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# Investigating preventive health behaviors against COVID-19 in elementary school students' parents: A cross-sectional study from Tehran – Capital of Iran

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## Abstract:

**BACKGROUND:** Parents act as a role model for children in showing health behaviors. This study investigated factors affecting the preventive behavior in elementary school students' parents based on protection motivation theory (PMT).

**MATERIALS AND METHODS:** This cross-sectional study was conducted in Tehran (Iran) in 2020. Multistage sampling was used to choose 660 elementary school students' parents. The data collection instrument was a multi-sectional questionnaire, including sections on demographic characteristics, PMT constructs, self-reported health, and information sources related to COVID-19. In this study, descriptive statistics (mean and standard deviation) and analytical statistical methods (Pearson correlation and path analysis) were used to analyze the data. The range of Cronbach's alpha of the study instrument varied from 0.71 to 0.97.

**RESULTS:** The results of the current study revealed significant association between all PMT constructs and preventive behaviors. Knowledge from both direct and indirect paths was related to preventive behaviors ( $B = 0.76$ ). Preventive behaviors had the strongest, direct relationship with age ( $B = 0.76$ ). Based on the final fitted model, knowledge had the greatest impact on preventive behaviors through indirect and direct routes.

**CONCLUSION:** Knowledge was the most important variable which influenced preventive behavior, and it should be noticed in prevention programs.

## Keywords:

Behavior change, COVID-19, path analysis, preventive behaviors, protection motivation theory, school students' parents

## Introduction

The new coronavirus, so-called COVID-19, causing the most severe respiratory disease, has originated and infected tens of thousands of people in Wuhan, China, and soon became a global epidemic with far-reaching consequences recently.<sup>[1]</sup> This infection does not have a definitive treatment. Supportive and maintenance

therapies are only used for its control.<sup>[2]</sup> There are several proven and effective measures that people can take during an epidemic to reduce their chances of getting an infection, such as hand washing, mask-wearing, and social distancing.<sup>[3]</sup> Iran is one of the countries with the highest prevalence of COVID-19 in the Middle East and the first country in the Middle East which reported the occurrence of COVID-19.<sup>[4]</sup> According to

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the official statistics reported by the Iranian Ministry of Health on July 26, 2020, there were 215,000 confirmed cases of COVID-19 and 10,000 death tolls.<sup>[5]</sup> Everyone in the community, including children, is at risk of getting COVID-19.<sup>[6]</sup> Based on a recent report, <1% of children under 10 were attacked with COVID-19.<sup>[7]</sup> Recent research in the USA indicated that 1.7% of the 15,000 positive cases of COVID-19 were children.<sup>[8]</sup> There are no accurate statistics on the number of Iranian children infected with this virus. However, the infection will become severe in 2% of the people under 18, which could be passed on to other people without any symptoms.<sup>[9]</sup> Asymptomatic children transmit the virus to others.<sup>[10]</sup> Therefore, it is essential to seriously consider health recommendations to prevent the occurrence of COVID-19 infection in children.<sup>[11]</sup> Parents act as a role model for children in showing health behaviors.<sup>[12-14]</sup> Children do not acquire the required cognitive and functional skills for taking care of their health. Consequently, this is the duty of their parents to take care of their kids' health.<sup>[15]</sup> Children at this age are under the supervision and control of parents and have not yet entered the community, and parents with control and supervision over their behavior can force and encourage them to do health behaviors such as hand washing and mask-wearing.

Fears, beliefs, and performances related to preventive behaviors play a key role in designing appropriate intervention programs.<sup>[16,17]</sup> Protection motivation theory (PMT) is an important model used to identify beliefs and intentions related to preventive behaviors<sup>[18]</sup> that have been used in various studies to predict protective behaviors.<sup>[19-21]</sup> This model examines the factors affecting health behaviors from two routes, namely threat appraisal (perceived threat and reward) and coping appraisal (self-efficacy [SE], response efficiency, and

response costs [RCs]).<sup>[22]</sup> Based on PMT assumptions, fear is considered as one of the major factors which can affect healthy behaviors.<sup>[23]</sup> This study assessed factors affecting preventive behavior in elementary school students' parents based on PMT [Figure 1] by using the path analysis model.

