

The effect of an educational program for hookah use prevention among high school male students: Application of the prototype willingness model

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ABSTRACT

INTRODUCTION The popularity of hookah use among adolescents has become a major concern and there is a need for an appropriate educational strategy to prevent hookah use. Therefore, the present study aimed to determine the effect of an educational program for hookah use prevention among high school male students using the Prototype Willingness Model (PWM) in Kermanshah city, Iran.

METHOD The present study was a randomized controlled trial study on 83 male adolescents in Kermanshah. We performed multi-stage random sampling. The data collection tool included a researcher-made questionnaire based on the Prototype Willingness Model. The intervention program consisted of 5 training sessions. We followed up the participants two months after the intervention, and analyzed data using SPSS Statistics 22.0.

RESULTS In the present study, scores of all model constructs were significant between the two groups after the intervention, except for positive prototypes of non-hookah users ($p < 0.001$). The greatest effect of the intervention was on reducing the positive attitude (-3.42 ± 5.7) and reducing the willingness to use hookah (-3.35 ± 5.1). After the intervention, the comparison of hookah use frequencies was significant among the participants in the experimental and control groups in the last month and now ($p = 0.03$).

CONCLUSIONS The research results indicate that the educational intervention based on the Prototype Willingness Model (PWM) was an appropriate educational strategy for reducing hookah use in male adolescents.

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INTRODUCTION

Tobacco consumption has become an epidemic worldwide and it will result in the deaths of 10 million people per year in 2030, and most of them will happen in developing countries¹. Hookah is a classic method of tobacco smoking and it dates back to more than 400 years. The younger age of smoking and the popularity of hookah among adolescents are major problems^{2,3}. The prevalence of hookah use is increasing due to the misconception about its safety, social acceptance, availability, low cost, and various flavors, in the world⁴. The results of a national survey on tobacco use indicated that hookah use increased among 12th-grade students in the United States from 17.1% for every 6 students in 2010 to 22.9% for every 4 students in 2014⁵. The prevalence of using hookah in women is higher than cigarette smoking. Negative views toward cigarette use and its unpleasant social image have made waterpipe smoking more acceptable and convenient than cigarette smoking^{3,6}.

Charcoal, which is used to heat tobacco, can increase health risks by producing large amounts of carbon monoxide, metals, and cancer-causing chemicals⁷. Adolescence is the most important and precious life period of every individual⁶. According to studies, most adolescents start using drugs at the age of 12 or 13 years and it starts with the use of substances such as cigarettes and hookahs that are available in society (legal substances), and gradually leads to the use of illegal substances such as inhalants and alcohol⁸.

Wrong attitudes and misconceptions in adolescents about hookah use are factors of their tendencies towards hookah. Studies indicate that education is an effective method of preventing substance abuse in society⁹. Not paying attention to psychosocial models and not using them in these programs are major reasons for the failure of educational programs⁶. Meanwhile, the education based on theories and patterns of health education is more effective in promoting smoking rejection skills and reducing its

consumption in adolescents^{4,10}. Evidence indicates that there are various structural and social factors in the creation of behavioral patterns of smoking and hookah use; hence, it is necessary to use theories of behavior change to analyze these behaviors^{6,11}.

