

Educational Interventions for Women based on the Behavioral model/theory concerning Cervical Cancer: A Systematic Review

Review Article

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Abstract

Introduction: Cervical cancer is the second most prevalent cancer worldwide among women and is also the second primary cause of cancer-induced mortalities among women at a global scale. The most effective educational programs are based on theoretical approaches derived from behavior change models. The present systematic review aimed to explore and identify the body of research with educational interventions based on a particular behavioral or cognitive model of cervical cancer. **Methods:** A number of keywords were search in the following databases: PubMed, Web of Science, Science Direct, Google Scholar, Embase, Scopus, Biomedcentral, IranMedex, SID and Magiran. These keywords were: Cervix cancer, uterine cervical neoplasms, screening, prevention and control, Papanicolaou Test, Pap test, Pap smear, education, intervention, cervical cancer, theory and model, behavior model. The search time span was restricted to 2005 to 2020. **Results:** From among all the published academic papers with educational interventions, finally 22 papers were selected based on a particular theory or model. Among these papers, those based on the health belief model outnumbered the rest concerning cervical cancer. The Transtheoretical Model (TTM) model was the second most prevalent model adopted in the theory-based educational interventions. **Conclusions:** Educational interventions based on the behavioral theory or model showed to be effective on the target group concerning screening (secondary behavior) for cervical cancer. To further increase the effectiveness of the educational interventions, there is a need for a combination of new methods and theory-laden education to enhance the primary preventive behaviors of cervical cancer.

Key Words: Cervical cancer, Theory, Model, Educational intervention, Women, Systematic review, Prevention.

Introduction

Aggressive cervical cancer is one of the most prevalent gynecological cancers and is the second most prevalent cancer among women, standing only next to breast cancer. It is also the second primary cause of mortalities induced by cancers overall in the world (1). Annually, 530 thousand new cases of this cancer are reported along with 270 thousand mortalities. About 85% of mortalities induced by this cancer occur in underdeveloped or developing countries and the mortality rate of this disease in low-income or average-

income countries is 18 times as high as high-income counterparts (2). In such developed countries as the U.S., there has been a significant decrease in the number of cervical cancers since the advent of Pap smear test in 1960s (3, 4).

Among the causes of the prevalence of the disease in developing countries are unawareness of the disease, distrust in the healthcare system and high costs of HPV vaccination (5). Biological, socio-economic and health-related factors can be involved in the occurrence of cervical cancer (6). An extensive body of research has been conducted on the role of sexually-transmitted infections (7), fertility (8), behavioral (9) and nutritional (10) factors in the occurrence of cervical cancer. Tobacco consumption, sex affair with multiple partners, infection with human papilloma virus and contraceptive pills are among the potential risk factors of cervical cancer (11). In different studies, mention has been made of tobacco consumption (12-14), physical activity and overweight, consumption of contraceptive pills (15-16) as the primary preventive measures and timely

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conduction of Pap smear test (17-20) as secondary preventive measures of cervical cancer.

Cervical cancer marked by a long-term pre-cancer period, availability of appropriate screening and possibility of effective treatment of initial damages is known as a preventable cancer (21). Individuals' education level and even training showed to be effective in preventing and diagnosing cervical cancer. Success in the primary cervical cancer prevention strategies depends on one's level of awareness and knowledge of the disease on multiple aspects and the vaccine (22). More cervical cancer screening helps to the early diagnosis and treatment of the diseases. Thus, the occurrence and mortality rate of the disease can be reduced (23).

Health education models and theories are basically a guide to the understanding of healthy behaviors as it provides a certain pathway for the intervention and development. Behavior change theories and models are derived from social and behavioral sciences that indicate the social, biological, cognitive, behavioral, psychological and environmental determiners of healthy behaviors (24).

A systematic review can help to explain educational interventions based on educational theories/models concerning primary and secondary behaviors to prevent cervical cancer and can be used to improve educational interventions and prevent cervical cancer.

