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Effect of Educational Intervention Based on the Theory of Planned Behavior (TPB) on the Intention to Inject the Third Dose of the COVID-19 Vaccine in Adults

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Abstract

Background: With the development of COVID-19 vaccines, experts predicted that COVID-19 will soon be eradicated. However, despite the availability of several types of COVID-19 vaccines, some people refused to receive any. The present study aimed to investigate the effect of an educational intervention based on the theory of planned behavior (TPB) on the intention to receive the third dose of the COVID-19 vaccine among Iranian people aged 18 or older with a history of not receiving the third dose of this vaccine.

Materials and Methods: This quasi-experimental study was conducted without a control group on 100 people aged 18 years or older who had not received the third dose of the COVID-19 vaccine in Bushehr, Iran, in 2022. The subjects were selected using the SIB system and available sampling method. The educational intervention included eight training sessions based on the TPB constructs using group discussion and question and answer method along with an educational booklet. Before and two months after the educational intervention, the participants completed a researcher-made questionnaire based on the TPB constructs. The data were analyzed using SPSS software (version 16.0).

Results: A total of 100 people aged 18 years or older with a mean age of 36±11.400 participated in this study. The results of paired t-tests showed that the mean scores of constructs of the TPB (attitude, subjective norms, perceived behavioral control, and behavioral intention) of the participants increased after the educational intervention ($P<0.05$).

Conclusion: The educational program designed based on the TPB is useful to change attitudes, subjective norms, perceived behavioral control, and behavioral intention of individuals to receive the third dose of the COVID-19 vaccine.

Key Words: Adults, Iran, Theory of Planned Behavior, COVID-19, Vaccine.

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1- INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2) (1). The first known case was identified in Wuhan, China, in December 2019. The disease quickly spread worldwide, resulting in the COVID-19 pandemic (2). The symptoms of COVID-19 are variable but often include fever, cough, headache, fatigue, breathing difficulties, loss of smell, and loss of taste. Symptoms may begin one to 14 days after exposure to the virus (3-7). At least a third of people who are infected do not develop noticeable symptoms (8, 9).

Preventive measures to reduce the chances of infection include getting vaccinated, staying at home, wearing a mask in public, avoiding crowded places, keeping distance from others, ventilating indoor spaces, managing potential exposure durations, washing hands with soap and water often and at least twenty seconds, practicing good respiratory hygiene, and avoiding touching the eyes, nose, or mouth with unwashed hands (10, 11). In 2020, the first COVID-19 vaccines were developed and made available to the public through emergency authorizations (12), and conditional approvals (13, 14).

Vaccines are widely credited for their role in reducing the spread of COVID-19 and reducing its severity and mortality (12, 15). The development and use of whole-inactivated virus (WIV), and protein-based vaccines have also been recommended, especially for use in developing countries (16, 17). However, despite the safety and effectiveness of immunization measures, hesitancy in vaccination has become an emerging global issue and was reported by the World Health Organization (WHO) as one of the top ten threats to global health in 2019 (18). The results of previous research in this field show that the unwillingness to receive the COVID-19 vaccine can be due to factors such as concerns about vaccine efficacy and safety, fake news on social media and the Internet, and vaccine side effects, among others (18-22). A systematic review study by Pourshahri et al. (2022) investigated the factors influencing the acceptance or non-acceptance of COVID-19 vaccination, and the results showed that gender as an individual factor, trust in governments and hospitals as a social factor, and concern about side effects of vaccination as a vaccine-related factor play the most important roles in accepting vaccination (23). Studies also show that educational interventions based on the Theory of Planned Behavior (TPB), and the Health Belief Model (HBM) structures have been effective in the intention to accept vaccination against human papillomavirus (HPV), and the intention to receive the HPV vaccine (25, 24).