In many behavioral theories and patterns associated with high-risk behavior based on the expected value approach, there is a logical assumption of the behavior and its conduct with a previous intention. The researchers' tendencies to use theoretical approaches, which divert the decision-making process from the path of logic, have increased, and most of them have used the Prototype Willingness Model (PWM) in adolescence^{6,11,12}. Given the few studies on hookah use in adolescents^{11,12}, it is necessary to design programs for preventing hookah use in adolescents. In this regard, Gerrard and Gibbons¹¹ have introduced a new concept, called Behavioral Willingness, as a part of the Prototype Willingness Model (PWM) to make unplanned decisions. According to this model, there are two hypotheses for deciding to perform a behavior: 1) conducting a behavior is an analytical process in which a person examines all aspects, and then acts like the theory of logical action and planned behavior; and 2) it is an exploratory process that uses mental ideas and willingness to make decisions such as social reactions. The second hypothesis seeks to investigate the unintentional behaviors without previous plans by the youth and adolescents¹³. Based on the Prototype Willingness Model, the individuals' positive attitudes to behavior and their perception of significant factors, which encourage to conduct a behavior, increases their behavioral willingness¹⁴. Even though behavioral willingness is linked to behavioral intention, willingness is an inherent characteristic and is distinguished from purposeful behavior through its reactions according to this model. Furthermore, people have prototypes of high-risk behavior, and their attitudes towards this behavior are directly associated with these primary prototypes⁴. Since health education is an essential pillar of all interventions to prevent the use of addictive substances among adolescents and its role in reducing the use of these substances has been emphasized in several studies, the present study aimed to determine the effect of an educational program based on hookah use prevention among high school male students using the Prototype Willingness Model (PWM) in Kermanshah.

METHODS

Materials and methods

The present research was a pre-test–post-test randomized controlled trial study in Kermanshah, western Iran on 83 high school male students (40 in the experimental group and 43 in the control group). For sampling, we first selected schools with a high prevalence of hookah use in the descriptive-analytical phase¹³, and randomly determined two schools, which were similar in terms of population, as experimental and control groups. There was a need for 30 samples per group according to an 80% power as well as the difference

between a mean score of 3 in willingness, and a standard deviation of 4, but finally, the sample size increased to 40 per group according to a loss of 20%.

Intervention

Before the educational intervention, schools and students were selected according to the sample size and were randomly divided into experimental and control groups, and the questionnaires were distributed among the groups, and the educational programs were performed according to the schedule.

At this stage, we used 8 members of the peer group as educational facilitators and group leaders among the groups to increase the impact of the scheduled educational program at the implementation stage and in the follow-up period. To this end, we selected the group leader according to the nomination of interested people, the group leader introduction by group members, teachers, and educators of the institute, and then we implemented a special educational program and the method of establishing proper communication with students.

According to the schedule and using the available educational facilities, we held educational sessions and a specific strategy model for each construct.

Implementation of the intervention

We presented an educational intervention for schools with a high prevalence of hookah use. The intervention was performed in 5 training sessions, each session consisting of 60 minutes. This intervention was performed over five weeks (one session per week). The educational sessions were held in the school's audiovisual room. After the educational sessions, reminder packages were sent to the intervention group via the virtual channel, and they included photo clips, educational video clips, pamphlet image files, booklets, and posters.

The control group did not receive any intervention program, but the educational content of the experimental group was provided for them after completing the post-test questionnaires due to the ethical principles of the research. To hold more effective educational sessions, the objectives of each session were included in the appendices using a regular Bloom pattern according to the learning domains. The questionnaires were re-completed through self-reporting by intervention and control groups two months after the last educational session.

Data collection tools

The data collection tool was a researcher-made questionnaire consisting of two parts: 1) demographic questions, and 2) questions about constructs of the Prototype Willingness Model and the method of completing the questionnaire by the self-reporting method.

We utilized the content validity indicator (CVI) and content validity ratio (CVR) to assess the content validity of

the questionnaire. To this end, we used the opinions of 15 health education and health promotion experts. To determine the content validity ratio, experts were asked to rate each question using a three-part scale, including essential, useful, but unnecessary, and unnecessary items. We selected the questions with CVR values above 0.49. Then, we assessed the content indicator by the criteria, including the relevance, clarity, and simplicity of each question and accepted values of higher than 0.79. The content indicator was evaluated according to the relevance, clarity, and simplicity of the questions.

We used internal consistency for evaluating the reliability of the questionnaire. Therefore, the initial version of the questionnaire was completed by 30 students, who had similar characteristics to the main research samples but were not the research samples, in a pilot study, and Cronbach's alpha coefficient was calculated for each construct.

