discriminant validity and internal consistency.

As a result of the all statistical analyses it has been decided that the Pandemic Fear scale consisting 5 factors and 25 items is valid, reliable, and useable. All items should be valued straight. In all factors high score indicates high pandemic fear.

It is hoped that the scale will help to better understand the fear impact of being exposed to an epidemic. Thus, it may be possible to strengthen preparations to respond to possible future outbreaks.

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