Research Paper

The Effect of Education Based on the Theory of Planned Behavior on the Adoption of Smoking Prevention Behaviors in Female Students at Tonekabon Islamic Azad University in 2018

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Background: With the rising prevalence of smoking among university students, coupled with the efficacy of the theory of planned behavior (TPB) in smoking prevention, the current study was conducted to assess the effect of education based on the said theory on adopting smoking preventive behaviors among female university students.

Materials and Methods: This experimental interventional study, conducted in 2018, involved 114 female students of Islamic Azad University, Tonekabon Branch (intervention and control groups, each with 57 students). The study data were collected using a demographic questionnaire and the YRBSS 2013, Fishbein, and Ajzen international questionnaire, focusing on the TPB components (intent, attitude, subjective norms, and perceived behavioral control). The data collection occurred in two stages: Before and one month after the intervention. The educational intervention was delivered in three sessions featuring lectures and group discussion methods. The collected data were analyzed by relevant tests using SPSS software, version 21.

Results: Before the intervention, no significant relationships were observed between preventive behavior measures and the TPB components in the experimental and control groups (P<0.05). However, one month after the intervention, there was a statistically significant increase in the experimental group’s mean scores of all TPB components and preventive behaviors (P<0.05).

Conclusion: Regarding the effectiveness of education based on the theory of planned behavior in reducing the intent to smoke among female students, using this intervention seems to be an appropriate preventive strategy.

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ABSTRACT

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Introduction

In recent years, health organizations, law enforcement, and social policymakers have identified a grave health threat and critical social problem—the rising prevalence of tobacco use among different population groups [1]. Smoking is one of today’s leading causes of death, killing nearly 8 million people every year. Most tobacco-related deaths occur in low- and middle-income countries that are targets of aggressive marketing by the tobacco companies [2]. The World Health Organization (WHO) predicts that the number of smoking-related deaths will soon exceed 10 million people annually. If this trend persists, 70% of annual deaths will be caused by smoking by 2030 [3]. Every day, over 32,000 young people start smoking, 98% of whom begin by the age of 26 [4]. An increase in smoking among young girls will certainly lead to the rise among women in the future [5], and those who start smoking at an early age are less likely to quit [6]. In 2018, out of 1.093 billion smokers worldwide, more than 244 million were women, and this number is currently snowballing [7]. These statistics indicate that the near future will witness an increase in the prevalence of young girl smokers [8], despite reported declines in the rate of smoking among adult men and women in several countries [9]. The results of the world’s largest survey on adolescents and tobacco use, conducted in more than 151 countries, reveal that the prevalence of smoking among girls in 58% of the surveyed countries closely mirrored that of boys [9]. According to a national survey in Iran, most people start smoking before 18 and experience their first instance of smoking before 14.

Nonetheless, the average age of smoking initiation among Iranian women is 24 years, with an onset age reported at 21 years [10]. Studies have also reported that 28.7% of smokers were in the age group of 18 to 24 years, forming the largest group of students [11].

During the student period, characterized by physical and sexual transitions from adolescence to adulthood and exposure to a new social environment, smoking often assumes a natural practice [12]. Various studies have shown a high prevalence of smoking among students. For example, Eryan et al. reported that 36.5% of male students and 3.5% of female students were smokers [13]. Babaei Hyderabadi et al. reported that 47.4% of students were smokers [14]. Studies conducted in other countries have reported varying rates of smoking prevalence among students. For instance, Liw et al. reported the rate of student smokers to be 14.1%, Latour et al. claimed it was 29.3%, and Barg et al. reported it to be 35.3% [15-17]. Tavakolizadeh et al. reported the prevalence of smoking among female students aged 17-27 years to be 4.1% [18]. Ghodoosi et al. reported a prevalence of 4.5% smoking among female students aged 22-24 [19].