Some research results also show that educational interventions based on TPB structures have been effective in increasing the intention to be vaccinated against COVID-19 (24). Some studies also showed that educational interventions were effective in people's positive attitude toward the COVID-19 vaccine, accepting it, and the intention to receive a booster dose of the COVID-19 vaccine (26). Therefore, identifying the reasons for not accepting the vaccine and investigating the intention to inject the COVID-19 vaccine and its boosters in Iranian society require educational interventions in the country. This is especially important in a city such as Bushehr, where due to commercial and maritime exchanges and the arrival of goods and crew of foreign cargo ships in this city, the risk of infections with new strains of COVID-19 such as the Omicron variant is high, and the preventative injection of the COVID-19 vaccine should

be followed up more quickly, and all people over the age of 18 should inject the third dose of the vaccine (27). Due to the importance of vaccinating all members of society during the COVID-19 pandemic, widespread receipt of the COVID-19 vaccine requires appropriate awareness and information in all sections of society. This goal necessitates the use of appropriate theories and models for intervention and education. One of the most effective models for studying the behavior of people in society is the Theory of Planned Behavior. The TPB is a social-cognitive theory that provides a useful framework for predicting and understanding health-related behaviors (**Figure 1**). According to this theory, intention is the main determinant of behavior. A person's intention is influenced by three factors: attitude, subjective norms, and perceived behavioral control. People evaluate a behavior positively and intend to do it when they believe that influential and important people think similarly about that behavior, and it is under their control and will (28-33). The use of this model on the COVID-19 vaccination helps identify the factors affecting it, plan, and implement effective educational interventions and political policies. To the authors' knowledge, TPB has not been used in the investigation of vaccination intention in Iran. This study aimed to investigate the effect of an educational intervention based on the TPB on the intention to accept the third dose of the COVID-19 vaccine in Iranian people with a history of not receiving the third dose of the vaccine.

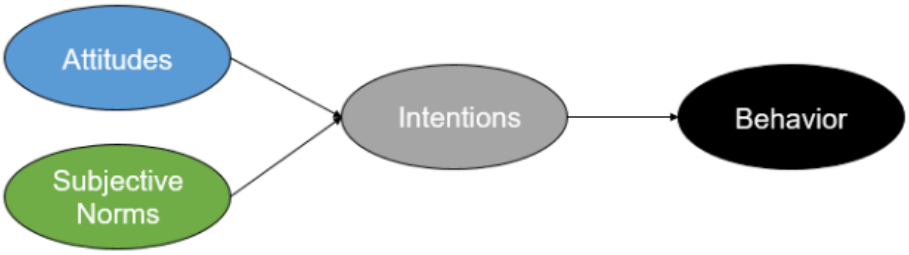

Fig. 1: Theory of Planned Behavior (Ajzen, 1991).

2- MATERIALS AND METHODS

2-1. Study design and method

The present study is an interventional study (quasi-experimental) without a control group conducted on Iranian citizens aged 18 and older in Bushehr city with a history of not receiving the third dose of the COVID-19 vaccine in 2022. The sample size was estimated using Cohen's method with the G*Power software, based on the following formula:

$$n = \frac{2\left(Z_{1-\frac{\alpha}{2}} - Z_{1-\beta}\right)s^2}{d^2}$$

The sample size was determined as 90 people, considering a significance level of at least 95%, an error of 5% (α = 0.05), a test power of 80% (β = 0.2), three repetitions, and the average effect size (d=0.25). In order to increase the strength of the study and considering the drop of 10% of the participants in the study, the sample size was increased to 100 people. Then, people who did not receive the third booster vaccine were identified and randomly selected from two comprehensive health service centers of Bushehr using the Integrated Health System (SIB) system

(https://sib.iums.ac.ir/Home/Login?state=0), and those who qualified were invited to participate in the research. The necessary permission to enter the centers and check the information of the households covered by these two centers was obtained from the Deputy Health Authority of Bushehr city.

2-2. Inclusion criteria

- Willingness to participate in the study,
- Age 18 years old or older,
- A native citizen of Bushehr,
- Not having received the third round of COVID-19 vaccine, and
- Reading and writing literacy.

