Review Paper

Effects of Model-based Educational Interventions on Promoting AIDS Preventive Behaviors in Iranian Adolescents: A Systematic Review

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ABSTRACT

Background: AIDS is one of the perilous infectious diseases and according to the WHO, the only effective way to prevent AIDS is through health education. Therefore, high-risk and vulnerable groups, including adolescents, should be prioritized in educational programs.

Objectives: This systematic review study aims to investigate the effects of model-based educational interventions on promoting AIDS preventive behaviors in Iranian adolescents.

Methods: International databases, including Scopus, PubMed/MEDLINE, Web of Science, ISC, and Google Scholar, along with national databases, including Magiran, SID, IranDoc, and IRCT were consulted for eligible articles. The following keywords were selected based on MeSH and combined with Boolean (AND, OR) operators: "Adolescent, " "Health model, " "Education, " "HIV, " "Iran, " and "Knowledge." A total of 2969 articles published from April 1, 2005, to May 1, 2020, were extracted. Subsequently, two researchers reviewed the articles independently for screening and selection. The main inclusion criteria were Persian and English studies and model-based educational interventions. Data extraction was performed by two researchers via a researcher-made form independently according to the inclusion criteria.

Results: Of the 12 final articles with a total sample size of 2013 adolescents, 8 articles were from the national databases and 4 from the international databases. Based on the results, although the health belief model is the most prevalent framework in designing educational interventions related to AIDS-preventive behaviors, it does not seem appropriate for changing long-term behaviors. It was also indicated that educational interventions based on the social cognitive theory did not have much effect on their attitudes, despite increasing adolescents' awareness. Educational interventions based on the theory of planned behavior also improved attitudes and significantly increased rejection skills while delaying risky AIDS-related suggestions in students.

Conclusions: Different types of health belief model, theory of planned behavior, and the social cognitive theory educational interventions can be effective in increasing the knowledge of adolescents and promoting their HIV-related preventive attitudes and cognitive perceptions. Given their effectiveness, the design and implementation of such interventions are recommended in schools.

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1. Introduction

Despite nearly four decades since the onset of acquired immune deficiency syndrome (AIDS), no certain cure or effective preventive vaccine exists for this disease (1). According to the report of the Ministry of Health and Medical Education in Iran, a total of 60 431 people were infected with human immunodeficiency virus (HIV) by September 2020, of which 30% were women and 70% were men. Moreover, more than 31% of the patients are in the age group of 16 to 30 years, and the ratio of sexual transmission has increased to 50.9% (2). Undoubtedly, proper education and perception of how to prevent this disease is the first step to fight against this epidemic. Additionally, creating the right attitude and educating the society about adopting healthy behaviors is important (3). This is especially important in the age group of 15- to 24-year-old individuals since, according to the United Nations, only about 18.3% of the Iranian 15- to 24-year-old population have sufficient knowledge about AIDS (4, 5).

Acceptance of gender roles and the special needs of adolescents also makes them more susceptible to HIV (6). Furthermore, negative attitudes and social stigma toward HIV affect adolescents' physical and mental health, reduce their self-esteem, brings about mental and social dysfunction, and lowers their quality of life. Therefore, timely and effective preventive measures are necessary (7). In this regard, the most effective educational programs are theory-based approaches that are rooted in behavioral change patterns and can play a key role in promoting an individual's awareness and beliefs about health behaviors. These two components can function as an introduction to unhealthy behaviors or adoption of preventive behaviors (8).

Evidence suggests that skill-based and theory-based behavior change interventions have positive effects on the prevention of HIV (9-11). The results of a meta-analysis study were also indicative of the positive effects of theory-based interventions on changing the participants' behavior (12). Similarly, few systematic studies have been conducted to prevent AIDS in different target groups in Iran, and the reasons and the importance of the study have not been properly addressed in these studies. Moreover, the lack of comprehensiveness of article search in addition to the lack of a specific time for the search is one of the methodological weaknesses in these studies (13, 14). Given the fact that no systematic study has been conducted based on educational models for AIDS prevention in Iranian adolescents and considering the low knowledge of Iranian adolescents about sexual health, unreliable sources, the possibility of transmitting incorrect and inadequate information among the adolescents (15), methodological weaknesses of previous systematic reviews conducted in Iran, and given that having society-based outcomes can be a better guide for decision-making and treatment selection, this study aims to systematically summarize the results of studies conducted on Iranian adolescents to investigate the effects of model-based educational interventions on the promotion of AIDS-preventive behaviors.

2. Materials and Methods

The present systematic review was conducted to investigate the effects of model-based educational interventions on promoting AIDS-preventive behaviors. Methods of presenting materials, including analysis and interpretation, determining the study problem, and collecting the findings were based on the PRISMA reporting system and PICO (population, intervention, comparison, outcomes) criteria. These methods were used to clarify the aim of the study and select the appropriate articles in the following procedure: the population of the study consisted of 15- to 24-year-old adolescents. The intervention was educational interventions based on the health belief model (HBM), the theory of planned behavior (TPB), and the social cognitive theory (SCT). The model-based educational intervention group was compared with the control group that was without model-based education. The outcomes referred to the effects of model-based interventions on promoting adolescents' AIDS-preventive behaviors, such as increased knowledge and model-based structures.