Materials and Methods

The present systematic review aimed to identify the body of research on educational interventions concerning cervical cancer. In this systematic review, the aim was to find academic papers with educational interventions based on particular behavioral and cognitive models/theories conducted to prevent cervical cancer.

The academic papers were searched in the following databases: PubMed, Web of Science, Science Direct, Google Scholar, Embase, Scopus, Biomedcentral, IranMedex, SID and Magiran. These keywords were: Cervix cancer, uterine cervical neoplasms, screening, prevention and control, Papanicolaou Test, Pap test, Pap smear, education, intervention, cervical cancer, theory and model, behavior model. The search was limited to the year span 2005 to 2020.

Inclusion criteria

The body of academic papers about cervical cancer were extracted with the aim of promoting preventive behaviors and measures. The target research population was 20-80 year-old women. The body of research searched for included those published in 2005-2020. Finally, only those were included that were enlightened by a behavioral theory or model. Health education models and theories are basically a guide to develop the required understanding of healthy behaviors. They actually provide a particular pathway for the intervention and development (25).

Exclusion criteria

The body of research excluded were descriptive, qualitative, case studies, reviews, structured reviews and meta-analyses. Those with screening for cervical cancer along with other cancer screenings such as breast cancer and colorectal were excluded. Exclusion was extended to interventions aiming to raise awareness and attitude and also those papers low in quality of education or those not following a certain behavioral theory or model.

A summary of the features of the body of academic papers was recorded in a Table. These features included: author(s)' name(s), year of publication, time and place of publication, target group, sample size, theory/model, intervention procedures, intervention results and behavior (Table 1).

Figure 1: Flowchart for selection of studies

Identification	Initial search results: a total number of 3908 academic papers with different interventions were found concerning cervical cancer.
Screening	After a second scannign of the topic, abstract and full-text, a total number of 2736 article were eliminated from the study due to duplication and irrelevance.
Eligibility	An examination of 1172 academic papers led to the elimination of papers in which the interventions were not based on any theory or model.
	A total number of 92 papers were evaluated for eligibility. Thus, 70 papers were eliminated due to synchrony with other studies or as they did not fit in with the purpose of the research.
Included	Finally, 22 academic papers were included.

Results

In the present research, 3908 academic papers were collected according to title and abstract. After many were excluded, 92 remaining papers were carefully assessed and 22 which met the requirements

of the study were finally (figure 1). These included 12 studies based on the Health Belief Model (HBM); 4 were based on the Trans Theoretical Model (TTM) and 2 followed the health belief model and Trans Theoretical Model (TTM); 2 followed the protection motivation theory (PMT); 1 adopted the Basnef model and 1 was based on a mixed theory of the health belief model, Trans theoretical Model (TTM) and Theory Reasoned Action (TRA).

An interventional study was conducted in Zarandieh, Kerman by Karimy et al. based on the health belief model to explore Pap smear conduction by women visiting urban healthcare centers. This research was quasi-experimental in type and was conducted on 120 women participants divided in two groups of 60 (intervention and control groups). The educational intervention was offered to the intervention group in three sessions. The intervention results revealed statistically significant differences between the two groups in terms of perceived susceptibility, severity, benefits, barriers and self-efficacy. Moreover, an increase in women's participation in Pap smear in the intervention group can be attributed to the intervention effect (26).

Some other research by Pirzadeh in Kouhdasht, a county in the west of Iran, aimed to examine the effect of education enlightened by the health belief model on women's performance in healthcare centers. The present quasi-experiment was conducted on 70 women receiving healthcare services from medical centers. These were divided in two groups, an intervention (n=35) and a control (n=35). The educational intervention and its content was based on the constructs of the health belief model, including perceived susceptibility (feeling the risk of cancer), perceived severity (feeling the depth of risk and outcomes), perceived benefits (feeling the advantage and applicability of prevention) and perceived barriers (feeling the obstacles to this measure). The educational intervention took three sessions of lecture and group discussion each taking 60 minutes in the healthcare center. The intervention effect was analyzed after a month. The results revealed statistically significant differences between the two groups in terms of perceived susceptibility, benefits, barriers and self-efficacy. They also showed significant participation of women in the intervention group in Pap smear as compared to the control group (27).

