

# Waterpipe smoking in the male college students: an education intervention using theory of planned behavior

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## Abstract

In the world, the trend of increasing waterpipe smoking was more than the cigarettes. The aim of this study was to determine of effectiveness of an educational intervention based on theory of planned behavior (TPB) to reducing waterpipe smoking in the male college students who were living in dormitories of Tehran University of Medical in 2011. In quasi-experimental study, 90 university were selected by random sampling method. Data collection was performed by designed questionnaire based on TPB constructs and demographic variables. The participants filled out questionnaires before the intervention. Education intervention was designed according to pre-test results and performed for intervention group. Two groups were followed- up two-months after completion of intervention and filled out questionnaires again. The collected data were analyzed by SPSS software, Chi-Square test, One-way ANOVA, independent-samples T test and Student's paired-samples t test. Findings of the present study showed that there were significant differences between the mean score of attitude, behavioral intention, subjective norms and perceived behavioral control in the experiment group compared with the control group after intervention. In addition, significant reductions in the frequency of waterpipe smoking were observed in the intervention group as compare to the control group. The results showed that developed educational intervention based on TPB constructs can be modified positive perceptions of college students toward waterpipe smoking and also reducing of smoking it.

**Keywords:** Behavior, Education, Student, Waterpipe

## Introduction

Statistics show that prevalence of Waterpipe use in the world is very high [1]. A study in Iran showed that waterpipe smoking has increased from 35.5% in 2003 to 40.9% in 2005 [2]. In Iran, 11.5% of females and 28.7% of boys smoke waterpipe [3]. Studies showed that prevalence of waterpipe use is high in countries such as Syria [4,5]. Since 1990, a sudden increase has been happened in waterpipe smoking among different countries. This period coincides with introduction of flavored (fruity) tobacco, whose mild smoke and misconception about their safety has promoted higher

waterpipe use [6,7]. In vitro studies have revealed toxic products resulting from smoking waterpipe including: carbon monoxide, formaldehyde, nitrogen, nitric acid and nicotine [8,9]. Lung cancer and other chronic diseases such as cardiovascular and respiratory diseases, and infectious diseases (such as tuberculosis) are related to waterpipe smoking [10,11]. It is considering that in recent years, the trend of waterpipe smoking was higher than cigarette [12, 13,14]. As opposed to cigarettes, waterpipe uses in public places such as restaurants or cafés and with friends and family [14]. The differences between

waterpipe and cigarette are associated with a wide range of characteristics such as duration and frequency of use, type of used tobacco, and volume of inhaled smoked [16]. In this study, the used theoretical framework to evaluate students' belief and perceptions to reduce frequency of waterpipe use was Theory of Planned Behavior (TPB) [17]. According to this theory, the best predictor of individual's behavior is their intention for doing behavior. In this theory, behavioral intention is influenced attitude, subjective norms and perceived behavioral control constructs [17]. TPB is one of the behavior change theories for predict different health behaviors. This theory contains constructs and variables ranging from encouragement, intention, and display of behavior and its validity has been experimentally confirmed in many studies [18,19,20]. Given the increase of prevalence of waterpipe use among college students and its many complications, it is necessary to designing multiple interventions to modify students' perceptions and beliefs about waterpipe smoking. It is considering that to our knowledge, conducted studies in Iran have mainly focused on descriptive investigation of prevalence of waterpipe use among students [21,22,23], and no education intervention based on theories of behavior change has been designed for reducing waterpipe smoking. Thus, the present study was conducted with the aim to determine the effectiveness of an education intervention based on TPB variables to reducing waterpipe smoking among male college students in dormitories of Tehran College student of Medical Sciences in 2012.

### **Method**

This quasi-experimental study was conducted on 90 male college students living in the dormitories of Tehran College student of Medical Sciences (experiment group=45, control group= 45) in 2012. In this study, multi-stage sampling method was used. Given the calculated sample size, 4 male dormitories of Tehran College student of Medical Sciences were randomly selected. Two dormitories were assigned as the experiment group and two dormitories as the control group. Then, 22 college students were selected from each dormitory. The selection criteria in this study were: volunteer participation, not having the diagnosis of disability or mental and physical diseases, and positive history of waterpipe use in the past 3 months. In this study, data collection tool was a researcher-designed

