

Application of Social Cognitive Theory to Prevent Waterpipe Use in Male High-school Students in Kerman, Iran

Abstract

Background: The growing supply and prevalence of waterpipe (WP) smoking among Iranian adolescents have become a concern for both families and policymakers. The aim of this study was to determine the factors underlying WP use and also to design an intervention program based on social cognitive theory (SCT) aimed to reduce the demand for WP smoking among male adolescents. **Methods:** This quasi-experimental study involved 189 high-school students in Kerman, Iran, who were split into two groups, an intervention group and a control group. A validated questionnaire based on SCT constructs was used to collect data. The intervention was performed over four sessions with a focus on preventing WP smoking. **Results:** Before intervention, the lifetime and current-use prevalence of WP smoking across both groups was 48.5% and 20.2%, respectively. In the intervention group, the most change was related to knowledge score from 10.70 ± 4.38 to 16.52 ± 3.89 ($P < 0.0001$) and outcome values score from 12.40 ± 3.81 to 13.53 ± 4.23 ($P = 0.007$); however, in the control group, no significant changes were seen in posttest scores. The scores for self-efficacy ($P = 0.21$), outcome expectations ($P = 0.09$), and environment constructs ($P = 0.06$) did not show any statistically significant changes after the intervention in both groups. Overall, there was no significant difference in the rate of WP smoking after the intervention. **Conclusions:** Based on the results of this study, although some construct scores showed significant differences after the intervention, there was no significant change in the prevalence of WP smoking. More effective educational interventions based on this theory but with a greater focus on self-efficacy and environmental influences may be warranted.

Keywords: Adolescent, social cognitive theory, student, waterpipe smoking

Introduction

Drug use, especially smoking, poses a major threat to the health of humans and communities and wastes, a substantial amount of human and economic resources.^[1]

Among the different methods of substance use, waterpipe (WP) is a traditional and conventional method for users and is not always legally prohibited. It is known by different names such as shisha, hookah, and narghile in different regions and cultures.^[2] Despite common belief, there are various side effects of WP use, including different types of cancer, cardiovascular disease, respiratory disease, and infectious disease. Tobacco smoke releases harmful toxins and heavy metals into the consumer's body, which can lead to the development of many disorders and diseases.^[3] More importantly, however, WP smoking and tobacco use can be a gateway to the use of other drugs.

Many studies in this field have revealed that a majority of drug users have previously used WP.^[4,5]

While WP smoking is common among adults, especially older men, this phenomenon is becoming an increasing trend among young people.^[6] Although health programs have led to a relative reduction in the prevalence of WP smoking among middle-aged adults, they have been unable to prevent the increasing trend and prevalence of WP smoking among young people.^[7,8]

Studies have shown that WP consumption is most common in the 15–24-year age group than in other age groups in Iran. This means that, despite the prevention programs run in the country, WP smoking is still threatening the health of adolescents and youths.^[1,2,5] Furthermore, adolescents who consume WP are more likely to use other types of substances, and it is more difficult to quit smoking for someone who began

Mohammadreza Rajabalipour, Hamid Sharifi¹, Nouzar Nakhaee², Abedin Iranpour¹

Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran, ¹HIV/STI Surveillance Research Center, and WHO Collaborating Center for HIV Surveillance, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran, ²Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Address for correspondence:
Dr. Abedin Iranpour,
HIV/STI Surveillance Research Center, and WHO Collaborating Center for HIV Surveillance, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.
E-mail: a.iranpour@kmu.ac.ir

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using tobacco in adolescence than someone who began when older.^[9-12]

The physical and mental health of youths is at risk, and it is imperative to have healthy, vigorous, and constructive human resources to ensure the future productivity of the country. Therefore, more attention should be paid to younger age groups and students to prevent the hazards associated with WP smoking.^[1,5,6]