Data extraction

To extract the data from the selected articles, using a researcher-made form, the two researchers extracted information independently based on the following inclusion criteria: the general characteristics of the articles (first author, date of publication); place of research (school, university, community and health centers, and so on); type of the study (experimental, quasi-experimental, and so on); the number of samples, target groups, and sample collection (sampling place and used tools); characteristics of the participants (demographic, age, and so on); type of educational interventions and structures of tools used and the follow-up duration after the intervention (the health

belief model, planned and social cognitive behavior); outcome measures (how to measure the results and the obtained results by the authors); and in case of disagreement between the authors, the discussion was used to reach a consensus (Table 1).

After surveying the entered studies, quantitative information was extracted, including the author, year, sample size, Mean±SD, and standard error (SE) before and after the educational interventions. Accordingly, the information that should be used for meta-analysis is the effect size (mean difference) and the combination method (random effect) but because of high heterogeneity in the articles, the meta-analysis was not possible.

Inclusion and exclusion criteria

The inclusion criteria were Persian and English studies, semi-experimental intervention studies with before-after design and with and without a control group, experimental studies with field trial design, and educational interventions based on HBM, TPB, and SCTs with a follow-up duration of 1 to 3 months aimed to promote HIV-preventive behaviors.

The review articles and letters to the editor were not included in the study, considering their lack of using primary data. The exclusion criteria were qualitative, descriptive, cross-sectional, and KAP (knowledge, attitude, and practice) studies, the lack of access to the full text of articles, and articles unrelated to the objectives of the study.

The quality of the studies was evaluated using the effective public health practice project (EPHPP) tool (16-18). This instrument has 6 criteria which include selection bias, study design, confounding factors, implementation bias and detection bias, data collection method, and sample drop report. The score range for each of these criteria is divided into 3 levels, namely "weak" (1 score), "medium" (2 scores), and "strong" (3 scores). Finally, the maximum mean total score of each study was considered to be 3 based on the average total score of 6 items, and the quality of studies was categorized as weak (1-1.50), medium (1.51-2.5), or strong (2.51-3). To avoid any bias, the quality of the articles was independently evaluated by the two researchers according to the EPHPP tool. If the two researchers were in disagreement on the score of the published articles, the discussion method was used to reach a consensus. The results of scoring the study articles based on the above tool are presented quantitatively and qualitatively in Table 2.

Data source

The researchers searched the international databases of Scopus, PubMed/MEDLINE, Web of Science, ISC, and Google Scholar, in addition to national databases, such as Magiran, SID, IranDoc, and IRCT from April 1, 2005, to May 1, 2020.

To achieve the maximum comprehensiveness of the search, the list of sources of each article was also investigated via manual search to find other possible sources. Related keywords, such as "Adolescent," "Health model," "Education," "HIV," "Iran, " and "Knowledge" were selected based on MeSH and were combined with Boolean (AND, OR) operators (Table 3). Details of the MEDLINE search strategy through PubMed are provided in Figure 1.

Study selection

The order of the study selection process started with an initial search in related databases and other sources. A total of 2969 articles were extracted and entered into the EndNote software. Then, 273 duplicate articles were eliminated via this software and the titles and abstracts of the other 2696 articles were reviewed. Next, 2660 articles were eliminated after reviewing their titles and abstracts; subsequently, the full text of the remaining articles was read independently by the two researchers. Finally, from the selected articles which passed the inclusion criteria, 12 articles were extracted and qualitatively analyzed after quality assessment.

The methodological quality of all evaluated studies was average. Given the design of the type of studies entered into the systematic review, no study was excluded from the research based on quality assessment. The flowchart of the steps based on which the articles entered into the study is presented in Figure 2.

3. Results

In this systematic review, all articles published on the selected databases based on the purpose of the research were evaluated. In the first stage, 2969 articles were found using relevant keywords and the initial search. All studies on adolescents were based on health theories. Finally, among the selected articles with the inclusion criteria, 8 articles were extracted from the national databases and 4 articles from international databases, of which 11 were quasi-experimental and one was a field trial study. The edu-

cational interventions in 6 articles were HBM-based, 3 TPB-based, and 3 SCT-based. The target groups were female students in 7 studies, male students in 3 studies, male and female students in 1 study, and male and female university students in 1 study. The lowest sample size belonged to Rahmati's study (58 subjects) (10) and the highest sample size belonged to Khalajabadi's study (441 subjects) (19). Given the nature of the intervention, it was impossible to blind the participants in any of these studies. The results were expressed in 3 groups, including the interventions based on HBM, TPB, and SCT. A review of the results is provided below:

Interventions based on health belief model

In this study, the educational intervention in 6 articles was based on HBM. Pirzadeh showed that after the educational intervention, all the structures increased except for the perceived sensitivity (20). However, Baghiani Moghaddam stated that after the educational interventions by peers, all of the model's structures increased significantly, while in the interventions by the teacher, only the perceived intensity and barriers were significantly higher. No change was observed in the perception sensitivity and benefits (21). In Soltani and Jeihooni's studies, the intervention significantly improved all the model's structures. It also significantly reduced the perceived barriers (8, 11). In her study, Kharazi mentioned that all the structures increased except for the perceived barriers; however, only the perceived sensitivity increased significantly (22). Rafiei also stated that education only affects the perceived sensitivity and reduces perceived barriers (23).