In another study, Rakhshani in Hamedan aimed to explore the effect of an educational intervention on conducting more Pap tests among 120 women. In this quasi-experiment, there were 60 participants in the intervention and 60 in the control group. The content of the educational intervention was based on the health belief model and was incorporated in an HBM booklet for the target women. The educational intervention was conducted in 4 sessions each taking between 45 and 60 minutes held in the healthcare centers instructed in lectures and group discussions. The results of the intervention were analyzed after three months. The results revealed statistically significant changes in terms of perceived susceptibility, severity, benefits, barriers

and self-efficacy. Moreover, the women in the intervention group showed more participation in having Pap smear than the control (28).

In a study by Hazavehei in Khomeinishahr in the middle of Iran, an intervention/control design was selected with 124 women participants receiving healthcare services at medical centers. This study aimed to explore the effect of education based on the health belief model on women's performance of Pap smear. To this aim, 62 participants were randomly selected and assigned to the control and 62 to the intervention group. The educational content was selected based on the health belief model and according to valid sources. The teaching was done in lecture and question and answers using a pamphlet with relevant content conveyed via the educational medium. The intervention results showed statistically significant differences between the two research groups in terms of perceived susceptibility, severity, benefits, barriers and self-efficacy. Moreover, women's more participation in the intervention group in Pap smear test could be attributed to the effect of the intervention compared to the control group (29).

Bahmani conducted a quasi-experiment based on the health belief model among country women in Sarvabad county in Kurdistan, Iran. In this research, 180 participants were randomly selected and assigned to the intervention (n=90) and control (n=90) groups. For the intervention group, lecture along with question and answer sessions were used as well as pamphlets and movie presentation. The results revealed statistically significant differences between the two groups in terms of perceived susceptibility, barriers, benefits and self-efficacy. Yet, for perceived severity, no significant divergence was spotted between the two research groups. 58 participants (64.5%) of those in the intervention group had the Pap smear. Overall, the performance rate of Pap smear in the intervention group was 5.2 times as high as the control (30).

In a controlled clinical trial in Bushehr, Hossaini used the health belief model with 150 Bushehri residents divided in three groups, an individual education group, a group-based education group and a control. In the second group, the education intervention took two sessions to conduct while in the first group it took only one session. The three groups received a pamphlet in their first visit. Their performance of pap test was checked in the beginning of the study and then once again after three months of intervention. Before the intervention, none of the participants had the Pap test. Yet, after the intervention, 42 participants of the group-based education group, 44 participants of the individual education group and 4 of the control had the pap smear (31).

In another quasi-experiment by Tahmasebi, 100 women receiving healthcare services from medical centers in Bushehr participated. The data collection instrument was a questionnaire containing demographic information, awareness questions along with the constructs of the health belief model concerning pap smear. The educational intervention was done in two sessions as group work. Before the intervention, there was no statistically significant difference between

the two research groups in terms of awareness, perceived severity and perceived barriers (32).

In a quasi-experimental study, Hanifi included women receiving healthcare services from the urban medical centers in Damavand, Iran. The participating sample was selected through simple randomization and divided in two research groups of 60. The data collection instrument was a questionnaire developed by the researcher based on Basnef model. The educational intervention in this study took 2 sessions (each taking 60 minutes). Statistically significant differences were found between the two groups in terms of awareness, enabling factors, behavioral intention and behavior (33).