2-3. Exclusion criteria

- Having received the first and second vaccine doses,
- Unwillingness to participate in the study,
- Failure to attend training sessions more than once,
- Failure to complete the questionnaire correctly and completely, and
- Distorted questionnaires.

2-4. Data Collection Tools

The data collection tool was a researcher-made questionnaire consisting of two parts: demographic information (age, gender, marital status, education level, job, income, chronic disease status, the person's status regarding COVID-19, and the family history of infection with the coronavirus disease), and TPB constructs with 35 items and four components, including attitude structures (15 items), subjective norms (10 items), perceived behavioral control (7 items), and behavioral intention (3 items). The items of attitude, subjective norms, perceived behavioral control, and behavioral intention were classified using a five-point Likert scale from "completely agree" (score 5) to "completely disagree" (score 1). Accordingly, 1-75 points were assigned to the attitude section, 1-50 to mental norms, 1-35 to perceived behavioral control, and 1-15 to behavioral intention.

2-5. Reliability and Validity

This study's content validity index (CVI) was 0.72 for attitude, 0.74 for subjective norms, 0.73 for perceived behavioral control, and 0.73 for behavioral intention. The content validity ratios (CVR) were 0.71, 0.48, 0.75, 0.84, and 0.68 for attitude, subjective norms, perceived behavior control, and behavioral intention, respectively. Cronbach's alpha coefficients for the planned behavior theory questionnaire structure were as follows: 0.70 for attitude, 0.73 for subjective norms, and 0.75 for perceived behavior control, 0.72 for behavioral intention. The present questionnaire had acceptable validity and reliability.

2-6. Procedure

Necessary permissions were obtained from the Vice-chancellor of research at Yasuj University of Medical Sciences, and from Bushehr University of Medical Sciences. The research was carried out at the peak of the delta strain (the fifth wave). Two health centers were randomly selected out of 14 urban health centers in Bushehr, and the number of people who did not receive the third dose of vaccine in these centers was identified using the Integrated Health System (which is known as SIB: a Persian backronym in Farsi meaning apple).

SIB is the latest electronic health record system in Iran, which is designed and employed by the Ministry of Health and Medical Education to integrate information related to people's health and provide healthcare services throughout the country. After selecting the sample size randomly, the target group completed the informed

consent form to participate in the research. At the beginning of the research (pre-test), the participants completed the researcher-made questionnaire based on TPB constructs. After the initial assessment (needs assessment), the coded data were analyzed and used to determine the training needs and specify the target constructs to be considered in the training sessions. Then, based on the results of the needs assessment, a theory-based training program, consisting of eight sessions of 45 to 60 minutes, was designed and applied along with the presentation of a targeted educational booklet. An educational poster and an educational film were also shown to the target group.

At the end of the session, the participants were given an educational CD and a pamphlet and were requested to read the educational resources completely and ask any questions from the first researcher over the phone. Two months after the intervention, the research questionnaire was completed again by the research units and the data before and after the intervention were analyzed.

2-7. Educational intervention

Educational content was designed based on the constructs of the TPB model and emphasizing the COVID-19 disease and prevention ways and the benefits of getting the vaccine with an emphasis on the third dose. In this regard, the educational pamphlets of the Ministry of Health were consulted extensively (https://behdasht.gov.ir/step2corona).

This training program was approved by faculty members, including health education and promotion (n=3), medical education (n=2), epidemiology (n=2), internist (n=2), and infectious disease specialist (n=1). The educational intervention was presented to the participants by the first researcher (AA, **Table 1**).

The teaching method was a combination of face-to-face, lecture, direct discussion (presentation of educational and group pamphlets and an educational video), and indirect (educational brochure) methods. The educational intervention was held in the meeting hall of the two selected health centers at 10 am. At the end of the intervention, an educational CD (containing all the materials taught in the training sessions), and a targeted educational booklet (containing all the materials taught) were given to the participants.

