

Original Article



The Effect of Educational Intervention Based on the Health Belief Model on Promoting Perceived Self-efficacy to Prevent HIV/AIDS Among the High School Students

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Abstract

Background: Promoting awareness and correcting health beliefs about preventive behaviors in adolescents and young people are the most effective ways to prevent the transmission of HIV/AIDS. This study was conducted to assess the influence of the educational intervention on the promotion of perceived self-efficacy to inhibit HIV/AIDS among high school students.

Methods: This quasi-experimental investigation included 230 high school students in Asadabad and was conducted in 2021. Following the selection of students by the multi-stage cluster sampling method, they were allotted into two equal (intervention and control) groups of 115 individuals. The educational program for the intervention group included five one-hour sessions of the students' social network (Shad), which was implemented by a participatory method based on questions and answers and group discussion, as well as practical performance. A reliable and valid questionnaire comprising three parts (personal attributes, awareness, and health belief model [HBM] constructs) was employed for data collection. The collected data were analyzed using different tests, including Fisher's exact test, the chi-square test, ANCOVA, and independent and paired sample *t* tests in SPSS software, version 16.

Results: Educational intervention based on HBM not only affected the promotion of awareness ($P < 0.05$), self-efficacy, perceived susceptibility, severity, and benefits but also reduced students' perceived barriers to preventive behaviors ($P < 0.05$).

Conclusion: Our findings revealed that the educational intervention based on HBM affected health belief constructs concerning HIV/AIDS. Thus, the results of this study can be beneficial for school health education and health educators who design disease education programs.

Keywords: Educational intervention, HIV, AIDS, Health belief model, Students



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Introduction

Human immunodeficiency virus (HIV), which is a well-known dangerous virus worldwide, poses a serious threat to the health and economy of human societies due to its high lethality and high cost of care (1). Acquired immunodeficiency syndrome (AIDS) infection typically begins at the age of fewer than 25 years and has been reported as the second major reason for mortality among the young worldwide (1). The world is now facing the HIV/AIDS crisis, the greatest human catastrophe since World War II (2). By the end of 2019, the total number of people living with HIV/AIDS in the world is 38 million, and 1 700 000 new cases of HIV have been reported. In the same year, 690 000 people died of HIV/AIDS, of which 300,000 were women and 390 000 were men (3). According to the Ministry of Health and Medical Education, 41 496

people became infected with HIV/AIDS in Iran by the end of 1398, of which 19 164 cases died (4). In Iran, the most common age group with the disease (30.2%) is 25-34 years old, and the most common methods of transmission are injecting drug use (65.5%), unknown cause (24.9%), sexual intercourse (7.4%), contaminated blood and blood products (1.7%), and mother-to-child transmission (0.5%), respectively (5). However, experts argue that the pattern of HIV infection in Iran is different. It is estimated that 31%, 25%, and 11% of cases in Iran are transmitted through injecting drug use, blood transfusion, and various means, respectively. Thus, addicts, especially injecting drug users, are significantly more at risk of becoming infected with the AIDS or hepatitis virus than ordinary people in the community (6). Based on a report by the World Health Organization, Iran is among the most high-



risk countries in the Middle East in terms of AIDS (7). The highest rate of disease growth in Iran by 2025 is projected to belong to HIV/AIDS for reasons such as attenuation, disability, and quality of life in patients with AIDS (3).

Although public awareness about HIV/AIDS prevention has increased, young people still do not have enough knowledge about the disease (1). As the world's most vulnerable group to AIDS, young people are at risk for unsafe sex because of a sense of curiosity, peer pressure, ignorance, and incompetence. Therefore, they are more likely to be infected with HIV/AIDS than adults (8) because adolescence is the most important stage in life for the emergence and peak of high-risk health behaviors. Many high-risk behaviors such as smoking, drug use, alcohol consumption, and unsafe sex occur at a young age (9). According to various studies, about half of Iranian youth experience at least one type of high-risk health behavior (10,11). High-risk behaviors can be prevented by increasing awareness and improving attitudes and beliefs. According to scientific references, health education is the only effective way to fight AIDS, and high-risk and vulnerable groups should be the main priority of educational programs (12).