The current literature suggests that patterns of tobacco smoking are linked to complex socio-structural processes, and theories and models are used to uncover the factors affecting this behavior.^[7,13] One of these models is the social cognitive theory (SCT). The structure of this model means that it can be applied to provide solutions to replace harmful health habits with new behaviors, in addition to helping explain factors that influence particular behaviors.^[14-16]

In Iran, few studies based on models of health promotion have been performed, particularly theories related to the prediction and prevention of tobacco smoking. The overall focus of tobacco prevention studies is almost always focused on cigarettes, while WP smoking is not usually the objective. However, WP is a more important risk factor than other tobacco products in Iran.^[10,11,13] The aim of this study was to evaluate the effectiveness of SCT for the prevention and reduction of WP smoking in students aged between 15 and 17 years in Kerman, Iran.

Methods

Participants and recruitment

This quasi-experimental intervention was carried out on 189 male students in Grade 10, who were randomly divided into two groups representing the intervention group (95 students) and the control group (94 students). The study was conducted in Kerman, a city in the southeast of Iran, from January 2016 to April 2016. The reason for choosing this specific group for the study is that they are in a critical transition period^[12] between the two levels of high school in Iran.

The sampling was performed using a multistage sampling method. First, Kerman city was stratified into two sections, east and west. In each stratum, the intervention and control groups were selected. This method was used to match the two groups for socioeconomic status. Two schools, with three classes for each school, were selected for the intervention and control groups. All students were included in the study if they met the eligibility criteria. The inclusion criteria were written agreement from the school authorities and willingness to participate in training sessions.

Instrument study

The instrument used for this study included a researcher-designed questionnaire based on SCT. This

questionnaire included three sections. The first was related to the demographic characteristics of the participants and included four items (age, number of family members, parental educational level, and economic status). The second part had questions related to constructs of the SCT, which included 46 items. These were all scored using a 5-point Likert scale (strongly agree to strongly disagree or very much to none) except knowledge which was scored with a yes and no scale. The third part included questions about WP-smoking behavior, which was scored on a yes-and-no scale. The items that made up each part were selected by in-depth review of the literature and the available tools, in addition to two-focus group discussions held with students ($n = 6$). For content validity, the primary version was discussed with a consensus panel made up of two researchers in the field of substance use, three specialists in health education and promotion, and two epidemiologists. On reviewing the items of the instrument, they commented on 50% of the items. Their proposed amendments to the questionnaire were implemented, and 100% consensus was reached at the end of the session. To determine face validity, and cultural appropriateness of the questionnaire, it was completed by seven students with different sociodemographic characteristics. In general, there were no major problems in reading and understanding the items by students.

The internal consistency of the questionnaire was determined by test-retest reliability and Cronbach's coefficient alpha. Alpha values of 0.7 or more were considered acceptable. The test-retest reliability was determined using the intraclass correlation coefficient (ICC) considering 95% confidence intervals. A sample of 33 respondents was interviewed 2 weeks after the first interview. The following ICC gauge was used to measure the level of agreement: an ICC value of ≤ 0.40 presented poor reliability, 0.40–0.75 indicated fair-to-good reliability, while a value > 0.75 demonstrated excellent reliability (agreement beyond chance).^[17] The ICC values for all constructs were > 0.68 (mean ICC ranged between 0.68 and 0.93).

Procedures and intervention

The educational interventions were designed based on the results of the pretest, which was based on the SCT constructs. The intervention was carried out in the intervention group for 30 days through 1 session/week lasting approximately 60 min. The constructs in which individuals scored the lowest were the focus of the intervention. The training methods included giving presentations and question-and-answer sessions, in addition to handing out pamphlets and booklets on WP and its side effects, group discussions about the causes of WP smoking among adolescents with an emphasis on self-efficacy, and situational perception. A film about creative-thinking and problem-solving in adolescents was shown to the group,

followed by a discussion. To change the environmental construct in the intervention based on SCT, three posters about the deleterious effects of WP were installed in the school during the study period, and health messages related to WP were broadcast from a speaker in the school yard (radio school) during break times. Messages were usually selected with the cooperation and supervision of school consultants.

