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Factors Affecting Preventive Behaviours during the Coronavirus Disease 2019 Pandemic in Saudi Arabia: An Application of Protection Motivation Theory

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Abstract The purpose of this study was to examine the efficacy of the Protection Motivation Theory (PMT) in predicting engagement in COVID-19 preventive behaviours in Saudi Arabia. A non-probability snowball sample (N = 594) of general public took part in the study via social media. Data were collected at two occasions for one week for each occasion between 30 August 2020 and 26 September 2020. Self-report measures of demographic information and the PMT constructs were obtained at the initial occasion. Two weeks later, self-report measures of COVID-19 preventive behaviours were collected. Structural equation modelling was used for data analysis. The results provided support of the relevance and predictive ability of the PMT. The pattern of effects among the constructs was consistent with the PMT. All of the PMT constructs, with the exception of perceived vulnerability, were found to explain preventive behaviours against COVID-19. Self-efficacy was the strongest variable in predicting the preventive behaviours from COVID-19. Based on these results, public health campaigns that are tailored toward the severity of COVID-19 may be more effective in increasing individuals' motivation for adopting COVID-19 preventive behaviours than those that focus on increasing perceptions of individuals' vulnerability to COVID-19. Health education interventions should consider strategies to increase an individual's perceived self-efficacy of protective behaviours against COVID-19 such as providing opportunities to direct experience with behaviour through demonstration, modelling, and positive feedback.

Keywords: *COVID-19, protection motivation theory, preventive behaviors, structural equation modeling, Saudi Arabia*

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1. Introduction

Coronavirus disease 2019 (COVID-19) is an infectious disease that was first identified in China in December 2019 and has since dramatically spread around the world. Thus, The World Health Organization (WHO) announced the COVID-19 outbreak as a worldwide pandemic on March, 11, 2020 [1]. As of 16 January 2021, more than 94 million infected cases have been registered across the world, resulting in more than 2 million deaths. Prior to the COVID-19 epidemic. there were two types of pathogenic coronaviruses: Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). SARS first occurred in November 2002 in China [2] while MERS first emerged in Jordan in April 2012 [3]. Although all these viruses belonged to the family of coronavirus, COVID-19 is a new strain of coronavirus that is far more lethal and contagious [4].

In Saudi Arabia, the first confirmed case of COVID-19 was a Saudi traveling from Iran. This case was reported on March 2, 2020. Since then there have more infections and an increase of deadly cases have been reported. As of January 16, 2021, the Saudi Ministry of Health (MOH) reported that there were over 364 thousand confirmed cases of the infection and more than 6,300 deaths. In an effort to limit the further spread of COVID-19 and minimize the number of cases and deaths, the Saudi Arabian government implemented rapid, stringent actions and polices such as national lockdowns of non-essential services, schools, and universities, mosques' prayers ban, and travel bans. Moreover, the MOH has made the public aware of the COVID-19 transmission modes and symptoms. The MOH has also launched several of public educational campaigns to educate and encourage the community on importance of adopting the heath protection behaviours to minimize risk of infection such as washing hands frequently with soap and water or hand sanitizers, keeping a distance from others, wearing a face mask in public places, covering mouth and nose with tissue when coughing or sneezing, and cleaning and disinfecting frequently touched surfaces.

One of the most widely used theories to explain an individual's motivation to engage in protective behaviours when encountering a health threat, such as the COVID-19 pandemic, is the protection motivation theory (PMT) [5]. It was developed by Rogers in 1975 based on the expectancy-value theory and was later revised in 1983 to understand the effect of fear appeals on health-related attitude and behaviour [6,7].