Some other quasi-experimental research by Baghiani Moghadam was conducted in Yazd, Iran with 87 married women visiting the medical centers. This research adopted the health belief model. The sampling was multi-stratified clustering in type through which first a number of four healthcare centers were selected in Yazd and assigned to two groups, an intervention and a control. Two educational sessions were held in the form of lecture and group discussion about cervical cancer, severe consequences of the disease, Pap smear procedures and its benefits. Before the intervention, no statistically significant divergence was observed between the two research groups in terms of the mean scores of the health belief model constructs. After the intervention, the results of the research indicated the effectiveness of the health belief model in persuading women to have a pap test in Yazd (34). In another quasi-experiment, Kheyali included 160 women receiving healthcare services in Fasa in Fars Province of Iran. In this research, 80 women were assigned to the experiment and 80 were assigned to the control group. The underlying theory of this research was the protection motivation theory (PMT) concerning pap smear. The educational program took 5 sessions to conduct as group discussion along with pamphlets. The results revealed that the mean awareness score and the constructs of the theory (perceived susceptibility, severity, barriers and benefits) were significantly increased in the intervention group compared to the control (35).

Ghahramani, in a quasi-experiment, included 80 women (20-65 years of age) living in Gonabad, Iran. These participants were women at the pre-contemplation, contemplation, preparation and return stages of change. They were divided in two groups of 40. The intervention group had an education course based on the constructs of health belief model to help them promote pap smear screening test behavior. The control group received ordinary advice on the pap test from the medical staff. No statistically significant difference was observed between the two groups before the intervention in terms of the stages of change. After the intervention, however, the behavioral performance of the intervention group concerning the pap test was significantly improved in comparison to the control (36).

In their quasi-experiment, Malmir et al. included 143 women participants in Kermanshah (the west of Iran). The participants were selected through

simple randomization and clustering. They were divided in two groups, an experiment group (n=72) and a control (n=71). The self-rating questionnaire was based on PMT and also involved demographic information. The intervention took more than 6 sessions for the experiment group. The mean PMT scores and cervical cancer screening behavior revealed no statistically significant differences between the two groups before the intervention. Yet, the educational intervention was accompanied by significant differences in terms of the following constructs: perceived vulnerability, severity, reward, self-efficacy, response efficacy, response cost and protection motivation. Three months after the educational intervention, the number of visits for the pap test showed an increase in the experiment group (37).

In Ankara, Turkey, Guvence aimed to explore the effect of three stages of intervention to increase Turkish women's participation in pap test. In this pre-test/post-test research based on the health belief model, 273, 302 and 54 participants comprised the first, second and third stages of intervention. Their awareness of screening, barriers and the reason for not performing the test, benefits, relevant risks of cervical cancer were assessed too. The intervention involved three stages. The first stage involved emailing the educational brochure for two weeks with the aim of raising women's awareness of cervical cancer and pap smear screening test. The second stage addressed those who had not accepted screening publicized through the brochures and thus now they received phone call interviews to discuss the barriers to performing the screening test. In the third stage, women who had not been persuaded to have pap test within the past two stages were interviewed face to face. The results revealed that emailing the brochures managed to raise women's awareness. Moreover, phone call interviews showed to increase the rate of screening behavior. Statistically significant differences were observed. However, in the third stage, the interview held with people face to face did not yield statistically significant differences (38).

In an interventional study in Malaysia, Abdullah selected 403 teacher participants through controlled randomized clustering from 10 high schools. Then, 201 women were assigned to the intervention and 202 were assigned to the control group. This research aimed to explore the effect of the intervention on increasing participants' performance of pap test. This study followed the transtheoretical model (TTM). The intervention involved sending invitation letters to the intervention group members and providing them with educational pamphlets concerning pap test. It further involved holding consultation sessions, making phone calls to people as a reminder for them to do the screening test and explaining to them the significance of the topic for 4 weeks. The results revealed statistically significant differences in women participants' progress in stages of change, from pre-contemplation to contemplation and then preparation and also from contemplation and preparation to action (39).