## Materials and Methods

### Study design and setting

This was a descriptive–analytic cross-sectional study conducted on 660 elementary school students' parents in 12 elementary schools in Tehran (Iran) in June 2020.

### Study participants and sampling

Study participants were school student's parents selected by stratified simple sampling. For sampling, at first, the educational offices of the 22 districts in Tehran were first determined. Then, two schools from each region were randomly selected by using a table of random numbers. The list of classes in each school was prepared. Then, two classes were selected from each school. In each class, all parents, either mother or father, were considered as the sample. Finally, after obtaining permission from education office, online questionnaires were sent to the parents. The inclusion criteria included willingness to participate in the study, having elementary student child (ren), being able to answer online questions, and being over 18 years old. However, the unwillingness to participate in the study was the exclusion criterion.

### Data collection tool and technique

The data collection instrument in this study was an online multi-sectional questionnaire, including subsections on demographic characteristics, 42 questions based on the PMT, self-reported health (SRH), and information

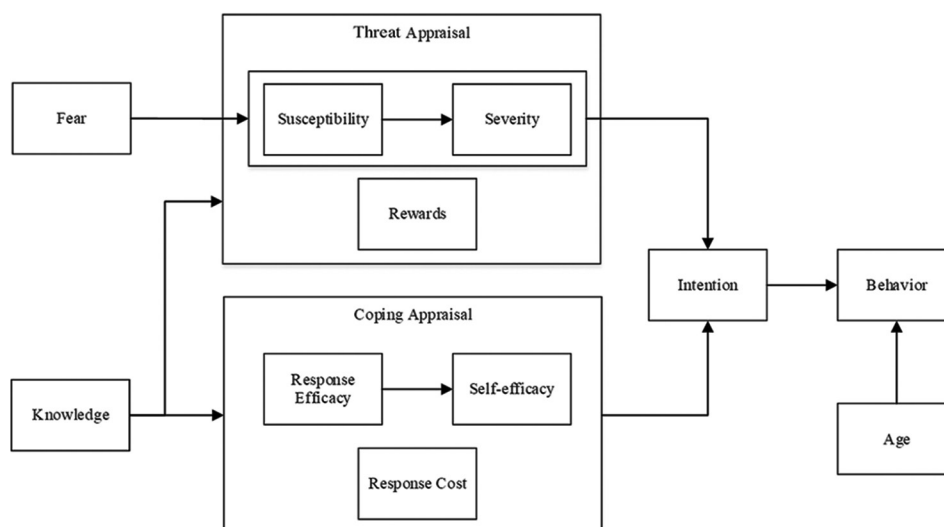


Figure 1: Conceptual model of the fear, perceptions, and intention related to preventive behavior

sources of COVID-19. The PMT questions were scored on a five-point Likert scale from 1 (definitely disagree) to 5 (definitely agree). The content validity of the study instrument was examined by 10 experts (two health education, three health psychology, three epidemiology, and two infection disease). Cronbach's alpha was used to assess the reliability of the instrument.

### Demographic characteristics

They included the participants' age, education, income level, SRH, and information sources for COVID-19.

### Self-reported health

For assessing SRH, the participants were asked to self-assessment their current health status as excellent, very good, good, fair, and poor.<sup>[24]</sup>

### Sources of information

It was determined by asking the respondents how often and where they saw, heard, or read about COVID-19.

### Knowledge

Seven close-ended questions were used to measure knowledge about COVID-19-preventive behaviors (e.g., "drinking alcohol can prevent the COVID-19," "proper social distance can be effective in preventing the transmission of the virus"). Each correct answer was given one point and the "I don't know" and incorrect answer was scored as zero. Cronbach's alpha and content validity index (CVI) for this scale were 0.82 and 0.98, respectively. The higher score presented more knowledge.