A person’s life changes during the university years significantly. One leaves home for the first time and begins to make their own decisions, forging new friendships, taking new classes, and engaging in entertaining activities. At this period, using alcohol and or drugs, smoking, and sexual activity are usually the behaviors in which people must decide whether or not to engage. In the university environment, these common types of behavior can be influenced by various personal, social, and epistemological factors. With the rise in smoking and risky behaviors among students, policymakers, health planners, and officials must prioritize preventive investigations and interventions [20]. Various motivations drive these behaviors, including passing the time, entertainment, relieving fatigue, emulating peers and valued friends and people, puberty, attention seeking, and modernism.

Moreover, misleading advertising policies in societies strongly exacerbate these problems. From another point of view, smoking is a disease. A person who smokes becomes addicted to nicotine quickly, and the first step in battling disease is prevention. Therefore, the most effective solution is to change the behavior of individuals in the community regarding preventive measures and early detection, thereby increasing the life expectancy of patients [21]. In health education, models have been developed to assist in designing effective educational programs. These programs aim at changing those behaviors that pose societal problems [22]. The results of research into behavioral change indicate that successful preventive education is based on well-established patterns [23].

As some studies have shown, essential factors in quitting addiction align with some aspects of the health education model [24]. One of the most practical and effective theories on preventive health behaviors is the theory of planned behavior developed by Ajzen and Fishbin. This theory posits that attitudes toward behavior, subjective norms, and perceived behavior control shape the intention to perform a behavior. The first component of the theory of planned behavior is attitude, representing the general feeling of liking or disliking any particular behavior. This component is related to two other constructs. One is behavioral belief, and the other is the behavioral consequences evaluation, contributing to attitude formation. Attitude directly affects an individual’s intention to perform a behavior.
The second component is subjective norms, encompassing one’s normative beliefs by considering the normative beliefs of the most influential people in one’s life regarding the desired behavior. The second motivational component refers to people’s thoughts about what other important people tend to do. Subjective norms directly affect a person’s intention to perform a behavior.

The third component is the control of perceived behavior. This construct relates to two other constructs. A person’s beliefs about internal or external factors that can prevent or facilitate behavior. Individual control can be simple or complex. The third construct of perceived behavior control is unique as it relates not only to the intent of the behavior but also to the performance of actual behaviors [22, 25-27].

The effectiveness of this model in smoking prevention has been proven in various studies. Many researchers have suggested the use of this model to prevent smoking [28]. Considering the high prevalence of smoking among students, their pivotal role in society [29], and the possible rise of the prevalence of smoking among young girls in the future [8], the current study aimed to determine the impact of education based on the TPB on the possible rise of the prevalence of smoking among students, their pivotal role in society [29], and the highest score of 4 [32].

The demographic and contextual questionnaire included questions about age, marital status, permanent residence, current residence, parental education, employment status, and smoking status. Based on the definition by the CDC, a smoker is defined as an adult who has smoked 100 cigarettes in his or her lifetime and currently smokes cigarettes. Since 1991, this group has been divided into “every day” and “someday” smokers (regular and irregular). Students who have experienced smoking in the past (even smoking 1 cigarette) along with non-smokers were included in the non-smoker group [31].

The questionnaire based on the TPB included 97 questions (11, 8, 10, 15, 5, 3, 9, and 36 questions on behavioral intent, attitude, belief behavior, evaluation of outcome expectancies, normative belief, motivation to follow, control belief, and perceived ability, respectively). All questions related to the components were scored on a 7-point Likert scale (strongly agree=7, agree=6, slightly agree=5, disagree=4, slightly disagree=3, strongly disagree=2, completely opposed=1), which were assigned the highest score of 7 and the lowest score of 1 and the highest score of 4 [32].

The smoking prevention behaviors questionnaire comprised 17 questions, with each question offering 3 scoring options, where 3 denoted the best and 1 the worst behavior [33]. For the current study, several tobacco and tool design experts were contacted by E-mail for their input. Based on their opinions, the validity of this instrument was evaluated by the content validity index (CVR), and questions with values more than 0.49 were accepted. The validity of the present study was confirmed by a mean of 1-0.6 with a mean of 0.72 and CVI=1 -0.76 with a mean of 0.92. The reliability of the questionnaire was assessed by the internal consistency method. The questionnaire was given to 30 students, and its Cronbach α coefficients were calculated for different parts. The results showed that the Cronbach α coefficient of each component was equal to or more than 0.7, and the total Cronbach α score was calculated to be 0.79. The total reliability values of all constructs of the TPB were 0.004, all with good stability.
Training based on the TPB was delivered in three sessions using the lecture and group discussion methods. The researcher conducted two 45-minute lectures and one 1- to 3-hour group discussion session in three groups of 11-12 participants.