Cultural norms and sexual roles make adolescents more likely to become infected with HIV. In this way, masculinity and courage in boys lead to high-risk behaviors such as multiple sexual partners and a lack of adherence to ethics in sexual relations with their sexual partners (11). These high-risk behaviors put girls at greater risk for sexually transmitted infections and AIDS. Providing, maintaining, and promoting the health of society are the missions of all governments. In this regard, correct and principled policies must be proposed by authorities and strictly implemented by the executors. Similar to the other necessities of human social life, it depends on the committed participation of all members of society (13). Schools are key places to promote health (14). Health education programs are valuable when they are effective. In addition, the effectiveness of these programs largely depends on the appropriate use of models and theories (15). An efficient model in health education is the health belief model (HBM), which is based on perceived susceptibility, severity, benefits, barriers, and perceived self-efficacy, as well as cues to action (16). Perceived susceptibility is referred to as an individual's subjective belief about the probability of contracting a harmful condition or illness that can result from conducting a behavior. Perceived severity is an individual's subjective perception of the extent of harm resulting from a harmful situation or disease caused by a specific behavior. Perceived benefits refer to beliefs in the benefits of approaches suggested to decrease the risk or severity of a detrimental condition or disease caused by a specific behavior. Perceived barriers include believing in the actual and perceived costs of pursuing new behaviors. Perceived self-efficacy includes a belief that one is capable of successfully performing the behavior needed for the achievement of the desired results. The cues to action,

which are known as accelerating forces, cause a person to feel the need for taking action (17).

HBM is one of the individual-level models that is especially useful for designing educational interventions with the aim of preventing diseases and changing behavior in the short term (18), and it supports our objective (i.e., the promotion of the preventive behavior of AIDS in a short period of time). Therefore, it was used as a conceptual framework. HBM is based on the hypothesis that preventive behavior is dependent on a person's beliefs. Thus, the intervention mainly focuses on the people's own HBM and attempts to alter his beliefs.

It is necessary to explain that each of the behavior change theories examines behavior from a specific point of view so that some of these theories consider behavior from an individual perspective, while some consider behavior from an interpersonal perspective or a social perspective (19). Individuals are the main audience in health education theories and preventive behaviors, but this does not mean that the individual is the only unit or the most important unit of intervention. Rather, it implies that all other units (groups, organizations, and societies) are composed of individuals, and individual behavior is the basic unit of group behavior. People participate in groups, manage organizations, elect and appoint leaders, and enact legal policies. Therefore, group and organizational changes and policy achievements also require influencing people. Individual-level theories focus on intra-individual factors such as knowledge, attitude, belief, motivation, self-concept, past experiences, and skills (20).

Due to the importance of raising students' awareness and beliefs about the importance of AIDS prevention and scant investigations in this field, the present survey was undertaken to assess the influence of HBM-based educational intervention on the promotion of perceived self-efficacy in order to inhibit HIV/AIDS among students, particularly high school ones.

Materials and Methods

Based on the HBM, the current quasi-experimental study evaluated the influence of the educational intervention on the promotion of perceived self-efficacy to inhibit HIV/AIDS among the high school students in Asadabad in 2021. The selection of the sample size was based on the results of a study by Soltani et al (21) in which after the educational intervention, the mean and standard deviation of perceived barriers were 20.12 ± 3.16 and 18.08 ± 3.46 in the intervention and control groups, respectively. The sample size formula was used for comparing means in the two independent groups. By considering 95% test power and 95% confidence interval using the formula, the minimum number of samples for each group was determined to be 69. Overall, 230 samples were selected and included in the intervention ($n=115$) and control ($n=115$) groups. The reasons for the selection of this number of samples were possible dropouts and maximization of the power of investigation.

The multi-stage cluster sampling method was employed for sampling. To this end, based on its geographical directions, Asadabad was divided into north and south regions. Subsequently, using through the lottery and a simple random method, one high school girl and one high school boy were chosen from each north and south region (4 schools in total). Then, through a lottery, one boy's school and one girl's school, as well as one boy's school and one girl's school, were selected as the intervention and control groups, respectively. Finally, the students were selected by the convenience sampling method; Next, 115 students were chosen from 2 schools of the intervention group, corresponding to the number of students in each of the 10, 11, and 12 grades, who met the criteria for entering the study.

The inclusion criteria were secondary school students who were studying in that school at the time of the study, access to students' social network (Shad), consent to participate in the study, parents' permission for their children to participate in the study, and lack of suffering from any specific physical or mental illness. On the other hand, the exclusion criteria included reluctance to continue cooperation and participation in the present study, absence of (more than two) training sessions in training sessions, incomplete answering of questionnaires, and dropout at the time of the study.

The data collection tool was a valid and reliable three-part questionnaire designed by Vakili et al (22). Its face validity was assessed by quantitative (calculating the impact factor of the item) and qualitative methods (comprehensibility of questions and relevance to cultural and social values) and by the participation of school (n = 10) and college (n = 10) students. The content validity of the questionnaire was evaluated and analyzed based on the opinions of 14 members of the panel of experts, including health education (4 people), infectious diseases (n = 3), epidemiology (n = 2), clinical psychology (n = 2), psychiatrist (n = 2), maternal and child health (n = 1), and by calculating the content validity ratio and content validity index. Hence, the validity of the questionnaire was confirmed using validation methods. Based on Cronbach's alpha, the questionnaire reliability and the correlation coefficient were affirmed to be above 80% and 86% by the participation of 40 students, respectively. According to the findings of Vakili et al, the tool designed to promote HIV/AIDS health beliefs based on HBM is valid and reliable and is appropriate to the cultural and social characteristics of Iran. The first part of the questionnaire included demographic information about educational background, age, gender, the number of family members, father's age, mother's age, father's job, mother's job, father's education, mother's education, parent's life status, housing status, and economic status. The second part of the questionnaire was composed of 10 questions about AIDS awareness. To score awareness questions, scores 2, 1, and 0 were allocated to each correct, I do not know, and each incorrect answer, respectively; the maximum and