According to the PMT, an individual's protection motivation (i.e. intention) for adapting a recommended behaviour in response to a potential threat is the immediate predictor of actual behaviour and it is determined by two parallel cognitive processes: threat appraisal and coping appraisal. Threat appraisal process evaluates the maladaptive behaviours (e.g. failure to adapt the recommended behaviour) and is based on the individual's perceptions of the seriousness of the health threat (perceived severity); and the expectancy of being exposed to the threat (perceived vulnerability). high severity and vulnerability result in high threat appraisal. Coping appraisal process focuses on the adaptive behaviours and is determined by the individual's beliefs of the effectiveness of adapting the protective behaviours in avoiding the threat (response efficacy); personal ability of being able to perform them successfully (self-efficacy); and any costs and barriers associated with taking the adaptive behaviours (response costs). In the context of worldwide pandemics, the response costs refer to what follows from COVID-19 preventive behaviours. This could mean staying at home, closing schools and universities, losing opportunities to meet friends, or wearing a face mask. High coping appraisal is expected if response efficacy and self-efficacy are high and response costs are low [8,9,10].

While the PMT has been utilized to predict and understand a wide range of health-related behaviours, there is limited research on COVID-19 prevention. In addition, no study of preventive behaviours for COVID-19 pandemic has been conducted in Saudi Arabia. Thus, the purpose of this study was to examine the efficacy of the PMT in predicting engagement in COVID-19 preventive behaviours in Saudi Arabia. As COVID-19 spreads rapidly across the world, it is crucial to understand the factors associated with preventive behaviours. Understanding and identifying of these factors will help policymakers to inform the content and design of behavioural interventions to promote increased adherence to preventive behaviours and ultimately reducing the spread of this outbreak.

2. Methods

2.1. Participants and Procedures

Participants were recruited using a non-probability snowball sampling technique via three most popular social media platforms in Saudi Arabia: Twitter, Instagram, and WhattsApp. Two online questioners were designed to collect the data. Participants (N = 594) completed the first questionnaire between August 30 and September 3, 2020, comprising self-report measures of the PMT constructs and demographic information. Participants were given the option to provide their contact number, email address, or social media contact details in order to receive a link to the follow-up questionnaire. Between September 20 and September 25, 2020, the second questionnaire was distributed and participants (N = 507, attrition rate = 14.65%) self-reported their participation in COVID-19 preventive behaviours performed over the past two weeks. This study was approved by the Research Ethics Committee of Ha'il University (approval case number: H-2020-203) and informed consent was obtained from all participants prior to the first data collection occasion.

Demographic information of the 507 participants who completed the two questionnaires is provided in Table 1. Overall, there were slightly more female participants (54.6%) than male. The majority of the participants (82.7%) were aged less than 45, and most (63.9%) had a bachelor degree.

Regarding the infection of COVID-19, few participants (9.3%) had been infected, one-third (34.7%) reported having at least one family member or relative that had contracted the virus, and the majority (89.2%) reported knowing at least one friend or colleague who had been infected.

Table 1. Demographic information (N=507)

Variable	N (%)
Sex	
Male	230 (45.4)
Female	277 (54.6)
Age	
15-24	125 (24.7)
25-34	139 (27.4)
35-44	155 (30.6)
45-54	75 (14.8)
55-64	10 (2)
Over 64	3 (0.6)
Education level	
Less than high school	12 (2.4)
High school	111 (21.9)
Bachelor	324 (63.9)
Postgraduate	60 (11.8)
Participant's infection of COVID-19	
Yes	47 (9.3)
No	460 (90.7)
Infection of COVID-19 in family or relatives	
Yes	176 (34.7)
No	331 (65.3)
Infection of COVID-19 in friends or colleagues	
Yes	452 (89.2)
No	55 (10.8)

2.2. Measures

Two questionnaires were used to measure the variables. The first questionnaire consisted of two sections: demographic information and the PMT constructs. In the first section, participants were asked to provide demographic information including sex, age, marital status, and education level. Participants were also asked whether they or any of their family members, or friends had tested positive for COVID-19.

