



Application of the Extended Planned Behavior Theory to Predict COVID-19 Preventive Behaviors

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ABSTRACT

Aims Preventive behaviors play an important role in reducing mortality caused by this disease. This study aimed to determine the application of the extended theory of planned behavior to predicting preventive behaviors against COVID-19.

Instrument & Methods In this descriptive-analytical cross-sectional study, 416 university students were selected and examined through virtual networks through convenience and snowball sampling methods. The data collection tool was developed by the researcher-made questionnaire based on the extended theory of planned behavior. Data were analyzed using descriptive statistics and correlation test and linear regression by SPSS 18 software.

Findings A positive and significant correlation was observed between the mean of all the studied theoretical constructs with preventive behaviors against COVID-19 ($p < 0.01$). Attitudes, subjective norms, perceived behavioral control, and perception of others' behavior predicted 43% of behavioral intention variance. Moreover, behavioral intention perceived behavioral control and perception of others' behavior predicted 56% of preventive behaviors variance against COVID-19. Behavioral intention, attitude, perception of others' behavior, subjective norms, and perceived behavioral control had the greatest impact on COVID-19 preventive behaviors.

Conclusion The extended theory of planned behavior can be used as an appropriate framework in designing educational interventions to promote preventive behaviors against COVID-19.

Keywords Students; COVID-19; Primary Prevention; Behavior

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Introduction

Viral diseases causing acute respiratory infectious pandemic are considered a global threat [1]. Coronaviruses cause three epidemics, including severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and coronavirus disease (COVID-19), primarily affecting the human respiratory system [2].

Coronavirus (COVID-19) has been known as an important and new public health issue emerging in China in late 2019 [3]. In the latest assessment, the World Health Organization (WHO) evaluated that the virus's risk level of spreading and effectiveness is very high and reported it as a global emergency [4]. Currently, COVID-19 has become widespread in many countries worldwide [5]. According to the latest data, more than 260 million cases and more than 5 million deaths from the disease have been reported worldwide, and also in Iran, more than 6 million cases and more than 129000 deaths have been reported [6]. The trend of infection and mortality in the city of Sabzevar has also been reported to be upward [7].

Patients with COVID-19 have clinical manifestations such as cough, muscle fatigue and pain, shortness of breath, headache, bleeding, diarrhea, leukopenia, lymphocytopenia, abnormalities in computed tomography (CT) of the chest, and bilateral lung infection [8]. The disease can spread rapidly among humans and has a high pandemic potential [9]. The main route of its transmission is through respiratory droplets and contact with each other. In addition, COVID-19 may be transmitted through the fecal-oral route [10]. Given the epidemiological features of the disease, to stop the spread of the virus prevention, control of the epidemic is important, such as isolating infected patients and controlling the infection source [11]. The best protective method against this disease is to use preventive behaviors, such as disinfecting surfaces, regular washing of hands with soap and water, using masks in public places, not shaking hands, not kissing, and not attending meetings [3]. Improving people's knowledge and attitude towards infectious diseases has a great impact on understanding the level of preventive measures and thus controlling acute respiratory diseases, such as COVID-19 [8-10].

Human behavior is obviously a reflection of various factors. Health education, as the basis of educational activities, requires recognizing behavior and replacing it with new behavior to be effective in its programs. This issue highlights the role of models and theories in the study of health behavior and education [12, 13]. In the present study, the extended theory of planned behavior was used to evaluate university students' beliefs and perceptions about the COVID-19. Numerous studies have pointed to the effective role of the theory of planned behavior on the use of preventive behaviors. The key elements in

the theory of planned behavior include attitude, subjective norms, perceived behavioral control, and the individual's intention to use preventive behaviors. In addition to the mentioned constructs, perception of others' behavior has been added to this theory which includes the perception of observing the preventive behaviors against COVID-19 in people around the students, referring to the impact of peers on their performance. According to this theory, students use preventive behaviors against COVID-19 when, first of all, they have a positive view towards the disease preventive behaviors (attitude), and feel that important people in their lives want to do preventive behaviors of the disease (subjective norms). Moreover, when students believe that they have voluntary control over the use of the disease preventive behaviors (perceived behavioral control). Ultimately, when they understand that people in the community use more preventive behaviors of the COVID-19, they will be more motivated to use preventative behaviors (perception of others' behavior) [13-16].

Any kind of planning to prevent the COVID-19 requires recognizing the factors influencing preventive behaviors. Given that no such study has been conducted among the student population, this study aimed to determine the application of the extended theory of planned behavior to predicting the preventive behaviors against COVID-19 in students of universities.