To reduce the social desirability bias, one training session was held for students in the control group focusing on the harms of WP. Because scientific studies have shown that mere awareness about substance use cannot significantly influence it. During the intervention, no training program was conducted on hookah by school attendances in intervention and control schools. One month after the intervention, a final test was conducted in both groups.

Statistical analysis

We checked the normality of the data using Kolmogorov–Smirnov test. As the data were not normal in different groups, we used nonparametric tests. We used Mann–Whitney test to compare different construct (knowledge, outcome value, outcome expectations, etc.) between intervention and nonintervention groups. Moreover, we used Wilcoxon test to compare before and after construct scores. To compare demographic variables in intervention and nonintervention groups, we used independent *t*-test to compare the distribution of continuous variable (age) and Chi-square test to compare binary variables (paternal and maternal education level and income source). We used a McNemar's test to compare WP Smoking before and after in the intervention and control group. Moreover, we used a Chi-square test to compare WP smoking in the intervention and control group before and after intervention. We analyzed the data using IBM SPSS Statistics version 22 (IBM Corp., Armonk, N.Y., USA) and $P < 0.05$ was considered as statistically significant.

Ethical considerations

The proposal was approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1395.119). Written informed consent was obtained from all students after explaining the goals of the study and assuring their privacy. Questionnaires were designed to be anonymous with a private identification code. Before starting the study, the project was approved with coordination by the General Directorate of Education in Kerman.

Results

Of the 189 questionnaires, 172 (response rate = 91.05%) were considered appropriate and included in the analysis (83 questionnaires for the control group and 89 questionnaires for the intervention group). The average response time was about 10 min (range 8–12 min).

The mean age of participants was 16.39 ± 0.65 years in the intervention group and 16.10 ± 0.61 years in the control group ($P = 0.003$). Of the participants, 35 students (41.7%) in the intervention group and 52 students (58.4%) in the control group reported that their fathers had a college education degree ($P = 0.50$). Of the participants, 38 students (45.2%) in the intervention group and 50 students (56.2%) in the control group reported that their mothers had a college education degree ($P = 0.26$). Majority of the students in the intervention (79.8%) and control (91%) group reported that their family meet their expenses ($P = 0.06$) [Table 1].

The lifetime prevalence (the students who had smoked a WP at least once in their lifetime) of WP smoking across both groups was 84 people (48.5%). The history of WP smoking in the past month (current use)

Table 1: Demographic characteristics of intervention and control group to study the students to evaluate social cognitive theory to prevent waterpipe use in male high-school students in Kerman, Iran

Demographic variable	Control group (n=83), frequency (%)	Intervention group (n=89), frequency (%)	P
Average age	16.3 (0.62)	16.1 (0.65)	0.003*
Number of family members			
<3	1 (1)	3 (3.4)	0.8**
3	7 (8.3)	7 (7.9)	
4	32 (38.1)	32 (36)	
5 or more	44 (52.4)	47 (52.8)	
Paternal education level			
Illiterate	3 (3.6)	0	0.5**
Elementary and middle school	8 (9.5)	9 (10.1)	
High school and diploma	38 (45.2)	28 (31.5)	
Collegiate	35 (41.7)	52 (58.4)	
Maternal education level			
Illiterate	1 (1.2)	0	0.26**
Elementary and middle school	11 (13.1)	6 (6.7)	
High school and diploma	34 (40.5)	33 (37.1)	
Collegiate	38 (45.2)	50 (56.2)	
Income source			
My family easily meets my expenses	67 (79.8)	81 (91)	0.06**
I have a job and I do not have problems	2 (2.4)	2 (2.2)	
I have a lot of problems in supplying the expenses	15 (17.9)	5 (5.6)	
Supported by other than my parents	0	1 (1.1)	

P* value of independent *t*-test, *P* value of Chi-square test

of the students in the intervention group before the intervention was 15.7% ($n = 14$), which had increased to 18% ($n = 16$) after the intervention ($P = 0.75$). The history of WP smoking in the past month of the students in the control group before and after the intervention was 25% ($n = 21$) ($P > 0.99$). Comparison of WP smoking before the intervention ($P = 0.129$) and after the intervention ($P = 0.260$) was not statistically significant [Figure 1]. Furthermore, 64.7% of the students in this study reported easy access to hookah, 16.8% of them went to WP lounges, and 69.9% of the students reported that their close friends use hookah.

