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Evaluation the COVID-19 preventive behaviors in healthcare workers in hospitals and health centers: Applying the Health Belief Model in 2021

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Abstract

Promoting preventive behaviors among healthcare employees is of paramount importance in managing the COVID-19 disease. This study aimed to evaluate the COVID-19 preventive behaviors in healthcare workers using the Health Belief Model (HBM). In this cross-sectional study, using a randomized multi-stage sampling method, 415 healthcare workers of hospitals and healthcare centers were included in the study in 2021. Data were collected through a researcher made and structured questionnaire. The reliability and content validity of the questionnaire were confirmed. Descriptive statistics (mean, standard deviation and frequency) and analytical statistics (Pearson correlation coefficient and linear regression coefficient tests) were used for data analysis. The significance level was set at ≤ 0.05.
The majority of the participants were female (57.6%). 13% and 46.3% reported having a chronic disease. Data analysis revealed that COVID-19 preventive measures were positively associated with perceived self-efficacy, perceived benefits, perceived severity, perceived susceptibility, and cues to action. Self-efficacy and perceived benefits and cues to action were significant predictors of COVID-19 preventive measures ($P \leq 0.05$). The HBM proved to be a suitable framework for studying the COVID-19 preventive measures among healthcare workers. These results can be utilized in the development and implementation of health-promoting educational programs.

Keywords: Health Belief Model, COVID-19, Behavior, Health

Introduction

On December 31, 2019, China reported a series of pneumonia cases in Wuhan, known as Coronavirus 2019 or COVID-19. This strain has exhibited greater severity, mortality rates, and socio-economic impact compared to previous clinical iterations of coronaviruses. The outbreaks of COVID-19 have provoked significant global health concerns, emerging as a major public health challenge worldwide (1-2).

The all of world population is at risk for morbidity and mortality of CIVID - 19. But, Health-care workers (HCWs) are more at risk. They are responsible for fighting against outbreaks, prevention, control, treatment, and its rapid spread (3-4).

According to the World Health Organization, until of April 13, 2022, there have been 523,619,420 confirmed cases of COVID-19 worldwide, resulting in 6,291,784 deaths and 493,560,651 individuals recovering from the disease. In Asia alone, 151,760,519 cases were reported, with 1,428,449 deaths and 144,295,753 recoveries. Remarkably, during this time, it's estimated that up to 180,000 healthcare workers may have lost their lives to COVID-19 (5-6).

"Research findings have revealed that healthcare personnel are responsible for a significant number of case transmissions within hospitals or healthcare centers. The World Health Organization (WHO) responded swiftly to the COVID-19 outbreak by developing interim guidance for COVID-19 positive patients, healthcare workers, and visitors. Implementing self-care behaviors in healthcare settings is principal for controlling, treating, and preventing the spread of the virus disease (7-8).

In Iran, previous studies have indicated that despite these recommendations, the level of adherence to COVID-19 preventive measures among the general population and healthcare workers is deemed unacceptable (8-9). The non-compliance with health behaviors has been associated with various factors, including political influences, personal expectations and individual variables such as knowledge, skills, beliefs and perceptions regarding different aspects of COVID-19 (9-10). Evaluating the beliefs and perceptions of healthcare workers in hospitals and other healthcare provider systems, and devising plans to enhance their knowledge and performance are crucial (10-11).

Given the complexity of human behavior and its associated factors, theories and behavior change models can provide structured and evidence-based strategies for assessing and measuring human behaviors. Research indicates the structured studies utility in evaluating and predicting staff adherence to WHO recommendations designed to prevent and control the spread of COVID-19 viruses' infection in hospitals and other healthcare centers (12-13).

Gochman (1997) defined health behavior as overt behavioral patterns or customs related to health conservation and development (14). Given the crucial role of COVID-19 preventive behaviors in the success of prevention programs against the disease, enlightening studies on individual and social factors influencing staff behaviors are imperative.

As a result, numerous epidemiological studies (1-2), knowledge, attitude, and practice studies (5-7), as well as model-based studies aimed at describing and promoting health workers self-care behaviors, have been conducted (5-7).