questionnaire in the two sections. The first section was associated with assess demographics variables (24 items). The second section was associated with assess TPB constructs directly and waterpipe smoking. To designing second questionnaire, developed guideline of the TPB was used [24]. Finally, intention with 2 items, attitude with 4 items, subjective norms with 4 items, and perceived behavior control with 4 items were assessed using a seven point rating scale (from Strongly agree to Strongly disagree). After developing the questionnaire, it was reviewed by 16 college students. Their comments on understandability, clarity, and simplicity of items were reviewed and edited (face validity). Reliability of the questionnaire was assessed using test-retest method (with a 10-day interval between tests). Validity of the questionnaire was assessed quantitatively. In order to, Content Validity Index (CVI) and Content Validity Ratio (CVR) of items were determined by a panel of experts (10 experts in health education). Test-retest correlation coefficient was 0.78 ( $P<0.03$ ) for intention, it was 0.70 ( $P<0.05$ ) for attitude, it was 0.76 ( $P<0.01$ ) for subjective norms, and it was 0.92 ( $P<0.001$ ) for perceived behavioral control. CVR of the instrument was .98 as a whole and CVI of it was .81. Next, sample size was calculated. Given the result of one previous study [25], confidence interval 95%, power of 80%, and standard deviation equal to 8.9, sample size was determined. Finally, 90 persons participated in this study (45 persons in each group). Designed educational intervention according to the analysis of pre-test results was implemented for the experiment group in four training sessions for 3 weeks. First session was an introduction to the risks of waterpipe use. Second session was focused on students' attitudes toward waterpipe smoking; third session was focused on influences of peers and roommates to reduce or increase waterpipe use, and the fourth session was held with the aim to increase students' perceived behavioral control of participants to reducing waterpipe use. At the end of training sessions, participants were received one education booklet about waterpipe smoking. Finally, two months after educational intervention, the questionnaire was completed by both groups again. Data were analyzed by SPSS software (version 18), student's paired samples t-test, independent-samples T test, Chi-square, and One-way ANOVA. In this study,  $P<0.05$  was considered significant.

**Results**

In this study, the mean age of the participants was 23.4(±2.6) years. 89% of participants in the experimental group and 89% in the control group were single. 28.9% of participants in the experimental group and 15.6 in the control group were smoking waterpipe and cigarettes together. 72.2% of waterpipe smokers in the experimental group reported that they had smoked waterpipe with their friends for the first time, and 35.6% had done this in traditional restaurants. 66.7% of waterpipe smokers stated that no one smoked waterpipe in their family. 22.2% of students currently smoke cigarettes. 94.4% of students preferred fruity waterpipe smoking. Demographic characteristics of students are presented in Table 1.

**Table 1** Mean and standard deviation of the variables

	Control group Mean(SD)	Experiment group Mean(SD)
Age	23.2(2.7)	23.5(2.58)
Birth order	2.75(1.2)	3.53(2.1)
Number of siblings	2.93(1.54)	4.33(2.24)
Cigarette use (per day)	0.84(2.1)	2.13(5.2)
Age at onset of waterpipe use	18.2(3.01)	17.4(3.2)
Frequency of waterpipe use (per month)	4.3(4.6)	7.3(2.2)

Independent t-test revealed that there was no significant difference between groups in age, number of siblings and age at onset of waterpipe smoking.

Results of the Chi-square test showed that there were no significant difference between groups in education level, marital status, parents' occupation, and parents' education level.

Independent t-test also revealed that there were no significant differences between groups in the mean scores of behavioral intention, attitude, subjective norms, perceived behavioral control, and the frequency of waterpipe use before intervention.

Mean and standard deviation of TPB constructs in the two groups are presented in Table 2.

Table 2 shows that significant increase occurred in the mean scores of intention (P<0.02), attitude (P<0.001), subjective norms (P<0.004), and perceived behavioral control (P<0.001) in the experiment group as compare to the control group after intervention. In addition, significant reduction was observed in the frequency of waterpipe use in the experiment group compared to the control group (P<0.006).

**Table 2** Mean scores of TPB constructs in the two groups before and after intervention

Variables	Control group		Experiment group	
	Before intervention	Two months after intervention	Before intervention	Two months after intervention
Behavioral intention	12.7± 4.4	12.5± 3.89	12.7± 5.1	14.5± 3.48*×
Attitude	16.9± 3.8	17.53 ±4.05	18.9± 4.4	21.04± 4.1*×
Subjective norms	17.15± 4.6	16.6± 3.5	17.8± 6.1	20.8± 4.06*×
Perceived behavioral control	16.8± 4.07	18.3± 6.2	17.8± 4.1	23.0± 9.5*×
Frequency of waterpipe smoking	4.3± 4.6	3.6± 3.2	4.3± 2.56	1.6± 2.46*×

Data have been reported as mean and standard deviation.

Student's paired samples t-test results for both groups, before and after educational intervention is: \*P<0.05

Independent-samples t-test results for both groups after educational intervention is: ×P<0.05

## Discussion

The present study was conducted with the aim to determine the effects of an educational intervention based on TPB on reducing waterpipe use among male college students. The results revealed significant changes in attitudes, subjective norms, perceived behavioral control, and behavioral intention in this experimental group compare to the control group after intervention.

