



A Systematic Review of Educational Interventions based on Health Behavior Models for Promoting Pap Smear Testing in Iran

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Abstract

Introduction: Cervical cancer is one of the most common cancers among women, and early detection through a Pap smear test plays an important role in timely diagnosis. This study aims to evaluate the type and degree of success of educational interventions based on health education theories and models in improving women's participation in the Pap smear test in Iran.

Methods: This research comprises a systematic review of studies published between 2010 and 2022 to synthesize existing knowledge on the effectiveness of educational interventions in increasing participation and performance of Pap smear tests. The search was conducted on databases such as Magiran, Science Direct, PubMed, Scopus, and SID, including all interventional studies (experimental and quasi-experimental). The search keywords included terms such as pap smear, screening, cervical cancer, educational models, theories of health education and educational interventions, which were reviewed in both Farsi and English languages.

Results: Among the 3,171 articles initially extracted, 27 relevant interventional studies were included in this review. The intervention methods examined in these studies mostly include lectures, group discussions, questions and answers, educational videos, and multimedia messages in which more than one educational method is used. Times allocated to implement the interventions were different in each study. Approximately 62% of these studies were based on the health belief model, while others explored alternative health behavior models. The measured variables included various components of health education models, and most of these variables demonstrated significant improvement after the implementation of educational interventions among participants in the test group.

Conclusions: This systematic review underscores the beneficial influence of targeted educational interventions in bolstering women's engagement in Papsmear testing and cervical cancer prevention in Iran. The outcomes underscore the potential of health behavior models to guide future evidence-based educational programs aimed at promoting preventive healthcare practices among women.

INTRODUCTION

Cervical carcinoma stands as the fourth leading cause of fatality attributed to cancer among the global female

population [1, 2]. Cervical cancer is the fourth most common cancer in women globally with around 660 000

new cases and around 350 000 deaths in 2022 [2]. It is envisaged that the global prevalence of cervical cancer will ascend to nearly 700,000 occurrences, accompanied by 400,000 fatalities, by the year 2030. This projection signifies a 21% surge in cases and a 27% augmentation in mortality rates [3, 4]. Per the databanks of the Iran Cancer Registration Center, cervical carcinoma ranks as the third most prevalent neoplasm, particularly among middle-aged Iranian women. An incidence rate of 1.7% is noted, contributing to 30% of all invasive uterine malignancies [5]. Variations in the geographic distribution of cervical cancer are conspicuous; the most elevated age-specific incidence rates materialize in Oceania and the central and sub-Saharan regions of Africa, while the lowest rates are documented in Europe, Australia, North Africa, and the Middle East. Albeit the age-standardized rates for both cervical cancer incidence and mortality have exhibited a decline across most global regions between 2007 and 2017, the absolute case count and disability-adjusted life years (DALYs) underscore its persistent pertinence as a public health apprehension, with mortality rates experiencing an upswing during this temporal span [6]. These pivotal shifts in the disease's epidemiological milieu are attributed, in part, to the implementation of interventions such as the Pap test, commonly referred to as the Pap smear test [6].

Given the protracted incubation interval of cervical cancer and the time lag spanning 10 to 20 years for the progression of cervical lesions from a precancerous to a cancerous state, this temporal window affords an auspicious opportunity for early detection and the swift execution of interventions [5]. A gamut of screening and therapeutic modalities for this carcinoma exists; the Pap smear test, notably, stands as an efficacious screening regimen conducive to the realization of this objective [7, 8]. Finland's notable feat in lowering the morbidity rate to below one in 100,000 individuals in 1973 serves as a pertinent case in point [9]. Analogously, in various nations that have enacted screening programs, cervical cancer incidence has experienced reductions ranging from 30% to 78% [10]. Demonstrating an expedient and cost-effective diagnostic utility, the Pap smear test garners acclaim for its high sensitivity in cervical cancer screening [11, 12].

Within the purview of the National Cervical Cancer Program in Iran, the recommendation encompasses the administration of a Pap smear test to all married women aged 20 to 65 years subsequent to their initial sexual engagement, with subsequent repetitions scheduled at three-year intervals [13]. Regrettably, notwithstanding the accessibility of these services, empirical evidence attests to a diminished Pap smear test uptake in Iran, relative to its global counterparts, casting a somewhat unfavorable light on the situation [14, 15]. Concomitant with scientific scholarship, the barriers

impeding women from availing themselves of this health service span a spectrum of cultural, religious, emotional, functional, social, geographical, and economic dimensions. A myriad of rationales underlie women's avoidance of the test, encompassing factors such as stress, feelings of shame, apprehension towards potential positive cancer findings, and trepidation surrounding the rigors of treatment and subsequent surveillance protocols [16-18].