Primarily, the HBM and the protection motivation theory (15), are utilized to study the self-care behaviors of both the general population and healthcare workers (15). Typically, socioeconomic factors such as gender, proficiency, and literacy, alongside subjective perceptions related to the COVID-19 disease were the descriptive or promoting factors for preventive behavior assessment (13).

The HBM is a comprehensive and inclusive model rooted in health-behavioral sciences, drawing from psychology and various (13-14). Previous researchers have recognized the HBM as a valuable framework for predicting and explaining preventive behaviors against infectious diseases such as COVID-19 (13-14).

HBM consists of four key constructs, namely perceived susceptibility (the belief that individuals are at risk of the disease) and perceived severity (the belief that the disease is a severe health problem), which together form the construct of the perceived threat (11-13). The third and fourth constructs of the HBM are perceived benefits (the advantages of the proposed preventive measures) and perceived barriers (the social, individual, and environmental obstacles people perceive in engaging in recommended behaviors) (11-13). After extending the model, the self-efficacy construct was added to HBM that shows the ability and capacity to do protective behaviors. In addition, cues to action include internal (e.g., chest pains, wheezing, etc.) and external (e.g., advice from others, illness of a family member, newspaper article, etc.) stimulating the recommended behavior (15-16).

According to the WHO's global surveillance system, failure to adhere to protective measures or insufficient use of individual protective equipment within the healthcare system accounts for 2.5% of all reported COVID-19 cases, affecting 49% of healthcare workers. Consequently, evidence-based and structured studies are crucial for developing more effective and feasible strategies to control COVID-19 infections among healthcare workers and communities (17-18). Therefore, this study aimed at evaluating the COVID-19 preventive behaviors of healthcare workers using the extended HBM, with the goal of devising suitable strategies to improve employee performance and prevent coronavirus infections among them.

Methods

Participants and Procedures

This cross-sectional study was conducted in the Sistan region, located in the Sistan and Baluchistan province in southeastern Iran, during the January to March 2021. A total of 415 health care workers from hospitals and healthcare centers were selected and surveyed. The Sistan region comprises five countries: Zahak, Nimrooz, Hirmand, Zabol and Hamoom. After receiving ethic approval from the Deputy of Research at Zabol University of Medical Sciences, the study objectives were explained to the participants, and informed consent was obtained from each participant.

This study employed a multi-stage sampling method. Initially, the populations of hospitals and healthcare centers across the five counties were identified. Subsequently, the study subjects for each county were determined based on the population of healthcare workers, prioritizing accuracy over sample size. Finally, samples from hospitals and health centers in each country were selected using a convenience sampling method. Referring to a previous study (19) and considering the participants' COVID-19 preventive practices ($p = 0.74$, $\alpha = 0.05$, and $d = 0.05$), a sample size of 300 was necessary. However, due to the dispersion of the sampling units and to increase the validity of the study, the sample size was multiplied by a design effect of 1.4 (design effect = 1.4), resulting in a final total of 415 subjects included in the study.

Inclusion and exclusion criteria

Data collecting tool

Autonomy willingness to participate in the study and being full-time employee were the inclusion criteria. Participants who do not complete the required information are excluded from the study.

The utilized data collection tool was a self-administered questionnaire, contained demographic characteristics and Health belief Model specific section that adapted from the existing literatures. To ensure the content validity of the questionnaire, an expert panel comprising 10 specialists in health education and epidemiology evaluated its content.

The content validity ratio (CVR) was assessed using the Lawshe table, and items with values greater than 0.60 were considered acceptable. To determine the Content Validity Index (CVI), experts were consulted to evaluate the relevance, clarity and simplicity of each question. Items with values exceeding 0.79 were considered acceptable. During this phase, three questions were removed. The validity coefficients for perceived severity, perceived benefits, perceived susceptibility, perceived barriers, self-efficacy, cues to action and preventive behaviors were 0.80, 0.80, 0.90, 0.80, 0.90, 0.80 and 0.90, respectively.