2-8. Data analysis

The normality assumption of data was verified using the Shapiro-Wilk (P>0.05). Descriptive statistical tests (including frequency, frequency percentage, mean, and standard deviation), and analytical statistical tests (including paired t-test to compare the difference between two groups) were applied to analyze the data using SPSS software version 16.0. A p-value lower than 0.05 was statistically significant.

2-9. Ethical considerations

The following ethical considerations were involved in this research:

- Permission from Yasuj University of Medical Sciences,
- Permission from Bushehr University of Medical Sciences,
- Informed consent, along with explaining the objectives of the research from all participants,
- Voluntary participation and optional withdrawal,
- No cost to participate in the study, and
- The information was analyzed in general, and it was not necessary to write the names and surnames of the participants.

Table-1: The method of educational intervention in the target group.

Session	Topic	Educational material	Educational strategy	Time
Introduction	Introducing the researcher and the participants, stating the objectives of the research, stating the implementation of the research, stating the expectations from the participants	PowerPoint and oral presentation	Lecture, question and answer method, providing a telephone line available to answer the questions of the participants	15 min
Session 1: Awareness and attitude towards COVID-19	Providing reliable and up-to-date information and statistics about the nature of the disease, risk factors and methods of disease prevention, and the introduction of COVID-19 vaccines, etc.	Educational booklet, educational PowerPoint, poster, pamphlet, educational video	Lecture, group discussion, question and answer method after the training sessions, providing a telephone line available to answer the questions of the participants	45 min
Session 2:	Group discussion	Educational booklet, poster, educational pamphlet	Question and answer	60 min
Session 3: subjective norms	Presenting statistics regarding people prone to contracting COVID-19, presenting statistics on the mortality of the disease, stating the severity of the complications of the disease and the costs of the disease, concrete examples of vaccination by important political, social, and cultural people etc.	Educational booklet, educational PowerPoint, poster, pamphlet, and educational video	Lecture, group discussion, question and answer method after the training sessions, providing a telephone line available to answer the questions of the participants	60 min
Session 4	Group discussion	Educational booklets, posters, and pamphlets	Question and answer	60 min
Session 5: Perceived behavioral control	Creating confidence in a person about their abilities to adopt preventive behaviors, acquire knowledge, prevent diseases, etc.	Educational booklet, educational PowerPoint, poster, pamphlet, and educational video	Lecture, group discussion, question and answer after the training sessions, providing a telephone line available to answer the questions of the participants	50 min
Session 6:	Group discussion	Educational booklets, posters, and pamphlets	Question and answer	60 min
Session 7: behavioral intention	Expressing perceived benefits and barriers concerning compliance with preventive behaviors, providing information about the COVID-19 vaccines available to the public, providing information about the third wave of COVID-19 (omicron) and the death rate, introducing the nearest COVID-19 vaccine injection centers.	Educational booklet, educational PowerPoint, poster, pamphlet, and educational video	Lecture, group discussion, question and answer method after the training sessions, providing a telephone line available to answer the questions of the participants, as well as giving a CD and a training booklet containing all the training provided in the training sessions to the participants.	60 min
Session 8:	The final summary of the training provided	Educational booklets, posters, and pamphlets	Question and answer	60 min

3- RESULTS

A total of 100 people aged 18 years and older from Bushehr city with no history of injecting the third dose of the COVID-19 vaccine participated in this research. The mean age of the participants was 36±11.40 years old, 68% of participants were female, and 59% were married. Also, 5% of the participants had no educational degree (less than a high-school diploma), and 43% had a bachelor's degree. A total of 41% of people were employed, and 20% were housewives. In addition, 51% of the participants and their families had a history of being infected with COVID-19 (**Table 2**).

Table-2: Baseline characteristics of participants (n=100).

