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Effectiveness of an educational intervention based on theory of planned behavior to reduce intentions to smoke among secondary school students

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Abstract

Beliefs about smoking are considered important predictors of smoking behavior among adolescents. The aim of the current study was to evaluate an educational program based on theory of planned behavior (TPB) at reducing intentions to smoke among adolescents. In a quasi-experimental, 150 students were selected using multistage sampling procedure from boy-specific high schools in Qazvin and were randomly assigned either experimental (n=75) or control group (n=75). A self constructed questionnaire was administered consisting of demographic and the theory of Planned Behavior (TPB) constructs (i.e. attitudes towards smoking, subjective norms, perceived behavioral control and intention to smoke). The educational program was developed based on results arose from pretest and was delivered on the experimental group within four sessions. The randomization unit was the school. Both experimental and control groups were followed up after three months of educational intervention. Data was collected before and three months after the educational intervention and then inputted into SPSS-16 and were analyzed using descriptive analyses, Chi square test, Mann-Whitney test, Wilcoxon test and independent t-test. The educational intervention resulted in improving for attitudes, subjective norms, perceived behavioral control and intention in the experimental group. While, in the control group, there was no significant improvement in terms of the TPB constructs. The results suggest that an intervention based on the TPB could be reduced intentions to smoke among students and to prevent smoking behaviors can bring about promising results among adolescents and preventive strategies based on the TPB can be used to designing of school-based programs.

Keywords: Adolescent, Education, Health Behavior, Intention, Smoking

Introduction

Smoking causes many diseases including types of cancer, premature birth in smoking parents, pulmonary diseases, cardiovascular diseases, gastrointestinal diseases, and periodontal diseases in humans [1,2]. The second cause of death after hypertension is smoking, which generally comprise 12% of deaths and is a major

reason of disablement [3]. According to World Health Organization forecast, 8,400,000 people will die per annum until 2020 due to tobacco-related diseases. However, two thirds of these deaths occur in developing countries [4]. Smoking, especially at young ages, is prevalent and dangerous and exposes adolescents to unsafe and health threatening acts like drug

abuse [5]. The age of beginning smoking among different strata in society, especially students, is descending [6]. This emphasizes the necessity for focusing on preventive interventions in adolescence ages [7]. If smoking does not begin in adolescence period, the probability for becoming a smoker will decrease. Moreover, the probability for smoking cessation has an inverse relationship with the age of beginning smoking [8]. Studies have shown that irregular smoking in adolescence ages significantly increases the risk of becoming a smoker in adulthood [9]. Addiction to cigarette does not belong to specific strata or groups, but adolescents and youths are the most vulnerable groups [10]. Various domestic studies have emphasized on high prevalence of smoking among adolescents, as Karimi et al. reported the prevalence of smoking in adolescents as 46% [11]. Furthermore, Mohhamadkhani found that 29.8% of male students and 7.5% of female students had a history of smoking [12]. The prevalence of smoking in studies by Mohammadpour and Tavakolizadeh was reported as 23% and 14%, respectively [13,14]. Moreover, as smoking cessation is difficult, it must be prevented or decreased [15]. Training as a key element of health promotion programs is much emphasized in changing and improving unhealthy behaviors. To facilitate behavioral changes, training is an effective start. Health educators should consider factors that specifically affect students' behavior. These factors determine the objectives of training programs precisely. It is noteworthy that the value of training programs depends on their effectiveness, which largely depends on the proper application of theories and models [16]. Theories are effective in designing interventions in different ways such as increasing health behavior understanding, conducting studies, and facilitating transfer of an intervention from a health-related subject, geographical district, or health treatment environment to other subjects, places or settings [17,19]. Various interventions have been designed for prevention of smoking, but few theories have described the processes involved in this regard. Currently, over 30