The questionnaire's reliability was confirmed using internal consistency reliability. Forty healthcare workers, not involved in the study, completed the questionnaire. Items with values exceeding 0.70 were acceptable. The reliability coefficient for knowledge questions stood at 0.76. Additionally, perceived severity, perceived susceptibility, perceived barriers, cues to action, self-efficacy, and preventive behaviors exhibited reliability coefficients of 0.80, 0.76, 0.80, 0.86, 0.76 and 0.73, respectively.

Measures

The knowledge questions included ten items, each providing three response options: 'yes,' 'no,' and 'I don't know'. Correct answers were awarded one point, while incorrect and 'I don't know' responses received zero points. Participants' scores could range from zero to ten.

Questions regarding perceived severity, perceived susceptibility, perceived barriers, perceived benefits, perceived self-efficacy and cues to action consisted of six, six, seven, seven, eleven and two items, respectively. Participants in the study, answered these constructs on a five-point Likert scale, ranging from 'strongly agree' to 'strongly disagree. According to correctness of the answers, five to one scores scored to each response.

The possible scores range for perceived severity and perceived susceptibility were 6 to 30. For perceived barriers and perceived benefits, the possible score range were 7 to 35, respectively. Perceived self-efficacy ranged from 11 to 55, while cues to action ranged from 2 to 10. COVID-19 preventive behaviors were assessed using ten questions on a four-point Likert scale, with responses ranging from 'always' to 'never,' valued at three, two, one and zero points, respectively.

Statistical analysis

The Kolmogorov-Smirnov test was used to evaluate the normality of the data. Given the great sample size (n=415), the Central Limit Theorem guarantees that the sampling distribution of the mean approximates normality, justifying the use of parametric tests despite the non-normality of the raw data." Parametric tests were employed for data analysis (20). Descriptive statistics, like as percentages, means, and standard deviations, were utilized to describe the data. The data were analyzed using independent-t test, Pearson correlation tests, linear regression (enter method), and one-way ANOVA tests. A significance level of $P \leq 0.05$ was set for all analyses.

All research stages were carried out in compliance with the Iranian Protection Code of Human Subjects in Medical Research. The study has received approval ethical from the Zabol University of Medical Sciences, with the reference number IR.ZBMU.REC.1399.082.1398-012

Results

In this study, 415 healthcare workers participated. The average age of the participants was 34.12 ± 6.38 years, with the most common age group being 30 to 34 years, accounting for 33.7 percent of the participants. 57.6% of the participants were female, and 87.2% were married. The majority of the participants (54.5%) held bachelor's degrees, while 4.8% were physicians (table1). 13% of healthcare workers had a history of chronic disease. Among them, 48.9% were hospital workers, and 28.9% of the participants had experience working in the COVID -19 department. Among all healthcare workers, hospital nurses constituted the largest group, accounting for 25.5%. 96.6, and 29.6 of the participants had medical insurance and supplemental health insurance, respectively. 15.2% of participants had a history of respiratory disease. , and 24.3 % of them had a history of positive for coronavirus (Table 1). Additionally, the findings revealed that the mean score of the knowledge construct was 8.26 ± 1.36. The mean scores for perceived severity and susceptibility were 23.96 ± 3.48 and 26.39 ± 3.46, respectively. Furthermore, it was determined that the mean scores of self-efficacy and perceived benefits were 40.97 ± 5.79 and 29.28 ± 5.13, respectively. The mean scores of perceived barriers and cues to action were 20.13 ± 4.81 and 8.27 ± 1.67, respectively (Table 2). The assessment of the mean scores of the HBM constructs according to socio-demographic variables showed that among healthcare workers, based on marital status, gender, chronic disease presence, and age groups, there were no significant differences (Table 3). However, significant differences in the mean scores of cues to action and perceived barriers were observed when comparing those working in hospitals versus healthcare centers Additionally, assessing the experience of working in a COVID-19 ward revealed that healthcare workers had significant differences in all HBM constructs except perceived benefits Furthermore, according to occupational history as a healthcare worker, a significant difference was observed in the cues to action construct (table 3).