Variables	Sub-group	Number (%)
Age, year	<30	33 (33)
	30-39	31 (31)
	40-49	23 (23)
	≥50	13 (13)
	total	100 (100)
Gender	Men	68 (68)
	Women	32 (32)
	Total	100 (100)
Marital status	Single	41 (41)
	Married	59 (59)
	Total	100 (100)
Educational level	Less than a High School Diploma	5 (5)
	Diploma	29 (29)
	Associate degree	13 (13)
	Bachelor	43 (43)
	Master's degree and above	10 (10)
	Total	100 (100)
Participant Occupation	Employee	46 (46)
	Non-Government job	10 (10)
	House wife	20 (20)
	Academic students	16 (16)
	Other	8 (8)
	Total	100 (100)
History of chronic disease	Yes	13 (13)
	No	87 (87)
	Total	100 (100)
History of getting infected with COVID-19	Yes	51 (51)
	No	49 (49)
	Total	100 (100)
History of family members being infected with COVID-19	Yes	51 (51)
	No	49 (49)
	Total	100 (100)
Average age, year	36±11.400	

The results of the paired t-test showed that the mean scores of attitude, subjective norms, perceived behavior control, and behavioral intention of the participants increased after the educational intervention, and this increase was statistically significant ($p<0.05$, **Table 3**).

Table-3: Comparison of mean TPB constructs regarding the intention to inject the COVID-19 vaccine before and after the educational intervention (n=100).

Variables	Time	Mean ± SD	Paired t-test	P-value
Attitude	Before intervention	48.65±7.84	-2.434	<0.017
	Two months after intervention	50.72±6.70		
Subjective norms	Before intervention	33.34±7.45	-4.918	<0.001
	Two months after intervention	36.67±8.63		
Perceived behavioral control	Before intervention	25.00±5.87	-4.159	<0.001
	Two months after intervention	27.93±5.92		
Behavioral Intentions	Before intervention	8.78±2.75	-7.740	<0.001
	Two months after intervention	11.94±3.92		

SD: Standard deviation.

The frequency distribution of the intention to inject the third dose of the COVID-19 vaccine after the educational intervention in relation to gender is shown in **Table 4**. According to the results, the intention to inject the third dose of the COVID-19 vaccine after the educational intervention was higher in women than in men.

Table-4: Frequency distribution of the intention to inject the third dose of the COVID-19 vaccine after the educational intervention according to gender (n=100).

Variables	Status	Number (%)
Men	Yes	20 (69)
	No	12 (31)
	Total	32 (100)
Women	Yes	47 (66.7)
	No	21 (33.3)
	Total	68 (100)

4- DISCUSSION

The COVID-19 pandemic has affected many aspects of people's lives, including physical, social, emotional, behavioral, and economic health, and has become an international concern. A safe and effective vaccine against COVID-19 is a long-term solution to control the epidemic (35, 34). It has been estimated that to achieve herd immunity against the acute respiratory syndrome of the coronavirus, a vaccination rate of 75-80% of the population is necessary (36). The success of the vaccination program against the COVID-19 disease depends on the acquired immunity in a sufficient proportion of the population (37). The main goal of this research was to investigate the effect of educational intervention based on the TPB on the intention to inject the third dose of the COVID-19 vaccine in people aged 18 and older living in Bushehr city.

The theory of planned behavior is a social-cognitive theory that provides a useful framework for predicting and understanding health-related behaviors. According to this theory, intention is the main determinant of behavior, and a person's intention is influenced by three factors: attitude, subjective norms, and perceived behavioral control (30-34).

Attitude is presented as a mental process that determines potential and actual actions, which is a predictor of behavior. People think about the meaning of a behavior and examine it before deciding (30). The results of this research showed that the mean score of the attitude of the participants towards the COVID-19 vaccine increased after the educational intervention ($P<0.05$), which is in line with the findings of Zamordi et al. (24), Seddig et al. (35), and Takagiet al. (26). Aktherl et al. (2021) investigated the key factors affecting the acceptance of the COVID-19 vaccine and the development of a model based on the TPB in Bangladesh and showed that false beliefs had a negative effect on individual attitudes, subjective norms, and vaccine acceptance. However, individual awareness has a positive effect on the acceptance of the COVID-19 vaccine. In addition, the perceived usefulness of vaccination and the ease of receiving it have a positive effect on the attitude and acceptance of immunization (36). Various studies have determined that people's attitudes toward the effectiveness of the COVID-19 vaccine and their understanding of the severity of the disease are influential in accepting the vaccine (37-40).