Interventions based on theory of planned behavior

In this study, the educational interventions in 3 articles were based on TPB. Aghdasi and Pakpour concluded that the intervention led to an increase in awareness and perceived behavioral control. It also improved attitudes and the development of appropriate abstract norms along with shaping behavioral intentions; meanwhile, it ultimately improved the skills to reject and delay dangerous AIDS-related suggestions (9, 24). Alizadeh reported similar results in the educational intervention through TPB and the use of peers' education approach (25).

Interventions based on social cognitive theory

In this study, educational interventions in 3 articles were based on SCT. Rahmati and Behrooz showed that the interventions did not change the attitude of vulnerability toward AIDS; however, they increased their awareness (10, 26). In Khalajabadi's study, the score of knowledge increased in both peers and adult groups; however, no significant difference was observed between the two groups. In neither of the two intervention groups, there were significant changes in the attitude toward vulnerability and only the adult group had significant improvements in self-sufficiency skills in students (19).

The features of all final articles included in the study process are given in Table 1, namely, the name of the first author, place and year of the study, aim, and type of the study, target group and sample size, evaluation method, and type and duration of the intervention and their results.

4. Discussion

The present study systematically reviewed the model-based studies conducted to promote AIDS-preventing behaviors in Iranian adolescents. A total of 12 articles were analyzed. According to the findings of the present study, educational interventions based on the constructs of HBM, TPB, and SCT are discussed separately below.

Interventions based on health belief model

Based on the results of the present study, although different types of HBM-based educational interventions are effective in adopting AIDS-preventing behaviors, they do not seem appropriate to change long-term behaviors. All 6 studies assessed the 4 main constructs as well as students' awareness, but none of them referred to the guidance construct for action. In Soltani's study, the educational intervention in the form of questions and answers and group discussions was able to increase girls' awareness of AIDS prevention (8). According to Baghiani Moghaddam, holding training sessions for educators, including teachers and peers, was effective in raising students' awareness (21). In the other 4 studies (8, 11, 21, 22), the perceived sensitivity increased after the intervention. In Jeihooni's research, education through group discussion, questions and answers, videos, and lectures could affect students' sensitivity (11). The lower increase in the sensitivity of the subjects in the other 2 studies (20, 22) may be because they were conducted on adolescent girls who were less likely to develop high-risk behaviors. Moreover, differences in the method, duration of education, and the

employed tools caused little sensitivity; thus, longer interventions are required to increase the sensitivity of this age group. Baghiani Moghaddam also argued that students who do not perceive the sensitivity and seriousness of a health problem, such as HIV, may not adopt preventive behaviors (21). Only Rafiei (23) maintained that the educational intervention did not affect the mean score of the perceived severity of the intervention group, while the effect of the educational intervention has been significant in other 5 studies (8, 11, 20-22). This difference in Rafiei's study (23) is perhaps due to the age groups or cultural characteristics of the students who considered themselves at risk of contracting AIDS, but their beliefs about the consequences of the disease had not changed. Accordingly, the educational intervention could not show the significance of the social consequences of this disease for Turkmen students. Therefore, it should have better designed more effective educational interventions to increase students' perceived intensity.

The results coming from the construct of the perceived benefits were significant in all studies (8, 11, 20, 22), except for Rafiei and Baghiani Moghaddam (21, 23). One of the reasons why the intervention does not affect the perceived benefits in Rafiei's study is the small number of educational sessions, which may require better interventional planning (23). In line with the above study, the results of Baghiani Moghaddam showed that in educational interventions by peers, students believed in the effectiveness of the strategies designed to reduce the risk or seriousness of health status when they had less perception of high-risk HIV behaviors. This does not mean that other HBM constructs have not been effective in explaining attitudes toward health-related behaviors in teacher-led educational interventions (21).

Ofori stated that increased perceived benefits may affect perceived barriers to participating in HIV testing and counseling (27). All studies, except for Rafiei's (23), showed that the intervention group perceived fewer barriers to adopting AIDS-preventive behaviors. Jeihooni (11) attributed this finding to the positive effects of education in removing barriers and noted that the correction of misconceptions through discussion can be effective in reducing barriers. Many other studies have also shown the positive effects of educational intervention on reducing barriers (20, 28). It seems that even in the presence of the above-perceived benefits, no behavior change will be located until the barriers to health behavior are removed; accordingly, the alignment of these two structures can help in developing health behavior (8). Baghiani Moghaddam pointed to cultural barriers in Iran, such as the taboo of out-of-marriage sexual behaviors, the unacceptability of education in this regard from the perspective of parents, and the educational system that, undoubtedly, has different educational methods that may lead to different results (21). However, no reduction of barriers in Rafiei's study (23) can be due to the cultural characteristics of students who find it difficult to prevent this disease and consider the occurrence of the disease as a part of their fate. Therefore, given this feature, more appropriate designs may be required for this type of intervention. The self-efficacy construct which was examined in only 3 studies (8, 11, 22) was associated with progress. Jeihooni argued that the student's belief in their ability to perform HIV-related preventive health behaviors correctly can be effective in promoting the self-efficacy of society, and the more the students rely on their ability to perform health behaviors, the more they perform such behaviors (11).