In some other work of research in Mexico, Byrd aimed to explore the effectiveness of interventions using lay healthcare educators to increase the rate of pap test performance based on the reasoned action theory, social cognitive theory (SCT), Transtheoretical model (TTM) and Health belief model (HBM). There were a total number of 613 women participants, 450 of whom were assigned to the intervention and 153 to the control group. Women’s belief and attitude toward screening, perceived benefits and barriers, self-efficacy were assessed concerning the pap smear test. The intervention followed the division of participants to 4 groups. In each group the intervention was as the following: the 1st group received video instructions on the barriers and facilitators of Pap test and a flow chart providing information about screening; the 2nd group received a flow chart without any accompanying video; the 3rd group received a video without any flow chart; the 4th group had no instructions at all as it stood as the control. The intervention results showed an increase in the rate of Pap test conduction after each stage of the intervention and a statistically significant difference after the intervention (40).

In their research, Koc et al. conducted a randomized prospective trial with 2 groups (an intervention and a control) in a social educational center in the North of Turkey within the PRECEDE educational model. This research was focused on cervical cancer. To this aim, a total number of 156 Turkish women not afflicted with cancer participated. The results revealed the positive effect of instructions on Pap smear behavior (41).

Lamb et al. adopted the Transtheoretical model to educate 100 women in 8 medical clinics in Medellin, Columbia about cervical cancer and screening. The screening involved a descriptive movie and a fiction (hard copy). The educational content was developed with the help of a body of research, production, pre-test, publication and evaluation. Though the findings were not statistically significant, the Transtheoretical model revealed changes to higher levels especially from pre-contemplation to contemplation and preparation (42).

Bebis used a randomized prospective clinical trial with 148 women participants in the light of the health belief model. The topic addressed was cervical

cancer and women’s Pap smear behavior. 75 women participants of the control group were asked to fill out the questionnaires. The educational intervention was given for 45 minutes as a lecture for the 73 participants of the intervention group. Everybody was asked to fill out the questionnaires after the educational intervention. The education content was based on the health belief model and the susceptibility, barriers, Pap smear conduction and awareness showed to be significantly and positively affected (43).

In another study, Kroc adopted the Transtheoretical mode. This research took 10 months to conduct with 90 women participants in Ohio Appalachia in the U.S. The interventions included phone calls, post cards and face-to-face consultations to conduct Pap smear. The results revealed that 63% of patients progressed from one stage to another within the model (44).

The study by Park et al. was based on the health belief model. It was conducted with a control group (n=48) and an experimental group (n=48) in Korea. The results revealed that after the intervention, the awareness, perceived benefits and self-efficacy were increased among women (45). In some other research, Hou et al. adopted the Transtheoretical model to investigate women’s conditions. The participants were relatives to patients hospitalized in a major hospital in Taiwan. To this aim, 424 women were randomly selected and assigned to the intervention group. They received direct messages along with phone calls as follow-up. The topic of the calls and messages was the act of performing Pap smear. The results showed that women’s contemplation in the intervention group was 5.5 times as high as the pre-intervention. Actually, there was a 40% increase in participants’ acceptance of Pap test (46). The work of research by Coronado Interis on 225 Jamaican women was based on the transtheoretical model as well as the health belief model. The effectiveness of the intervention was checked afterwards. The most increase was observed in responses to items exploring knowledge, symptoms and prevention. In some cases, there was an increase in 62% from the pre-test to post-test. Among the 123 women participants in the follow-up, 50 women (40.7%) were screened for cervical cancer (47).

Table-1. Summary of articles included in this review

Study	Location	Sample size/ Population	Intervention method/ Duration of intervention	Results	Model/ Theory	CONSORT score
Karimy et al., 2012	Zarandieh, Iran	60 women participants each: the experiment (intervention) group and the control	Each: the experiment (intervention) group and the control	The mean score of self-efficacy, susceptibility, severity, benefit and barriers perceived and performance of pap smear test were significantly increased (p<0.05).	Health Belief Model(HBM)	17