Table 2. Items for all variables and measurement model analysis

Construct	Items	Measurement item	Standardized factor loading	Composite Reliability
Perceived severity	PS1	I find COVID-19 is a serious disease. (Paital et al. (2020); Basheti et al. (2020))	.836	0.84
	PS2	I find COVID-19 can lead to death. (Bashirian et al. (2020))	.800	
	PS3	I find COVID-19 is more severe than any other disease. (Bashirian et al. (2020))	.764	
Perceived vulnerability	PV1	It likely that I will be infected with COVID-19. (Bashirian et al, 2020)	.901	0.84
	PV2	I think there is a chance that my family will be infected by COVID-19. (Nicola et al. (2020); Coccia (2020))	.803	
	PV3	I have a history of susceptibility to infectious diseases. (Diaz et al. (2016))	deleted	
Self-efficacy	SE1	I think preventive protocols are easy to be implemented. (Shen et al. (2020)	.765	0.73
	SE2	Without any problems, I can use clean masks and gloves when I get out of the house and into crowded places. (Khazaee-Pool et al. (2020)	.544	
	SE3	I can easily wash my hands before contacting my face and after contact with surfaces outdoors. (Khazaee-Pool et al. (2020).	.729	
Response efficacy	RE1	I think the preventive protocols for the COVID-19 outbreak in my country are effective. (WHO (2020))	.682	0.84
	RE2	I think a face mask can prevent the transmission of COVID-19. (Prasetyo et al. (2020)).	.755	
	RE3	Washing my hands with soap and water for a least 20 seconds is an excellent way to prevent me from COVID-19 disease. (Khazaee-Pool et al. (2020))	.928	
Response cost	RC1	Continuous washing of hands at least 20 seconds outside the home is time-consuming and difficult. (Khazaee-Pool et al. (2020))	.544	0.60
	RC2	If I do not shake hands or I have a distance with them when communicating with others, they may be angry with me. (Khazaee-Pool et al. (2020))	.486	
	RC3	It is hard to breathe with a mask. (Khazaee-Pool et al. (2020))	.685	
Protection motivation	PM1	I am willing to perform the preventive COVID-19 behaviours every day in the coming week. (Lin et al. (2020)).	.942	0.93
	PM2	I plan to perform the preventive COVID-19 behaviours every day in the coming week. (Lin et al. (2020)).	.936	
	PM3	I am willing to follow the recommended precautions until the end of the COVID-19 outbreak. (Bashirian et al. (2020))	.810	
Behaviours	B1	Use a hand sanitizer that contains at least 60% alcohol, if soap and water are not readily available.	deleted	0.84
(Toussaint et al., 2020).	B2	Avoid touching your eyes, nose, and mouth with unwashed hands.	.411	
	B3	Avoid close contact with people who are sick.	.426	
	B4	Put distance between yourself and other people if COVID-19 is spreading in your community.	deleted	
	B5	Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.	.695	
	B6	Throw used tissues in the trash.	.550	
	B7	After coughing or sneezing, immediately wash hands with soap and water for at least 20 second.	.892	
	B8	After coughing or sneezing, if soap and water are not readily available, clean your hands with a hand sanitizer that contains at least 60% alcohol.	.874	
	B9	Clean and disinfect frequently touched surfaces (tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, and sinks).	.640	

In the second section, the PMT constructs including severity, vulnerability, response efficacy, self-efficacy, response costs, and protection motivation were measured by 18 items with three items for each of the six constructs. These items were adapted from several studies [11-20]. All items were scored on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

COVID-19 preventive behaviours were assessed in the second questionnaire using the Clean and Contain Scale [21]. This scale comprises 9 items assessing two subscales: clean (5 items; e. g., 'use a hand sanitizer that contains at least 60% alcohol, if soap and water are not readily available'), and contain (4 items, e.g., 'put distance between yourself and other people if COVID-19 is spreading in your community'). All items were measured on a five-point Likert scale with choices 1 (never), 2 (sometimes), 3 (about half of the time), 4 (most of the time), and 5 (always). Table 2 shows the detailed description of the Items for all study measures with descriptive statistics.