Historical inquiries have underscored the pivotal role of health education in ameliorating screening behaviors. Well-structured educational interventions possess the potential to precipitate early diagnosis and expeditious therapeutic intervention. Consequently, the encouragement of women's active participation in cervical cancer screening initiatives within the community arena stands poised to engender reductions in both mortality rates and the morbidities stemming from this ailment [19, 20]. A seminal step in the selection of an effective educational framework hinges upon the identification of an apt and efficacious behavioral theory or model [21]. Such constructs furnish valuable insights into the elucidation of screening behaviors [21-24].

Health models are defined frameworks based on which health education is planned and implemented. The aim of the models in health education is to increase awareness, change people's attitudes, and help them to change their behavior [25].

Numerous empirical investigations have probed the realm of educational interventions predicated upon diverse models in the context of Pap smear utilization, both on a global scale and within the confines of Iran. Ergo, the scrutiny and appraisal of interventions executed in alignment with prevailing evidence in this domain bear promise as a compass to steer forthcoming deliberations [26]. The main objectives of the present study include examining and putting together the effect of educational interventions, based on health education models, on women's participation in Pap smear tests during the period from 2010 to 2022 in Iran.

METHODS

This study constitutes a systematic review that has been meticulously undertaken to consolidate the existing body of knowledge pertaining to the efficacy of educational interventions aimed at enhancing participation rates and adherence to the Pap smear test. The investigation encompasses a comprehensive assessment of all relevant articles, encompassing experimental, quasi-experimental, and intervention-based studies, published in both Persian and English languages within the geographical context of Iran, spanning the time frame from 2010 to 2022.

The exploration was meticulously conducted across a spectrum of databases, inclusive of Science Direct,

PubMed, Scopus, SID, and Magiran, employing a methodical approach as detailed below: A. The application of filters, inclusive of temporal and thematic parameters, aligning with the intended research keywords. B. Utilization of Boolean operators, incorporating logical conjunctions (AND/OR).

The keywords harnessed in this systematic inquiry encompassed a comprehensive array: "educated," "cervical cancer," "screening," "Pap smear," "Educational interventions," "models," and "theories of health education."

The inclusivity and exclusivity criteria for the articles under investigation were delineated along four axes:

All forms of interventional studies, spanning experimental, semi-experimental, and experimental designs, geared towards the goal of cervical cancer screening.

The targeted demographic encompassed women aged 16 to 79 years, devoid of a recent history of Pap smear testing within the past three years.

Inclusion of Persian and English language papers, replete with full-text publications spanning the chronological interval of 2010 to 2022.

Essential keywords, or their functional equivalents, were requisite components within the titles or abstracts of the articles.

Papers that fell short of aligning with the research objectives, as well as studies lacking comprehensive full-text availability or those disseminated in the form of editorials, were excluded from the review. Given the heterogeneous nature of the examined studies, amalgamation of their outcomes in a quantitative manner was not feasible. The analytical process unfolded through a comprehensive review of the compiled papers, qualitative collation, and eventual deduction of overarching conclusions.

Following the meticulous application of inclusion criteria, a methodical scrutiny of the full texts was executed, culminating in the extraction of pertinent details. This encapsulated the title, primary author, year of publication, study populace, methodological approach, and ultimate findings. In order to mitigate potential bias, two researchers actively participated in all facets of the study, encompassing database exploration, article evaluation vis-à-vis the predefined inclusion criteria, and abstract scrutiny. Subsequently, a dual review of the complete articles was conducted independently by both researchers, facilitating data extraction and categorization through the medium of a comprehensive form. Discrepancies, if any, were deliberated upon through collaborative discourse during team meetings, ultimately culminating in a harmonized consensus.