psychological theories of behavioral change exist [20], and consequently, selecting the most appropriate theory would be difficult. Therefore, for determining the effectiveness of theories in long-term prevention of smoking in adolescents, present theories must be examined. A review of studies performed in Iran with the aim of training and preventing smoking in adolescents showed that most of the studies have been successful in prevention and used health belief model in training. For instance, Sharifi et al. [21] and Rahnavard et al. [22] could significantly increase preventive behaviors, using the above-mentioned model. Besides capabilities of each model, certain theories and models of behavioral change have specific potentials for changing special behaviors like smoking. Various studies show that the theory of planned behavior have been largely used in different groups in order to predict, intervene, and prevent behaviors related to smoking cigarette and tobacco, and results of these studies recommend use of the model [23,25].

Theory of planned behavior (TPB) is a well-known model of behavioral change. TPB is a social-cognitive model of expectancy-value suggesting that intention is the main determinant of behavior. Intention is under the influence of three independent constructs including attitude, subjective norm, and perceived behavioral control. Attitude shows individuals' positive or negative assessment of performing a behavior. Subjective norm implies that perceived social pressures may make an individual perform or not perform a specific behavior. Finally, perceived behavioral control refers to individuals' perceptions of their ability to perform a specific behavior, which is assumed to affect the behavior directly and indirectly. The theory of planned behavior shows that people intend to do a behavior when they assess it as positive and believe that certain important and influential people think that they must perform the behavior, and assume that performing the behavior is under the control of those people. In addition, the theory presumes that attitude,

subjective norm, and perceived behavioral control are determined by their underlying beliefs [26]. According to a review of theories and models by Armitage and Arden, TPB is the most complete and appropriate theory for examining behavior [27]. Different studies emphasized on predictive power of TPB about smoking [28,31]. Many researchers are interested in applying TPB in interventions related to health behaviors due to its characteristics such as effectiveness in various metaanalyses, conciseness and universality of its components and a precise guideline for measuring constructs, the possibility of accurate measurement of intervention's outcomes, and its application for a wide range of behaviors [32,33]. Regarding the above items, the present study was conducted to examine the effect of TPB-based training intervention on reduced smoking intention among adolescents.

Method

This randomized controlled quasi-experimental study was conducted in Qazvin in 2012. The study population was all the first year students of a boys' secondary school in Qazvin, Iran. The inclusion criteria included voluntary participation, no history of smoking, and having no specific disease. The exclusion criteria included being unwilling to continue participating in the study and failure to attend any of the training sessions. However, no sample was excluded from the study. All the participants signed a written consent form and they were ensured of confidentiality of their information. Moreover, the training intervention was provided to the control group after the study was completed and the posttest data were collected. The data were collected before the training intervention and 3 months after.

According to Rakhshani et al.'s study [34], sample size of the present study was estimated 75 people in each group based on the formula for comparison of two means, confidence interval of 95%, dropout rate of 10%, and test power/rigor of 90% (regarding mean and standard deviation of 4.1 and 39.90, respectively for the experimental group, and

4.0 and 37.47, respectively for the control group). Furthermore, the participants were selected using multistage cluster sampling. In this respect, Qazvin was divided into three sections based on its socioeconomic status. Of each section, one high school was selected for the study. The high schools were randomly divided into two groups; 3 high schools in the experimental group and 3 high schools in the control group. To comply with research ethics, the objective of the study and confidentiality of the information were explained to the students, and the students participated in the study upon acquisition of required information and consent.

