



Research Article

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Intention to Take COVID-19 Vaccine and the Associations among College Students

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Abstract

Aims: This study aimed to explore factors associated with decision-making among college students on taking the coronavirus disease 2019 (COVID-19) vaccine using the Health Belief Model.**Materials and methods:** This study used a web-based questionnaire to assess college students' intention to take the COVID-19 vaccine and their beliefs about COVID-19 and the vaccine. Descriptive statistics were used to characterize the sample. Independent group t-tests and one-way analysis of variance were used to assess the differences in intention to take the COVID-19 vaccine based on demographics. Pearson correlation was used to assess the associations among continuous variables. Multiple linear regression analysis was used to identify the factors associated with college students' intention to take the COVID-19 vaccine.**Results:** The score for intention to take the COVID-19 vaccine was 3.76 ± 1.12 . Scores for perceived susceptibility, perceived benefits, and perceived barriers were associated with the intention to take the vaccine.**Conclusion:** Important predictors of college students' intention to take the COVID-19 vaccine included perceived high susceptibility to infection, perceived high benefits, and perceived low barriers to receiving the vaccine. Interventions targeting these factors may be useful in facilitating acceptance of the COVID-19 vaccine.

Key words

Coronavirus disease 2019, College students, Intention to take vaccine, Health Belief Model

Introduction

The emergence of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has affected humanity heavily [1]. By the end of January 2021, the World Health Organization (WHO) declared that COVID-19 directly resulted in over 2 million fatalities, and the number of confirmed cases had reached approximately 99 million across countries world wide. It is disturbing that the number of fatalities and confirmed cases continue to increase. In the absence of a COVID-19 vaccine, avoiding exposure to the virus remains the first and only line of defense. These non-pharmaceutical suppression strategies, contact tracing, limiting gatherings, restricting attendance at schools and universities, social distancing, and closing borders prevented the spread of COVID-19. These strategies resulted in the impairment of physical and psychological well-being, social interactions, and a decline in the global economy [2].

Thus, there is a great need for a safe and effective vaccine to curb the outbreaks. From a public health perspective, vaccines are recognized as the most effective strategy for dealing with outbreaks of infectious diseases [3]. There is no doubt that the COVID-19 vaccine is among the most sustainable options for managing the current pandemic. Thus far, the development of the COVID-19 vaccine has

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been relatively rapid. The safety and effectiveness of many vaccines are acceptable, and some COVID-19 vaccines are already under clinical trials [4-6]. The development of the COVID-19 vaccine warrants creating sufficient awareness to the public. College students have a strong ability to accept new things, and their intention to take the COVID-19 vaccine may influence those around them also to take the vaccine. Thus, it is reasonable to investigate college students' intention to take the COVID-19 vaccine to provide evidence for better strategies to improve acceptance of the vaccines.

The Health Beliefs Model (HBM) is widely used to understand behaviors of health and illness. This model consists of several main constructs, including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy to engage in a behavior, and cues to action. Regarding the COVID-19 vaccine, perceived susceptibility refers to the beliefs about vulnerability to the COVID-19 infection, perceived severity refers to the beliefs about the adverse effects of the COVID-19 infection, perceived benefits refer to the beliefs about being vaccinated, and perceived barriers are the beliefs that they are restricted from being vaccinated because of psychological, physical, or financial factors. Cues to action are about information, people, and events that guide one to be vaccinated [7]. Constructs in HBM are considered essential predictors of vaccine acceptance, and it has been used in many previous studies [8,9]. Therefore, it is crucial to explore significant HBM constructs that are associated with college students' intention to take the COVID-19 vaccine.

Materials and Methods

Study participants and survey design

We conducted a cross-sectional survey using an online questionnaire. The researchers used the network platforms We Chat and QQ to disseminate the survey. Firstly, we sent the online questionnaire to teachers. Then, when teachers were giving a lesson to students, teachers send the online questionnaire to students. Therefore, we ensure that the respondents were only students. This study was reviewed and approved by the Xinyang Normal University Ethics Committee before the study began. The study included college students willing to participate in this study. The questionnaire was developed in Chinese. Prior to the formal survey, local experts validated the content, and the questionnaire was pilot tested.