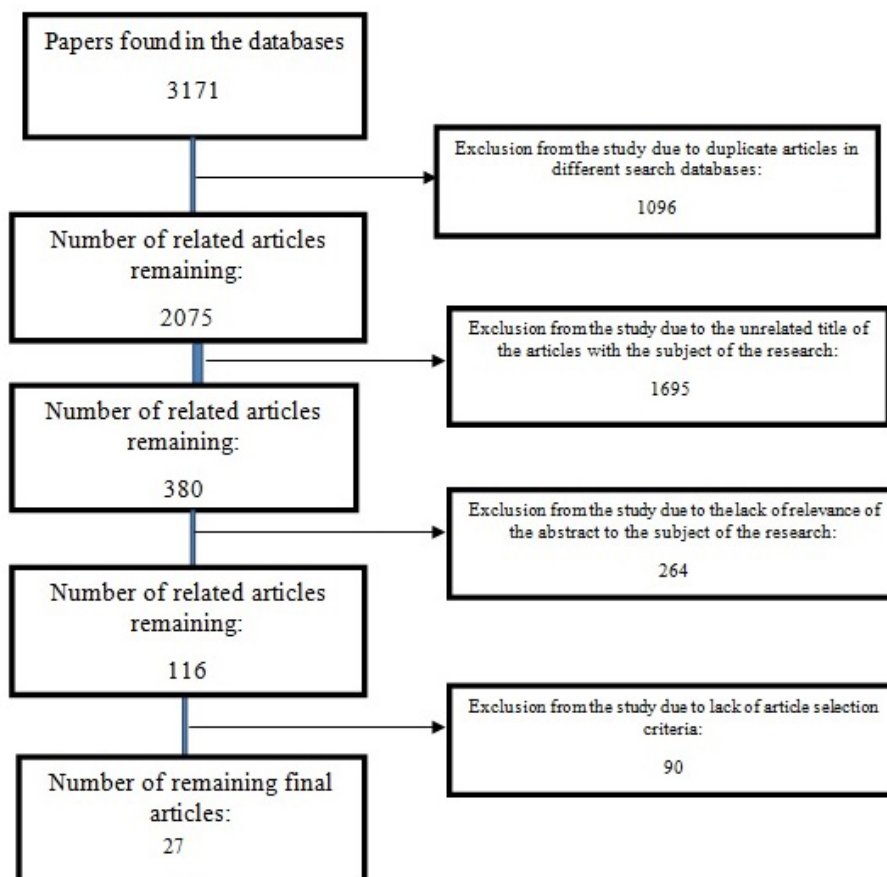


Figure 1. Chart of paper selection based on the inclusion and exclusion criteria

RESULTS

After screening for duplicates and irrelevant papers, 27 relevant papers were selected for review. The methods of interventions reviewed in these studies, include lectures, group discussions, questions and answers, educational film, PowerPoint presentations, pamphlets and educational booklets, text messages, phone calls, electronic posters, peer training and multimedia messages, and more than one of these methods were used in most studies. In most of the studies, lecture sessions were presented with questions and answers, and were also used, group discussions, brainstorming, and educational booklets and pamphlets.

The educational content used in these studies includes awareness with cervical cancer, symptoms and risk factors and perceived sensitivity, understanding seriousness of cervical cancer complications and its

various effects on life (Perceived severity), general information about pap smear, how it is doing and its benefits in diagnosing the disease and correcting any misconceptions about the test.

Times allocated to implement the interventions were different in each study. So that the shortest follow-up time was immediately after the intervention and the longest was 15 months after the intervention. In some studies, the allotted time was not clear.

Regarding the use of health education models in educational interventions, the most frequent model had used the health belief model (17 studies) and the protection motivation model (3 studies). In all studies, intervention group operation improved after the educational intervention and led to a positive performance of women in the field participating in the Pap smear test (Table 1).