2.3. Data Analysis

Structural equation modelling (SEM) analysis was performed to test the hypothesized relationships in the proposed model. The SEM has the advantage of allowing complex relationships to be examined simultaneously from a confirmatory approach as well as accounting for biasing effects of random measurement errors [22]. The model was estimated using AMOS software version 24.0 with the maximum likelihood estimation method. Before running the SEM, the data were checked and examined for missing values, outliers, and normality distributions according to the guidelines provided by Tabachnick and Fidell [23] with SPSS software version 26.0.

Data analysis was conducted in two steps as recommended by Jöreskog [24] and Anderson and Gerbing [25]: a measurement model followed by a structural model. The measurement model, which is a confirmatory factor analysis, specified how measured variables represent a latent construct. It provided an assessment of reliability and validity of measured variables for each latent construct. The structural model specified the relationships among the latent constructs [26].

The overall fit of the measurement and structural models to the data was assessed using the following indices: Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA) with 90% confidence interval (90% CI). The cut-off values applied as indicators of an acceptable fit were: CFI ≥.90, and SRMR, RMSEA ≤ .08 [22,27,28].

3. Results

3.1. Prevalence of COVID-19 Preventive Behaviours

A summary of COVID-19 protective behaviours frequencies among participants is shown in Table 3. Generally, most of preventive behaviours against COVID-19 among participants were high. A large number of participants reported that they frequently threw used tissues in the trash (4.58), covered mouth and nose when coughing or sneezing either with a tissue or the inside of elbow (4.39), avoided close contacts with sick people (4.23), used hand sanitizer (4.20), avoided touching face (4.20), and kept social distance (4.04) to protect themselves from COVID-19. However, participants reported less frequent engagement in washing hands after coughing or sneezing (3.19), cleaning and disinfecting touched surfaces (3.23), and cleaning hands with a hand sanitizer after coughing or sneezing (3.34).

3.2. Data Screening

Prior to analysis, data were screened for missing values, outlier cases, and normality distributions. There were no missing values. Both univariate and multivariate outliers were detected. To identify univariate outliers, z-scores were calculated for all variables. Tabachnick and Fidell [23] recommend considering cases with z scores higher than 3.29 (p<.001, two-tailed test) to be outliers. Multivariate outliers were examined through the use of Mahalanobis distance and a case is considered as a multivariate outlier if the probability associated with its D^2 is 0.001 or less [23]. Nine cases were detected as both univariate and multivariate outliers and were deleted. After removing these cases, the sample size was 498.

The normality of the variables was assessed using skewness and kurtosis tests. Kline [29] suggest that absolute values of skewness and kurtosis should not exceed 3 and 10, respectively. The skewness values ranged from -1.41 to 1.74 and the kurtosis values ranged from -0.94 to 2.84. Thus, all variables met the assumption of normality.

3.3. Measurement Models

The measurement model was conducted on 7 constructs and 27 items. The results indicated that three items (PV3, B1, and B4) had very poor reliabilities as their squared factor loadings were less than 0.15. Thus, the model was modified by deleting these three items. The results of the modified model are shown in Table 2. All fit indices were within acceptable values (CFI= 0.90; SRMR= 0.06; RMSEA= 0.073 [90% CI: 0.68- 0.079]). All factor loadings were significant at p<0.001 and ranged from 0.41 to 0.93. Composite reliabilities for all constructs were well above the cut-point of .70 as suggested by Hair et al. [30], except for the Response Cost (0.60). The descriptive statistics and the correlations between the constructs in the model are indicated in Table 4.

3.4. Structural Models

The results of the structural model are shown in Figure 1. The results indicated that the fit indices were within acceptable values (CFI=0.889, SRMR= 0.0715, RMSEA= 0.074 [90%CI= 0.069-0.79]), indicating a good fit between the model and the data. The model explained 49% of the variance in protection motivation, and 36% of the variance in COVID-19 preventive behaviours. The largest direct effect on protection motivation was exerted by self-efficacy (ß = 0.36, p < 0.001), followed by response cost (ß = -0.26, p < 0.001), response efficacy (ß = 0.16, p < 0.05), and perceived severity (ß = 0.10, p < 0.05). Perceived vulnerability, however, did not have a significant effect on protection motivation (ß = 0.03, p = 0.526). Protection motivation (ß = 0.60, p < 0.001) was found to have a significant direct effect on COVID-19 preventive behaviours.