The educational content was based on the program protocol and guide, aligning with the pre-test questions and implementing each component of the TPB. The training program covered various aspects, including the harms of smoking or exposure to secondhand smoke, the consequences of not preventing smoking, the importance and benefits of smoking prevention, appropriate strategies to reduce smoking behavior, attitudes and beliefs in reducing or ceasing smoking, normative beliefs and the influence of significant people in one’s life. Additionally, topics such as increasing empowerment in people (encouraging smokers to control smoking and gradual cessation of smoking or saying no to friends’ compliments for smoking) and the effect of smoking on chronic illness were addressed in sessions for the experimental group. Educational aids such as pamphlets, posters, and videos were used in these sessions (Table 1).

A Letter of introduction was presented to the participating students explaining the nature and objectives of the study. The questionnaires were then distributed among them. All students were asked to answer the questions honestly and assured that their information would be kept confidential. Students were given ample time to understand and answer the questions properly. The students participated in the study willingly and were allowed to leave the study at any time. The questionnaires were completed in the student’s classrooms with the assistance of the faculty officials.

After collecting the questionnaires, the obtained data were entered into SPSS software, version 21 and analyzed using the Kolmogorov-Smirnov test to examine the normality of data distribution. Then, the Independent t-test was used to compare scores between the control and experimental groups before the intervention. The covariance analysis was used to determine the effect of training after the intervention. The chi-square test was also used to evaluate qualitative variables. The significance level was set at P<0.05. The results showed that increasing preventive behavior reduced behavioral intention toward smoking.

### Table 1. Educational intervention program in intervention group participants

<table>
<thead>
<tr>
<th>Session</th>
<th>Objectives</th>
<th>A Summary of Topics and Activities</th>
<th>Educational Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture session 1</td>
<td>Specific objective (1): To determine the scores of the theory of planned behavior (TPB) components (behavior) and (behavioral intention) and (attitude towards behavior) and (behavioral belief) and (evaluation of the consequences of behavior) of women under study in relation to preventive smoking behaviors before and after training through the TPB in intervention and control groups.</td>
<td>The educational content of these sessions was based on the protocol and program guide to implement each TPB component by designing an educational program based on the questions raised earlier. The program was followed by two lectures and one group session at the end of the program. In the first session of the lecture, the following topics were presented: What smoking is, knowledge of smoking in the world, characteristics of tobacco, distribution, and production, the structure of cigarettes, chemical elements of cigarettes, the effect of smoking on human and community health, lung cancer, and other smoking-related cancers, dependence, and addiction of smoking, Brno smoking effects of youth and youth, men.</td>
<td>A 45-minute lecture</td>
</tr>
<tr>
<td>Lecture session 2</td>
<td>Specific objective (2): To determine the scores of the TPB components, including normative belief, subjective norms, motivation to follow, perceived behavioral control, controlling belief, and power and ability to control perceived behavior in the participants in relation to preventive smoking behaviors before and after training in intervention and control groups.</td>
<td>In the second session, a lecture was presented with topics on the effects of smoking on physical and mental health, respiratory system, heart, blood pressure, skin, hair, nails, teeth, bad breath, the effect of smoking on fitness, mental health, social and community health, personality and social credibility and acceptance, ways to control preventive behaviors, the effect on economic costs and effective smoking policies in controlling preventive behaviors, the role of life skills, family and peers in smoking, the role of volunteers in controlling preventive behaviors, and effective relationships in smoking, the effect of self-confidence on smoking, how to quit smoking, and preventive smoking behaviors.</td>
<td>A 45-minute lecture</td>
</tr>
<tr>
<td>Lecture session 3</td>
<td></td>
<td>Group discussion related to the whole learning content was performed in two lecture sessions.</td>
<td>A 45-minute lecture</td>
</tr>
</tbody>
</table>
Results

Our results indicate no significant difference between the intervention and control groups in terms of demographic and smoking behavior (P>0.05). In other words, the two groups were homogeneous regarding study variables (Table 2). The Mean±SD age of the students in the experimental and control groups were 21.7±2.25 and 22.5±2.4 years, respectively.