Table1. Summarizing the results of examining studies

Author, year, place	Paper title	Research population	Type of study& and methodological	Results
Poorolajal Jalal et al. (2011, Hamadan) [27]	The Effect of Educational Program on Increasing Cervical Cancer Screening Behavior among Women in Hamadan, Iran: Applying Health Belief Model	70 Women aged 16 to 54 covered by health centers	Semi-experimental interventions - using the health belief model. The method of training was lecturing, questions and answers, group discussions, presentation of slides and educational pamphlets. The post-test time was performed four months after the intervention.	Findings indicated that education based on HBM was effective and could enhance the participants' knowledge significantly and improve the HBM Constructs including perceived susceptibility, severity, benefits, and barriers. 81.4% of the participants had done a pap smear test after intervention.
Pirzadeh Asia et al. (2010, Kohdasht) [28]	The effect of health education based on the health belief model on performance of women regarding Pap smear test in Kouhdasht health centers	70 Women covered by health centers	Quasi -experimental interventions. Using awareness questions, health belief model and performance on the Pap smear test. The method of training was three sessions in the form of lectures, group discussions and booklets.	There was a significant difference in the mean scores of awareness and components of the health belief model after the intervention and 97.4% in the case group and 2.86% in the control group, had done a pap smear test.
Karimi Mahmoud et al. (2012, Zarandieh) [29]	The effect of health education program based on the Health Belief Model on the performance of Pap smear test among women referring to health care centers in Zarandieh	120 women covered by health, urban centers	Semi-experimental interventions - using awareness questions, health belief model and performance. The method of training was three sessions in the form of lectures, group discussions and exchange of opinions. Post-test time was performed two months after the intervention.	Mean scores of HBM Model constructs were significantly increased in the experimental group compared to the controls after the intervention. Also, performance of pap smear test increased significantly among the experimental group as compared to the controls after the intervention ($P < 0.01$) (before intervention 30%, after intervention 53.9% in the experimental group).
Hassani Laleh et al. (2014, Tehran) [30]	The effects of an educational intervention based on the protection motivation theory and implementation intentions on first and second pap test practice in Iran	200 Women were referred to a primary health care clinic	Quasi -experimental interventions. Using theory of protection motivation. The method of training was four sessions of 60 minutes. Include (Group discussions, lectures and questions and answers). post-test time was performed 15 months after the intervention	The mean scores of self-efficacy, perceived vulnerability, and behavior intention variables were significantly higher in the intervention group Compared to the control group ($p < 0.05$). No significant differences were found in the perceived severity, Response efficacy, response cost, and fear. Between two groups following the intervention, A higher percent of women in the intervention group had obtained first and second Pap test compared to the controls
Rahmati Maryam et al. (Khomeini Shahr 2012) [31]	Effect of Educational Program Based on Health Belief Model on the Practice of Women about Pap Smear	124 women covered by two health centers	Prospective interventions were based on awareness questions, health belief model and pap smear screening performance. The method of training was two training sessions in the form of lectures, questions and answers, and educational pamphlets. post-test time was performed one month after the intervention	At the post test, Women in the experimental group had significantly higher scores on knowledge ($P < .001$) perceived susceptibility ($P < .001$), perceived severity ($P < .001$) perceived benefits ($P < .001$) and Perceived barriers ($P < .001$) as well as taking health action (pap smear) ($P < .001$)
Ahmadi-Jouibari Toraj et al. (Hamadan 2013) [26]	Pap smear test among Women: An Educational Intervention Based on Health Belief Model	120 Women aged 35-54 referring to two health centers	Semi-experimental interventions based on health belief model and pap smear screening performance. The educational program consisted of four sessions of 45 to 60 minutes in the form of lectures, group discussions and educational booklets. post-test time was performed three months after the intervention	There was a significant difference in increasing the average score of the perceived barriers to performing a pap smear test ($P = 0.001$) and the perceived severity ($P = 0.001$) among the women in the intervention group; there was also a significant relationship an increase in