### Perceived susceptibility

Perceived susceptibility indicates one's beliefs about the possibility of developing a disease or condition which was assessed with five questions (e.g., I am at risk of coronavirus; only people with immunodeficiency and other underlying diseases are at risk of coronavirus). Cronbach's alpha and CVI for this scale were 0.71 and 0.97, respectively.

### Perceived severity

Perceived severity refers to the person's opinions about how serious a condition and its consequences are (e.g., COVID-19 is deadly; there are several financial costs involved in getting COVID-19). This construct was assessed with five questions. Cronbach's alpha and CVI for this scale were 0.92 and 0.98, respectively.

### Rewards

They are the positive aspects of showing unhealthy behaviors. This construct was assessed with three questions such as "I breathe easier when I don't use a mask," "When I hug my friends, the intimacy between us increases," and "By reducing the amount of hand washing, I feel more tenderness in the skin of my hands."

Higher scores in this subscale indicated more rewards related to unhealthy behaviors. Cronbach's alpha and CVI for this scale were 0.76 and 0.97, respectively.

### Self-efficacy

SE is an individual's trust in his/her ability to take action and was assessed by items such as "I am sure I can use a mask at all times and places to prevent COVID-19," "I am sure I can keep a proper social distance (1-1.5 m) from others in order to prevent COVID-19 transmission," and "I'm sure I can get out of my house just in case of an emergency." The higher scores in this subscale indicated higher SE related to healthy behaviors. Cronbach's alpha and CVI for this scale were 0.71 and 0.97, respectively.

### Response efficacy

Response efficacy (RE) refers to the proposed protective behavior for reducing risks. The items included "It is possible to overcome COVID-19 by observing hygienic standards," "By following the advice of doctors and specialists regarding COVID-19, I can stay healthy," and "Masking in public places can prevent COVID-19." RE was assessed by four questions, and higher scores indicated higher RE related to healthy behaviors. Cronbach's alpha and CVI for this scale were 0.72 and 0.98, respectively.

### Response cost

RC associated with recommended protective behavior was regarded as RCs. RC was measured by five items such as "Repeated hand washing makes me tired" and "I lose my job by staying in quarantine." Cronbach's alpha and CVI for this scale were 0.79 and 0.96, respectively.

### Fear

Fear indicates an unpleasant emotional experience caused by risky stimuli.<sup>[23]</sup> This construct was assessed by three questions (e.g., "I am afraid to be infected with COVID-19" and "I am horrified to hear about the number of people infected with and killed by the COVID-19"). Cronbach's alpha and CVI were 0.79 and 0.96, respectively.

### Intention

Intention indicates people's decisions to perform particular actions.<sup>[25]</sup> Sample items include "I plan to use a mask in public places to prevent COVID-19" and "To prevent COVID-19, I intend to maintain a proper social distance with others." This construct was measured by three questions. The Cronbach's alpha and CVI for this scale were 0.86 and 0.97, respectively.

### Behavior

Behavior was assessed by four items (e.g., "To prevent COVID-19, I must wash my hands regularly for at least 20s" and "I Avoid public spaces or crowds to prevent COVID-19"). Cronbach's alpha and CVI for this scale were 0.77 and 0.97, respectively.

### Data analysis

The Kolmogorov–Smirnov test was used to check the data normality. The significant correlation between the variables was considered the first hypothesis of the path analysis. There were eight independent variables affecting preventive behaviors such as knowledge, perceived susceptibility, perceived severity, SE, RC, RE, intention, and age, while there was only one dependent variable, i.e., preventive behaviors.

To evaluate model fitness, fitting indexes such as  $\chi^2/df$ , root mean square error of approximation (RMSEA), comparative fit index (CFI), goodness of fit index (GFI), normal fit index, and incremental fit indices were computed. Lisrel-8.8 and SPSS-19 (SPSS-19 (IBM Corp., Armonk, NY, USA) IBM Corp., Armonk, NY, USA) were used to analyze the data.