In other words, people who have a positive attitude towards the COVID-19 vaccine are also positive in accepting it. The results of some studies also show a positive and significant relationship between people's awareness and attitude towards the COVID-19 pandemic and its vaccine, so that with increasing awareness, people's attitude towards the vaccine improves (41-44). Some studies have shown that people's attitudes also have a positive effect on preventive behaviors (45-49).

The second predictive structure of the theory of planned behavior is subjective norms, which also affect behavioral intention (50). Subjective norms are the understanding of social pressures to/not to adopt some behavior and the opinion of certain people on the desired behavior. Therefore, a person intends to perform a certain behavior under the influence of people who are important to them (31). In the present study, the mean score of the subjective norms of the participants increased after the educational intervention, and this increase was statistically significant ($P<0.05$). These results are in line with the findings of Zamordi et al. (24), and Seddig et al. (35).

Zamordi et al. (24) showed that after the educational intervention, the mean scores of attitude, subjective norms, perceived behavioral control, and behavioral intention in the intervention group were significantly higher than the control group. In Germany, Seddig et al. (35) also showed that people's intention to be vaccinated is a function of their attitude towards vaccination, social pressure, and perceived barriers to vaccination. Hagger et al. showed that attitude and mental norms are the greatest predictive factors about the intention to receive the vaccine (51). In the United States, Alrubaiee et al. studied the impact of social norms in different groups on predicting preventive behaviors against COVID-19 and showed a significant correlation between social norms (such as trusting experts and scientists), and predicting preventive behaviors (46). Based on the theory of planned behavior, subjective norms can play a role in the initiation of healthy behaviors by creating motivation. Subjective norms are related to a person's opinion about their previous thoughts

about performing a behavior and their motivation to perform or accept it. A person will be influenced by numerous people in their social network, and these people around them (e.g., parents and family, religious leaders, and political leaders) have an influence on their beliefs and behaviors (52, 53). According to the theory of reasoned action by Fishbein and Ajzen (1975), subjective norms are a reflection of social pressure perceived by a person and form a specific behavior (33). Subjective norms express a person's perception about whether important people from their point of view approve a certain behavior (54). Subjective norms measure the influence of others on behavior. If social expectations dictate that people should perform some behavior, there is a higher probability of the individual doing that (30). Previous research has come to the conclusion that subjective norms play a more important role than attitudes in predicting a person's behavioral intentions (55).

Perceived behavioral control is the degree of a person's perception of the extent of their voluntary control about performing a behavior (56). Perceived behavioral control can influence behavior directly and indirectly through behavioral intention (33). Previous studies have shown that perceived behavioral control has a positive relationship with behavioral intention (49). In the present study, the mean score of perceived behavioral control of the participants increased after educational intervention, and this increase was statistically significant ($P<0.05$). These results are in line with the findings of Zamordi et al. (24). They showed that after educational intervention, the mean scores of attitude, subjective norms, perceived behavioral control, and behavioral intention in the intervention group were significantly higher than the control group (24). Rabb et al.'s study in the United States (57) investigated the impact of social norms in different groups on predicting preventive behaviors against COVID-19 in the U.S. and showed a significant correlation between perceived social norms and preventive behaviors against COVID-19 (such as people's trust in scientists). Research has concluded that the willingness to engage in preventive behaviors related to COVID-19, including vaccination, depends on the perceived intensity with which others participate.