					performing pap smear tests between the two groups ($P=0.013$).
Taghi Pour shoorijeh et al. (Bandar Abbas, 2015) [32]	The impact of educational interventions based on the Health Belief Model pap smear test in women referred to health centers of Bandar Abbas	120 women referred to health centers		Semi-experimental interventions were based on awareness questions and the health belief model. The method of training in the form of three-hour sessions in the form of lectures, questions and answers, and using two training booklets. post-test time was performed two months after the intervention	The average score of awareness, perceived sensitivity and severity, perceived benefits and barriers, self-efficacy and internal and external action guidance increased after the intervention of the intervention group.
Tahmasbi Rahim et al. (Bushehr, 2014) [33]	The effect of education based on the health belief model of women's practice about Pap smear test	100 women aged 20 to 65, including married and divorced women, covered by health center city		Semi-experimental interventions were based on awareness questions and the health belief model. The method of training in the form of questions and answers, lectures with PowerPoint and educational booklets. Post-test time was performed three months after the intervention.	After the intervention, the mean scores of knowledge ($P<0.001$), perceived seriousness ($P=0.015$) and perceived barriers ($P<0.001$) were significantly different between Two groups. Three months after the intervention, 42 (85.7%) in the intervention group and 4 (8.2%) in the control group had performed Pap smear test ($P<0.001$).
Fatemeh Shabiri et al. (Hamadan, 2014) [34]	Effects of Group Training Based on the Health Belief Model on Knowledge and Behavior Regarding the Pap Smear Test in Iranian Women	165 Women referred to a marriage counseling center		Semi-experimental interventions were based on awareness questions and the health belief model. Two educational session classes was performed in the case group. Of 45-60 minutes during one week.	After the educational intervention, a significant increase was observed in the average scores of awareness and all constructs of the health belief model ($P < 0.001$).
Noroozi Azita et al. (Bushehr, 2015) [35]	The effect of Health Belief Model-based education through telegram instant messaging services on pap smear performance	106 eligible Women referred to health centers		Semi-experimental interventions were based on awareness questions and the health belief model. Educational intervention in the form of text messages, electronic posters, info graphics, podcasts and educational videos at least 6 messages per week during four weeks to one month.	In the intervention group, the mean difference of the scores before and immediately post training on the knowledge and all of the constructs were significant ($P<0.001$) Within the three months after the training, 23 participants (47.9%) in the intervention group, and 4 participants (5.8%) in the control group performed Pap smear which indicates a statistical significant difference ($P<0.001$).
Bahmani Afshin et al. (Kurdistan, 2016) [36]	Effect of Health Belief Model Education on the Participation of Rural Women in Pap Smear Test	180 Married women aged 20 to 60 are among the eligible people who refer to health centers		It was a semi-experimental intervention based on health belief model. The educational intervention was three one-hour sessions with the method of lectures with questions and answers, showing educational videos in the local language and pamphlets. post-test time was performed four months after the intervention	In the two test groups and the control group, in the constructs of perceived sensitivity ($P=0.004$), perceived benefits ($P < 0.001$), perceived obstacles ($P = 0.002$) and perceived self-efficacy ($P < 0.001$). $P = 0$ (There was a significant relationship. Regarding the perceived severity ($P = 0.39$), no significant relationship was observed. Pap smear tests in the test group were more than the control group.
Bahmani Afshin et al. (Kurdistan, 2017) [37]	The Effect of Training Based on Precaution Adoption Process Model (PAPM) on Rural Females' Participation in Pap smear	180 Rural married women aged 20 to 60 covered by rural health centers		Semi-experimental interventions based on the psychological variables Based on Precaution Adoption Process Model. The educational program was based on the position of each person in the stages of the model (PAPM) The method of training was lecturing, questions and answers, video, specialized telephone consultations and pamphlets. post-test time was performed four months after the intervention	Comparing the average scores of the two experimental and control groups, there is a significant difference in awareness scores ($P=0.000$), (perceived sensitivity ($P=0.004$), (perceived benefits ($P=0.000$), perceived obstacles ($P=0.004$) $P =$ perceived self-efficacy ($P = 0.001$) and perceived social norms ($P = 0.006$). Pap smear test in the intervention group was 2.5 times that of the control group ($OR = 2.5$).
Ghahremani Leila et al. (Fasa, 2017) [38]	The effect of an educational program based on the theory of protection motivation on pap smear screening behavior among women	200 Women referred to urban health- centers		Semi-experimental interventions - Based on protection motivation theory, The method of training was a group discussion, using PowerPoint, and educational pamphlets during 4 two-hour sessions. post-test time was performed two months after the intervention	The average scores of all constructs of protection motivation theory, except response efficiency ($P=0.552$) increased in the intervention group compared to the control group after the educational intervention ($P<0.001$). After the educational intervention, the rate of Pap smear test in the intervention group had increased by 58%.
Hanifi Maryam et al. (Damavand, 2018) [39]	The Effects of an Educational Intervention Based on the BASNEF model on Promoting Cervical Cancer Preventive Behaviors among women	120 women referred to health centers		Semi-experimental interventions - based on Bezenf model, The method of training was conducted in the form of educational pamphlets, questions and answers, group discussions and lectures during two sessions of 60 minutes. Post-test time was performed one month after the intervention.	The mean scores of awareness, attitude, enabling factors, intention to quit and Bezenf constructs showed a statistically significant difference in the intervention group compared to the control group after the training program ($p<0.05$).
Ghahremani Maryam et al. (Gonabad, 2018) [40]	Cervical cancer screening: an educational intervention based on transtheoretic-al behavior change models and health beliefs	80 Women aged 20 to 65 referred to health centers		It was a semi-experimental intervention based on awareness questions and the health belief model and Pap smear screening performance. The educational intervention in order to improve the screening behavior .post-test time was performed 3 months after the intervention	After intervention, the average scores of all constructs of the health belief model in the test group were significant compared to the control group. ($P < 0.05$) (Pap smear screening performance was also significantly higher in the intervention group than the control group ($P < 0.001$).
Ezzati Elaha et al. (Islamabad West, 2017) [41]	The Effect of a Blended Educational Program (BEP) on Cervical Cancer	120 individuals of housekeeper women referred to health Center		Semi-experimental interventions based on awareness questions and the health belief model. The educational intervention consisted of 5 sessions during 4 weeks in the	The average scores of awareness and all constructs of the health belief model except the perceived severity ($P<0.05$) in the intervention group compared to the control