The results of the present study showed no significant difference between the experimental and control groups in the mean scores of TPB components before the intervention, based on the independent t-test. The mean scores of TPB components were as follows: Intended behavior (P=0.73), attitude (P=0.91), belief behavior (P=0.41), evaluation of expectations (P=0.22), normative belief (P=0.11), motivation to follow (P=0.69), belief control (P=0.25), and perceived strength or capability (P=0.98).

Before the intervention, the independent t-test results detected no difference was observed between the experimental and control groups in the mean scores of adopting preventive behaviors based on the TPB of smoking: Habit of saying no (P=0.001), habit of going to a hookah house (P=0.13), avoiding exposure to secondhand smoke (P=0.78), acknowledging the harmfulness of smoking (P=0.34), consumption pattern of cigarettes (P=0.99), number of days of smoking (P=0.32), number of cigarette butts (P=0.32), habit of inhaling cigarette smoke into the lungs (P=0.13), smoking without filter (P=0.13), Smoking cigarettes in end (P=0.16), placing cigarettes on the lips for a long time (P=0.99), placing cigarettes between the fingers for a long time (P=0.16), habit of encouraging smoking (P=0.01), habit of complimenting smoking (P=0.16), habit of smoking indoors (P=0.31). One month after the intervention, the study results showed a significant difference in the mean scores of all components of the TPB smoking behavior between the two groups based on analysis of covariance (P 0.001).

### Table 2. Demographic characteristics of students participating in the two study groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intervention</th>
<th>Control</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>57(100)</td>
<td>47(82.5)</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>0.00(0.00)</td>
<td>10(17.5)</td>
</tr>
<tr>
<td>Permanent residence</td>
<td>Urban</td>
<td>41(71.9)</td>
<td>41(71.9)</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>16(28.1)</td>
<td>16(28.1)</td>
</tr>
<tr>
<td>Fathers’ education</td>
<td>University</td>
<td>32(38.6)</td>
<td>29(50.9)</td>
</tr>
<tr>
<td></td>
<td>Diploma or less</td>
<td>35(61.4)</td>
<td>28(49.1)</td>
</tr>
<tr>
<td>Mothers’ education</td>
<td>University</td>
<td>27(47.4)</td>
<td>29(50.9)</td>
</tr>
<tr>
<td></td>
<td>Diploma or less</td>
<td>30(52.6)</td>
<td>28(49.1)</td>
</tr>
<tr>
<td>Employment status</td>
<td>Unemployed</td>
<td>53(93)</td>
<td>54(94.7)</td>
</tr>
<tr>
<td></td>
<td>Employed</td>
<td>4(7)</td>
<td>3(5.3)</td>
</tr>
<tr>
<td>Current location</td>
<td>Home (only)</td>
<td>0(0)</td>
<td>7(12.28)</td>
</tr>
<tr>
<td></td>
<td>Home (with friends)</td>
<td>14(24.56)</td>
<td>4(7.01)</td>
</tr>
<tr>
<td></td>
<td>Home (with relatives)</td>
<td>8(14.3)</td>
<td>10(17.54)</td>
</tr>
<tr>
<td></td>
<td>Dorm</td>
<td>6(10.52)</td>
<td>7(12.28)</td>
</tr>
<tr>
<td>Current situation in terms of smoking</td>
<td>Smoker</td>
<td>15(26.3)</td>
<td>17(29.8)</td>
</tr>
<tr>
<td></td>
<td>Non-smoker</td>
<td>42(73.7)</td>
<td>40(70.2)</td>
</tr>
</tbody>
</table>