Instrument and Methods

This descriptive-analytical cross-sectional study was carried out in 2020 and consisted of all students of the universities of Sabzevar. Considering $p=q=0.5$ and $d=0.05$ and the confidence level of 0.95, using the formula of $n=z^2 p(1-p)/d^2$, 385 samples were estimated; however, to be more reliable 416 students were selected and examined by convenience and snowball methods. No one of the students did not have COVID-19 disease. Exclusion criteria included dissatisfaction with participation in the study and incomplete completion of the questionnaire.

The data collection tool was a researcher-made questionnaire based on the extended theory of planned behavior made electronically and completed as a self-report. The questionnaire consists of two parts: the first part was related to basic studies including gender, educational level, father's level of education, mother's level of education, and the second part of the questionnaire includes attitude questions (5 items), subjective norms (4 items), perceived behavioral control (4 items), and behavioral perception of others (5 items). Answers were scored on a 5-point Likert scale from strongly agree to strongly disagree with a score of 1 to 5. Before designing the tool to determine the most important effective criteria in

each of the theoretical constructs, face-to-face interviews were conducted with 15 students. Preventive behaviors were asked by students to design questions about the structure of abstract norms and the structure of perceived behavioral control. The most important internal and external barriers and stimuli that were effective in the ease or difficulty of preventive behaviors in students. Influenced by other people in the community, they use preventive behaviors to design structural questions to understand the behavior of others. The Face validity of the questionnaire was confirmed by 10 students (qualitative and quantitative) and the content validity was confirmed by 10 experts for instrument development, infectious disease, and health education (qualitative and quantitative). The reliability of the questionnaire was also confirmed using the internal consistency method ($N= 30$, $\alpha= 0.69-0.93$).

Due to the epidemic and the rapid transmission of the disease, the questionnaire was completed through social and virtual networks. The students recognized by the researcher were given a link to the questionnaire.

The data collected at different stages of the study were coded into the computer and were analyzed through descriptive statistics (frequency distribution, mean, standard deviation) and also through analytical statistics using correlation test and linear regression, using SPSS18 statistical software.

Findings

The study population was 416 students whose average age was 22.51 ± 4.44 years. Most of the

subjects (70%) were males, 80% of them were in non-medical sciences, and 74% of whom were undergraduates. Most students' mothers (39%) had a high school education, 36% of their fathers had primary education and 11.7% of their relatives had a history of coronavirus disease.

According to the results, the highest percentage of the obtained score was related to attitude, subjective norms, perception of others' behavior, and perceived behavioral control. Moreover, the percentage of the obtained scores of behavioral intention and preventive behaviors against COVID-19 were 87% and 86%, respectively (Table 1).

A positive and significant correlation was observed between the mean of all constructs of the extended theory of planned behavior with preventive behaviors ($p<0.01$). The highest correlation coefficient was observed between intention and behavior, attitude and behavioral intention, and attitude and subjective norms (Table 2).

According to the findings, attitudes, subjective norms, perceived behavioral control, and perception of others' behavior together predicted a total of 43% of behavioral intention variance. Among these variables, attitudes, perceived behavioral control, subjective norms, and perception of others' behavior had the greatest impact on behavioral intention, respectively. Furthermore, behavioral intention along with perceived behavioral control and perception of others' behavior, predicted a total of 56% variance in the disease preventive behaviors. Behavioral intention, perception of others' behavior, and perceived behavioral control had the greatest impact on preventative behaviors, respectively (Figure 1).

Table 1) Score obtained of questionnaire variables

| Variables | Achievable score range | Mean±SD | Score percentage earned |
|-----------------------------------|------------------------|------------|-------------------------|
| Attitude | 4-20 | 19.24±1.19 | 95 |
| Subjective norms | 4-20 | 18.65±1.73 | 92 |
| Perceived behavioral control | 4-20 | 15.22±2.26 | 70 |
| Understand the behavior of others | 5-25 | 20.63±2.63 | 78 |
| Intention | 4-20 | 17.91±2.03 | 87 |
| Preventive behaviors | 4-20 | 17.85±2.16 | 86 |

Table 2) Correlation matrix between the mean constructs of the theory of programmed

| Variables | 6 | 5 | 4 | 3 | 2 | 1 |
|--------------------------------------|-------|-------|-------|-------|-------|---|
| 1- Attitude | 0.444 | 0.492 | 0.180 | 0.317 | 0.490 | 1 |
| 2- Subjective norms | 0.404 | 0.459 | 0.381 | 0.438 | 1 | |
| 3- Perceived behavioral control | 0.321 | 0.373 | 0.257 | 1 | | |
| 4- Understand the behavior of others | 0.365 | 0.412 | 1 | | | |
| 5- Intention | 0.738 | 1 | | | | |
| 6- Preventive behaviors | 1 | | | | | |