Interventions based on theory of planned behavior

According to the results of this systematic review, all TPB-based educational interventions led to an increase in awareness, behavioral control, improved attitudes, the development of appropriate abstract norms, and a significant increase in rejection skills and delay of risky AIDS-related suggestions in students. All 3 studies (9, 24, 25) evaluated the 4 main constructs, however, only Pakpour's study (24) examined self-efficacy as the strongest construct in predicting behavior change. Since having sufficient knowledge is a prerequisite to changing attitudes, special emphasis should be placed on proper awareness in studies. Perhaps the reasons for the optimal effect of education on improving attitudes in Aghdasi's study are the use of the question-and-answer method, the possibility of providing experiences and opinions, and the creation of a friendly atmosphere between teachers and audiences. Thus, a better attitude has probably been because of increased awareness and the impact of new HIV-education content (9). In Alizadeh's research, peer education allows learnings, feelings, attitudes, and norms to be better expressed, and better attitudes are caused by increased awareness and the positive impact of this educational intervention (25). The effects of educational intervention on raising awareness in Pakpour's study was also due to the researcher's emphasis on the significance of knowledge transfer through a suitable channel and based on the students' characteristics. Because of the cultural sensitivities associated with AIDS, education in this field

Table 1. Characteristics of the articles included in this study

Author (Year, Place and Reference)	Study Objective	Study Design	Target Group	Intervention	Results
Khalajabadi Farahani (2004) Tehran (19)	Compare the effect of two educational interventions for the prevention of AIDS by peers and adults (school counselors), on knowledge, attitude, and self-efficacy of students	Quasi-experimental	441 female students of second grade of high school with an average age of 15.9 years in 3 groups: 2 intervention groups (peer education: n=147, adult education: n=143) and a control group without any training (n=151)	Training peer educators and school consultants in a 1-day workshop based on SCT and then transferring this information to students in 6 h (2 h of lectures, 2 h of group discussion, and 2 h of training 3 self-efficacy skills by solving exercises and group works), followed by pre-intervention and post-intervention (1 month)	The mean scores of knowledge and attitude of students toward rejecting AIDS patients in both groups were significantly improved compared to the control group; however, no significant difference was detected between peer-led and adult-led groups in this regard. Only the adult-led group had a significant enhancement of self-efficacy skills compared to the control group.
Pirzadeh (2012) Esfahan (20)	Determine the effects of educational program on knowledge and structures of health belief model about AIDS among students	Quasi-experimental	72 female high school students in 2 groups (intervention: n=36 and control: n=36)	Presenting two 45-minute educational sessions based on HBM structures pre-intervention and post-intervention (1 month) in the form of lecture and group discussion and using educational aids (blackboard, educational booklet, pamphlet, and poster)	The educational intervention led to a significant increase in knowledge, severity, benefits, and perceived barriers; however, there was no significant increase in the perceived sensitivity
Pakpour Hajiagha (2012) Qazvin (24)	Determine the effects of health education based on the theory of planned behavior in skills of preventing AIDS	Quasi-experimental	120 male high school students with an average age of 16 years in 2 groups (intervention: n=60 and control: n=60)	Presenting 5 group discussion sessions (45 to 60 min) based on TPB structures and pre-intervention and post-intervention (3 months), along with an educational booklet, photos, film, and CD	The educational intervention led to a significant increase in attitude, intention, subjective norm, perceived behavioral control, and forming the skills of rejection and delaying of dangerous HIV-related suggestions.
Baghianimoghadam (2012) Yazd (21)	Compare the effects Peer-led vs teacher-led AIDS education	Comparative-interventional	180 female high school students in 3 groups: 2 intervention groups (peer education: n=60, teacher-led education: n=60) and a control group without any training (n=60)	Training 9 peer educators (3 people in each class) in 8 h by researcher and then teaching adolescents with peer educators and teacher in three 5-hour sessions based on HBM, pre-intervention, and post-intervention (2 months) in the form of a slide, brochure, lecture, and face-to-face teaching	Peer education in comparison with teacher education significantly increased the scores of awareness and all of the HBM structures while in the teacher group only the severity and the perceived barriers had a significant increase. No significant increase was observed in the sensitivity and perceived benefits.
Alizadeh Siouki (2013) Zahedan (25)	Determine the effects of peer education on preventive behaviors from AIDS based on theory of planned behavior	Quasi-experimental	276 male students of second grade of high school in 2 groups (peer education: n= 140, and control group: n=136 without any training)	Training based on TPB for peer educators in three 90-minute sessions and then transferring this information to students in two 45-minute sessions, pre-intervention and post-intervention (1.5 months) in the form of lecture, booklet and film	The educational intervention led to a significant increase in the mean scores of awareness and attitude, intention, subjective norm, and perceived behavioral control.
Behrooz (2014) Maragheh (26)	Survey the impact of education on preventing AIDS based on social cognitive theory on the knowledge and attitude of students	Quasi-experimental	369 students of first to the third grade of high school (50% male and 50% female) with an average age of 15 to 18 years in 2 intervention groups (general physician to teach the first group and SCT specialist to teach the second group) and no control group.	Pre-intervention and post-intervention (2 months)	The mean score of knowledge in both intervention groups increased significantly but no significant change was observed in the attitude of vulnerability toward AIDS.