	Screening Behavior among Housekeeper		form of 5 training methods (lecturing, question and answer, group discussion, brainstorming and role model). post-test time was performed 3 months after the intervention	group were significantly increased. Also, after the educational intervention, 66.7% of women in the intervention group performed pap smear compared to the control group
Barati Majid et al. (Kermanshah, 2018) [42]	The effect of an educational intervention based on protection motivation theory of preventing cervical cancer among marginalized women in west Iran	143 women of Kermanshah city, referred to health centers	Semi-experimental interventions based on awareness questions and protection motivation theory. The method of training was conducted the form of 5 sessions of 45 minutes for small groups of 10 to 15 people in a period of 4 weeks in the form of lecturing, group discussions, questions and answers, pamphlets and booklets. post-test time was performed three months after the intervention	The educational intervention had a significant effect on perceived vulnerability, perceived intensity, perceived reward, self-efficacy, response effectiveness and response cost ($P < 0.001$). (Pap smear screening performance was also significantly higher in the intervention group than the control group ($P < 0.001$).
Afsaneh Ghasemi et al. (Fasa, 2017) [43]	The Effect of educational intervention based on the Health Belief Model on pap Smear test in women	160 women referred to health centers	Semi-experimental interventions were based on awareness questions and the health belief model. The training program has been implemented in 5 sessions of 90 minutes during five weeks in the form of lecturing, group discussions and educational pamphlets. post-test time was performed two months after the intervention	The mean scores of HBM Model constructs (susceptibility, severity, benefit and barriers perceived) were significantly increased in the experimental group Compared to the controls after the intervention 51.25% of women had a Pap Smear test. that was statistically significant ($P < 0/05$)
Khajedeh zoya et al. (Yazd, 2018) [44]	The effect of educational intervention based on Health Belief Model constructs on performing pap smear	87 women in 20-65 years old referred to health centers	Semi-experimental interventions were based on awareness questions and the health belief model. The educational package based on the culture of Yazd city was designed for two one and a half hour training sessions in the form of brainstorming, lecturing and group discussion. Post-test time was performed two months after the intervention.	After intervention, the mean scores of perceived susceptibility ($p < 0.001$), perceived intensity ($p < 0.001$) and cues to action ($p = 0.002$) and awareness ($p = 0.008$) showed a significant increase in the experimental group, while perceived barriers Score ($p < 0.001$) was decreased. Relating to behavior, 63.8 percent (30 persons) performed Pap smear test after intervention while this percentage was 2.8% (1 person) in the control Group.
Bahmani Afshin et al. (Kurdistan, 2019) [45]	Survey the effect of educational program based on precaution adoption process model on screening cervical cancer behaviors among rural women, mixed method development	210 Rural married women aged 20 to 60 covered by rural health centers	Mixed Method study Based on Precaution Adoption Process Model. Study was conducted implementing a quasi-experimental method. The methods of training were lecturing with question and answer, playing videos, specialized consulting and pamphlet.	Comparison of the means of the scores of psychological variables affecting the decision process in Pap smear test, there was a significant relationship.
Bab Eghbal Sedighe et al. (Gilan, 2020) [13]	Evaluating the effect of an educator program for increasing cervical cancer screening behavior among rural women	160 rural women referred to rural health centers	Semi-experimental interventions were based on awareness questions and the health belief model. The educational program was in the form of three sessions, phone calls and text messages. post-test time was performed six months after the intervention	There was a significant difference in the mean scores of knowledge performance and all constructs of the HBM in two groups ($p < 0.001$). The rate of Pap smear test in the intervention group increased from 18.7% to 78.7%.
Khani Jeihooni Ali et al. (Fasa, 2021) [46]	The effect of an educational program based on beliefs, subjective norms and perceived behavior control of doing pap-smear test in sample of Iranian women	300 Women referred to health centers	Semi-experimental interventions were based on the Theory of Planned Behavior and the health belief model. The educational program was in the form of eight sessions, group discussion, brainstorming, question and answer, showing movies, PowerPoint, educational booklet and educational CD. post-test time was performed six months after the intervention	The average score of awareness, perceived sensitivity, perceived severity, perceived benefits, perceived behavioral control, mental norms and behavioral intention in the experimental group increased significantly and perceived barriers decreased ($P < 0.05$) after intervention, 72% in the experimental group and only 6% in the control group had done the pap smear test.
Ghalavandi Shahnaz et al. (Andimeshek, 2021) [47]	A blended educational intervention program on Pap-test related behavior among Iranian women	84 Women aged 18-49 covered by 16 health care centers	Semi-experimental interventions were based on knowledge and attitude questions, self-efficacy and pap smear screening performance. The educational intervention was in the form of 7-day form of multimedia messages and online discussions. Post-test time was performed in three times (immediately, 4 weeks and 12 weeks after intervention.	Significant differences were found in the control and case groups in terms of knowledge, attitude, self-efficacy, and pap smear performance in different time measurements, which were statistically significant ($P < 0.001$).
Samimi Elaha et al. (Amol, 2019) [48]	The effect of educational intervention based on the health belief model on knowledge, attitude, and function of women about Pap smear test at Iranian health centers	120 Women covered by urban health centers	A randomized controlled clinical trial was based on awareness questions, and the health belief model. The intervention was in the form of two training sessions of 90 minutes. Post-test time was performed two months after the intervention.	After the educational intervention, the average scores of awareness and all constructs of the health belief model were increased ($P < 0.001$) and the Pap smear performance in the intervention group increased from 23.3% to 31.17%.
Hosseini Zahra et al. (Iran, Bandar Deir, 2022) [49]	Increasing cervical cancer screening in Iran: effectiveness of a theory-based educational intervention	202 Eligible women in urban centers	A quasi-experimental educational intervention based on awareness and Bezenf model. The intervention in the form of lectures, group discussions, questions and answers, brainstorming, peer training.	There was a significant difference in the mean scores of the model ($P < 0.001$). This study found that attitude, enabling factors and behavioral intention were the main predictors of cervical cancer screening.