Instrument of the study was a self-administered researcher-made questionnaire, which was finalized based on a review of scientific sources, confirmation of face and content validity by running a pilot, comments of a panel of experts (consisting of 9 experts in health education, psychology, and nursing), and determination of the reliability coefficient by completing a questionnaire in a 3-week interval among 15 students (who were randomly selected but excluded from the main experiment). In this respect, instrument of the study consisted of the following parts: a demographic questionnaire for age, economical status, parents' educational level and occupational status, and the history of smoking in relatives and friends. The second part included questions for measuring constructs of TPB. To do so, the underlying beliefs of attitude, norm, intention, and perceived behavioral control were determined directly and indirectly based on Ajzen's suggestion [35]. The key beliefs were deduced from a 20-student sample through interview. Questions of the interview were about positive or negative outcomes, influential social factors, and facilitating or inhibiting factors for smoking. Finally, the behavioral intention was measured by 3 questions with appropriate internal consistency coefficient and test-retest coefficient ($\alpha=0.86$, $P=0001$, $r=0.91$). Attitude was measured directly by 4 items based on 5-point Likert scale.

Moreover, in assessing attitude indirectly, 6 behavioral beliefs were used, which resulted from the probability perceived from major outcomes (e.g., If I don't smoke, I will feel I take a positive step toward my wellbeing) and the assessment of these outcomes (e.g., I enjoy doing positive things for my wellbeing). The Cronbach's alpha ($\alpha=0.83$) and the test-retest coefficient ($P=0.0002$, $r=0.81$) indicated the appropriate internal consistency and reliability of this construct. Subjective norm was measured directly by 3 items. To do so, students were requested to tell their opinion about each sentence (e.g., my friends ask me, they like I smoke) using 5-point Likert scale starting from "totally disagree" to "totally agree" for scores of 1 to 5. Furthermore, 4 normative beliefs were used to reflect the effect of family, friends, health experts, and teachers. The social pressure perceived from these figures was measured through 5-point Likert scale (1= I shouldn't smoke to 5= I should smoke), and motivation of following these figures was also assessed under similar condition (1= Not at all to 5= very much). The Cronbach's alpha and the test-retest coefficient for the mentioned construct were 0.94 and 0.86, respectively. To measure the perceived behavioral control, 6 questions were used directly on the basis of Likert scale (1= It is unlikely to 5= It is quite possible). For instance, "When I have all these stresses, it is difficult for me not to smoke." The Cronbach's alpha and the test-retest coefficient for the mentioned component were 0.82 and 0.80, respectively. Finally, behavior was assessed by 5 questions based on a self-report. All the questions were measured through 5-point Likert scale.

The training program was designed based on TPB constructs for 4 sessions of 45- 60 min. The training program was planned based on results of the pretest and TPB constructs and performed on the experimental group. The first session, which was held in the form of a lecture and questions and answers, emphasized on the awareness about the outcomes of smoking, the impact of cigarette on mood and irritability, effects of smoking on sensory systems, false beliefs about the specious consequences of

smoking such as its effectiveness in weight loss, relaxation, refreshment, thrill-seeking, and reduced fatigue. The second session emphasized on the negative position of smokers, specific social relationships of smokers, disapproval of reference groups, collective commitment to avoid and reduce social attractiveness, and other positive and negative norms about smoking. The third session involved life skill training with emphasis on individual capabilities, values, indentifying barriers and proposing solutions through brainstorming, identifying difficult situations and ways of dealing with them, and increased self-efficacy with reliance on a sense of responsibility. In the third session, during the process of role playing, the students modeled dealing with high-risk situations and stressful issues. Moreover, the strategy of motivational interview was performed on the students through the following procedures: a) assessment of students' motivation and confidence, b) elicitation of barriers, concerns, and positive self-motivational statements about avoiding cigarettes, c) review of pros and cons of behavior, d) preparation and presentation of a list containing options and solutions, and finally e) explanation of behavioral commitment and a brief description of the consulting session. The motivational interview lasted 25 min. Meanwhile, every student was given a pamphlet about consequences of smoking. The data were analyzed by SPSS 17.0 software, and descriptive statistics and analytical statistics including Chi square (to determine the frequencies observed in the range of expected frequencies), Mann-Whitney test and independent t-test for comparison of the means of two independent groups, paired t-test, covariance analysis, and Wilcoxon for comparison of one group's mean in two intervals. The significance level was set at $P<0.05$.