Author (Year, Place and Reference)	Study Objective	Study Design	Target Group	Intervention	Results
Rahmati Najarkolaei (2016) Tehran (10)	Survey the effect of educational intervention in the form of a workshop based on social cognitive theory on knowledge and attitude toward AIDS prevention	Quasi-experimental of self-control	58 students (29 male and 29 female) in different levels of Tehran University (non-medical fields) with an average age of 22.7 years in one group) the intervention group is the same as the control group(	Holding 2 days of workshop based on SCT structures in 2 separate classes for girls and boys and presenting an educational video on the first day and life skills training with role-playing, brainstorming, and group discussion on the second day and presenting an educational booklet, pamphlet, and counseling at the end of the workshop. pre-intervention and post-intervention immediately)	The educational intervention led to a significant increase in students' awareness but did not have much effect on their attitudes.
Soltani Kazemi (2016) Tehran (8)	Survey the effect of educational program health belief model based on changing health beliefs about AIDS in students	Quasi-experimental	149 female students 14 to 17 years old from the first to the third grade of high school in 2 groups (intervention: n=77, control: n=72)	Presentation of two 90- minute sessions for each group (n=12 - 14) based on HBM structures pre-intervention and post-intervention (2 months) in the form of group discussion and problem-solving (1 month)	A significant increase was observed in knowledge, severity, sensitivity, benefits, and perceived self-efficacy, while a significant decrease in perceived barriers was detected.
Kharazi (2017) Mashhad (22)	Determine the effectiveness of educational interventions based on the health belief model on the promotion of AIDS preventive behaviors in students	Quasi-experimental	80 female high school students of 16 to 17 years old in 2 groups (intervention: n=40, control: n=40)	Educational intervention based on HBM structures pre-intervention and post-intervention (1 month), performed in the form of lectures and group discussion	After the educational intervention, there were significant differences in the score of knowledge, severity, benefits, barriers, and perceived self-efficacy except for the perceived sensitivity.
Khani Jeihooni (2018) Fars province (Fasa) (11)	Survey the effect of an educational program based on health belief model about HIV	Quasi-experimental	100 male students of 16 to 17 years old in second grade of high school in 2 groups (intervention: n=50, control: n=50)	Training based on HBM structures in eight 55- to 60-minute sessions for each group (n=10) in the form of group discussion, question and answer, video presentation, and manuals, pre-intervention and post-intervention (3 months)	The educational intervention led to meaningful enhancement of the student's awareness, sensitivity, severity, benefits, and perceived self-efficacy and their perceived barriers about beliefs related to HIV preventive behaviors decreased significantly.
Rafiei (2019) Golestan province (Aq-Qala) (23)	Survey the effect of education based on the health belief model in creating AIDS preventive beliefs in Turkmen girl students	Randomized controlled field trial	78 female students of the third grade of high school with an average age of 16.8 and 16.6 years in the intervention and control groups in 2 groups (intervention: n=34, control: n=44)	Presenting educational intervention based on HBM structures in two 60-minute sessions for one week (separately for each class) pre-intervention and post-intervention (1 month) in the form of lecture, question and answer, showing short films and teasers of the Ministry of Health, and presentation disease pamphlet at the end of the first session	The educational intervention led to meaningful enhancement of the student's awareness and perceived sensitivity and decrease perceived barriers, but it did not affect the severity and perceived benefits score.
Aghdasi (2020) North Khorasan Province (Torbat Heydariyeh) (9)	Determine the effects of applying HIV prevention behaviors in female students	Quasi-experimental	90 female students of the first grade of high school with an average age of 15.6 years in 2 groups (intervention, n=45, control: n=45)	Presenting three 90-minute sessions based on TPB structures and a new HIV education package; pre-intervention and post-intervention) immediately and in 3 months) in the form of lecture, question and answer, group discussion, slide show, presentation of the pamphlet, and CD	The educational intervention led to meaningful enhancement of the student's attitude, intention, subjective norms, and perceived behavioral control.

HBM: health belief model; TPB: theory of planned behavior; SCT: social cognitive theory.