*The chi-square test.
Analysis of covariance also revealed significant differences between the two groups in the mean scores of adopting preventive behaviors based on the theory of planned smoking behavior. The habit of saying no was in the control group (P=0.07), and between the two study groups (P=0.001), the habit of smoking a hookah (P=0.001) and avoiding exposure to cigarette smoke (P=0.001) were obtained. Acknowledging the harmfulness of smoking (P=0.001), smoking pattern (P=0.001), number of days of smoking (P=0.001), number of cigarette butts (P=0.004), the habit of inhaling cigarette smoke into the lungs (P=0.02), smoking without a filter (P=0.005), smoking to the end (P=0.002), placing the cigarette on the lips for a long time (P=0.005), placing the cigarette on the fingers for a long time (P=0.003), habit of encouraging smoking (P=0.01), habit of complimenting smoking (P=0.005), and habit of smoking indoors (P=0.008) in the two study groups had a significant relationship between covariance (P <0.05) (Tables 2, 3 and 4).

Discussion

This study was designed and conducted to determine the effect of education based on the theory of planned behavior (TPB) in adopting smoking-preventive behaviors among female students of the Islamic Azad University of Tonekabon in 2018. After the intervention, the mean score of behavioral intention increased significantly in the intervention group, and a significant difference was observed between the experimental and control groups in terms of behavioral intent. Given the significance of behavioral intention on how and when the action is performed, filling the gap between intention and behavior can help perform the preventive behavior. The results of this study are consistent with those of Mehri et al. [34], Dehdari et al. [35], Barati et al. [36], and Hyde et al. [37]. Studies by Sutton et al. [38] and Sniehotta et al. [39] revealed a gap between intention and behavior in different models, and those with intentional behavior do not necessarily perform that behavior. The present results showed that after training, the mean attitude
Table 4. Comparing the frequency of preventive smoking behavior between the intervention and control groups

<table>
<thead>
<tr>
<th>Preventive Behavior of Smoking</th>
<th>Control</th>
<th>Intervention</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No (%)</td>
<td>Yes (%)</td>
<td>No (%)</td>
</tr>
<tr>
<td>Variable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>73.6(39)</td>
<td>24.6(14)</td>
<td>72.5(37)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The habit of saying no</td>
<td>Post-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>66.7(38)</td>
<td>33.3(19)</td>
<td>3.5(2)</td>
</tr>
<tr>
<td>No</td>
<td>50.9(27)</td>
<td>49.1(26)</td>
<td>65.4(34)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Get used to going to the hookah house</td>
<td>Post-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>50.9(29)</td>
<td>49.1(28)</td>
<td>93(53)</td>
</tr>
<tr>
<td>No</td>
<td>75.4(43)</td>
<td>24.6(14)</td>
<td>71.2(37)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoid exposure to secondhand smoke</td>
<td>Post-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>77.2(44)</td>
<td>28.8(15)</td>
<td>1.75(1)</td>
</tr>
<tr>
<td>No</td>
<td>64.9(37)</td>
<td>35.1(20)</td>
<td>56.1(32)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acknowledging the harmfulness of smoking</td>
<td>Post-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>61.4(35)</td>
<td>38.6(22)</td>
<td>5.3(3)</td>
</tr>
<tr>
<td>No</td>
<td>7.01(4)</td>
<td>22.80(13)</td>
<td>8.7(5)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The habit of inhaling cigarette smoke into the lungs</td>
<td>Post-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking without a filter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>7.01(4)</td>
<td>22.80(13)</td>
<td>5.26(3)</td>
</tr>
<tr>
<td>Post-test</td>
<td>10.52(6)</td>
<td>15.78(9)</td>
<td>24.6(14)</td>
</tr>
<tr>
<td>Smoking to the end</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>5.3(3)</td>
<td>24.55(14)</td>
<td>1.75(1)</td>
</tr>
<tr>
<td>Post-test</td>
<td>8.7(5)</td>
<td>1.75(1)</td>
<td>28.8(15)</td>
</tr>
<tr>
<td>Put a lighted cigarette between the lips for a long time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>15.78(9)</td>
<td>14.03(8)</td>
<td>15.78(9)</td>
</tr>
<tr>
<td>Post-test</td>
<td>12.28(7)</td>
<td>14.03(8)</td>
<td>28.8(15)</td>
</tr>
<tr>
<td>Put a cigarette between your fingers for a long time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>8.7(5)</td>
<td>21.05(12)</td>
<td>5.26(3)</td>
</tr>
<tr>
<td>Post-test</td>
<td>10.52(6)</td>
<td>15.78(9)</td>
<td>28.8(15)</td>
</tr>
<tr>
<td>The habit of encouraging smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>8.7(5)</td>
<td>21.05(12)</td>
<td>7.01(4)</td>
</tr>
<tr>
<td>Post-test</td>
<td>12.28(7)</td>
<td>14.03(8)</td>
<td>22.80(13)</td>
</tr>
<tr>
<td>Get used to the compliments of smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>7.01(4)</td>
<td>22.80(13)</td>
<td>3.5(2)</td>
</tr>
<tr>
<td>Post-test</td>
<td>8.7(5)</td>
<td>17.54(10)</td>
<td>22.80(13)</td>
</tr>
<tr>
<td>The habit of smoking indoors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>10.52(6)</td>
<td>19.29(11)</td>
<td>8.7(5)</td>
</tr>
<tr>
<td>Post-test</td>
<td>12.28(7)</td>
<td>14.03(8)</td>
<td>24.6(14)</td>
</tr>
</tbody>
</table>
In the present study, the mean score of belief behavior increased significantly in the intervention group after training. The experimental and control groups showed a significant difference in terms of this variable. The results of studies conducted by Barfi et al. [42], Mohammad Hossein et al. [43], and Rahimi Kian [44] showed a statistically significant difference between intervention and control groups in this behavioral structure after the educational intervention, which is consistent with the current results. Emmanuel et al. [45], however, achieved results that were inconsistent with those of the current study. The present study showed belief as a factor in the development of behavior that can effectively prevent smoking in young people and adults. The results of this study on the behavioral belief variable before and after the intervention showed that the educational intervention was effective and could significantly impact students’ knowledge of health behavior.