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Pirzadeh, et al., 2012	Kouhdasht, Iran	Quasi-experimental 70 women Intervention group = 35 CON=35	3 sessions of teaching class, lecture and group discussion for 60 minutes	perceived susceptibility and severity, perceived benefits, and barriers had significantly difference between two groups($P < 0.001$)	Health Belief Model(HBM)	17
Rakhshan, et al., 2013	Hamadan, Iran	Experimental 120 women Intervention group = 60 CON=60	4 sessions of teaching class, lecture and group discussion for 45- 60 minutes	Significant difference in terms of perceived barriers ($p=.001$) and perceived severity after the intervention ($p=.001$), significant difference in terms of more pap test conduction after intervention ($p=.013$)	Health Belief Model(HBM)	18
Hazavehei, et al., 2007	Khomeini Shahr, Iran	Experimental 124 women Intervention group = 62 CON=62	2 educational sessions each taking 60 minutes in length in the form of lectures	Significant difference in terms of perceived susceptibility, severity, benefits and barriers ($p=.001$) and pap test conduction between the intervention and control groups after intervention	Health Belief Model(HBM)	18
Bahmani, et al., 2016	Sarvabad, Kordestan, Iran	Quasi-experimental 180 women Intervention group = 90 CON=90	Education in the form of lecture mixed with Q&R, movie presentation and pamphlets	A comparison of the mean model construct scores between the control and experiment groups revealed statistically significant differences in terms of perceived susceptibility ($p=.004$), perceived benefits ($p<0.001$), perceived barriers ($p=.002$), perceived self-efficacy ($p=.001$). Yet, in terms of perceived severity, there was no statistically difference ($p=.39$). Pap test conduction in the experiment group was increased for 5.2 times as much as the control group.	Health Belief Model(HBM)	19
Hossaini, et al., 2017	Bushehr, Iran	Randomized controlled trial – 150 women:	2 lecture sessions along with book presentation in 3 groups: individual education, group work and control	Awareness and perceived barriers showed statistically significant differences between the three groups after the intervention ($p<0.001$).	Health Belief Model(HBM)	20
Tahmasebi, et al., 2015	Bushehr, Iran	Quasi-experimental 100 women Intervention group = 50 CON=50	2 sessions (each taking 1 hour) with one week interval	The following variables showed statistically significant differences between the three groups after the intervention: awareness ($p<0.001$), perceived severity ($p=.015$), perceived barriers ($p<0.001$)	Health Belief Model(HBM)	17

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Hanifi, et al., 2018	Damavand, Iran	Quasi-experimental 120 women, Intervention group = 60, CON=60	Educational program in 2 sessions each lasting for 60 minutes	The mean awareness, attitude, enabling factors, behavioral intention and Basnef constructs showed statistically significant differences in the intervention group after the intervention (p<0.05)	BASNEF model	18
Baghiani moghadam, et al., 2018	Yazd, Iran	Quasi-experimental 87 women, Intervention group = 47, CON=40	2 educational sessions (lecture-based) and group discussions on cervical cancer	After the intervention, the mean perceived susceptibility score (p<0.001), perceived severity (p<0.001) score, cue for action (p=.002) and awareness (p=.008) score were increased.	Health Belief Model(HBM)	18
Khiyali, et al.,2016	Fasa, Iran	Quasi-experimental 100 women, Intervention group = 50, CON=50	Educational program was implemented during 4 sessions using group discussions and educational pamphlets	The mean scores of protection motivation theory constructs significantly increased in the experimental group compared to the control group (P<0.001).	Protection Motivation Theory (PMT)	19
Ghahremani, et al., 2016	Gonabad, Iran	Quasi-experimental 80 women, Intervention group = 40, CON=40	Educating the intervention group based on the health belief model and the control group simply by the healthcare staff	After the intervention, the mean awareness, perceived benefits, barriers and self-efficacy scores showed statistically significant difference in the intervention group (p<0.05)	Trans Theoretical Model (TTM), Health Belief Model	17
Malmir, et al., 2018	Kermanshah Iran	Quasi-experimental 143 women, Intervention group = 72, CON=71	The educational intervention was developed and implemented based on the two groups' pre-tests findings during the five sessions within 4 weeks	significant effects on the experimental groups' average response for perceived vulnerability, perceived severity, perceived reward, self-efficacy, response efficacy, response cost and protection motivation (all p < 0.001). prevalence of regular Pap smear testing significantly increased in the experimental (P=0.048), but not the control group (P>0.05)	Protection Motivation Theory (PMT)	19
Guvence, et al.2013.	Ankara, Turkey	It was a pre-test-post-test design with 273 participants in the 1 st stage, 302 in the second stage and 54 in the third stage.	Three stages of education: 1 st stage: email and educational pamphlet for 3 weeks, 2 nd stage: phone interview, 3 rd stage: face to face interview	The result showed that of the 144 who did not have Pap test after telephone interviews, 54 were then interviewed face-to-face, and 37.0% decided to accept free Pap test. A total of 668 women had accepted free Pap test uptake by the end of the intervention.	Health Belief Model(HBM)	21