All significant in $p<0.01$

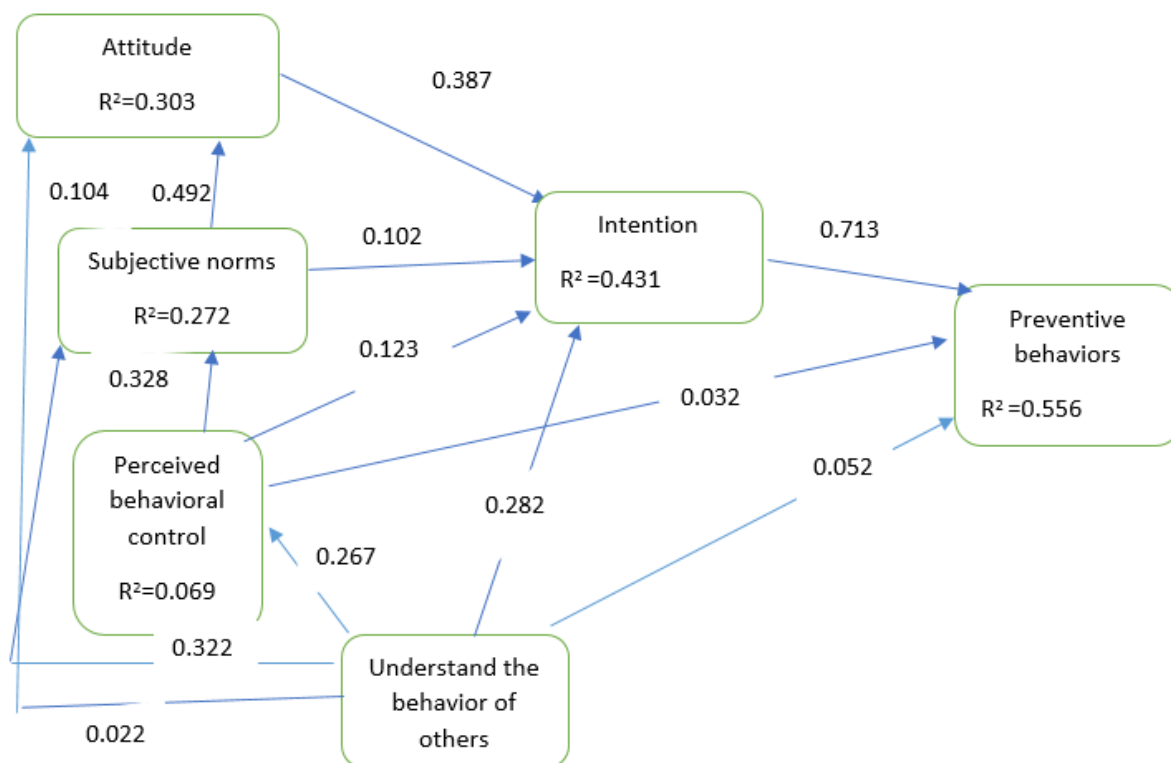


Figure 1) Path analysis model based on the structures of the theory of planned behavior developed

Examining the overall effect of the extended theory of planned behavior constructs in predicting preventive behaviors against COVID-19 showed that behavioral intention, attitude, perception of others' behavior, subjective norms, and perceived behavioral control had the greatest impact on preventive behaviors.

Discussion

This study sought to determine the predictors of preventive behaviors against COVID-19 based on the extended theory of planned behavior. Based on the results, the obtained score percentage of attitude was 95% and very desirable. The results also indicate that most students believe in the adequacy of the benefits (economic, health, etc.) resulting from preventive behaviors against COVID-19 and believe that conducting preventive behaviors against COVID-19 is effective in preventing the disease. The results of the studies [17-19] are in line with the present study. In the Clemens study [18], attitude was considered the most important predictor of proper handwashing intention in the prevention of COVID-19. According to the results, attitude was the most important predictor of the intention to perform protective behaviors, so this structure is an effective factor in changing the preventive behaviors of COVID-19. Since emotional variables are closely related to the actual behaviors of individuals [15], therefore, programs must be designed by the relevant authorities to promote attitude.