All constructs were scored on scale of 0–20 before and after the intervention. Before the intervention, the maximum score from SCT constructs was for outcome values (12.4 and 13.0 in the intervention and control groups, respectively). The minimum score belonged to the environment construct (9.02 and 9.37 in the intervention and control groups, respectively). After the intervention, the maximum score was for knowledge (16.52) and the minimum score was for environment (9.39). Therefore, the environment had the lowest scores throughout the study.

When the scores of the intervention group were compared, there were statistically significant changes in the knowledge score before and after the intervention ($P < 0.0001$), and there were also statistically significant changes in the outcome value construct ($P = 0.007$) and situational perception ($P = 0.03$). However, there were no statistically significant changes in self-efficacy ($P = 0.26$), environment ($P = 0.06$), or outcome expectations ($P = 0.09$). In the control group, the pre- and post-test scores did not show any statistically significant changes. Therefore, based on the comparison between the two groups, intervention in the structures of knowledge, outcome values, and situational perception were effective, but not for self-efficacy, environment, and outcome expectations [Table 2].

The results of this study showed that, despite changes in the level of some SCT constructs, the intervention based on this theory did not significantly change WP smoking in the participating students.

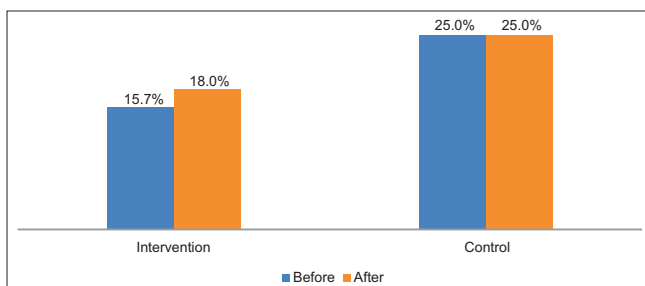


Figure 1: The status of waterpipe consumption in the past month (current use) in intervention and control groups before and after the intervention

Discussion

The aim of this study was to investigate the effect of SCT on preventing and reducing the consumption of hookah in boys aged 15–17 years in Kerman. The roles of school and peer groups are critical determinants in the trends toward smoking as these forms their closest communicational networks after family. During school years, when students are easily accessible, implementation of preventive interventions is vital as many may not be possible once they leave school.^[18-20] In this study, the prevalence of WP smoking as a gateway to heavier substances was high; thus, it is of critical importance to implement early interventions aimed at prevention.

Interventions based only on increasing the knowledge of students are not successful in changing smoking behavior.^[20-23] This may even increase drug use, because increasing knowledge could increase students' curiosity for experimenting with tobacco or other substances.^[24] Similar studies have confirmed these results, showing that outcomes in students were better with skill-building rather than knowledge-based education approaches.^[24-26]

The results showed statistically significant changes in constructs such as knowledge, situational perception, and outcome values. These are related to cognition so are more susceptible to interventions. Many constructs such as self-efficacy and environment that require a more comprehensive intervention did not show any significant changes. In addition, no significant changes were observed for outcome expectations that are influenced by the self-efficacy of students, which is in line with the findings of several other studies.^[23,27,28]

According to numerous studies based on SCT, self-efficacy is one of the most effective constructs in the theory.^[29-31] In other words, higher levels of self-efficacy cause a shift in behaviors from wrong behaviors to more favorable actions.^[30-32] Self-efficacy also affects individual factors such as outcome expectations.^[18,28,33] In similar studies, high self-efficacy was associated with a reduced likelihood of smoking and greater success when quitting smoking. Therefore, one of the key findings in this study was that limited interventions that are not comprehensive, beginning in older adolescents, are less likely to prevent smoking, which is in line with other studies.^[10,30]