minimum scores included 20 and zero, respectively. The third section was related to HBM constructs and included 30 questions about an individual's beliefs about AIDS. In this section, the maximum and minimum scores were 150 and 30, respectively.

The model constructs included perceived susceptibility (6 questions), perceived severity (n = 5), perceived benefits (n = 7), perceived barriers (n = 5), and perceived self-efficacy (n = 7), with a maximum score of 30, 25, 35, 25, and 35 and a minimum score of 6, 5, 7, 5, and 7, respectively. All questions were scored based on a five-point Likert-type scale, ranging from completely agree (five points) to completely disagree (one point). Each participant's status in terms of model constructs, including perceived susceptibility, severity, benefits, barriers, self-efficacy, and awareness, was assessed by summing up their answers to questions concerning each construct. In each construct, obtaining a higher score typically denoted the good condition of an individual in terms of the construct.

All stages of the study, including obtaining informed consent from participants, completing questionnaires, and training sessions, were performed through the social network of students (Shad) due to the outbreak of COVID-19 and the closure of schools. To obtain informed consent, the text of the consent form was sent through Shad for the participants to confirm. Shad provides the possibility of managing students' distance learning through an internet connection and using smart mobile phones, laptops, or tablets. Shad is a platform designed for the distance learning of students. In the pre-test stage, first, the questionnaire was electronically designed, and its direct link was sent to the members of the intervention and control groups through Shad to be completed. The educational program for the intervention group (Shad) was implemented by a participatory method based on questions and answers and group discussion, as well as practical performance. Training materials, audio and video files, and assignments were sent to the intervention group one night before each session, and members were consulted about the timing of tomorrow's training session between 8 AM and 8 PM. Finally, people discussed and exchanged views on training materials and assignments online and reported on practical work at the time allotted for the session. The training was held in small groups of about 10 people to facilitate everyone's participation in group discussions and exchange of views. A telephone call was made to students once every two weeks for three months to review and remind them of the training material. The details of the training sessions are presented in [Table 1](#).

The topics and content of the training sessions included speaking about AIDS, explaining ways of transmitting and preventing it, increasing perceived susceptibility, severity, benefits, and self-efficacy, and reducing perceived barriers to AIDS. Educational aids such as posters, pamphlets, educational booklets, photos, and audio and video files were used to increase the effectiveness of educational

Table 1. Details of the Training Sessions

Sessions	Objectives	A Summary of Topics and Activities	Educational Time (min)
The first session	Improving the knowledge	Introduction to HIV/AIDS and ways of its transmission and prevention.	60 Minutes
The second session	Improving the perceived susceptibility and perceived severity constructs	Prevention of disease, risk factors, symptoms diagnosis, and increasing of perceived sensitivity and severity.	60 Minutes
The third sessions	Improving the perceived benefits, perceived barriers, and perceived self-efficacy constructs	Benefits and barriers of the prevention of HIV/AIDS, recommendations, self-efficacy in prevention and control of the disease.	60 Minutes
The fourth and fifth sessions	Cuse to action	The role of family members and teachers in facilitating the prevention of HIV/AIDS and providing educational posters and pamphlets, as well as audio and video files to subjects.	60 Minutes

Note. HIV/AIDS: Human immunodeficiency virus/acquired immunodeficiency syndrome.

interventions. Three months following the educational intervention, the members of the intervention and control groups completed the questionnaires the same as the pre-test stage to perform the post-test.

The data were entered into SPSS software (version 16) after collection, processing, and organization. Descriptive statistics indices (frequency distribution table and graphs) were used to display qualitative variables. In addition, the measures of central tendency and dispersion indices were applied to display quantitative data. The normal distribution of data was checked by applying the Kolmogorov-Smirnov test, and the demographic features of students in the intervention and control groups were compared by Fisher's exact and chi-square tests, as well as the Mann-Whitney U test. Further, Wilcoxon signed-rank test was employed to determine alterations in variables after the educational intervention in each group. Before the educational intervention, the scores of variables between the intervention groups were compared to those of the control using the Mann-Whitney U test and analysis of covariance (ANCOVA), and $P < 0.05$ was considered to be statistically significant.