Demographic and hookah use awareness questions

There were 27 questions about the self-reported background information, including age, field of study, grade, parents' jobs and age, the number of siblings, use of the Internet and computer games, having a history of hookah use by the student and parents, and having friends who used hookah, and suggestions and insistence on hookah use by friends, history of leaving home, and the reasons for the tendency to use hookah. The second part of the questions was about constructs of the Prototype Willingness Model.

Attitude

There were 10 questions about the attitude towards hookah use, and they were scored on a 5-point Likert scale from 'strongly disagree' to 'strongly agree'. The highest score of this section indicated the students' positive attitude towards hookah use. Its alpha coefficient was estimated to be 0.90.

Behavioral willingness

Questions about the willingness to use hookah included a scenario in which the student thought that they were among friends who were smoking hookah and were introduced by them to use hookah. There was a probability of four reactions

for the students to the question scenario. We used a 5-point Likert scale from 'never' to 'very high' with an alpha of 0.89. The higher score indicated the higher probability of hookah use as it was introduced by friends.

Prototype

The prototype questions described a hookah and non-hookah person and it included 14 questions that assessed the individuals in terms of intelligence, temperament, and personality on a 5-point Likert scale from 'very high' to 'never' with an alpha coefficient of 0.78. The highest scores in two separate sections for hookah and non-hookah individuals' traits indicated a positive prototype of students in the groups.

Abstract norms

The questions about abstract norms were about the acquaintances' expectation and attitude towards the hookah use and there were 8 questions on a 5-point Likert scale in two states from 'always' to 'never', and 'I never use' to 'I surely use'. Its alpha coefficient was 0.71 and was completed by self-reporting. The highest score for acquaintances' attitude towards the hookah indicated their positive views about the hookah use, and the highest score in the acquaintances' attention and influence indicated the acquaintances' effect on students' use of hookah.

Behavioral intention

There were 4 questions about the constructs of behavioral intention, for example, 'trying not to consume during life'. The questions were scored on a 5-point Likert scale from 'strongly disagree' to 'strongly agree' and its alpha coefficient was 0.91 and they were completed by self-reporting. The higher scores indicated the intention to use hookah.

RESULTS

The mean age of the experimental group was 16.42 ± 1.85 years and the mean age of the control group was 16.65 ± 1.79 years.

Table 1 shows no significant difference in the intervention and control groups between father's education (p=0.061),

Table 1. Distribution of underlying variables of students incase and control groups

| Variable Categories | Case group (N=40) | | Control group (N=43) | | p |
|---------------------|-------------------|------|----------------------|------|--------|
| | n | % | n | % | |
| Age (years) | | | | | |
| 16 | 24 | 60.0 | 21 | 48.8 | 0.188 |
| 17 | 15 | 37.5 | 16 | 37.2 | |
| 18 | 1 | 2.5 | 6 | 14.0 | |
| Father's job | | | | | |
| Employee | 2 | 5.0 | 10 | 23.3 | 0.001* |

Continued

Table 1. Continued

| Variable Categories | Case group (N=40) | | Control group (N=43) | | p |
|--|-------------------|------|----------------------|------|-------|
| | n | % | n | % | |
| Self-employed | 22 | 55.0 | 28 | 65.1 | |
| Worker | 16 | 40.0 | 5 | 11.6 | |
| Father's education level | | | | | |
| Illiterate | 14 | 35.0 | 9 | 20.9 | 0.061 |
| Primary | 10 | 25.0 | 16 | 37.2 | |
| Diploma | 16 | 30.6 | 18 | 41.9 | |
| Mother's education level | | | | | |
| Illiterate | 14 | 35.0 | 9 | 20.9 | 0.265 |
| Primary | 17 | 42.5 | 19 | 44.2 | |
| Diploma | 9 | 22.5 | 15 | 34.8 | |
| Living condition | | | | | |
| With parent | 34 | 85.0 | 39 | 90.6 | 0.733 |
| With mother | 6 | 15.0 | 4 | 9.3 | |
| Comparison of hookah use status | | | | | |
| Best friend | | | | | |
| Always | 3 | 7.5 | 5 | 11.6 | 0.118 |
| Sometimes | 20 | 50.0 | 12 | 27.9 | |
| Never | 17 | 42.5 | 26 | 60.4 | |
| Father | | | | | |
| Always | 1 | 2.5 | 2 | 4.7 | 0.097 |
| Sometimes | 8 | 20.0 | 10 | 23.2 | |
| Never | 14 | 35.0 | 15 | 34.8 | |
| I do not know | 17 | 42.5 | 16 | 37.2 | |
| Mother | | | | | |
| Never | 24 | 60.0 | 21 | 48.8 | 0.363 |
| I do not know | 16 | 40.0 | 22 | 51.2 | |
| Sibling | | | | | |
| Always | 1 | 2.5 | 0 | 0 | 0.75 |
| Sometimes | 5 | 12.5 | 6 | 13.9 | |
| Never | 19 | 47.5 | 18 | 41.8 | |
| I do not know | 15 | 37.5 | 19 | 44.1 | |