In the present study, the mean score of the evaluation structure of the outcome expectations in the experimental group increased significantly after the training, resulting in a substantial difference between the experimental and control groups in terms of this variable. A study conducted by Mokhtari et al. [46] shows that the evaluation structure of outcome expectations has a statistically significant difference compared to the control group after the educational intervention, consistent with the present study. Perrier et al. studied people’s intention to exercise and reported that people with higher expectations of negative and positive outcomes were more likely to engage in positive behavior [47]. The results of these studies were consistent with those of the present study. The current study showed that one of the reasons for the prevalence of smoking is the evaluation of the positive and negative outcomes of smoking behavior.

Based on the results shown in Table 4, the habits of “saying no,” “going to a hookah bar,” “avoiding exposure to smoke,” “acknowledging the harms of smoking,” “inhaling cigarette smoke,” “smoking without a filter,” “smoking until the end,” “holding a lighted cigarette between the lips and fingers for a long time,” “encouraging others to smoke,” “complimenting smoking,” “smoking inside the house” changed after the educational intervention towards positive and preventive behaviors (P=0.005). Also, the participants recognized the educational content of this study and intended to behave appropriately. The results of the Rakhshani et al. study were consistent with this study, too [48].

The current study showed that the evaluation variable of expectations of behavioral outcomes before and after the educational intervention with a high score could significantly impact female students. The mean score of the subjective norm in the experimental group increased significantly after training, and a significant difference was observed between the experimental and control groups in terms of this variable. The results of the present study were in line with those of Mehri et al. [34] and Jovini et al. [36]. Furthermore, Kiani showed that the normative belief that has emerged from the subjective norms of TPB could give credibility and acceptance to students after educational intervention. Also, the significant others play a very important role in reducing and quitting cigarette smoking, which was consistent with the present study results [49]. Nevertheless, this result was not compatible with the study of Ashogh et al. in relation to subjective norm and behavioral intention [50]. However, the results of 51. Poultier et al. [51], Tavafian et al. [52], and Warner and Abarg [53] studies do not agree with the present study.