Table 1: Descriptive statistics of demographic variables

Variables	**Count**	**Percentage**
Age		
<30	107	25.8
30-34	140	33.7
35-39	93	22.4
≥ 40	75	18.1
Gender		
Male	176	42.4
Female	239	57.6
Marital status		
Married	362	87.2
Single	53	12.8
Education		
Diploma	107	25.8
Associate Degree	29	7
Bachelor	226	54.5
Masters and Higher	33	8
Physician	20	4.8
History of chronic disease		
Yes	54	13
No	361	87
Occupation		
Hospital	203	48.9
Health centers	212	51.1
History of working in the corona department		
yes	120	28.9
No	295	71.1
Supplementary insurance		
yes	123	29.6
No	292	70.4
History of respiratory disease		
Yes	63	15.2
No	352	84.8
History of corona positive test		
Yes	101	24.3
No	352	84.8

Table 2: The mean scores of knowledge and health Belief Model constructs

Construct	Mean	SD	Score range	Maximum score	Minimum score	Total score (%)
knowledge	8.26	1.36	0-10	10	3	82
Perceived severity	23.96	3.48	6-30	30	16	79
Perceived Susceptibility	26.39	3.46	6-30	30	15	87
Perceived self-efficacy	40.97	5.13	11-55	50	20	74
Perceived benefits	29.28	5.1	7-35	35	9	83
Perceived barriers	20.13	4.81	7-35	30	6	57
Cues to action	8.27	1.67	2-10	10	2	82
Behavior	25.91	3.72	0-30	30	14	86

Based on the Pearson correlation coefficient test, the data indicates positive and significant correlations between perceived benefits (r=0.253), perceived severity (r=0.142), perceived susceptibility (r=0.140), perceived self-efficiency (r=0.396), and cues to action (r=0.256) with COVID-19 preventive behaviors (Table 4). The findings revealed that the model summary was statistically significant at the P=0.001, with an adjusted R-squared value of 0.19. Moreover, the constructs of self-efficacy, perceived benefits and cues to action emerged as significant predictors of preventive behaviors (Table 5).

Discussion

Our study successfully fulfills our objective to determine and survey the preventive behaviors and perceptions related to COVID-19 preventive behaviors in the target population through using the HBM. Similar to this study, the health belief model has successfully been used previously in this area (7, 10).

As a result, it can be concluded that the Health Belief model is a useful framework in predicting the beliefs of participants to adhere to the protective measures COVID-19 preventive behaviors (13-15). The regression coefficient for perceived barriers was negative, indicating a trend that higher perceived barriers could reduce the likelihood of engaging in preventive behavior and concluded that healthcare workers with more barriers, will become less likely to adopt COVID-19 preventive behaviors (13). Similar to this finding, it has been reported that individuals which showed more perceived barriers participated less in preventive health behaviors (7, 14). Hence, similar to our finding, various studies have showed that to encourage the healthcare workers to embrace and enact COVID-19 prevention measures, it's crucial to identify the barriers they face, adopt preventive measures, and offer straightforward methods to overcome these perceived barriers (5, 7, 14). Additionally, our research uncovered a prominent association between perceived benefits and self-care preventive behaviors concerning COVID-19. Examination of the mean scores of perceived benefits across participant demographics revealed no significant differences among them (Table 3). Similar studies have indicated that perceived benefits are significant predictors of self-care preventive behaviors in healthcare workers, thus supporting our study results (11-13). Previous studies demonstrating a direct positive correlation between perceived severity and preventive behaviors corroborate the findings of the current study (10-13, 16-18). In our current study, we observed a significant correlation between COVID-19 preventive behavior and the perceived susceptibility construct. Higher perceived susceptibility appears to lead to better preventive behaviors, consistent with findings from other studies (18-19). The study further revealed a significant positive relationship between the construct of self-efficacy and COVID-19 preventive behavior. Self-efficacy reflects an individual's belief in their ability to perform behaviors necessary to achieve specific outcomes

Table 3: Comparisons of Mean Scores of Health Belief Model Constructs and Corona Preventive Behaviors across Demographic Variables