*p<0.05.

mother's education (p=0.265), living status (0.733), hookah smoking status in father (p=0.097), mother (p=0.363), siblings (p=0.75) and best friend (p=0.118) and this difference was significant only between the father's job (p=0.001).

Table 2 indicates the effectiveness of the educational intervention in correcting positive attitudes towards hookah, reducing the subjective norms encouraging hookah use,

reducing positive prototype of consumers, and reducing the behavioral willingness and intention of hookah use in the experimental group (p<0.05). There was a significant decrease in the mean scores of positive attitude toward hookah smoking (p=0.010), subjective norms about hookah smoking (p=0.001), positive prototype of hookahs (p=0.002), intention (p=0.001) and behavioral willingness (p<0.001) in the experimental group compared to the control group after

Table 2. Comparison of participants' scores of the constructs in the experimental and control groups before and after the intervention

| Prototype-willingness model variables | Groups | Before intervention | After intervention | Pair-t | p |
|--|---------------|---------------------|--------------------|--------|--------|
| | | Mean \pm SD | Mean \pm SD | | |
| Attitude | Case group | 18.8 \pm 6.9 | 15.38 \pm 3.8 | 3.75 | 0.001 |
| | Control group | 20.93 \pm 8.3 | 21.14 \pm 8.1 | -0.71 | 0.48 |
| | p | 0.21 | <0.001 | | |
| Subjective norms | Case group | 16.81 \pm 4.5 | 15.57 \pm 1.7 | 1.632 | 0.11 |
| | Control group | 18.01 \pm 4.2 | 22.11 \pm 3.3 | -5.04 | <0.001 |
| | p | 0.22 | <0.001 | | |
| Positive prototype of hookahs | Case group | 17.62 \pm 5.3 | 16.01 \pm 3.8 | 1.612 | 0.115 |
| | Control group | 18.65 \pm 5.7 | 19.02 \pm 5.6 | -1.75 | 0.09 |
| | p | 0.4 | 0.005 | | |
| Positive prototype of non-hookahs | Case group | 25.88 \pm 6.1 | 26.10 \pm 4.8 | -0.21 | 0.83 |
| | Control group | 23.6 \pm 5.1 | 23.53 \pm 4.8 | 0.39 | 0.7 |
| | p | 0.07 | 0.02 | | |
| Behavioral willingness | Case group | 8.42 \pm 3.9 | 5.08 \pm 2.5 | 4.19 | <0.001 |
| | Control group | 8.12 \pm 4.6 | 14.05 \pm 4.6 | -6.75 | <0.001 |
| | p | 0.75 | <0.001 | | |
| Behavioral intention | Case group | 6.82 \pm 3.4 | 5.45 \pm 1.7 | 2.83 | 0.007 |
| | Control group | 7.79 \pm 4.6 | 7.93 \pm 4.4 | -0.86 | 0.39 |
| | p | 0.29 | 0.001 | | |