Subjective norms are determined by individuals' beliefs about what others think about doing the behavior and the perceived pressure on them to do it. Culture, race, and ethnicity are among the main factors affecting subjective norms [13]. The obtained score percentage of subjective norms was 92%, indicating that 92% of the students believed that the individuals' important people, such as family members, professors, health workers, friends, classmates, etc. expect them to conduct preventive behaviors against COVID-19. The results of the studies [20] confirm this finding. Family members, friends, classmates, professors, and health workers were the most people expected the individual to engage in preventive behaviors against COVID-19. It seems that if family members and relatives have a favorable attitude towards protective behaviors, students will be more inclined to meet their expectations. Therefore, in order to increase the effectiveness of educational interventions to promote preventive behaviors against COVID-19, the students must participate and consider these influential people.

Perceived behavioral control refers to peoples' perception regarding the control or loss of control behavior, and in fact, if an individual does not expect to be able to do a behavior, he/she will probably not be motivated to try to do that behavior [21]. Low social and economic status along with lack of resources, education, and social support, can play an important role in reducing perceived behavioral control [21]. In this study, 70% of the students

believed that they had control over the factors affecting preventive behaviors. This finding is consistent with the studies [22, 23]. In Bagardo, students' easy access to healthy food increased young people's perceived control over behavior. Perceived behavioral control is very important in the occurrence and application of preventive behaviors against viral diseases [22]. It seems that when students have access to protective equipment such as masks and disinfectants and other necessary structures as the main supporters, they will manage and control the challenges with more power and confidence.

The perception of other people's behavior is cognition related to their behaviors, beliefs, and attitude [24]. In this study, 78% of the students believed that their close and important people performed preventive behaviors against COVID-19 or believed that preventive behaviors were effective in preventing the disease. The results of the studies by Canova and Liselotte are consistent with this finding [20, 24]. Because the social support of others and role modeling is especially important in adopting healthy behaviors and understanding the behavior of others is effective when people pay attention to the behaviors, desires, and input of others [24], understand them, and understand them with Cognitive displays related to certain behaviors are similar, so the design and implementation of interventions to express views, beliefs about preventive behaviors by close people, as well as the preparation of related television programs are suggested.

In this study, a positive and significant correlation was observed between all the constructs of the extended theory of developed planned behavior and prevention behaviors against COVID-19. These results are consistent with the results of studies [25-27]. These positive and significant correlations provide early evidence to support the theories of the extended planned behavior theory. Therefore, this theory can be used as a framework in the design of educational interventions to increase behavioral intent and perform preventative behaviors of COVID-19.

According to the results, a unit increase in the variables of attitude, subjective norms, perceived behavioral control, and perception of others' behavior causes an increase of 0.43 in the behavioral intention variable. Moreover, increasing one unit in the variables of behavioral intention perceived behavioral control, and perception of others' behavior increases 0.60 in the variable of preventive behaviors against COVID-19. These results are consistent with the results of studies [28-32]; however, they are not in line with Tafazoli [32]. The study results indicate the high predictive power of the extended theory of planned behavior in conducting preventive behaviors against COVID-19. Therefore, structured planning for educational interventions

based on the constructs of this theory can play an effective role in preventing the disease.

Examining the general effects of the studied constructs on preventive behaviors against COVID-19 showed that behavioral intention, attitude, perception of others' behavior, subjective norms, and perceived behavioral control had the greatest impact on preventive behaviors against COVID-19, respectively. Therefore, it is necessary to consider these variables in intervention programs to improve preventive behaviors against coronavirus.

One of the strengths of this study is the study population, which includes students from both genders. Given that this study was conducted only among university students, the results could not be generalized to the whole society. The other limitation of the present study included completing the questionnaire as a self-report and through virtual networks. According to the results, the followings are recommended to increase the efficiency of the intervention:

- 1- Increasing students' attitudes by using role-playing and face-to-face training by the students' close and important people;
- 2- Increasing perception of others' behavior by expressing the views, beliefs, and behaviors of close friends, as well as television programs;
- 3- Carrying out educational interventions to promote influential individual factors such as improving the ability of individuals to use preventive behaviors from COVID-19 as well as external influence factors such as removing and facilitating environmental and social barriers regarding the use of preventive behaviors.

Conclusion

Although the score of behavioral intention and preventive behaviors against COVID-19 was desirable, it is necessary to conduct interventional programs to improve preventive behaviors against COVID-19 due to its high contagiousness.

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Ethical Permissions: This study was carried out at the permission of the Ethics Committee of Sabzevar University of Medical Sciences with a code of ethics (IR.MEDSAB.REC.1398.126) in 2020.

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