Results

The mean (\pm standard deviation) of students' age was 16.53 ± 1.29 and 16.66 ± 0.79 in the intervention and control groups, respectively. Most mothers of students had secondary education (32.2%) and primary (30.4%) education in the intervention and control groups, respectively. In both groups, 52.2% and 47.8% were males and females, respectively. Moreover, 51.3%, 33%, and 15.7% of the intervention group, as well as 40%, 46.1%, and 13.9% of the control group were investigated in the tenth, eleventh, and twelfth grades, respectively. Most students in the intervention (48.7%) and control (53%) groups had self-employed fathers.

Based on the results, no significant difference was observed between the two groups in terms of demographic characteristics (educational level, gender, age, parents' age, parents' occupation, parents' education, family economic status, and family size) before the educational intervention (Table 2).

The results of the independent sample t test indicated no statistically meaningful difference between the intervention and control groups in terms of the mean

scores of awareness ($P = 0.369$), as well as perceived susceptibility, severity, benefits, barriers, and self-efficacy ($P = 0.787$, $P = 0.405$, $P = 0.863$, $P = 0.670$, and $P = 0.778$), respectively. However, ANCOVA results suggested a significant difference between the two groups following the educational intervention ($P < 0.05$).

According to paired sample t test and intra-group comparisons, the difference between the mean scores of all constructs in the intervention group before and after the educational intervention was statistically significant ($P < 0.05$), but it was insignificant in the control group ($P > 0.05$), except for the perceived severity (Table 3).

Furthermore, all constructs increased before and after the educational intervention, and they were all significant ($P < 0.05$), while in the control group, no significant difference was observed in any of the HBM constructs before and after the educational intervention ($P > 0.05$).

Discussion

This study was conducted to investigate perceived self-efficacy to prevent HIV/AIDS in students after the implementation of an HBM-based educational program. The results suggested that the HBM-based educational intervention could enhance perceived susceptibility, severity, benefits, and self-efficacy while reducing perceived barriers in students. Moreover, the difference between perceived susceptibility before the educational intervention and after the intervention was significant. These findings are in line with those of Soltani et al (21) and Mohammadi et al (23). After the educational intervention, the students realized that not only others but also, they may be at risk of contracting AIDS. The HBM-based educational intervention significantly promoted perceived severity following the educational intervention, but in the control group, the difference in this construct was non-significant. This finding is in conformity with the results of Hosseini et al (24) and Yu et al (25), implying that educational intervention based on HBM can play a significant role in improving people's perceived severity. However, it contradicts the results of Soltani et al (21) and Mohammadi et al (23) on perceived severity. This can be attributed to differences in the gender of the target group, the number of training sessions, or the cultural characteristics of the study population. According to a study by Lin et al in Taiwan, the perceived severity

Table 2. Comparison of Demographic Information in Two Groups at the Pre-intervention Phase

Qualitative Variable		Intervention Group (n=115)	Control Group (n=115)	P Value
Grade	Tenth	59 (51.3)	46 (40.0)	0.122 ^a
	Eleventh	38 (33.0)	53 (46.1)	
	Twelfth	18 (15.7)	16 (13.9)	
Gender	Female	60 (52.2)	60 (52.2)	1 ^a
	Male	55 (47.8)	55 (47.8)	
Father's occupation	Unemployed	5 (4.3)	6 (5.2)	0.280 ^a
	Manual workers	24 (20.9)	16 (13.9)	
	Government employee	14 (12.2)	22 (19.1)	
	Self-employed	56 (48.7)	61 (53.0)	
	Retired	16 (13.9)	10 (8.7)	
Mother's occupation	Housewife	107 (93.0)	105 (91.3)	0.623 ^a
	Government employee	8 (7.0)	10 (8.7)	
	Elementary	21 (18.3)	21 (18.3)	
Father's education	Middle school	39 (33.9)	35 (30.4)	0.370 ^a
	High school and Diploma	28 (24.3)	31 (27.0)	
	University	27 (23.5)	28 (24.3)	
Mother's education	Illiterate	5 (4.3)	8 (7.0)	0.370 ^a
	Elementary	31 (27.0)	35 (30.4)	
	Middle school	37 (32.2)	27 (23.5)	
	High school and diploma	34 (29.6)	31 (27.0)	
	University	8 (7.0)	14 (12.2)	
Family economic status	Weak	37 (32.2)	28 (24.3)	0.217 ^a
	Average	78 (67.8)	87 (75.7)	
Quantitative Variable		Mean ± SD	Mean ± SD	
Age (year)		16.53 ± 1.29	16.66 ± 0.79	0.328 ^b
Father's age (year)		48.22 ± 5.67	48.21 ± 6.44	0.991 ^b
Mother's age (year)		42.08 ± 6.60	42.58 ± 6.77	0.575 ^b
Family size		5.02 ± 4.32	4.90 ± 3.90	0.823 ^b

Note. HIV/AIDS, human immunodeficiency virus/human immunodeficiency virus; SD, Standard deviation.