				Telephone follow-up was done once a week, post-test time was performed three months after the intervention.	
Hosseini Zahra et al. (Bandar Abbas, 2022) [50]	The effectiveness of educational interventions on women's participation in cervical cancer screening: a quasi-experimental study based on the PEN-3 model	160 women referred to urban health centers		Semi-experimental interventional study based on PEN-3 model. Educational intervention included 30 online sessions of 15 to 20 minutes in the intervention group, while the control group did not receive any training. Post-test time was performed three months after the intervention.	After the educational intervention, the average scores of the knowledge, attitude and behavior of the Pap smear test in the experimental group increased significantly ($P < 0.05$) compared to the control group.
Sharifpour Zhiyal et al. (Karaj, 2022) [51]	Women's decision to accept or not to accept cervical cancer screening: using the precautionary acceptance process model (PAPM) as a theoretical framework	140 Women referred to urban health centers		A semi-experimental intervention study based on precaution adoption process model. The educational intervention consisted of 6 sessions of 45 minutes in the form of lectures, questions and answers, and video presentations. Post-test time was performed two months after the intervention.	The result showed that the stages of the decision-making process between the two groups were significantly different at the time immediately and 2 months after the intervention ($P > 0.001$). The average scores of the variables of awareness, perceived sensitivity, perceived benefits, perceived barriers and mental norms were significantly different between the two groups ($P > 0.001$).

DISCUSSION

This Systematic Review study evaluated the effect of educational interventions in improving cervical cancer screening behavior in women. In this study, the type of educational interventions and its effects on performing Pap smear tests in women aged 16 to 79 from 2010 to 2022 in Iran have been investigated. The present study is one of the first steps in identifying evidence-based interventions. Despite the reliable evidence in the field of the effectiveness of Pap smear screening in early diagnosis, prevention and delay in the development of cervical disorders, there are notable weaknesses in using this evidence to promote women's health. Therefore, in this study, twenty-seven interventional studies in the field of Pap smear test in Iran are evaluated so that the results can be used by researchers in future studies. According to the reviewed studies, the most effective educational programs are based on theories and models that are designed based on behavior change [52]. Asadian and et al showed that almost all of educational interventions based on theory / model have a positive effect on Pap smear test and prevent cervical cancer [53]. In this review research, the health belief model has been used more than all other theories and models in cervical cancer educational interventions. The possible reason for the widespread use of this model can be attributed to the existence of basic structures such as perceived barriers and perceived benefits that affect the behavior of participating in the Pap smear test, which is actually a simple and basic behavior. The health belief model is a prevention model related to health. Another educational model that was used more in this review research was the Protection Motivation Theory (PMT) model, which is one of the most useful frameworks for predicting protective behaviors in health behavior change studies to adopt preventive behaviors [54]. Another model discussed in this review research that helps to understand the non-participation in screening is the precaution adoption process model (PAPM) [55]. This model suggests people take steps towards participation. The difference in motivations for not