Table 2. Assessment of the quality of primary articles by the EPHPP tool

Authors	Selection Bias	Study Design	Confounders	Blinding	Data Collection Method	Withdrawal and Drop-Out	EPHPP Score
Rafiei (23)	3	3	3	1	2	2	2/33 Intermediate
Aghdasi (9)	2	3	3	1	3	3	2/50 Intermediate
Khani-Jeihooni (11)	2	3	3	1	3	2	2/33 Intermediate
KHARAZI (22)	2	3	3	1	3	2	2/33 Intermediate
Soltani (8)	2	3	3	1	3	3	2/50 Intermediate
Rahmati Najarkolaei (10)	1	3	1	1	3	3	2 Intermediate
Behrooz (26)	2	3	3	1	3	2	2/33 Intermediate
Alizadeh Siouki (25)	2	3	3	1	3	2	2/33 Intermediate
Pakpour Hajiagha (24)	2	3	3	1	2	1	2 Intermediate
Baghianimoghadam (21)	2	3	3	1	2	3	2/33 Intermediate
Pirzadeh (20)	2	3	3	1	2	1	2 Intermediate
Farahani (19)	2	3	1	1	3	1	1/83 Intermediate

EPHPP: effective public health practice project.

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using the channels which are by the values and cultural characteristics of the society is an undeniable necessity (24). In Aghdasi's and Alizadeh's studies, the high pre-intervention behavioral intention could have a positive effect on increasing AIDS-preventive behaviors (9, 25); also, increasing post-intervention behavioral intention score in Alizadeh's study has probably been because of the effects of peer lectures on preventive behaviors. Caron also stated that educational intervention delays the intention of sexual relationships in students (29). In all 3 studies, the positive effects of education on perceived behavioral control were observed, which contains the construct of perceived self-efficacy (9, 24, 25).

Shakerinejad's study findings were also in line with these studies (30). However, the results of Ahmadi's study (31) were not in line with the findings of the above studies and the decrease in the perceived behavioral control score has probably been because of the cold weather during the intervention or cancellation of early physical activity at the workplace by the institution manager. Self-efficacy is the strongest construct in predicting behavior change and evidence suggests that self-efficacy declines over time (32). To avoid this decline, according to Pakpour's study where the evaluation period of results was only 3 months after the educational intervention, it may be necessary to repeat the reminder and reinforcement educational sessions over time (24). In all 3 studies, holding sessions for peers and providing educational pamphlets for both teachers and students' families could have a positive effect on promoting the mental norms related to HIV prevention. The peer education approach also provides an opportunity for adolescents to acquire the necessary knowledge about health issues and transfer it to other peers (9, 24, 25). However, Sarzehi's results were not consistent with these studies; accordingly, the construct of the mental norms has no predictive effect on girls' behavior toward the opposite sex, which may be because families, unlike their peers, have reacted to the issue of the opposite sex less appropriately, and these social pressures have led to a kind of resistance (33). The results of Ahmadi (31) and Shafieinia (34) were also consistent with Sarzehi's results, which is likely to be because of the age differences, cultural characteristics of participants, and the type of intervention.

The increase in the behavior score in Aghdasi's and Alizadeh's study is indicative of the positive effects of the educational sessions about AIDS-preventive behaviors on the promotion of this concept. From the results of this concept in the control group, it is implied that no behavior change is significantly possible until the initial conditions of motivation are available and a training program on preventive behaviors is developed (9, 25). Several studies are in line with the

Table 3. Keywords for search in MEDLINE database (via PubMed)

((Adolescen*[tiab] OR Teen*[tiab] OR Youth[tiab] AND (("adolescent"[MeSH Terms] OR "adolescent"[All Fields]) AND ("female"[MeSH Terms] OR "female"[All Fields])) AND tiab[All Fields] OR (("female"[MeSH Terms] OR "female"[All Fields]) AND ("adolescent"[MeSH Terms] OR "adolescent"[All Fields])) AND tiab[All Fields] OR (("adolescent"[MeSH Terms] OR "adolescent"[All Fields]) AND ("male"[MeSH Terms] OR "male"[All Fields])) AND tiab[All Fields] OR (("male"[MeSH Terms] OR "male"[All Fields]) AND ("adolescent"[MeSH Terms] OR "adolescent"[All Fields])) AND tiab[All Fields] OR "school age"[tiab] OR student[tiab] OR "young adults"[tiab] OR "young people"[tiab] OR "younger people"[tiab] OR "young women"[tiab] OR "young men"[tiab] OR "middle school"[tiab] OR "high school"[tiab] OR "secondary school"[tiab] OR young[tiab]) AND (education[tiab] OR educational[tiab] OR "sex education"[tiab] OR "behavior model"[tiab] OR "behavior models"[tiab] OR "health models"[tiab] OR "health promotion model"[tiab] OR "Promotion Model"[tiab] OR "health belief model"[tiab] OR "Planned Behavior Theory"[tiab] OR "Social Cognitive Theory"[tiab]) AND (hiv[tiab]) OR "hiv aids"[tiab] OR "hiv infection"[tiab] OR "hiv prevention"[tiab]) AND (Iran[tiab] OR Iran[pl] OR Iran[ad])

Filters applied: English, Persian, from 2005/4/1 - 2020/5/1

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above studies (35, 36). However, the reason for the lack of behavior change in the studies of Ahmadi (31) and Kinmonth (37) is probably due to the high average age of the participants and the habit of sedentary living from the beginning of childhood.