Instruments

The questionnaire consisted of questions assessing 1) demographic characteristics, 2) HBM constructs, and 3) intention to take the COVID-19 vaccine.

Demographic data

Personal details, including gender, living area, school category, and monthly living expenses, were queried. The participants were also asked whether they or their families and friends had been diagnosed with COVID-19.

Beliefs about COVID-19 and COVID-19 vaccination

Items derived from the HBM were used to measure the students' beliefs about COVID-19 and the vaccine. The

questions assessed perceived susceptibility to COVID-19 infection (four items), perceived severity of COVID-19 infection (two items), perceived benefits of a COVID-19 vaccine (two items), perceived barriers to getting a COVID-19 vaccine (four items), and cues to action (five items). Each item used a 5-point scale ("none" to "very large"). Self-efficacy was not assessed in this study because it was not necessary to understand simple health behavior. Scores < 3 was defined as low scores, scores ≥ 3 and < 4 were defined as moderate scores, and scores ≥ 4 were defined as high scores.

Intention to take the COVID-19 vaccine

The intention to take the COVID-19 vaccine was assessed using a one-item question (Overall, are you willing to take the COVID-19 vaccine?) on a 5-point scale ("none" to "very large").

Statistical analysis

SPSS software for Windows (version 20.0; IBM Corp., Armonk, NY, USA) was used for data analysis. Descriptive statistics were used to characterize the sample. Independent group *t*-tests and one-way analysis of variance were used to assess the differences in intention to take COVID-19 vaccine scores based on demographics. Pearson's correlation was used to assess associations among continuous variables. We carried out a multiple linear regression analysis to determine factors associated with the intention to take COVID-19 vaccine. Only significant factors in the *t*-tests and one-way analysis of variance, with *p*-value of < 0.05 , were selected for the multiple linear regression analysis. A *p*-value ≤ 0.05 was considered significant.

Results

Demographic data

The survey was conducted between December 1 and December 27, 2020, and 171 complete responses were received from students with diverse demographic data. The mean score for intention to take COVID-19 vaccine was 3.76 ± 1.12 . As shown in (Table 1), the participants in this group had a higher representation of females (63.2%), rural localities (69.0%), junior college students (81.9%), and monthly living expenses ranging 1,000-1,500 yuan.

Health beliefs

Participants had low perceptions of susceptibility. They believed that they could partly be infected with COVID-19 because of the collective living in campus dormitories, fragile bodies, and many contacts with classmates on campus. Perceived severity was relatively high. They thought that COVID-19 was a threat to people's physical and mental health to a large extent. They believed that taking COVID-19 vaccine could be beneficial; for example, the COVID-19 vaccine may protect against the disease to a relatively large extent. Regarding barriers to taking the COVID-19 vaccine, they thought taking the vaccine may lead to minor adverse reactions. In addition, acceptance of the vaccine could be based on the following factors: Ease to access, proximity to

Table 1: Comparison of intention to take COVID-19 vaccine by Sample Characteristics (N = 171).

Demographic characteristics	N (%)	intention to take COVID-19 vaccine M ± SD	t/F	p-value
Gender			-1.298	0.169
Male	63 (36.8)	3.90 ± 1.19		
Female	108 (63.2)	3.68 ± 1.07		
Living area			0.339	0.735
Urban	53 (31.0)	3.72 ± 1.26		
Rural	118 (69.0)	3.78 ± 1.05		
School category			1.880	0.067
College	31 (18.1)	3.42 ± 1.12		
Junior college	140 (81.9)	3.84 ± 1.10		
Monthly living expenses			0.488	0.691
<1,000 yuan	43 (25.1)	3.65 ± 1.17		
1,000-1,500 yuan	110 (64.3)	3.77 ± 1.10		
>1,500 yuan	18 (10.5)	3.94 ± 1.11		

Table 2: Correlation between mean scores for health belief and intention to take the COVID-19 vaccine (N = 171).