Results

The mean age of the participants was 15.3 ± 0.62 . The results showed that 7.6% of

fathers and 0.9% of mothers smoked. Moreover, 14.3% of the students reported that there were some smokers among their close friends. There was no significant difference between the experimental group and the control group in terms of the mentioned variables and also other variables such as parents' educational level and occupational status, place of residence, and economic status.

Table 1 shows that mean score of attitude in the experimental group after intervention significantly changed as compared with that before intervention ($P < 0.001$). However, no significant difference was observed in the control group in terms of mean score of attitude before intervention and after intervention ($P > 0.05$).

Table 1 Mean score of TPB constructs in both groups before and after intervention

Variables	Control		Experimental	
	Before intervention	After intervention	Before intervention	After intervention
Attitude	34.36± 16.62	33.91± 16.22	34.87± 14.21	67.45± 13.86**
Subjective norm	33.68± 11.65	33.93± 11.09	32.04± 10.01	68.61± 12.44**
Perceived behavioral control	43.56± 10.91	42.6± 11.93	41.31± 11.59	81.29± 14.23**
Behavioral intention	7.86± 2.39	7.72± 2.23	7.21± 2.21	13.16± 1.93**

Data are reported as mean and standard deviation.

Results of the paired t-test in each group before and after intervention are as follows: * $P < 0.05$

Results of the covariance analysis in each group before and after intervention are as follows: * $P < 0.05$

Results in Table 1 do not show a significant difference between the experimental group and the control group in terms of the subjective norm before the training program. However, after intervention, the difference between the experimental group and the control group in term of the subjective norm was significant ($P < 0.001$). There was a significant increase in mean score of subjective norm in the experimental group ($P < 0.001$), but no significant difference in the control group. After performing the training intervention, mean score of perceived behavioral control in the experimental group increased significantly ($P < 0.001$), whereas no significant difference was observed in the control group in terms of the mentioned variable. Detailed results are shown in Table 1. In respect to behavioral intention, no significant difference existed between both groups before intervention, whereas mean score of the variable after intervention was significant without a change in the control group, and significantly increased in the experimental group (from 7.21 to 13.16, $P < 0.001$).

Results in Table 1 indicated that mean score of behavior in the experimental group after intervention increased significantly as compared with that before intervention ($P < 0.001$). In

this regard, no significant difference was observed in the control group before and after intervention (12.05 and 11.96, respectively).

Discussion

Results of the present study showed that TPB-based training intervention could remove students' smoking intention. Therefore, this study revealed that performing health training based on TPB was effective in promoting the intention of preventing smoking among students.

The results showed a significant difference in students' attitude toward smoking in the experimental group ($P < 0.001$), which agreed with those of the previous studies [6,23,28,35,39]. Various studies have shown a correlation between behavior and attitude. In other words, most of attitudes are considered as antecedents. Thus, fundamental understanding of attitudes related to smoking is essential as a strategy for changing unhealthy behaviors like smoking [40,41]. Adolescents' positive attitudes toward smoking is the main determinant of their intention for smoking, and adults' and adolescents' awareness of adverse consequences of smoking make them avoid or reduce smoking [42,43].

Establishment of an appropriate attitude toward a health problem, in terms such as perceived susceptibility or perceived severity, is a key step toward encouraging and motivating people to adopt healthy behaviors. Training programs must devote a part of their activities to promote students' perceived vulnerability to smoking. Sometimes, failure to provide necessary training may reduce attitudes to the extent that people's susceptibility toward health-threatening issues decreases. Therefore, it is necessary to create motivation required for safe changes through training interventions and emphasis on changing people's attitudinal foundations by effective methods. However, in training interventions, creation of excessive fear must be avoided while emphasizing on susceptibility and severity of the subject because people's excessive fear put them in fear control process not in risk control process [44]. In such a process, students are not expected to adopt healthy behaviors preventing health problems.