^a Chi-square test; ^b Independent *t* test.

and threat of AIDS were significantly correlated with a reduction in high-risk behaviors (26). In the present study, after the educational intervention, the students found that they will suffer from severe complications and problems, including rejection by friends, family, and the community if they become infected with AIDS. They also indicated that AIDS is one of the diseases for which no cure or vaccine has ever been discovered and causes high mortality in those infected. Thus, the finding can be used to reinforce the perceived threat and to create appropriate action. One of the reasons for the appropriateness of applying the HBM for AIDS can be the adverse consequences of the disease. People adopt preventive behaviors by understanding the adverse consequences of the disease. A strong association between perceived benefits and the adoption of preventive behaviors has been reported in some studies (26,27).

Our results reflected that the educational intervention significantly enhanced the perceived benefits. This is consistent with the findings of Delsouz et al (5) and Liu et al (28), representing that the HBM-based educational

intervention has an essential function in the promotion of the perceived benefits so that people in the intervention group gained more understanding of the benefits of taking preventive measures, including more confidence in maintaining their health (29). However, it did not match the result of Rafiei et al (30) on perceived benefits. This discrepancy can be attributed to differences in the gender of the target group, the number of training sessions, or the cultural characteristics of the study population. Browski et al argued that increasing perceived benefits reduces students' risky sexual behaviors (29). In the present study, after the educational intervention, students found that they would be safe from getting the disease by raising their awareness, avoiding high-risk behaviors, and providing and using personal items.

In both groups, no significant difference was observed between the perceived barriers before the educational intervention. However, they were significantly reduced after the educational intervention, indicating the effect of HBM-based educational intervention on the reduction of

Table 3. Mean Scores of HBM Constructs in Two Groups at Pre- and Post-intervention Phases

Constructs	Study Phase	Mean \pm SD		P Value	η^2p
		Intervention Group	Control Group		
Knowledge about HIV/AIDS and its prevention	Pre-test	11.40 \pm 2.24	11.68 \pm 2.58	0.369 ^a	0.490
	Post-test	15.03 \pm 2.02	11.24 \pm 2.30	<0.001 ^{ab}	
	P-within	<0.001 ^c	0.108 ^c		
Perceived susceptibility to be at risk of contracting HIV/AIDS	Pre-test	20.09 \pm 3.70	19.96 \pm 3.59	0.787 ^a	0.302
	Post-test	23.97 \pm 3.06	20.06 \pm 3.40	<0.001 ^{ab}	
	P-within	<0.001 ^c	0.313 ^c		
Perceived severity of HIV/AIDS complications	Pre-test	17.46 \pm 3.21	17.04 \pm 4.43	0.405 ^a	0.176
	Post-test	20.29 \pm 2.28	18.01 \pm 3.37	<0.001 ^{ab}	
	P-within	<0.001 ^c	0.003 ^c		
Perceived benefits of performing HIV/AIDS preventive behaviors	Pre-test	24.32 \pm 7.98	24.46 \pm 4.52	0.863 ^a	0.311
	Post-test	29.33 \pm 4.18	24.76 \pm 4.04	<0.001 ^{ab}	
	P-within	<0.001 ^c	0.300 ^c		
Perceived barriers to performing HIV/AIDS preventive behaviors	Pre-test	15.66 \pm 4.25	15.45 \pm 3.08	0.670 ^a	0.191
	Post-test	12.93 \pm 4.20	15.41 \pm 3.27	<0.001 ^{ab}	
	P-within	<0.001 ^c	0.844 ^c		
Perceived self-efficacy to performing HIV/AIDS preventive behaviors	Pre-test	21.93 \pm 9.95	22.21 \pm 3.56	0.778 ^a	0.318
	Post-test	27.20 \pm 3.65	22.25 \pm 3.86	<0.001 ^{ab}	
	P-within	<0.001 ^c	0.890 ^c		

Note. HIV/AIDS, Human immunodeficiency virus/human immunodeficiency virus; ANCOVA, Analysis of covariance; HBM, Health belief model; SD, Standard deviation; η^2p : Partial eta squared and interpreted following the Cohen guidelines (24) for small (partial $\eta^2=0.01$), moderate (partial $\eta^2=0.06$), and large (partial $\eta^2=0.14$) effect sizes;

^a Independent *t* test; ^b ANCOVA; ^c Paired *t* test; ^d Adapted ANCOVA test based on the pre-test score.

perceived barriers to AIDS prevention among students. Studies by Lance Coleman (31) and Hounton et al (32) confirmed that educational intervention affects the reduction of perceived barriers to AIDS inhibition. According to their studies, educational intervention based on HBM can play a significant role in reducing perceived barriers. The barriers such as not providing personal items to take to the hairdresser and not talking and consulting with parents and teachers about the disease were removed after the educational intervention. Previous studies recommended that correcting misconceptions and high perceptions of benefits can help remove barriers and adopt AIDS preventive behaviors. Barriers perceived by individuals may act as barriers to performing the behavior, and individuals may engage in high-risk behaviors despite being aware of preventive methods and behaviors (31,32).