The present results showed that the educational intervention was influential on the perceived behavior component. After the training, the mean score of perceived behavior control of the intervention group increased significantly, and a significant difference was observed between the intervention and control groups regarding this variable. This study result agreed with the results of Mehri et al. [34], Barati et al. [36], Tavousi et al. [54], and...
and Dehdari et al. [35]. There was a post-intervention control, which was consistent with the present study. This study found that people with low self-esteem and poor self-control are more likely to be influenced by others to smoke. Therefore, skills should be developed to respond decisively to their compliments on smoking, reduce their susceptibility to social influences, and make them less likely to become addicted to drugs. Fathi et al. [55] and Caron et al. [56] also reported that the mean score of perceived behavioral control on the refusal of smoking hookah after the intervention did not significantly increase in the experimental group compared with the control group, which does not agree with this study.

The results of similar studies indicate that the predictive power of control over the drug Rfhardrk is ongoing [57]. In social psychology studies, the behavioral control level of confidence and self-belief were reported to be weak. The likelihood of these individuals becoming addicted to cigarettes and narcotics under the influence of others has been reported. In the case of training empowerment skills to cope with the compliments of others, the extent to which one is less able to cope with the social effects of self-esteem and the control of self-esteem [58]. So far, Byrne and Mazano [59] and Crump et al. [60], Kawabata et al. [61], and Vingilis et al. conducted studies on self-esteem and self-confidence and smoking [62].

Overall, it can be said that the control of perceived behavior in the third construct of the theory of perceived planning behavior, including “perceived control, power, and perceived ability, can have a direct effect on the extent of behavior and operational implementation of appropriate behavior against its obstacles [63].

The current findings revealed that after training, the mean score of smoking prevention behaviors in students in the experimental group increased significantly. A significant difference was observed between the experimental and control groups in terms of this variable, consistent with the results of Renuka [28] and Chi et al. [63]. In the study by McGrath et al. [64], however, no predictive factor was found. The results of Aghamolaei et al.’s study showed that behavioral intention predicts safe driving behaviors, and whatever the intention of drivers with safe driving behaviors (such as driving within the speed limit, not using a cell phone, wearing a seat belt, not overtaking, driving in the case of pollution, and other safety behaviors) promote these safe behaviors [50].

The results of the present study showed that training based on the TPB could increase awareness. Planned behavior theory (attitudes of individuals) promotes the adoption of smoking-preventing behaviors in students; thus, the training conducted was commensurate with the model used. According to the approval obtained from Tonekabon Islamic Azad University, the researchers could access the study participants without restriction regarding the educational regulations or the time of classes. However, regarding the target group in the present study, only working students were considered restricted. It is recommended that other studies use this model in different populations and groups (in terms of age, gender, education, and geographical area). Data collection was also self-reported, which was one of the limitations of this study. Therefore, the results of this study cannot be generalized to other age groups and students.

5. Conclusion

In general, the results of this research indicate that education based on the theory of planned behavior components (intention, attitude, behavioral beliefs, evaluation of the consequences of behavior, normative belief, motivation to follow, control belief, power, and ability to control perceived behavior) can change attitudes and beliefs of the students and promote their appropriate behaviors regarding smoking prevention. Therefore, considering that health education programs are cost-effective interventions, the positive results obtained in the current research suggest that this theory be used in different educational programs. It is also recommended that this theory be carried out at preventive levels. It is hoped that in this field, more studies will be conducted in both genders, along with a longitudinal design, to evaluate the present findings in detail.

Ethical Considerations

Compliance with ethical guidelines

Ethical approval of the research was obtained from Shahid Beheshti University of Medical Sciences (No.: IR.SBMU.PHNS.REC.1396.145).

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Authors’ contributions

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saneh Giti, Ali Ramezankhani and Davood Shojaeizade; 
Supervision: Ali Ramezankhani; Avatar: Afsaneh Giti.

Conflict of interest

The authors declared no conflict of interest.

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