### Ethical consideration

At the beginning of the study, the objectives of the study were explained to the parents. Participation in the study was voluntary, and the participants' written consent was obtained.

The research was approved by the Ethics Committee of the Alborz University of Medical Sciences (Ethical Code: IR.ABZUMS.REC.1399.041).

## Results

A total of 660 parents with a mean age of 38.77 years participated in this study. Most participants were female ( $n = 541$ ; 82%), and 40.8% had a high-school diploma degree. Table 1 gives the participants' other demographic characteristics.

Significant correlations were found between the independent variables and preventive behaviors ( $r = 0.016-0.803$ ). SE ( $r = 0.601$ ) had the strongest association with preventive behaviors [Table 2].

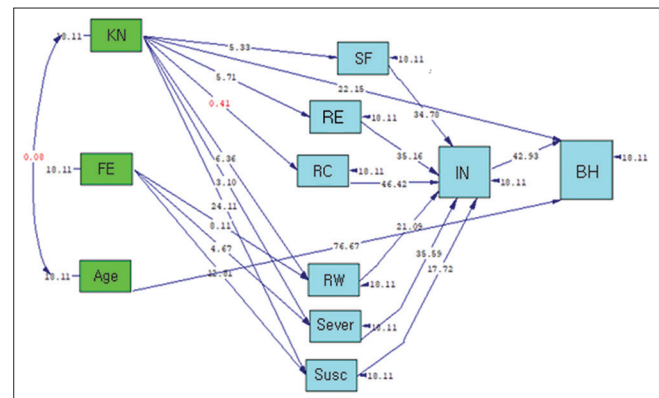
The default relationship between the study variables was based on the PMT [Figure 1]. Based on the correlations between the variables and the model indexes, the default model was tested in Figure 2.

In Figure 2, a significant relationship is observed between the variables based on  $t$ -values. Pathways with  $t$ -values  $< 1.96$  are not significant, and they are shown in red in Figure 2. However, pathways with  $t$ -values higher than 1.96 are significant. The results of the current study have revealed significant associations between all PMT constructs and preventive behaviors.

Based on the final model [Figure 3], only knowledge from both direct and indirect paths through SE had a significant relationship with behavior ( $B = 0.76$ ). Among

**Table 1: Demographic characteristics of the school student's parents sample study ( $n=660$ )**

Variable	<i>n</i> (%)
Gender	
Male	119 (18)
Female	541 (82)
Education (years)	
<12	77 (11.7)
12	296 (40.8)
14	80 (12.1)
16	182 (27.6)
>18	52 (7.6)
Income	
Very good	7 (1.1)
Good	107 (16.2)
Fair	445 (67.4)
Bad	84 (12.73)
Very bad	17 (2.6)
Self-reported health	
Excellent	188 (28.5)
Very good	356 (53.94)
Good	102 (15.5)
Bad	10 (1.5)
Very bad	4 (0.6)
Source of information	
Social network	136 (20.6)
Web search	53 (8)
TV and radio	483 (66.4)
Health authority	13 (1.97)
Family and friends	6 (0.91)
Others	14 (2.1)



**Figure 2:** Initial path analysis model (based on  $t$ -value). The initial path analysis model of KN=Knowledge, FE=Fear, SF=Self-efficacy, RE=Response efficacy, RC=Response cost, RW=Rewards, Sever=Perceived Severity, Susc=Perceived susceptibility, IN=Intention, BH=Behavior

the variables directly affecting the behavior, age has the strongest correlation with behavior ( $B = 0.76$ ) [Table 3].

The final path model has a good fitness (CFI = 0.95, RMSEA = 0.048, GFI = 0.95). The mean and standard deviation of the variables are presented in Table 4. Notably, all the variables entered in the model were quantitative.