Table 3. A summary of COVID-19 protective behaviours frequencies among participants (n= 507) No. (%)

COVID-19 preventive behaviors	Never	Sometimes	About half of the time	Most of the time	Always	Item mean	Item SD
Hand sanitizer	2 (.4)	27 (5.3)	99 (19.5)	120 (23.7)	259 (51.1)	4.20	.958
Don't touch face	9 (1.8)	23 (4.5)	77 (15.2)	145 (28.6)	253 (49.9)	4.20	.976
Avoid close contact	15 (3)	21 (4.1)	72 (14.2)	124 (24.5)	275 (54.2)	4.23	1.033
Distance from others	13 (2.6)	23 (4.5)	84 (16.6)	197 (38.9)	190 (37.5)	4.04	.976
Cover cough/sneeze	19 (3.7)	11 (2.2)	46 (9.1)	106 (20.9)	325 (64.1)	4.39	1.001
Throw tissues	9 (1.8)	5 (1)	44 (8.7)	74 (14.6)	375 (74)	4.58	.831
Wash after cough/sneeze	60 (11.8)	96 (18.9)	152 (30)	88 (17.4)	111 (21.9)	3.19	1.297
Sanitize after cough/sneeze	57 (11.2)	79 (15.6)	139 (27.4)	100 (19.7)	132 (26)	3.34	1.317
Surfaces	57 (11.2)	111 (21.9)	117 (23.1)	100 (19.7)	122 (24.1)	3.23	1.333

Table 4. Means, standard deviations and correlations among variables

	1	2	3	4	5	6	7
1. Perceived severity	-						
2. Perceived vulnerability	0.21***	-					
3. Self-efficacy	0.33***	-0.03	-				
4. Response efficacy	0.47***	0.16**	0.66***	-			
5. Response Cost	-0.23***	0.08	-0.57***	-0.53***	-		
6. Protection Motivation	0.35***	0.04	0.63***	0.57***	-0.56***	-	
7. Behaviours	0.20***	0.10	0.58***	0.42***	-0.44***	0.60***	-
Means	3.71	3.24	4.09	4.29	1.89	4.26	3.89
Standard deviations	0.90	1.00	0.71	0.63	0.71	1.67	0.76

Note. *** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05.