Perceived self-efficacy is the premise of conducting behavior. Hence, special attention should be paid to the promotion of self-efficacy (21). According to the results, in the intervention group, the educational intervention based on the HBM constructs could significantly improve self-efficacy, but in the control group, no significant difference was observed in self-efficacy following the educational intervention. Some domestic and foreign studies (33,34) on AIDS preventive behaviors in different populations based on HBM indicated that the educational intervention increases self-efficacy in adopting AIDS preventive behaviors. The HBM-based educational intervention can play an essential role in promoting self-efficacy. The skill

of “Saying no” to high-risk behaviors in students and the phrase “I can” were strengthened after the educational intervention. Lance argued that perceived self-efficacy is one of the key variables in performing safe behaviors (31). Some studies demonstrated a significant association between self-efficacy and preventive behaviors (35,36). According to Coleman, the correlation of perceived self-efficacy with the adoption of high-risk AIDS-related behaviors was significant (31).

Considering that self-efficacy has an effective role in predicting antisocial behaviors, it can be the most important predictor of behavior; in other words, people are motivated to perform preventive behaviors when they feel in control of their health behavior, and people with a higher level of self-efficacy have high competence and confidence to perform and implement health behaviors (37). Therefore, the main goal of this study was to increase the self-efficacy of students. Further, due to the correlation between the constructs of the HBM and perceived self-efficacy (36), the HBM has been used in other studies to promote self-efficacy (28,36).

Conclusion

The findings of the present study revealed that MBH-based education was effective in improving students' perceived self-efficacy to perform AIDS preventive behaviors. Our results can be utilized in theory-based intervention strategies to develop and promote health beliefs so that success indicators are selected more rationally. This

study faced limitations such as using self-report for data collection. This is inevitable given the nature and type of behavior in such studies. Another limitation was the absence or withdrawal of students from participating in the study. A loss of 10% was considered in determining the sample size to solve this possible problem. The influence of the educational intervention was assessed after 3 months due to the prevalence of COVID-19 and the reduction of students' attendance time at school. It is recommended that this educational program be used in schools for other diseases as well. Given that the study was performed only on students, it is suggested that it be performed on general populations as well. Moreover, future studies can examine the impact of educational interventions on the other models of health education and cues to action. The findings can be employed as a basis for interventions designed with principles and long-term education.

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Competing Interests

No conflict of interests was reported by the authors.

Ethical Approval

This study was approved by the Research Ethics Committee of Asadabad School of Medical Sciences (IR. ASAUMS.REC.1399.022).