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Abdullah, et al.2013	Malaysia	Cluster randomized controlled trial, intervention group =199 and CON =199	Intervention group: A call– recall program The control group received usual care from the existing program.	In both groups, pre-contemplation stage was had the highest proportion of changes in all stages. An intervention group showed two times more in the action stage than control group (OR= 2.44) At 24 weeks	Health Belief Model(HBM)	21
Byrd, et al .2012	El Paso, Texas, the US/ Mexico	Quasi-experimental 613 women, Intervention group = 450, CON=153	Program with a video and a flip chart (n = 151), the program without the video (n = 154), the program without the flip chart (n = 155) and a usual care control group (n = 153	An increased rate of Pap test conduction after each stage of the intervention and a statistically significant difference after the intervention (p<0.001)	Mixed model: TRA/SCT/ TTM// HBM	22
Koç Z, et al., 2017	turkey	Prospective, randomized, 2-group (intervention and control) trial, 156 Turkish women	First training,the women were provided with general information about female cancers, including cervical cancer; the risk factors for cervical cancer. At the second training, they were informed about the prevalence and epidemiology of HPV. At the third training, they were informed about how to protect themselves from cervical cancer	subdimension scores were found to be higher among women in the study group, cervical cancer seriousness(P = .001), health motivation(P = .001) as compared with the control group after the education program	PRECEDE Educationa l Model	18
Lamb, et al., 2018	Medellin, Colombia	The research followed a pre-test-post-test design with 100 women participants.	A descriptive movie and fiction (hard copy)	Behavioral changes were observed within the model from one stage to another. Yet awareness of HPV and perceived risk were not significantly increased.	Transtheor etical Model(TTM)	16
Bebis, et al., (2012)	Turkey	RCT Intervention group=75 CON=75	Educational conference (45 minutes) about Cervical cancer and Papanicolaou test in study group	There was statistically significant between two group in the score of knowledge (p<0.05) and There were statistically lower levels of susceptibility to cervical cancer score, lower levels of perceived benefit and lower levels of perceived barriers to Papanicolaou test score (P < 0.05).	Health Belief Model(HBM)	19

Krok-Schoen, et al., (2016)	USA	Randomized controlled trial 90 women	Received all components for the intervention (both visits, both phone calls, and 4 mailed postcards)	At visit 1 woman in the preparation and contemplation stages reported more barriers than women in the precontemplation stage. At visit 2, the number of reported barriers declined, and a higher number of barriers were reported by those the early stages of change	Transtheoretical Model(TTM)	20
Park, et al, .2005	Korea	Non-equivalent control group post-test	The core contents of the program reflected the results of a previous qualitative study conducted through focus groups to explore cognitive and affective attributes that women experience related to Pap test	Participants in the experimental group had significantly higher scores on perceived benefits of Pap tests, knowledge of cervical cancer, lower scores on procedural and cognitive barriers to testing($p < 0.05$). Results showed the Improvement in self-efficacy, strong intention to have the pap test and advanced stages of behavior adoption ($p < .01$).	Health Belief Model(HBM)	16
Hou, et al, .2005	Taiwan	Pretest–posttest design n = 424	Phone educational intervention	at the end of the program women in the intervention group were 2.31 more likely and in contemplation stage 4.18 were more likely to receive a cervical cancer screening.	Transtheoretical Model (TTM)	19
Coronado Interis, et al., 2016	Jamaica	Pre-test/post-test design n=225	Intervention sessions were conducted one-to-one and in groups of up to 30 women. Presentations lasted approximately 15 min for both methods of delivery	6 month after intervention statistically significant increases in the percentage of questions correctly answered and in participants' intention to CCS.40.7% of women screened for cervical cancer	Transtheoretical Model (TTM) AND Health Belief Model (HBM)	18