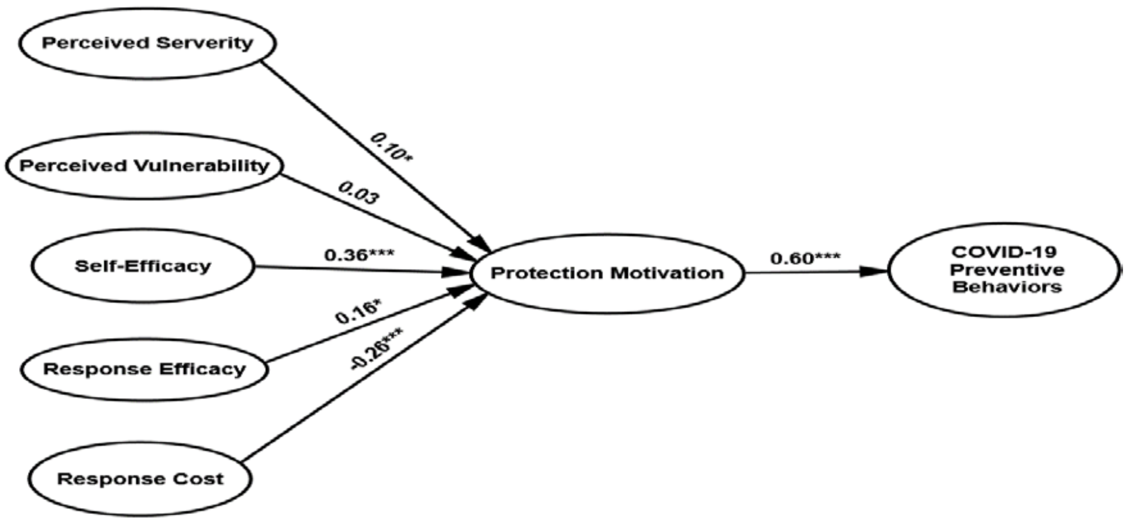

Figure 1. Path diagram of the structural equation modelling testing relationships among the protection motivation model constructs for COVID-19 preventive behaviours. *** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05

Table 5. Direct, indirect, and total standardized effects on COVID-19 preventive behaviours

	Direct Effect	Indirect Effect	Total Effect	Ranking of Total Effects
Perceived severity	-	0.06	0.06	
Perceived vulnerability	-	0.02	0.02	
Self-efficacy	-	0.22***	0.22***	2
Response efficacy	-	0.09	0.09	
Response Cost	-	-0.16**	-0.16**	3
Protection Motivation	0.60***	-	0.60***	1

Note. *** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05.

In addition, the indirect and the total effects of constructs in the model on COVID-19 preventive behaviours were examined and reported in Table 5. Among PMT constructs, the results showed that only self-efficacy (ß = 0.22, p < 0.001) and response cost (ß = -0.16, p < 0.01) had significant indirect effects on preventive behaviours. Protection motivation had the largest direct and total effect on COVID-19 preventive behaviours (ß = 0.60, p < 0.001).

4. Discussion

The purpose of this study was to examine the efficacy of the PMT to predict compliance with preventive behaviours for reducing the risk of infection with COVID-19 virus in Saudi Arabia. Structural equation modelling was performed, and the results provided support of the relevance and predictive ability of the PMT. The pattern of effects among the variables was consistent with the PMT. All of the PMT constructs, with the exception of perceived vulnerability, were found to explain preventive behaviours against COVID-19 and accounted for 49% of the variance in protection motivation and 36% of the variance in preventive behaviour.

As proposed by the PMT, protection motivation had the largest effect on COVID-19 preventive behaviours, a finding consistent with other research [5,31]. Also, coping appraisal variables (response efficacy, self-efficacy, and response cost) had stronger impacts on protection motivation than did threat appraisal variables (perceived severity and perceived vulnerability). This is consistent with most of research on other health threats [32,33,34].

Among threat appraisal variables, only perceived severity had a significant impact on protection motivation, whereas perceived vulnerability failed to yield a significant effect in predicting the preventive behaviours from COVID-19. This implies that individuals who evaluated the COVID-19 as more severe were more likely to engage in the protective health behaviours. The insignificant effect of perceived vulnerability on protection motivation might be influenced by the severity of the disease and the complexity of the preventive behaviours [35]. Where an individual perceives COVID-19 to be a serious disease and perceives preventive behaviours, for example, wearing a mask or keeping a distance from others are complex behaviours, the role of perceived vulnerability may be weak. Based on these results, public health campaigns that are tailored toward the severity of COVID-19 may be more effective in increasing individuals' motivation for adopting COVID-19 preventive behaviours than those that focus on increasing perceptions of individuals' vulnerability to COVID-19.

All coping appraisal variables were found to have significant impacts on protection motivation, with self-efficacy to be the strongest predictor which is consistent with the majority of pervious research [5,31]. Based on this result, this study suggests that health education interventions should consider strategies to increase an individual's perceived self-efficacy of protective behaviours against COVID-19 such as providing opportunities to direct experience with behaviour through demonstration, modelling, and positive feedback [36,37].

References

[1] WHO. (2020, December). Coronavirus disease (COVID-19) advice for the public. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public.