participating in screening, the importance of change intention into action is surveyed. The PAPM model has also been used in the field of other cancer screening in past studies [56]. Marlow et al. contend that the Precaution Adoption Process Model (PAPM) furnishes crucial insights into effectively addressing and educating women who exhibit no inclination to undergo Pap smear testing, as opposed to those who express intent to participate [57]. Among the other educational models used in this review, we can pay attention to the Bezenef model. This model is used to study the behaviors and plan to change them. Effective factors in making decisions for healthy behavior, identifying norms, social pressures and attitudes towards an appropriate behavior [58]. Ghahrani et al found that the use of two educational models (health belief and transtheoretical model) is effective in promoting positive attitude towards cancer screening [41]. The health belief model helps to identify obstacles and promote positive behavior changes [59]. The transtheoretical model evaluates the individual's readiness to create positive behavior changes and a detailed and regular action plan to help the individual progress in the stages of changes (pre thinking, contemplation, preparation, action and maintenance). The transtheoretical model states that increasing the level of knowledge and awareness of a person leads to following a healthy protective behavior [60]. Drokow et al. Also, using the same two models reported similar results in their study [61]. In the study of Khani Jihouni et al, two models (health belief model and planned behavior model) were used, which are suitable for intervention programs in the field of cervical cancer screening [46]. It has been confirmed [62]. Scarinci et al achieved such results 62PEN3 model was a theoretical guide for the development and implementation of the intervention, which has three parts (1) Perception including knowledge, attitude and beliefs) (2) Enablers (includes social pressures) and (3) Nurturers (includes family, friends, and relatives influencing the individual in performing health behaviors) [63]. Few studies using the PEN-3 model have been conducted in Iran [64]. In the study of Karimi et

al, in Shahrekord found that the use of this model useful in identifying factors related to cervical cancer screening [64].

There is no doubt that education is a basic tool for cancer prevention. The results of various studies have shown that effective education based on models can cause a changing behavior [65]. Education the topic of pap smear using methods including lectures, group discussions, questions and answers, PowerPoint, film screening, educational pamphlets, etc. are effective in screening the behavior of women. In educational interventions in similar studies in other parts of the world, lecture-based education and group discussion have been used more than other methods [66, 67]. Regarding the use of educational videos and its positive results, which are emphasized in this review study, they are similar to the results of the video-based educational intervention in the study of Drokow et al [61]. The place of educational intervention plays a fundamental role in the effectiveness of interventions [66]. The results of the studies investigated in the current research showed that most of the interventions were carried out in health centers, that is, the place where people go to receive health services. With the spread of corona disease in some studies, educational interventions were conducted online using social media to prevent the spread of covid-19 [35, 47, 50]. The interventions showed the efficiency and effectiveness of the media and the internet as a suitable platform for the implementation of interventions in the field of cervical cancer screening. The study of Si Mingyu et al. It also confirms the positive effect of Internet-based education on human papilloma vaccination among female students in China [97]. Accordingly, considering the wide access and use of social media and the Internet in the general population, Policy makers and health planners can take advantage of the potential of social networks to facilitate interventions in this field.

CONCLUSION

The effectiveness findings derived from the comprehensive evaluation of numerous scholarly articles within this study underscore the pivotal role that diverse methods of educational interventions, rooted in well-established theories and models of health education for women, can play as a pivotal stride towards enhancing their health outcomes, particularly concerning one of the most prevalent forms of cancer among women. Cultivating an understanding of the advantages inherent in adopting correct health behaviors, while concurrently mitigating obstacles, elucidating the perceived susceptibility and severity vis-à-vis disease risks, fostering self-efficacy, and furnishing a judicious framework can significantly facilitate individuals' engagement in health-promoting behaviors. Notably, these proactive efforts hold

significant promise in the realm of disease prevention, particularly for ailments such as cervical cancer.

The insights gleaned from a diverse array of studies consistently highlight the Pap smear test's unrivaled cost-effectiveness among the gamut of strategies aimed at preventing cervical cancer. This realization underscores the imperative to intensify foundational education initiatives, with a particular focus on augmenting the involvement of women in undergoing Pap smear tests. Leveraging pedagogical approaches grounded in robust health education models is strongly recommended as a means to bolster women's active participation in this critical health screening practice.

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AUTHOR'S CONTRIBUTIONS

Data collection and Writing—original draft: Sayran Nili, Elahe Sepehrian and Fatemeh Khaledian; Writing—review & editing: Afshin Bahmani.

ETHICAL CONSIDERATIONS

This research has been approved at the research deputy of Kurdistan University of Medical Sciences with the ethics code of IR.MUK.REC.1401.364.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interests regarding the publication of this paper.

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