Therefore, it can be concluded that group training with emphasis on families' and society's support for resistive behaviors against smoking could improve the social norm variable, which is a psychological mediator of smoking intention ($P < 0.001$). The school itself is an important factor in the development or prevention of drug abuse and delinquency and as an influential institution determines adults' and adolescents' quality of life and behaviors. Besides the school, family as the fundamental unit of society and main center of human's development and progress, which plays the major role in education, has been passive in spreading awareness and training key issues, especially hazards of smoking [45,46]. Having designed the training program in the form of subjective norms and held sessions of group discussions with reliance on normative beliefs, the present study could develop a mindset in students that their behaviors are monitored by significant others or reference groups. Because risky and unhealthy behaviors start in the age range of 12-16 years, this period is the best time for establishing positive behavioral changes. In establishment of the

changes, parents' engagement or formation of peer groups may have a high efficiency. The most important influential factor in reduced addiction and smoking among adults and adolescents, based on their opinions, included parents' involvement in education, logical control, appropriate relationship with children, reduction of family disputes, not smoking at home, involving adolescents in family decision-making, and paying attention to adolescents' independence [47]. The framework of future interventions should use the peer group approach to facilitate learning. This approach is an effective strategy in prevention of diseases and increase students' self-confidence. Peer groups have been the most influential in adolescents' performance in all fields, and this influence may be undeniably positive or negative. Adolescent educators transfer information more easily because they have common features (age, sex, etc.) with their audience and are very similar to them in terms of their characteristics [48]. In such condition, generally, the authority and domineering among the group members are little, and interaction, consensus, and unanimity between groups are impressive [48]. Personal efficacy is a component that reflects people's belief in their ability to do a responsibility. It is believed that people's perceptions affect their future efforts in doing the responsibility. Results of the study showed that perceived behavioral control, which includes perceived self-efficacy, increased considerably after training in the experimental group ($P < 0.001$), which conforms to the results of other studies [27,49,50]. Self-efficacy is the most powerful construct in prediction of people's behavioral changes. Therefore, self-efficacy changes occur following successful and active participation of people to maintain safe behavior. However, self-efficacy may play the role of a behavior changing factor. The reason is that, normally, people with more behavioral changes are at higher level of self-efficacy in doing a specific behavior [51,52]. In adopting healthy behaviors to prevent smoking, students are exposed to a broad

range of real or perceived barriers including physical, psychological, environmental, and normative barriers. Thus, training programs must emphasize on environmental factors besides the individual because some barriers are out of the individual's control. In the present study, the training intervention could adjust the behavioral intention, based on TPB components ($P < 0.001$). The results of this part of the study are comparable to those of domestic studies that used health belief model and meta change to change behavior and prevent smoking in different age groups [30,35,38,50].

Despite positive points of the present study, it has limitations: Firstly, the assessment period of the consequences was only 3 months after the intervention, which can be prolonged in future research in order to assess consequences of training better. Secondly, although designing training interventions and presenting them by trainers are very efficient, they are costly and providing training to students by a health expert is not always possible. In this respect, designing printed and electronic self-learning programs on the basis of behavioral change models is suggested in order to generalize trainings and reduce costs.

Conclusion

Regarding the necessity for changing health training programs in schools in compliance with educational and behavioral models, broad investigations must be done in the area of behavioral change and psychological models. Learning health knowledge, attitudes, and behaviors begin in early ages. Thus, performing programs for prevention of smoking in schools on the basis of models whose efficiency has been well proved, such as TPB, at early ages and repeating the trainings in adolescence period play an important role in prevention of smoking. Future researchers can make advantage of the TPB when designing training materials and performing training interventions in order to identify and design framework of interventions.

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Contributions

Study design: IMZ, AHP

Data collection and analysis: IMZ, AHP

Manuscript preparation: IMZ, AHP

Conflict of interest

"The authors declare that they have no competing interests."

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