[2] Zhong, N. S., Zheng, B. J., Li, Y. M., Poon, X. Z. H., Chan, K. H., Li, P. H., Tan, S. Y., Chang, Q., Xie, J. P., Liu, X. Q., Xu, J., Li, D. X., Yuen, K. Y., Peiris, & Guan, Y. (2003). Epidemiology and cause of severe acute respiratory syndrome (SARS) in Guangdong, People's Republic of China, in February, 2003. *Lancet, 362*, 1353-8.

[3] Hijawi, B., Abdallat, M., Sayaydeh, A., Alqasrawi, S., Haddadin, A., Jaarour, N., Alsheikh, S., & Alsanouri, T. (2013). Novel coronavirus infections in Jordan, April 2012: Epidemiological findings from a retrospective investigation. *Eastern Mediterranean Health Journal,19* (Suppl 1): S12-8.

[4] Zhu, Z., Lian, X., Su, X., Wu, W., Marraro, G. A., & Zeng, Y. (2020). From SARS and MERS to COVID-19: A brief summary and comparison of severe acute respiratory infections caused by three highly pathogenic human coronaviruses. *Respiratory Research, 21*, 224.

[5] Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology, 30*(20): 407-429.

[6] Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology, 91*(1), 93-114.

[7] Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. T. Cacioppo & R. E. Petty (Eds.), *Social psychophysiology: A sourcebook* (pp. 153-176). Guilford Press.

[8] Madduk, J. E., & Rogers, R. W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology, 19*(5), 469-479.

[9] Norman, P., Boer, H., Seydel, E. R., & Mullan, B. (2015). Protection motivation theory. In M. Conner & P. Norman (Eds.), *Predicting and changing health behavior: Research and practice with social cognition models* (pp. 70-106). Open University Press.

[10] Prentice-Dunn, S., & Rogers, R. W. (1986). Protection motivation theory and preventive health: Beyond the health belief model. *Health Education Research, 1*(3), 153-161.

[11] Basheti, I., Nassar, R., Barakat, M., Alqudah, R., Abu-Farha, R. K., Mukattash, T., & Saini, B. (2020). Pharmacists' readiness to deal with the coronavirus pandemic: Assessing awareness and perception of roles. *Research in Social and Administrative Pharmacy*, S1551-7411(20)30418-6.

[12] Bashirian, S., Jenabi, E., Khazaei, S., Barati, M., Karimi-Shahanjarini, A., Zareian, S., Rezapur-Shahkolai, F., & Moeini, B. (2020). Factors associated with preventive behaviours of COVID-19 among hospital staff in Iran in 2020: An application of the protection motivation theory. *The Journal of Hospital Infection, 105*(3), 430-433.

[13] Coccia, M. (2020). Factors determining the diffusion of COVID-19 and suggested strategy to prevent future accelerated viral infectivity similar to COVID. *The Science of the Total Environment*, 729, 138474.

[14] Díaz, A., Soriano, J. F., & Beleña, Á. (2016). Perceived Vulnerability to Disease Questionnaire: Factor structure, psychometric properties and gender differences. *Personality and Individual Differences, 101*, 42-49.

[15] Khazaee-Pool, M., Naghibi, S., Pashaei, T., Jahangiry, L., Daneshnia, M., & Ponnet, K. (2020). Development and Initial Validation of a Scale for Assessing Affecting Factors on Preventive Behaviors of COVID-19 (AFPB-CO): Using the Protection Motivation Theory. Available at Research Square.

[16] Lin, C.-Y., Imani, V., Majd, N. R., Ghasemi, Z., Griffiths, M. D., Hamilton, K., Hagger, M. S. & Pakpour, A. H. (2020). Using an integrated social cognition model to predict COVID-19 preventive behaviours. *British Journal of Health Psychology*, 25(4), 981-1005.

[17] Nicola, M., O'Neill, N., Sohrabi, C., Khan, M., Agha, M., & Agha, R. (2020). Evidence based management guideline for the COVID-19 pandemic - Review article. *International Journal of Surgery, 77*, 206-216.