Table 3. Comparison of the difference between of the constructs of the prototype willingness model in the experimental and control groups before and after the intervention

| Prototype-willingness model variables | Case group | Control group | t-test | p |
|---------------------------------------|-----------------|-----------------|--------|--------|
| | Mean \pm SD | Mean \pm SD | | |
| Attitude | 3.42 \pm 5.7 | 0.21 \pm 1.9 | 3.91 | <0.001 |
| Subjective norms | -1.22 \pm 4.7 | 4.12 \pm 5.3 | -4.8 | <0.001 |
| Positive prototype of hookahs | -1.62 \pm 6.3 | 0.37 \pm 1.3 | -2.004 | 0.048 |
| Positive prototype of non-hookahs | 0.22 \pm 6.7 | -0.07 \pm 1.1 | 0.28 | 0.78 |
| Behavioral willingness | 3.35 \pm 5.1 | 5.93 \pm 5.7 | -7.77 | 0.001 |
| Behavioral intention | -1.83 \pm 3.1 | 0.14 \pm 1.1 | -3.04 | 0.003 |

the educational intervention (Table 2).

Table 3 indicates that the mean scores of model constructs were significant between the two groups in all constructs of the model after the intervention, except for the positive prototype of non-hookah users ($p < 0.001$). The greatest effect of the intervention was on the reduction of positive attitudes (-3.42 ± 5.7) and reduction of willingness to use hookah (-3.35 ± 5.1).

DISCUSSION

The present study aimed to determine the effectiveness of an educational program in preventing hookah use in high school adolescents using the prototype willingness model (PWM). The significant reduction of mean scores of positive attitude towards hookah use in the experimental group after the intervention, in comparison with the control group, indicated the effect of the educational intervention and the

result was consistent with other studies¹⁵⁻¹⁷. The research results indicated that a positive attitude towards hookah use could decrease by implementing appropriate educational interventions. Adolescents believed that hookah use was less addictive and harmful than smoking cigarettes, and thus their perception might lead to more hookah attraction, reluctance to quit, and continued use in adolescents; and smokers were less likely to perceive the risk of hookah use¹⁸. Tobacco prevention program (alcohol, cigarettes, WP, and other drugs) was effective in reducing the positive attitude towards tobacco⁶.

After conducting the intervention in the present study, there was a significant reduction in hookah users' positive prototypes in the experimental group in comparison with the control group, but there was no significant difference between the experimental and control groups before the intervention. Behavioral prototypes are considered as one of the most important assumptions of the prototype-willingness model, in which adolescents have clear social prototypes of the types of people of their age who engage in specific risky behaviors. Aspects of adolescents' prototypes of tobacco users (e.g. being independent and attractive) are exciting for teenagers. Therefore, one of the reasons that they start smoking is achieving some of these characteristics^{14,4}. According to adolescents, inexperienced smokers were very popular and attractive among their peers, and they were also independent and had high self-confidence. Positive prototypes for high-risk behaviors increased the intention to do that behavior, and they were effective in creating the willingness to high-risk behaviors^{19,13}.

In the present study, the positive prototype scores in non-hookah users increased in the experimental group after the intervention. In the study of Bashirian et al.⁴, the social reaction was important in smoking behavior among adolescent non-smokers, and the theoretical understanding of the prototype and willingness to avoid smoking was effective among adolescent non-smokers.

Depending on the living conditions and places, people have positive or negative prototypes of cigarette smokers, and their prototypes are effective in creating the willingness to smoke, and it indicates the necessity of interventions for the individuals' prototypes and willingness^{3,20}. In other studies, mental prototypes were major predictors of behavioral willingness¹⁴ and there was a significant relationship between negative prototypes for hookah use and willingness to avoid it^{6,21,22}.

The research findings indicated no significant difference between the scores of willingness to use hookah in the experimental and control groups before the beginning of the study. In other words, there was the same level of willingness to use hookah in the experimental and control groups at the beginning of the study, but there was a significant difference between scores of willingness to use hookah in the experimental and control groups after the intervention.