**Table 2: Relationship among knowledge, fear, perceived susceptibility, perceived severity, reward, self-efficacy, response efficacy, response cost, intention, behavior variables**

Variable	1	2	3	4	5	6	7	8	9	10
Knowledge	1									
Fear	-0.085*	1								
Perceived susceptibility	0.016	-0.021	1							
Perceived severity	0.120**	-0.260**	0.108**	1						
Reward	0.241**	-0.060	0.017	0.194**	1					
Self-efficacy	0.204**	-0.115**	0.118**	0.256**	0.596**	1				
Response efficacy**	0.218**	-0.016	0.101**	0.170**	0.607**	0.656**	1			
Response cost	0.016	-0.217**	0.080*	0.328**	-0.118**	0.072	0.803*	1		
Intention	0.184**	-0.166**	0.021	0.262**	0.523**	0.546**	0.479**	0.171**	1	
Behavior	0.164**	-0.171*	0.037	0.294**	0.519**	0.601**	0.432**	0.183*	0.749**	1

\*Correlation is significant at the 0.05 level (two-tailed), \*\*Correlation is significant at the 0.01 level (two-tailed)

**Table 3: Path coefficients for study predictors on preventive behavior in parents**

Variable	Direct effect	Indirect effect	Total effect	R <sup>2</sup>
Knowledge	0.24	0.5237	0.7637	0.94
Fear	-	0.36956	0.36956	
Self-efficacy	-	0.1748	0.1748	
Response efficacy	-	0.1748	0.1748	
Response cost	-	0.23	0.23	
Reward	-	0.1058	0.1058	
Perceived treat	-	0.1748	0.1748	
Perceived sever	-	0.092	0.092	
Intention	0.46	-	0.46	
Age	0.76	-	0.76	

**Table 4: Mean and standard deviation of the study variables (knowledge, fear, perceived susceptibility, perceived severity, reward, self-efficacy, response efficacy, response cost, intention, behavior)**

Variable	Mean	SD	Minimum	Maximum
Perceived susceptibility	18.31	2.29	11	30
Perceived severity	8.96	2.76	4	20
Reward	5.01	1.63	3	11
Self-efficacy	7.46	2.74	4	20
Response efficacy	8.78	1.89	5	19
Response cost	7.40	2.77	4	20
Knowledge	12.76	1.88	7	21
Fear	20.28	7.02	3	27
Intention	5.86	2.14	4	20
Behavior	4.65	1.89	3	16

SD=Standard deviation

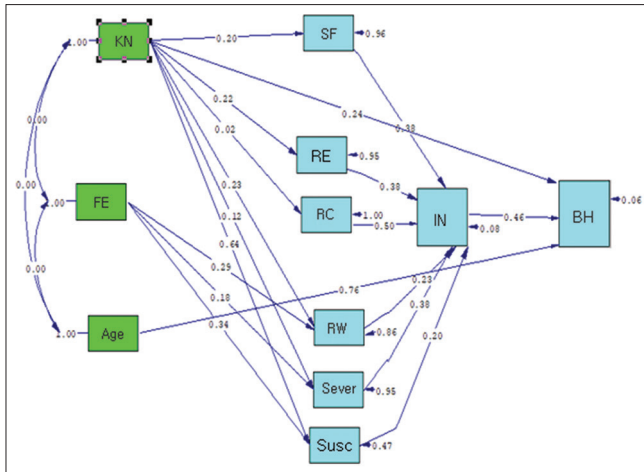
## Discussion

Based on the final fitted model in our study, knowledge had the greatest impact on preventive behaviors through indirect (by SE) and direct routes. Another study conducted in Iran reported a high level of COVID-19-related knowledge and self-reported preventive behaviors.<sup>[26]</sup> According to Maleki *et al.*'s study, the more awareness of the individuals related to the consequences and costs of the disease, the more the likelihood of their protective behaviors will be.<sup>[27]</sup>