[18] Paital, B., Das, K., & Parida, S. K. (2020). Inter nation social lockdown versus medical care against COVID-19, a mild environmental insight with special reference to India. *The Science of the Total Environment*, 728, 138914.

[19] Prasetyo, Y. T., Castillo, A. M., Salonga, L. J., Sia, J. A., & Seneta, J. A. (2020). Factors Affecting Perceived Effectiveness of COVID-19 Prevention Measures among Filipino during Enhanced Community Quarantine in Luzon, Philippines: Integrating Protection Motivation Theory and Extended Theory of Planned Behavior. *International Journal of Infectious Diseases, 99*, 312-323.

[20] Shen, K., Yang, Y., Wang, T., Zhao, D., Jiang, Y., Jin, R., Zheng, Y., Xu, B., Xie, Z., Lin, L., Shang, Y., Lu, X., Shu, S., Bai, Y., Deng, J., Lu, M., Ye, L., Wang, X., Wang, Y., & Gao, L. (2020). Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' consensus statement. *World Journal of Pediatrics, 16*(3), 223-231.

[21] Toussaint, L. L., Cheadle, A. D., Fox, J., & Williams, D. R. (2020). Clean and Contain: Initial Development of a Measure of Infection Prevention Behaviors During the COVID-19 Pandemic. *Annals of Behavioral Medicine, 54*(9), 619-625.

[22] Byrne, B. M. (2016). Structural equation modeling with AMOS: Basic concepts, applications, and programming. Routledge.

[23] Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Pearson Education.

[24] Jöreskog, K. G. (1993). Testing Structural Equation Models. In K. A. Bollen & J. S. Long (Eds.), *Testing Structural Models* (pp.294-316). Sage.

[25] Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411-423.

[26] Schumacker, R. E. & Lomax, R. G. (2004). *A beginner's guide to structural equation model*. Lawrence Erlbaum Associates.

[27] Browne, M., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. Bollen & J. Long (Eds.), *Testing structural models* (pp. 445-455). Sage.

[28] Hu, L., Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6* (1), 1-55.

[29] Kline, R. B. (2005). Principles and practice of structural equation modeling. Guilford.

[30] Hair, J., Black, B., Babin, B., Anderson, R., &Tatham, R. (2006). *Multivariate data analysis*. Prentice-Hall.

[31] Milne, S., Sheeran, P., & Orbell, S. (2000). Prediction and intervention in health related behavior: a meta-analytic review of protection motivation theory. *Journal of Applied Social Psychology, 30*, 106-143.

[32] Sharifirad, G., Yarmohammadi, P., Sharifabad, M. M., & Rahaei, Z. (2014). Determination of preventive behaviors for pandemic influenza A/H1N1 based on protection motivation theory among female high school students in Isfahan, Iran. *Journal of Education and Health Promotion, 3*, 36-41.

[33] Plotnikoff, R. C., & Higginbotham, N. (1998). Protection motivation theory and the prediction of exercise and low-fat diet behaviours among Australian cardiac patients. *Psychology & Health, 13*, 411-429.

[34] Plotnikoff, R. C., & Higginbotham, N. (2010). Protection motivation theory and exercise behaviour change for the prevention of heart disease in a high-risk, Australian representative community sample of adults. *Psychology, Health, & Medicine, 7,* 87-98.

[35] Montgomery, S. B., Joseph, J. G., Becker, M. H., Ostrow, D. G., Kessler, R. C., & Kirscht, J. P. (1989). The health belief model in understanding compliance with preventive recommendations for AIDS: How useful? *AIDS Education and Prevention, 1*, 303-323.

[36] Bandura A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes, 50*(2): 248-287.

[37] Warner, L. M., & French, D. P. (2020). Confidence and self-efficacy interventions. In M. S. Hagger, L. D. Cameron, K. Hamilton, N. Hankonen, & T. Lintunen (Eds.), *The handbook of behavior change* (pp. 461-478). Cambridge University Press.