Health beliefs	M ± SD	correlation with scores for intention to take the vaccine	
		r	p-value
Intention to take the COVID-19 vaccine	3.76 ± 1.12		
Perceived susceptibility			
Your probability of getting COVID-19 in the future	1.94 ± 0.95	0.059	0.444
Your likelihood of getting infected due to the collective living in campus dormitories	2.67 ± 1.13	0.174	0.023
Your likelihood of getting infected due to your fragile body	2.67 ± 1.10	0.232	0.002
Your possibility of getting infected based on your multiple contacts with classmates on campus	2.83 ± 1.18	0.259	0.001
Perceived severity			
Your perception of COVID-19 as a threat to people's mental health	4.05 ± 0.93	0.159	0.038
Your perception of COVID-19 as a threat to people's physical health	4.43 ± 0.83	0.228	0.003
Perceived benefits			
Your perception of the COVID-19 vaccine protecting against COVID-19	3.50 ± 1.03	0.488	<0.001
Your attitude towards COVID-19 vaccine	3.64 ± 1.07	0.265	<0.001
Perceived barriers			
Your hesitation about the COVID-19 vaccine because it may lead to minor adverse reactions	2.37 ± 0.87	0.001	0.993
Your reluctance to take the COVID-19 vaccine due to adverse reactions	1.81 ± 0.85	-0.266	<0.001
Your reluctance to take the COVID-19 vaccine because it is unsafe	2.02 ± 1.01	-0.168	0.028
Your reluctance to take the vaccine because of the policy of the vaccine adverse reaction compensation system	2.27 ± 1.08	-0.13	0.862
Cues to action			
How do you feel about the importance of relatives around you for the COVID-19 vaccination?	3.51 ± 1.04	0.566	<0.001
How do you feel about the importance of students around you for the COVID-19 vaccination?	3.59 ± 0.99	0.586	<0.001
Will making the vaccination site close to you influence your decision on taking the vaccine?	4.16 ± 0.96	0.185	0.015
Will multiplying the number of vaccination sites influence your decision on taking the vaccine?	4.15 ± 0.94	0.235	0.002
Will few people at vaccination sites influence your decision on taking the vaccine?	4.15 ± 0.95	0.256	0.001

vaccination sites, multiplicity of vaccination sites, and few people at vaccination sites (Table 2).

Intention to take COVID-19 vaccine

Table 2 shows the correlations between scores for health beliefs and the intention to take the COVID-19 vaccine.

Table 3 shows the multiple linear regression analysis of the intention to take the COVID-19 vaccine score. In the multiple linear regression analysis, scores for the item under perceived susceptibility in the HBM, namely your possibility of getting infected based on your multiple contacts with classmates on campus, was found to be associated with scores for intention

Table 3: Multiple linear regression analysis of intention to take COVID-19 vaccine score (N = 171).

Variables	β	t	p-value
Constants		1.058	0.292
Perceived susceptibility			
Your likelihood of getting infected due to the collective living in campus dormitories	-0.209	-1.849	0.066
Your likelihood of getting infected due to your fragile body	0.103	1.043	0.298
Your possibility of getting infected based on your multiple contacts with classmates on campus	0.230	2.455	0.015
Perceived severity			
Your perception of COVID-19 as a threat to people's mental health	-0.030	-0.432	0.666
Your perception of COVID-19 as a threat to people's physical health	0.091	1.333	0.184
Perceived benefits			
Your perception of the COVID-19 vaccine protecting against COVID-19	0.167	2.195	0.030
Your attitude towards COVID-19 vaccine	0.203	2.144	0.034
Perceived barriers			
Your reluctance to take the COVID-19 vaccine due to adverse reactions	-0.186	-2.056	0.041
Your reluctance to take the COVID-19 vaccine because it is unsafe	0.025	0.290	0.772
Cues to action			
How do you feel about the importance of relatives around you for the COVID-19 vaccination?	0.159	1.317	0.190
How do you feel about the importance of students around you for the COVID-19 vaccination?	0.135	1.029	0.305
Will making the vaccination site close to you influence your decision on taking the vaccine?	-0.022	-0.212	0.832
Will multiplying the number of vaccination sites influence your decision on taking the vaccine?	0.076	0.589	0.556
Will few people at vaccination sites influence your decision on taking the vaccine?	-0.016	-0.135	0.893