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References

- Khalajabadi Farahani F, Darabi F, Yaseri M. The effect of theory-based HIV/AIDS educational program on preventive behaviors among female adolescents in Tehran: a randomized controlled trial. *J Reprod Infertil.* 2020;21(3):194-206.
- Bietsch B. Second time overlooked in crisis: examining how HIV/AIDS health policies in the USA connect with policy implications today for aging LGBTQ Adults during the COVID-19 pandemic. *J Hum Rights Soc Work.* 2022;7(3):246-55. doi: [10.1007/s41134-021-00208-7](https://doi.org/10.1007/s41134-021-00208-7).
- Opondo H, Lindo NA, Morris HB, Chen H. Counsellors' experiences of HIV status disclosure to children living with HIV in Uganda. *Br J Guid Coun.* 2022;1-16. doi: [10.1080/03069885.2022.2051430](https://doi.org/10.1080/03069885.2022.2051430).
- Momeni E, Karimi Z, Malekzadeh JM, Moshfe H. The knowledge level and attitude of pre-university students of Yasuj city towards AIDS in 2003. *Dena.* 2006;1(1):41-50. [Persian].
- Delsouz S, Farrokh Eslamlou HR, khalkhali HR, Didarloo A. The impact of educational intervention based on health belief model on promoting health beliefs among male high school students in Oshnavieh toward AIDS. *Nurs Midwifery J.* 2021;19(1):67-76. [Persian].
- Brener L, Caruana T, Broady T, Cama E, Ezard N, Madden A, et al. Addressing injecting related risks among people who inject both opioids and stimulants: findings from an Australian survey of people who inject drugs. *Addict Behav Rep.* 2022;15:100398. doi: [10.1016/j.abrep.2021.100398](https://doi.org/10.1016/j.abrep.2021.100398).
- Emmanuel F, Akhtar S, Attarad A, Kamran C. HIV risk behavior and practices among heroin addicts in Lahore, Pakistan. *Southeast Asian J Trop Med Public Health.* 2004;35(4):940-8.
- Al-Sadi AM, Al-Oweisi FA, Edwards SG, Al-Nadabi H, Al-Fahdi AM. Genetic analysis reveals diversity and genetic relationship among *Trichoderma* isolates from potting media, cultivated soil and uncultivated soil. *BMC Microbiol.* 2015;15:147. doi: [10.1186/s12866-015-0483-8](https://doi.org/10.1186/s12866-015-0483-8).
- Shaluhiah Z, Musthofa SB, Indraswari R, Kusumawati A. Health risk behaviors: smoking, alcohol, drugs, and dating among youths in rural Central Java. *Kesmas.* 2020;15(1):17-23.
- Avanessian E, Naserirad M, Abrahamian H, Anis S. Size of social network and probability of occurrence of HIV/AIDS among sexually affected patients in behavioral diseases consulting centers. *Iran J Health Educ Health Promot.* 2017;5(2):73-80. [Persian].
- Darabi F, Yaseri M, Kaveh MH, Khalajabadi Farahani F, Majlessi F, Shojaeizadeh D. The effect of a theory of planned behavior-based educational intervention on sexual and reproductive health in Iranian adolescent girls: a randomized controlled trial. *J Res Health Sci.* 2017;17(4):e00400.
- Murphy M, Sosnowy C, Rogers B, Napoleon S, Galipeau D, Scott T, et al. Defining the pre-exposure prophylaxis care continuum among recently incarcerated men at high risk for HIV infection: protocol for a prospective cohort study. *JMIR Res Protoc.* 2022;11(2):e31928. doi: [10.2196/31928](https://doi.org/10.2196/31928).
- Zeggagh J, Bauer R, Delaugerre C, Carette D, Fressard L, Charreau I, et al. Incidence and risk factors for recurrent sexually transmitted infections among MSM on HIV pre-exposure prophylaxis. *AIDS.* 2022;36(8):1129-34. doi: [10.1097/qad.0000000000003187](https://doi.org/10.1097/qad.0000000000003187).
- Chan CT, Olivieri-Mui BL, Mayer KH. Associations between state-level high school HIV education policies and adolescent HIV risk behaviors. *J Sch Health.* 2022;92(3):316-24. doi: [10.1111/josh.13130](https://doi.org/10.1111/josh.13130).
- Shi J, Kim HK. Integrating risk perception attitude framework and the theory of planned behavior to predict mental health promotion behaviors among young adults. *Health Commun.* 2020;35(5):597-606. doi: [10.1080/10410236.2019.1573298](https://doi.org/10.1080/10410236.2019.1573298).
- Suess C, Maddock J, Dogru T, Mody M, Lee S. Using the health belief model to examine travelers' willingness to vaccinate and support for vaccination requirements prior to travel. *Tour Manag.* 2022;88:104405. doi: [10.1016/j.tourman.2021.104405](https://doi.org/10.1016/j.tourman.2021.104405).
- Khani Jeihooni A, Mohammadkhal F, Razmjouie F, Afzali Harsini P, Sedghi Jahromi F. Effect of educational intervention based on health belief model on mothers monitoring growth of 6-12 months child with growth disorders. *BMC Pediatr.* 2022;22(1):561. doi: [10.1186/s12887-022-03593-8](https://doi.org/10.1186/s12887-022-03593-8).
- Sharma M. Theoretical Foundations of Health Education and Health Promotion. Jones & Bartlett Learning; 2021.