	Knowledge	Perceived Severity	Perceived Susceptibility	Self -Efficacy	Perceived Benefits	Perceived Barriers	Cues to Action	Behavior
Gender	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Female	8.28±1.36	23.82±3.39	23.82±3.39	41.13±6	29.46±4.47	20.48±4.48	8.35±1.66	26.13±3.67
Male	8.24±1.37	24.15±3.61	24.15±3.61	40.75±5.47	28.17±5.88	19.65±5.19	8.16±1.67	25.6±3.79
Independent t-test	0.767	0.34	0.71	0.5	0.09	0.08	0.24	0.14
Marital								
Single	8.20±1.42	24.54±3.52	26.75±3.41	27.75±5.74	28.75±5.76	20.62±4.87	7.98±1.95	25.77.±4.07
Married	8.30±1.35	23.87±3.48	26.33±3.47	29.35±5.03	29.35±5.1	20.06±4.8	8.32±1.61	25.93±3.68
Independent t-test	0.12	0.19	0.41	0.41	0.429	0.430	0.16	0.77
chronic disease								
Yes	8.14±1.2	23.72±3.42	26.62±3.26	41.4 ± 5..73	29.87±4.18	19.58±4.13	8.72 ±1.35	26.46±3.62
No	8.28 ± 1.3	24 ±3.5	26.35±349	40.9 ±5.73	29.19±5.25	20.17±4.9	8.21±1.7	25.82±3.74
Independent t-test	0.49	0.58	0.57	0.55	0.372	0.64	0.36	0.24
Occupation								
Hospital	8.15 ± 1.37	23.76 ± 3.25	26.5 ± 3.3	40.74±5.53	28.87 ± 4.87	20.6 ± 4/5	8 ± 1.6	25.65. ±4.1
Health Center	8.37 ±.1.34	24.15 ± 3.69	26.28 ± 3.57	41.18±6.03	29.66 ±5.34	19.6 ± 4.9	8.16 ±1.6	26 .15 ±3.3
Independent t-test	0.10	0.26	0.52	0.44	0.120	0.02	0.0.13	0.17
Working in Corona ward								
Yes	8.1 ± 1.15	23.3±3.20	26.22±3.76	40±5.63	28.85 ± 4.96	21.± 4.33	7.84 ± 1.71	25.21 ± 4.53
No	8.31 ± 1.34	24.23 ±3.56	26.45±3.46	41.33±5.83	29.452±5.19	19.77 ± 4.96	8.45 ± 1.62	26.1 ± 3.3
Independent t-test	0.29	0.013	0.04	0.046	0.28	0.01	0.0.01	0.01
Education								
Diploma and Lower	8. ± 1.47	24.19 ± 3.59	26.29 ± 3.54	41.59 ± 5.59	28.58±5.7	19.72±5.15	8. 42 ± 1.59	26 ± 3.29
Associate Degree	7.93 ± 1.36	24.96 ± 3.35	26.41±3.36	41.27 ±4.47	28.1 ± 6.32	20.75±4.36	8.82 ± 1.31	27 ± 3
Bachelor	8.36 ± 1.28	23.52 ± 3.53	26.6 ± 3.47	40.34 ±5.85	29.44 ± 4.66	19.72 ± 4.49	8.18 ± 1.6	25.76 ± 3.89
Masters and Higher	8.39 ± 1.43	24.93 ±2 .8	27.8 ± 3.15	42.25 ±7.1 5.9	30.2 ± 4.99	19.8 ± 4.51	7.7 ± 1.52	25.5 ± 3.59
One-way ANOVA	0.08	0.04	0.41	0.17	0.1	0.74	0.127	0.5
Occupational history								
<5	8.13 ± 1.48	24.35 ± 3.38	26.97 ± 2.8	41.1±6	29.14±5.44	20.29 ± 5.38	7.8. ± 2	25.32 ± 4.24
5-9	8.37 ± 1.39	23.5±3.24	26.57 ± 3.2	40.59 ± 5.94	28.8±5.11	19.75 ± 4.44	8.37 ± 1.58	26.15 ± 3.47
10-14	8.3 ± 1.31	24±3.87	26 ± 3.88	41.36 ± 5.67	30 .17 ± 4.8	20.48 ± 4.9	8.41 ± 1.5	26.17 ± 3.65
15-19	8.17 ± 1.25	24.6±3.1	25.75 ± 4.	40.68 ± 5.8	28.44 ±5	19.97 ± 3.3	8.4 ± 1.43	25.36 ± 3.81
≥ 20	8.21 ± 1.19	23.25 ± 3.77	25.9 ±3.6	41.35 ± 4.91	29.8±5.15	20.32 ± 4.89	8.75 ± 1.29	26.67 ± 2.89
One-way ANOVA	0.69	0.162	0.17	0.85	0.21	0.8	0.02	0.21
Age								
<30	8.55 ± 2.51	24.14±3.17	27.35±2.88	40.86±5.94	28.77 ± 5.19	20.16±4.83	8 ± 1.98	25.62 ± 4
30-34	8.42 ± 1.42	23.45±3.48	26.15±3.28	40.88±5.7	29.89±4.42	19.93±4.8	8.27 ± 1.6	25.8 ± 3.8
35-39	8.12 ± 1.22	23.9±3.54	25.93 ± 3.64	40.66±5.81	28.91 ±5	20.05±4.7	8.26 ± 1.56	26.21 ± 3.63
≥ 40	8.26 ± 1.36	24.69 ± 3.7	26.± 4	41.66±5.78	29.32 ± 6.23	20.5 6±4.98	8.69 ± 1.36	26.21 ± 3.2
One-way ANOVA	0.245	0.08	0.009	0.7	0.837	0.837	0.05	0.54