The results of present study showed that the mean score of positive attitude about waterpipe smoking significantly decreased in the experiment group compare to the control group after intervention ( $P < 0.001$ ). These changes can be explained due to implemented training intervention for this group. This finding is consistent with Sohrabi *et al.* [27]. The relationship between attitude and behavior is complicated. They found that change in adolescents' attitudes toward cigarette smoking is the first step in process of addiction and prevention of spread of this disorder [28]. These results are consistent with similar studies [29,30]. Therefore, training college students can modify their inappropriate attitudes about waterpipe, and its adverse effects, not befriending waterpipe smokers, and learning skills to say NO for waterpipe use) toward waterpipe smoking at university dormitories. The results showed that there was significant increase in the mean score of subjective norms in the experimental group compare to the control group after intervention ( $P < 0.004$ ). Button *et al.* revealed that significant reduction in subjective norms for drug use in the intervention group after a cognitive-behavioral intervention [31]. In the present study, it is likely that presence of students' roommates and close friends enhance subjective norms associated with waterpipe use. College students that spend more time away from the family and in dormitories, naturally, peer pressure is high. Many studies on prevention of drug abuse have also emphasized holding out against peer pressures [31,32]. In fact, training life skills as one of the important strategy for preventing drug abuse may increase resistance of students

against peer requests for waterpipe smoking. In this study, 31.5% of waterpipe smoking students reported that first waterpipe was smoked with friends. In a study by Barikani, it was shown that 47% of people smoked their first cigarettes when offered by their friends [35]. In another study by Taraghi-Chah *et al.*, a significant relationship was found between waterpipe and cigarette smoking by friends and likelihood of smoking it by a person [21]. This results shows that families should more attention to their children's associates with friends. The results of present study revealed that the mean score of perceived behavioral control in the experiment group had significant increase compare to control group after intervention ( $P < 0.001$ ). This finding is consistent with Alahverdipour *et al.*, and Alistair *et al.* [34,35]. Literatures were shown that people with low self-esteem and self-control are more likely to be influenced by others to use waterpipe [31,36]. Therefore, training necessary skills to increase people's capacity to respond decisively to offers of waterpipe use may reduce addiction to tobacco and drug abuse.

The results of the present study showed that the mean score of behavioral intention in the experiment group significantly increased compare to the control group after intervention ( $P < 0.02$ ). This is indicative of the effect of intervention. This finding is consistent with Barati *et al.* [25]. Other similar studies have also shown a significant increase in behavioral intention after education intervention [37,38]. The present study showed that the frequency of waterpipe use in the experiment group had significantly decreased compare to the control group after intervention ( $P < 0.006$ ). This result is in line with Barati *et al.*, Karen *et al.*, and Grad *et al.* [39,26,40]. Therefore, given the increase of waterpipe use among college students, it is necessary designing and implementing education interventions to reducing waterpipe use for this population. The results of this study showed that 94.4% of students were used fruity tobacco. Maziak *et al.* concluded that flavored tobaccos play an

important role in popularity of waterpipe use among adolescents in Syria [40]. According to literature, one of the reasons for increase use of flavored tobaccos is people's misconception about their safety compared with natural tobacco [41]. Meanwhile, studies have shown that smoking waterpipe with fruity tobacco leads to lung cancer and other chronic diseases such as cardiovascular, respiratory and infectious [10,11]. Therefore, given the considerable increase in use of fruity tobaccos, conducting more researches about the effects and dangers of this product and their additives is essential. The results of study showed that 35.6% of students were smoked first waterpipe in the traditional restaurants. Maziak et al. showed that Syrian youths mainly were used waterpipe outside home and in their leisure time [42]. Therefore, legislations for prohibiting waterpipe smoking in public places such as traditional restaurants and cafeterias may significantly reduce access to this product. Another strategy is increasing price and taxes on tobacco production and sales, which should be more considered by relevant authorities.

This study was some limitations. First limitation was the lack of sufficient time and no followed-up participants for assessing quit waterpipe smoking after intervention. Second limitation was no study other college students such as female. More researches are needed for these groups in future. Furthermore, education interventions should be designed and evaluated using other behavioral change theories and models such as stages of change models to quitting waterpipe smoking in youth.

### Conclusion

The results of this study showed efficacy of designed training intervention based on TPB in reducing waterpipe use among university students. For designing educational interventions, more attention to change of positive attitudes of college students toward waterpipe use and increase of their perceived behavioral control is essential. Interventions also could heighten social pressures (through family and friends) to reduce waterpipe use by students.

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### Contributions

Study design: HJ, TD

Data collection and analysis: HJ, TD, MG

Manuscript preparation: HJ, TD

### Conflict of interest

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

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