Discussion

The present systematic review led to the identification and exploration of 22 academic studies conducted worldwide on preventive educational interventions for cervical cancer in the light of behavioral theories or models. The main measures taken to control and prevent the disease were health education at society level, the group at risk or the group that play a key role in disease control (48). Education is a fundamental instrument for preventing cancer. Different studies have shown that the most effective educational programs are based on theories rooted in behavior change (49). Though the body of research in this systematic review aimed to enhance or create Pap smear behavior to prevent cervical cancer, the present

systematic review revealed that almost all theory/model based educational interventions managed to positively affect Pap test conduction to prevent cervical cancer. This finding is consistent with the results of another similar systematic review that explored the body of related literature published between 1980 and 2001 and showed that educational interventions managed to improve Pap smear conduction behavior for 18.8% (50).

The present systematic review showed that in theory or model based body of research with educational interventions on cervical cancer, the health belief model was used more prevalently than all other theories or models. Probably this wider prevalence is due to the underlying constructs such as perceived barriers and benefits that truly affect people's health-related behaviors such as the Pap smear. Moreover, the

underlying constructs of the health belief model are often shared by other models too. The health belief model is in fact a preliminary and simple behavioral model to explain a preventive health-related behavior. In the educational interventions enlightened by the health belief model focused on Pap smear and cervical cancer prevention, lecture-based education and group discussions were used more prevalently than other methods. In this systematic review, the most common model after the health belief model was the Transtheoretical model. In several studies, a combination of both was used. In the Transtheoretical model, such educational methods as phone consultation, flow chart, email and post card were used. In a systematic review, Yabroff et al. investigated Pap smear and cervical cancer prevention. These researchers employed such educational methods as phone reminders and emails used in the body of research reviewed (50). In another review, Soares and Silva explored women's Pap smear performance and they reported that using media at workplace, phone calls and invitation letters help to increase women's knowledge of the Pap smear (51).

The educational intervention setting plays a key role in the effectiveness of interventions (52). The setting deals with the workplace, university, school and medical, social and healthcare centers (53). The body of research reviewed in the present research showed that the majority of interventions occurred in medical or healthcare centers and this could affect the different effectiveness of interventions. In their systematic review, Lu et al. showed that a combination of education at work and in groups or mobile-assisted and face-to-face services tremendously affected the Pap smear conduction behavior to prevent cervical cancer (54).

The present results indicated that theory/model based educational interventions managed to improve women's preventive behaviors concerning cervical cancer and Pap smear conduction. In another study, Ryan showed that health behavior theories managed to enhance self-regulation skills and raise improve knowledge of and attitude toward health-related behaviors (55).

Conclusion

The present systematic review showed that almost all educational interventions aiming to prevent cervical cancer, enlightened by a certain model, were focused on Pap smear conduction (secondary behavior in preventive measures) and a limited number of interventions simultaneously dealt with HPV and Papilloma. Yet, Pap smear is a major measure to take to prevent cervical cancer. However, other primary healthy behaviors such as HPV vaccination, beginning age of sex affair, multiple sex partners, long-term consumption of contraceptives, cigarette/hookah smoking and overweight can also account for cervical cancer. There is a dearth of research with theory/model based educational interventions to improve such healthy behaviors concerning cervical cancer prevention. In many countries including the developing and

underdeveloped, there is a need for theory/model based educational interventions or a mixture of theories such as socially-constructed or individually-constructed education types provided through the virtual world and applications, mobile-assisted and internet-based devices to prevent cervical cancer in groups of women especially school or university students.

Conflict of interest : None

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