Intention is a sign of a person's readiness to perform a certain behavior and comes exactly before it. Intention is based on a person's view of behavior, objective norms, and perceived behavioral control. Each factor is valued based on its relationship with behavior and the beneficiary population. Behavioral intention expresses the intensity of an individual's intention and will to perform the target behavior. The relationship between behavioral intention and behavior shows that people tend to engage in behaviors that they intend to do. Therefore, behavior always comes after the behavioral intention and is connected to it (58). Fishben and Ajzen considered the intention to determine the action in a certain direction. They defined behavioral intention as the mental probability of forming a specific behavior (59).

For example, the intention to perform a specific health behavior (e.g., vaccination intention) has been recognized as a good predictor of performing that behavior (vaccine injection). The results of the present study showed that the mean score of behavioral intention of the participants increased after educational intervention, and this increase was statistically significant ($P<0.05$). These results are consistent with the findings of Bayrami et al. (25), Ab et al. (60), Zomorodi et al. (24), Seddig et al. (35), Witus et al. (61), and Hagger et al. (51) showing the positive effect of educational intervention on the behavioral intention of people. Li et al.

(2021) also showed that trust in the providers of the COVID-19 vaccine was an important factor in changing the intention from doubt to accepting the vaccine after educational intervention (62).

The study by Soleimanpour et al. (2021) showed that a lack of trust in vaccines and vaccine production institutions, concerns about the future of the COVID-19 pandemic, and false beliefs about vaccination had a significant inverse relationship to the intention to vaccination against COVID-19 (63). The results of Yoda et al.'s study (2021) in Japan showed that 66% of people intended to be vaccinated against COVID-19, 22% were hesitant, and 12% did not want to receive the vaccine (21). The results of a systematic review showed that the percentage of people willing to receive the COVID-19 vaccine worldwide ranged from 23.1% to 92%. The willingness to be vaccinated was associated with factors such as male gender, older age groups (65 years or more), higher income, ethnicity, recommendations of experts, barriers to access (place of vaccine delivery, cost, time, and distance of vaccine access), and education level. Vaccine hesitancy was due to concerns about vaccine safety, its perceived effectiveness, mistrust of health officials or health experts, lack of vaccine provision, vaccine characteristics (e.g., methods of vaccine administration and the location of the vaccination), the speed of vaccine development, and the fear of known or unknown long-term side effects (64). Therefore, to increase the vaccination intention of the general population, it is necessary to consider the effective factors in vaccine acceptance or rejection and design plans to increase the vaccination intention among the target groups (65).

4-1. Study limitations

- Small sample size, which may be due to the limitations of human resources (people aged 18 and older with a history of not being vaccinated with the third dose of the COVID-19 vaccine).
- Not using a control group.
- The use of self-reporting tools to collect data due to the mental structure of the questions and the possibility of information errors on the part of the participants.
- The evaluation period of intervention results (immediately after training and two months afterward) could be longer.
- Conducting the study at a specific point in time (beginning of the fifth wave). A change in the type of disease and the perception of its threat may affect the responses of the participants.
- Despite the effectiveness of the educational intervention based on the TPB, it is not possible to have a correct estimate of the effectiveness of the model due to the lack of comparison with the results of traditional education or based on other models.

5- CONCLUSION

The educational program based on the theory of planned behavior can significantly increase the attitude, subjective norms, perceived behavioral control, and behavioral intention of people aged 18 and older concerning receiving the third dose of the COVID-19 vaccine. Therefore, it is suggested to design educational programs based on the constructs of TPB to increase the behavioral intention to inject COVID-19 vaccination in people with a history of no COVID-19 vaccination.

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7- AUTHORS' CONTRIBUTIONS

Study conception or design: AA and SFZ; Data analyzing and draft manuscript preparation: MS, SA, and AY; Critical revision of the paper: SFZ; Supervision of the research: MS and SFZ; Final approval of the version to be published: AA, MS, SA, AY, and SFZ.

8- CONFLICT OF INTEREST: None.

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