Table 4: Results of the Pearson correlation coefficients among the constructs of the Heath Belief Model

Construct	Behavior	severity	Susceptibility	barriers	Benefits	self-efficacy	Cues to action
Behavior							
Perceived severity	0.142**						
Perceived Susceptibility	0.140**	0.338**					
Perceived barrier	-0.075	0.141**	0.298**				
Perceived benefit	0.253**	0.133**	0.208**	0.039			
Self-efficacy	0.396**	0.418**	0.416**	-0. 028	-0.270**		
Cues to action	0.256**	0.153**	0.010	-0. 071	0.090	0.250**	

****Correlation is significant at the 0.01 level (2-tailed).**
***Correlation is significant at the 0.05 level (2-tailed).**

Table 5: Linear Regression Analysis of the Mean Scores of Health Belief Model Constructs and COVID-19 Preventive Behaviors

Model	Standardized Coefficients		95% Confidence		P Value	Adjusted R Square : 0.198
	B	Std. Error	Lower-Bond	Upper-Bond		
Construct	12.753	1.789	9.237	16.270	< 0.001	
Perceived Severity	-0.032	0.053	- 0.137	0.027	0.543	P Value: < 0.001
Perceived Susceptibility	-0.004	0.057	-0.11	0.107	0.947	
Perceived benefits	0.114	0.033	0.048	0.18	0.001	
Perceived Barriers	-0.043	0.037	-0.115	0.029	0.238	
Perceived Self-efficacy	0.21	0.035	0.14	.0.27	< 0.001	
Cues to action	0.359	0.102	0.157	0.56	0.001	

(21-22). Consistent with our findings, Zetu et al. (22), Shahnazi et al. (23), and Karimy et al. (24) similarly identified the crucial role of self-efficacy in adhering to recommended healthy behaviors. These findings differ from those of Karimy et al. (24), Mahindarathne et al. (25), Teitler-Regev (26), and Deshpande et al. (27)., who demonstrated that perceived susceptibility and perceived severity were significant determinants of COVID-19 preventive behaviors. On the other hand, these finding were similar to the results of Mahindarathne PP et al., who have shown that self-efficacy and perceived barriers were the significant determinants of the COVID- 19 preventive behaviors (25).