Interventions based on social cognitive theory

Based on the results of this systematic review, all SCT constructs were not evaluated in all of the relevant studies. This is while in all studies, SCT-based educational interventions have been very optimal in increasing adolescents' awareness; however, they did not have much effect on attitudes (10, 19, 26). In Khalajabadi's study, the better knowledge of the students who have been educated by their peers was because the peer group was able to provide the target group with a better sense of confidence about AIDS (19). In this regard, in Rahmati's study, self-control education had a positive effect on female students' knowledge (38). Regarding the attitude of vulnerability toward AIDS, it seems that the better attitude of students in Aghdasi's study has been due to the effect of educational content, designed to have a positive effect on individuals' attitudes (9). On evaluating different results of various studies about the impact of educational interventions on people's attitudes, LIAO attributed these differences to educational methods and demographic characteristics of the participants. He stated that factors, such as social and family contexts, internet access, and family education are related to the level of knowledge and attitude toward HIV prevention; meanwhile, attitude is influenced by various factors whose measurement are much more difficult than the measurement of knowledge (39). In this regard, to examine the effects of peer education, a study conducted in Peru showed that peer educators responsible for educating other young people for 6 months had a positive effect on students' attitudes (40). The reason for the success of this study compared to Khalajabadi's maybe because of the duration of education, which has been much longer than his study on Tehrani students. The discrepancy between the results in Khalajabadi's study and the above study can be explained by the difference in the level of knowledge, type of attitude, and self-sufficiency skills of students, leading to the effects of various socio-family factors on students' knowledge, attitude, and self-sufficiency. Since attitudes are created by profound internal changes in thoughts and

((Adolescen*[tiab] OR Teen*[tiab] OR Youth[tiab] AND (("adolescent"[MeSH Terms] OR "adolescent"[All Fields]) AND ("female"[MeSH Terms] OR "female"[All Fields])) AND tiab[All Fields] OR (("female"[MeSH Terms] OR "female"[All Fields]) AND ("adolescent"[MeSH Terms] OR "adolescent"[All Fields])) AND tiab[All Fields] OR (("adolescent"[MeSH Terms] OR "adolescent"[All Fields]) AND ("male"[MeSH Terms] OR "male"[All Fields])) AND tiab[All Fields] OR (("male"[MeSH Terms] OR "male"[All Fields]) AND ("adolescent"[MeSH Terms] OR "adolescent"[All Fields])) AND tiab[All Fields] OR "school age"[tiab] OR student[tiab] OR "young adults"[tiab] OR "young people"[tiab] OR "younger people"[tiab] OR "young women"[tiab] OR "young men"[tiab] OR "middle school"[tiab] OR "high school"[tiab] OR "secondary school"[tiab] OR young[tiab]) AND (education[tiab] OR educational[tiab] OR "sex education"[tiab] OR "behavior model"[tiab] OR "behavior models"[tiab] OR "health models"[tiab] OR "health promotion model"[tiab] OR "Promotion Model"[tiab] OR "health belief model"[tiab] OR "Planned Behavior Theory"[tiab] OR "Social Cognitive Theory"[tiab]) AND (hiv[tiab]) OR "hiv aids"[tiab] OR "hiv infection"[tiab] OR "hiv prevention"[tiab]) AND (Iran[tiab] OR Iran[pl] OR Iran[ad])

Figure 1. Keywords for search in MEDLINE database (via PubMed)