In this intervention, the score for environment construct did not show any statistically significant changes as we had no control over the environment construct. Despite changes in the physical and visual environment of the school, we were unable to control external environments such as access to WP outside of school. Environmental factors such as easy and inexpensive access, tobacco flavoring, and the numerous WP lounges in the city make the role of the environment more and more important, which is in line with the previous studies.^[18,34,35] Furthermore,

Table 2: Comparing different social cognitive theory constructs scores in intervention and control groups before and after the intervention to prevent waterpipe use in male high-school students in Kerman, Iran

Constructs	Intervention group			Control group			P**	P***
	Average±SD		P*	Average±SD		P*		
	Before	After		Before	After			
Knowledge	10.70±4.38	16.52±3.89	<0.0001	10.36±4.20	10.46±4.22	0.11	0.492	<0.001
Outcome values	12.40±3.81	13.53±4.23	0.007	13.00±3.42	13.17±3.45	0.04	0.321	0.274
Outcome expectations	11.68±2.50	12.08±2.35	0.09	10.67±2.35	11.06±4.53	0.43	0.007	<0.001
Self-efficacy	12.69±3.47	12.99±2.88	0.26	12.70±2.66	12.66±2.75	0.93	0.897	0.428
Situational perception	11.75±2.49	12.36±2.64	0.03	11.90±2.48	11.88±2.49	0.72	0.922	0.206
Environment	9.02±2.76	9.39±2.58	0.06	9.37±2.81	9.28±2.80	0.56	0.989	0.939

*P value to compare before and after scores in each group based on Wilcoxon test, **P value to compare before scores between two groups based on Mann–Whitney test, ***P value to compare after scores between two groups based on Mann–Whitney test. SD=Standard deviation

the WP lounges in our country are attractive to students, and WP smoking venues represent a gathering place.^[36,37] Indeed, to change the environment requires intersectional collaboration and general policy at the macro level.

According to the results of this study, the prevalence of WP smoking in the intervention group was slightly increased after the intervention. Although this change was not significant, two additional students reported consuming hookah after the intervention. This result is consistent with similar research, especially in adolescents and youths, which may be explained by an increased level of trust and confidence between participants and researchers causing them to be more honest in their responses in the second session after the intervention.^[31-34] For this reason, students who concealed their hookah use in the preintervention questionnaire may have decided to disclose their use in the postintervention questionnaire. In addition, several studies have shown that community-based interventions such as SCT on behavior change and social problems, particularly tobacco and substance use with a focus on family, social, and environmental factors, are more successful than limited learning interventions.^[13-16,29-37]

Conclusions

The intervention used in this study was unsuccessful in reducing the prevalence of WP smoking. The main reasons for this failure could be attributed to the lack of change in the environment and self-efficacy constructs. However, school-based programs with a limited learning intervention to prevent and control tobacco use have limited impact in the absence of other organizations and public interventions such as parent education and more control over WP lounges.

Limitations

Some of the reasons for our failure to reduce the rate of WP use include time limitations and the fact that increasing self-efficacy requires effective interventions beginning at a younger age, such as in the family and at preschool centers.^[24,30] In addition, it was not possible to implement the

intervention outside of school, such as by restricting access to tobacco and WP distribution centers including shops and WP lounges. The instrument of this study was a self-report instrument; thus, WP smoking behaviors could not be directly observed, which could lead to less valid results.

Our finding is only correlational as the study design meant that we were unable to determine causal relationships. Due to the small sample size and the limited intervention, the results of this study have limited generalizability. However, they could be of benefit to other geographical areas with similar cultural backgrounds. Furthermore, we do not receive consent form from parents.

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Conflicts of interest

There are no conflicts of interest.

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