Strengths and limitations of the study

Considering the nature of cross-sectional studies, study has some limitations. Because of the data gathering in these studies occurred in specific time point, these studies are weak in developing causal relationships. Self-reporting was another limitation of the study. The strength of the study was the sample size of the study. In this study 415 individuals participated, which have different experiences of different sections of the health system such as hospitals or comprehensive health centers. The participants completed the questionnaires in the Work environments was another strength of the study. The data gathering in these studies occurred in specific time point, these studies are weak in developing causal relationships. Self-reporting was another limitation of the study. The strength of the study was the sample size of the study. In this study 415 individuals participated, which have different experiences of different sections of the health system such as hospitals or comprehensive health centers. The participants completed the questionnaires in the Work environments was another strength of the study.

Conclusion

This study aimed to explore the relationship between Health Belief Model constructs and the adoption of preventive measures for COVID-19 among healthcare providers. The findings highlighted that the promotion of COVID-19 preventive measures among healthcare workers. The findings highlighted that the promoting the COVID-19 preventive among healthcare workers relied on their perceptions and beliefs concerning different aspects of the disease. Therefore, policymakers should prioritize correcting and reinforcing employees' accurate perceptions regarding compliance with professional standards for promoting the adherence of COVID-19 preventing behaviors. Accordingly, our results suggest that reinforcing constructs of self-efficacy, perceived benefit and cues to action through educational programs plays an essential role in promoting COVID-19 prevention behaviors.

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Conflict of Interests

No conflict of interest has been reported by the authors.

References

1. Hui DS, Azhar EI, Madani TA, Ntoumi F, Kock R, Dar O, Ippolito G, Mchugh TD, Memish ZA, Drosten C, Zumla A. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health—The latest 2019 novel coronavirus outbreak in Wuhan, China. International journal of infectious diseases. 2020 Feb 1;91:264-6.
2. Ogunremi T, Dunn K, Johnstone J, Embree J. Infection Prevention and Control for 2019 Novel Coronavirus (2019 nCoV) in Acute Healthcare Settings: The Canadian Response. Infection Control & Hospital Epidemiology. 2020 Oct;41(S1):s17-8.
3. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and corona virus disease-2019 (COVID-19): the epidemic and the challenges. International journal of antimicrobial agents. 2020 Feb 17:105924.
4. Guarner J. Three emerging coronaviruses in two decades: the story of SARS, MERS, and now COVID-19. American journal of clinical pathology. 2020 Mar 9; 153(4):420-1.
5. Khan MU, Shah S, Ahmad A, Fatokun O. Knowledge and attitude of healthcare workers about middle east respiratory syndrome in multispecialty hospitals of Qassim, Saudi Arabia. BMC Public Health. 2014 Dec; 14(1):1-7.
6. Choi JS, Kim JS. Factors influencing preventive behavior against Middle East Respiratory Syndrome-Coronavirus among nursing students in South Korea. Nurse Education Today. 2016 May 1; 40:168-72.
7. Ejeh FE, Saidu AS, Owoicho S, Maurice NA, Jauro S, Madukaji L, Okon KO. Knowledge, attitude, and practice among healthcare workers towards COVID-19 outbreak in Nigeria. Heliyon. 2020 Nov 1;6(11).
8. Karimy M, Bastami F, Sharifat R, Heydarabadi AB, Hatamzadeh N, Pakpour AH, et al. Factors related to preventive COVID-19 behaviors using health belief model among general population: a cross-sectional study in Iran. BMC public health. 2021 Dec; 21(1):1-8
9. Mahindarathne PP. Assessing COVID-19 preventive behaviors using the health belief model: A Sri Lankan study. Journal of Taibah University Medical Sciences. 2021 Dec 1; 16(6):914-9.
10. Tadesse T, Alemu T, Amogne G, Endazenaw G, Mamo E. Predictors of coronavirus disease 2019 (COVID-19) prevention practices using health belief model among employees in Addis Ababa, Ethiopia, 2020. Infection and drug resistance. 2020 Oct 22:3751-61.

11. Chou YJ, Shih CM. Using the health belief model to predict those seeking treatment for Hypoactive Sexual Desire Disorder among premenopausal women. Taiwanese J Obstetrics Gynaecol 2018; 57(6): 791e795. https://doi.org/10.1016/ .tjog.2018.10.003.