The willingness to use hookah significantly decreased in the intervention group in comparison with the control group. The effect of the intervention on 'rejection of suggestion of hookah use despite its presence in the place' was higher than other components. In studies by Abedini et al.²³ and Bashirian et al.⁴, there was a significant relationship between negative prototypes for hookah use and willingness to avoid it and positive or negative perceptions were effective in creating the willingness to consume²². Ignorance and the perception that hookah is less harmful than cigarettes among adolescents cause a greater willingness to use hookah^{18,24,25}. In the study by Noonan²⁶, perception may lead to more hookah attraction, reluctance to quit, and a tendency to continue its use in adolescents, and cigarette smokers probably have a lower perception of hookah use risk. According to the results, the scores of social norms encouraging hookah use decreased significantly in the experimental group compared to the control group. There was a significant difference between parents' and teachers' scores of social norms in the experimental and control groups after the intervention, but there was no significant difference between scores of two components, the best friend and other friends, after the intervention in comparison with the pre-intervention. The significance levels of the two components as motivators for hookah use decreased in comparison with the pre-intervention. Subjective norms are significant determinants and predictors of hookah use^{23,27}. A study by Joveini et al.²⁸ emphasized the weakening of norms as an obstacle to quitting hookah use. In various studies, friends who used hookah were effective norms in hookah use from the students' points of view^{29,30} and desirable normative beliefs were associated with higher intention to use⁶; and mental norms encouraging hookah use predicted behavioral intention and willingness²³. The presence of hookah users among family members had a significant effect on increasing the prevalence of consumption³¹. The social learning theory emphasizes interpersonal factors in explaining drug use. Adolescents acquire their beliefs about high-risk behaviors from role models, especially from close friends, relatives, and parents⁴.

A review of studies indicated that friends, parents, and teachers, were very effective norms in the tendency or non-tendency to use hookah among adolescents and young people and should be considered in educational interventions for high-risk behaviors^{2,6}.

According to the results, the difference in mean scores of intention to use hookah was not significant before the intervention, but there was a reduction of behavioral intention in the experimental group compared to the control group. There was also a statistically significant difference in behavioral intention of both groups. The changes in mean scores of the experimental group (before and after) indicated the effectiveness of the intervention. Three studies found that 52.6%, 30%, and 9.3% of students intended to use hookah, respectively³²⁻³⁴. The intention increases by

increasing level of willingness and behavioral willingness and intentions as the two predictors are appropriate for behavioral change⁴. The results indicated the significant mean scores of the constructs except for positive perception of non-hookah smokers in other constructs of the model after the intervention between the two groups, and the greatest effect of the intervention was to reduce the positive attitude and reduce the hookah smoking willingness.

In addition to the above, using web-based interventions is a good educational strategy for prevention of hookah smoking in adolescent females⁴. So that an intervention was performed based on the prototype willingness model and the results showed that significant difference in reducing the behavior of hookah smoking between the intervention and control groups after the educational intervention among adolescent females⁴.

Limitations

One of the limitations of the present study is that due to the educational calendar as well as the educational level of the target group students, it was not possible to extend the follow-up period. Also, cigarette smoking was not questioned among the participants, which is suggested to be considered in future research. Due to the vulnerability of adolescence, conducting this study among male adolescents shows that the implementation of educational interventions can help change the attitudes and perceptions of adolescents.

CONCLUSIONS

Given the use of the prototype willingness model (PWM) in the implementation of educational programs in the present study, the intervention results indicated that the use of the model in educational programs was effective in reducing positive attitudes and perceptions of hookah use that were important predictors of willingness and intention to hookah use. It could decrease the abstract norms encouraging hookah use, including school teachers and parents, among students due to rejecting the offers by the adolescents' relatives, especially the peer group, by acquiring four skills, namely self-awareness, interpersonal communication, problem-solving, and power of saying no.

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CONFLICTS OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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ETHICAL APPROVAL AND INFORMED CONSENT

This study was approved by the Hamadan University of Medical Sciences' institutional review board and Ethics Committee (IR.UMSHA.REC.1394.477). The participants gave informed consent.

DATA AVAILABILITY

The data supporting this research are available from the authors on reasonable request.

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed.

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