19. Vu HN, Nielsen MR. Understanding determinants of the intention to buy rhino horn in Vietnam through the theory of planned behaviour and the theory of interpersonal behaviour. *Ecol Econ*. 2022;195:107361. doi: [10.1016/j.ecolecon.2022.107361](https://doi.org/10.1016/j.ecolecon.2022.107361).
20. Hausen JE, Möller J, Greiff S, Niepel C. Students' personality and state academic self-concept: predicting differences in mean level and within-person variability in everyday school life. *J Educ Psychol*. 2022;114(6):1394-1411. doi: [10.1037/edu0000760](https://doi.org/10.1037/edu0000760).
21. Soltani K, Tavafian S, Vakili M. Influence of educational program based on health belief model in health beliefs in AIDS among students. *Armaghane Danesh*. 2014;19(9):797-807. [Persian].
22. Vakili M, Moazen A, Sharifi S, Kamali K. Development, psychometric and factor analysis of HIV/AIDS health belief model scale in adolescents and youth (second phase: a study based on theory, culture and population of Iran). *Iran J Epidemiol*. 2018;14(3):255-64. [Persian].
23. Mohammadi N, Hooshian M, Omid A, Soltanian A. The effect of health belief model education on nutrition behavior of boys in secondary schools in Hamadan. *Avicenna J Nurs Midwifery Care*. 2019;26(6):397-406. doi: [10.30699/sjhnmf.26.6.397](https://doi.org/10.30699/sjhnmf.26.6.397). [Persian].
24. Hosseini Z, Najafi P, Mohseni S, Aghamolaei T, Dadipoor S. The effect of a theory-based educational program on southern Iranian prisoners' HIV preventive behaviors: a quasi-experimental research. *BMC Public Health*. 2022;22(1):1342. doi: [10.1186/s12889-022-13763-z](https://doi.org/10.1186/s12889-022-13763-z).
25. Yu B, Jia P, Huang YL, Zhou JM, Xie T, Yu J, et al. Self-efficacy as a crucial psychological predictor of treatment adherence among elderly people living with HIV: analyses based on the health belief model. *AIDS Care*. 2022;34(8):1041-7. doi: [10.1080/09540121.2021.1938964](https://doi.org/10.1080/09540121.2021.1938964).
26. Lin P, Simoni JM, Zemon V. The health belief model, sexual behaviors, and HIV risk among Taiwanese immigrants. *AIDS Educ Prev*. 2005;17(5):469-83. doi: [10.1521/aeap.2005.17.5.469](https://doi.org/10.1521/aeap.2005.17.5.469).
27. Alidosti M, Delaram M, Reisi Z. Impact of education based on health belief model in Isfahanese housewives in preventing *H. pylori* infection. *J Fasa Univ Med Sci*. 2012;2(2):71-7. [Persian].
28. Liu H, Lai G, Shi G, Zhong X. The influencing factors of HIV-preventive behavior based on health belief model among HIV-negative MSMs in Western China: a structural equation modeling analysis. *Int J Environ Res Public Health*. 2022;19(16):10185. doi: [10.3390/ijerph191610185](https://doi.org/10.3390/ijerph191610185).
29. Borawski EA, Tufts KA, Trapl ES, Hayman LL, Yoder LD, Lovegreen LD. Effectiveness of health education teachers and school nurses teaching sexually transmitted infections/human immunodeficiency virus prevention knowledge and skills in high school. *J Sch Health*. 2015;85(3):189-96. doi: [10.1111/josh.12234](https://doi.org/10.1111/josh.12234).
30. Rafiei N, Aghapoor S, Behnampour N, Heshmati H, Ghasemyani S. Promoting AIDS preventive beliefs in Turkmen students by using the health belief model in Aq-Qala. *Iran J Health Educ Health Promot*. 2020;7(4):323-32. doi: [10.29252/ijhehp.7.4.323](https://doi.org/10.29252/ijhehp.7.4.323). [Persian].
31. Lance Coleman C. Health beliefs and high-risk sexual behaviors among HIV-infected African American men. *Appl Nurs Res*. 2007;20(3):110-5. doi: [10.1016/j.apnr.2007.04.003](https://doi.org/10.1016/j.apnr.2007.04.003).
32. Hounton SH, Carabin H, Henderson NJ. Towards an understanding of barriers to condom use in rural Benin using the health belief model: a cross sectional survey. *BMC Public Health*. 2005;5:8. doi: [10.1186/1471-2458-5-8](https://doi.org/10.1186/1471-2458-5-8).
33. Faraji S, Taymoori P, Gharibi F, Bahmani A. The effect of mother's education on sexual education of preschool children based on health belief model. *J Educ Community Health*. 2021;8(4):299-306. doi: [10.52547/jech.8.4.299](https://doi.org/10.52547/jech.8.4.299).
34. Asefa A, Midaksa G, Qanche Q, Wondimu W, Nigussie T, Bogale B, et al. Does the perception of HIV risk among female sex workers affect HIV prevention behavior? Application of the health belief model (HBM). *BMC Public Health*. 2022;22(1):1646. doi: [10.1186/s12889-022-14046-3](https://doi.org/10.1186/s12889-022-14046-3).
35. Yıldırım M, Güler A. COVID-19 severity, self-efficacy, knowledge, preventive behaviors, and mental health in Turkey. *Death Stud*. 2022;46(4):979-86. doi: [10.1080/07481187.2020.1793434](https://doi.org/10.1080/07481187.2020.1793434).
36. Zhou C, Yue XD, Zhang X, Shangguan F, Zhang XY. Self-efficacy and mental health problems during COVID-19 pandemic: a multiple mediation model based on the health belief model. *Pers Individ Dif*. 2021;179:110893. doi: [10.1016/j.paid.2021.110893](https://doi.org/10.1016/j.paid.2021.110893).
37. Buglar ME, White KM, Robinson NG. The role of self-efficacy in dental patients' brushing and flossing: testing an extended health belief model. *Patient Educ Couns*. 2010;78(2):269-72. doi: [10.1016/j.pec.2009.06.014](https://doi.org/10.1016/j.pec.2009.06.014). Velit eatistibus magnimimus rent velignatus comnis aut eaquas sent doloriatem dolum harum