Furthermore, based on Zamanian *et al.*, increasing public awareness via reliable mass media is recommended.<sup>[28]</sup> Due to our study results, age had the strongest, direct relationship with preventive behaviors. A study also indicated a statistically significant relationship between health responsibility and age.<sup>[29]</sup> According to Choi and Kim, age and knowledge were two factors that influence on preventive behavior during the Middle East respiratory syndrome-coronavirus among nursing students in South Korea.<sup>[30]</sup> Knowledge has a significant role in providing the necessary information for the general population and maximizing citizen compliance with preventive recommendations.<sup>[31]</sup>

Based on these study results, fear had the strongest association with preventive behaviors in the indirect path, in accordance with Barr *et al.*, who found that fear predicted half of the preventive behaviors during the influenza pandemic in Australia.<sup>[32]</sup> Several studies have reported a linear effect of fear on preventive health behaviors.<sup>[33-35]</sup> People are more likely to exhibit precautionary behaviors when they feel greater fear during an outbreak.<sup>[36]</sup>

The results presented in this study revealed significant associations between all PMT constructs and preventive behaviors. Along with this study, other study results also indicated the association between PMT construct and preventive behavior.<sup>[37]</sup> According to Xiao *et al.*'s findings, there was a positive correlation between protective behaviors and perceived severity, as well as perceived susceptibility and SE, and a negative correlation between reward and RC. However, in the current study, the association between all PMT constructs and preventive behavior was a positive association. It seems that this difference was due to differences in sociodemographic characteristics of the study subjects and type of behavior. As in the study by Xia *et al.*, 2014, preventive behavior against schistosomiasis has been considered in rural students,



**Figure 3:** Final path analysis. Final path analysis model of KN=Knowledge, FE=Fear, SF=Self-efficacy, RE=Response efficacy, RC=Response cost, RW=Rewards, Sever=Perceived severity, Susc=Perceived susceptibility, IN=Intention, BH=Behavior

while in this study, simple preventive behaviors (such as apply masks, wash hands frequently) against COVID 19 in parents with elementary school students were considered.

The study results are also similar to Sadeghi *et al.* that indicated a correlation between protection motivation and perceived susceptibility, perceived severity, RE, and fear and RC.<sup>[38]</sup>

Regarding PMT constructs, perceived susceptibility and perceived severity are related to one's belief of the seriousness and the risk of contracting a specific disease, and they can motivate individuals toward disease prevention.<sup>[39]</sup>

SE is a strong factor, which influences on the adoption and preserves health behavior. According to the current study results, knowledge influences preventive behavior through SE.

In terms of RCs and response efficiency, these two factors play an important role in persuasion of people to engage in health behaviors.<sup>[40]</sup>

Along with these study results, all variables in PMT predicated 94% variance in preventive behavior, and this result is similar to Sharifirad *et al.*'s finding.<sup>[41]</sup>

The current study results revealed that all PMT constructs influenced behavior through intention. Due to the planned behavior model and PMT assumptions, intention is the strongest predictor of behavior. According to Rhodes and Dickau's declaration, the intention was an essential factor for behavior.<sup>[42]</sup>

### Limitation and recommendation

Given that the current study was conducted

through cyberspace media, some factors such as misunderstanding of the questions might influence on the participant responses. Despite that, we attempt to adjust the appropriate guidance for the questionnaire responses. Related to another limitation in this study, we did not measure the behavior of children acquired from their parents through cognitive learning; however, as mentioned earlier and the role of parents as a model and control of children's behavior, we expect children to reflect parental behavior. Children and teens react, in part, on what they see from the adults around them. When parents deal with the COVID-19 confidently, they can provide the best support for their children. Parents can be more reassuring to others around them, especially children, if they are better prepared.<sup>[43]</sup> In future researches, besides parental behavior, it is additionally recommended to study the protective behavior of elementary students in pandemics.

### Conclusion

The results of this study showed that participants' knowledge had the greatest association with their preventive behaviors, in both direct and indirect paths through SE. The provision of accurate information can help individuals to overcome problems and show preventive behaviors more appropriately. In addition, fear is another factor associated with preventive behaviors. Various supportive methods could be used to successfully manage the parents' fear of developing such behaviors.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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