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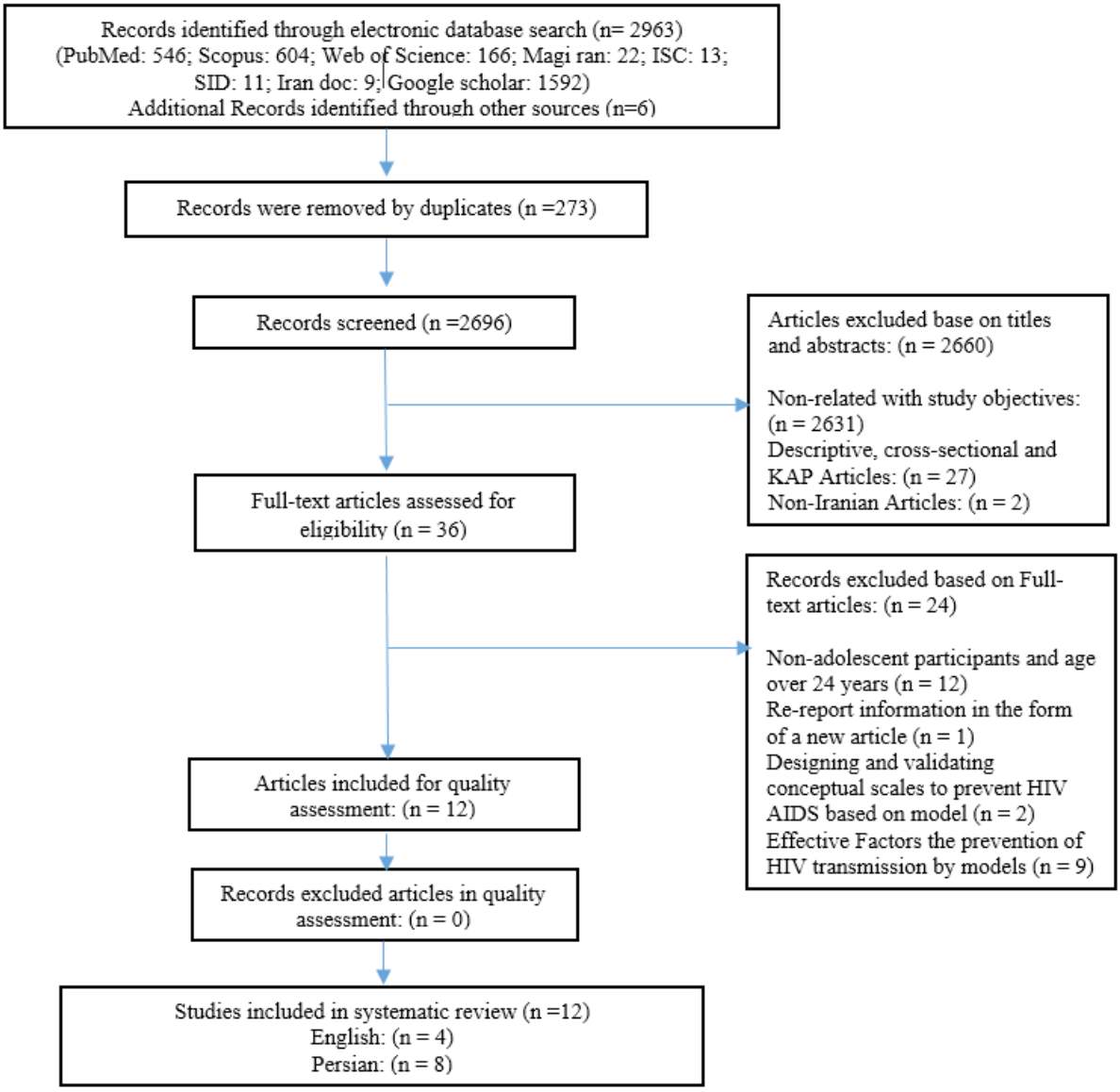

Figure 2. PRISMA flowchart for the selection of studies

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beliefs, the duration of self-sufficiency skills education should be more than 2 h to change the students' attitudes (19). Behrooz also maintained that the high sensitivity of society and prevalent HIV-related moral and psychological issues in Iran affect the attitudes of high school students. Accordingly, peer education, use of condom, and life skills education by educated professionals seems necessary to change their attitudes (26). Rahmati also stated that given the prevailing culture in developing societies, the distorting effect of AIDS-related social stigma on attitude is significant. Therefore, to change this attitude in the long run and to determine the stability of the effects of education over time, it is required to examine the continuous effect of theory-based education in 3, 6, and 12 months after the educational interventions (10).

According to the results of this systematic review, the results of all 3 interventions can be used in theory-based intervention strategies to create and change health behaviors. The main reasons for the tendency of some youths to high-risk behaviors include some spiritual beliefs and misconceptions, poor educational skills to deal with sexual emotions, and the lack of effective interactions in the family system as well as specific social and cultural conditions prevailing in Iran. Therefore, it is emphasized that policymakers train adolescents and young people, parents, and teachers with detailed educational planning based on different models of

health education and using individual and group educational methods in schools, universities, and society to prevent this perilous disease. Attitudes need more time for long-term changes and it is recommended to examine the continuity of the effect of theory-based training for at least several months after educational interventions to determine the stability of the effect of training over time. Since the use of the peer education approach raises awareness, strengthens attitudes, and promotes avoiding risky behaviors, it is recommended to change attitudes in this regard: peer education, condom promotion, life skills training, program training, and family education by trained professionals.

5. Conclusion

According to the research results, it is suggested to use educational programs based on the health education model in schools and universities to promote preventive behaviors against AIDS and other sexually transmitted diseases and reduce drug use. It is also suggested that future researchers use integrated models to improve AIDS prevention skills and create stronger health education interventions. It is recommended that to improve the quality of initial studies, standard tools are substituted for researcher-made tools, and the guidance structure for action be considered as well. It is also recommended that future educational interventions be conducted in the form of educational campaigns, group discussions, instruction by teachers and peers, and the use of mass media, such as television and radio to better influence the interventions.

Limitations

One of the limitations of the present study was that it evaluated only the studies conducted in Iran and on adolescents. We recommend that future studies be conducted on other age groups and in other parts of the world to generalize the results. Also, given the severe heterogeneity, meta-analysis was not possible and the results were reported qualitatively.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article. This article is a systematic review with no human or animal sample. This study was approved by the Ethics Committee of the University of shahid beheshti university of medical scinces (Code: IR.SBMU.PHARMACY.REC.1398.246).

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Authors' contributions

Conceptualization, methodology, investigation, and analysis: All authors; Writing – original draft: Leila Mohamadkhani Shahri; Writing – review and editing: Leila Mohamadkhani Shahri, Marzieh Bagherinia; Supervision: Masoumeh Simbar.

Conflicts of interest

The authors declared no conflict of interest.

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