12. Teitler-Regev S, Shahrabani S, Benzion U. Factors affecting intention among students to be vaccinated against A/H1N1 influenza: a health belief model approach. Advances in preventive medicine 2011; 2011:353207. DOI: 10.4061/2011/353207

13. Mutemwa D, Zvánovcová V, Helová A, Novotný DD. The Role of Religion, Philosophy of Life, Global Health, Traditional Medicine, and Past Experiences in the Covid-19 Pandemic Response: Zambia Case Study. Caritas et Veritas. 2021: (11) 34-49.

14. Tadesse T, Alemu T, Amogne G, Endazenaw G, Mamo E. Predictors of coronavirus disease 2019 (COVID-19) prevention practices using health belief model among employees in Addis Ababa, Ethiopia, 2020. Infection and drug resistance. 2020 Oct 22:3751-61

15. Mehanna A, Elhadi YA, Lucero-Prisno DE. Factors influencing intention to adhere to precautionary behavior in times of COVID-19 pandemic in Sudan: An application of the Health Belief Model. medRxiv. 2020.

16. Yu Y, Lau JT, She R, Chen X, Li L, Li L, Chen X. Prevalence and associated factors of intention of COVID-19 vaccination among healthcare workers in China: Application of the Health Belief Model. Human Vaccines & Immunotherapeutics. 2021 Sep 2; 17(9):2894-902

17. Shirahmadi S, Bashirian S, Barati M, Jenabi E, Haghighi M, Shamsaei F, et al. Fear and COVID-19 protective behaviors among high school students in hamadan, Iran; Application of an extended parallel process model. Journal of Education and Community Health. 2021 Sep 30; 8(3):165-72.

18. Zareipour MA, Ardakani MF, Moradali MR, Jadgal MS, Movahed E. Determinants of COVID-19 prevention behavior in the elderly in Urmia: Application of health belief model. Open Access Macedonian Journal of Medical Sciences. 2020 Dec 25; 8(T1):646-50.

19. Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus disease-2019: knowledge, attitude, and practices of health care workers at Makerere University Teaching Hospitals, Uganda. Frontiers in public health. 2020 Apr 30;8:181.

20. Adams WJ. The life and times of the central limit theorem. American Mathematical Soc.; 2009 Nov 25.

21. Pourhaji F, Peyman N, Pourhaji F. Encounter corona virus based on health belief model: A cross-sectional study. Medical journal of Mashhad University of medical sciences. 2021 Oct 23; 64(4).

22. Zetu L, Zetu I, Beatrice C, Du C, Alexandrina L. Gender variations in the psychological factors as defined by the extended health belief model of oral hygiene behaviors. Procedia - Social Behavioral Sci 2014; 127: 358e362. https://doi.org/ 10.1016/j.sbspro.2014.03.271.

23. Shahnazi H, Ahmadi-Livani M, Pahlavanzadeh B, Rajabi A, Hamrah MS, Charkazi A. Assessing preventive health behaviors from COVID-19: a cross sectional study with health belief model in Golestan Province, Northern of Iran. Infect Dis Poverty 2020; 9(1): 157. https://doi: 10.1186/s40249-020-00776-2.

24. Karimy M, Azarpira H, Araban M. Using health belief model constructs to examine differences in adherence to Pap test recommendations among Iranian women. Asian Pac J Cancer Prev APJCP 2017; 18(5): 1389e1394. https://doi:10.22034/APJCP. 2017.18.5.1389.

25. Mahindarathne PP. Assessing COVID-19 preventive behaviours using the health belief model: A Sri Lankan study. Journal of Taibah University Medical Sciences. 2021 Dec 1; 16(6):914-9.

26. Teitler-regev S, Shahrabani S, Benzion U. Factors affecting intention among students to be vaccinated against A/H1N1 Influenza: a health belief model approach factors. Adv Prev Med 2011. ttps://doi.org/10.4061/2011 /353207.

27. Deshpande S, Basil MD, Basil DZ. Factor's influencing healthy eating habits among college students: an application of the health belief model. Health Market Q 2009; 26(2): 145e164. https://doi: 10.1080/07359680802619834.