Note: Dependent variable: Score for intention to take COVID-19 vaccine.
 β = Standardized Beta, Adjusted R^2 = 0.436.

to take COVID-19 vaccine ($\beta = 0.230, p = 0.015$). Students with higher scores for items under perceived benefits, namely your perception of the COVID-19 vaccine protecting against COVID-19 ($\beta = 0.167, p = 0.030$) and your attitude towards COVID-19 vaccine ($\beta = 0.203, p = 0.034$), were found to have a higher score for intention to take COVID-19 vaccine. In addition, scores for the item under perceived barriers, namely, your reluctance to take the COVID-19 vaccine due to adverse reactions, were associated with the intention to take COVID-19 vaccine ($\beta = -0.186, p = 0.041$). The variables in the multiple linear regression analysis accounted for 43.6% of the variance in the score for intention to take the COVID-19 vaccine.

Discussion

This study used the HBM to examine the factors associated with the intention to take the COVID-19 vaccine among Chinese college students. Findings of the beliefs showed that college students' scores for perceived susceptibility, "probability of getting COVID-19 in the future", "your likelihood of getting infected due to the collective living in campus dormitories", and "your fragile body or multiple contacts with classmates on campus" were relatively low. The scores for perceived severity, "COVID-19 is a threat to people's mental health or physical health," were relatively high. The scores for perceived benefits, "COVID-19 vaccine can protect against COVID-19" and "attitude towards COVID-19 vaccine" were moderate. Relatively perceived low susceptibility may be due to little awareness of college students on COVID-19 because government measures have adequately controlled the COVID-19. The government's compelling explanation of COVID-19 could account for college students' relatively

high perceived severity, while college students' moderate perception of benefits may be due to the moderate promotion of COVID-19 vaccines.

The overall acceptance of taking the COVID-19 vaccine was moderate. It is noteworthy that actions need to be taken on college students who have little intention of taking the COVID-19 vaccine to ensure their adherence to it and indirectly encourage their entourage to get vaccinated. The findings of this study showed that HBM constructs were associated with college students' intention to take the COVID-19 vaccine, which is consistent with many other studies [7,10]. Our findings suggest that perceived susceptibility, perceived benefits, and perceived barriers are important HBM constructs influencing college students' intention to take the COVID-19 vaccine, which is similar to previous study [7]. Hence, public health intervention programs that focus on increasing college students' perceived susceptibility to infection and perceived benefits of the COVID-19 vaccine, while reducing barriers of taking the COVID-19 vaccine are recommended. Findings suggest that it is not needful to promote health information framing a high risk of illness, as this has been found to be useful in influencing vaccination-related behavior [11].

This study had several limitations. First, the use of a web-based questionnaire may have led to selection bias. Second, the participants in this study were from three colleges that covered less than 1% of the whole colleges in China, limiting the generalizability of our results to all college students. Third, this study used a single item to assess the intention to take a vaccine. As the intention to take a vaccine is complex and multidimensional, it is recommended to use various types of data and measurement methods to accurately identify the intentions [12], which should be considered in future studies.

Conclusion

College students had a moderate intention to take the COVID-19 vaccine. Significant predictors of college students' intention to take the vaccine included perceived high susceptibility to infection, perceived high benefits, and perceived low barriers to receiving the COVID-19 vaccine. Interventions targeting these factors could be useful in promoting college students' acceptance of the COVID-19 vaccine. This study could provide reference information for the development of interventions to enhance COVID-19 vaccine acceptance.

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