Comparison of the Effect of Board Game and Tobacco Cessation Education on Nicotine Addiction in Adolescent Smokers

Sigara İçen Ergenlerde Masa Oyunu ve Tütün Bırakma Eğitiminin Nikotin Bağımlılığı Üzerine Etkisinin Karşılaştırılması

Remziye CAN[1]
 0000-0001-5913-6007
Özlem ÖRSAL[2]
 0000-0002-4494-8587

[1]Public Health Nursing, Mustafa Kemal Atatürk Vocational and Technical Anatolian High School, Eskişehir, Türkiye

[2]Department of Public Health Nursing, Osmangazi University Faculty of Health Sciences, Eskişehir, Türkiye

ABSTRACT

Aim: The aim of this study was to compare the effect of a board game and tobacco cessation education on nicotine addiction in adolescent smokers.
Material and Methods: This randomized controlled study included 103 adolescents who declared to smoke at least one cigarette per day. For data collection, sociodemographic data form, Fagerstrom test for nicotine dependence, and stages of change scale were used. The study groups consisted of three intervention groups; board game, tobacco cessation education, and the combined use of these two interventions, and a control group. All interventions were compared with the control group. Follow-ups were conducted at baseline, 8th, and 12th week.
Results: While 38.8% (n=40) of all participants were addicted to nicotine at a very low level, 6.8% (n=7) were very high. 37.9% (n=39) of the participants reported smoking the first cigarette of the day within the first 5 minutes. Groups had an effect on the nicotine addiction level of adolescents (p=0.031), while there was no significant difference for the period, and period*group interaction (p=0.472 and p=0.339, respectively). The difference was due to the board game group. In the post evaluation, three of the adolescents who played board games and two of the adolescents who received tobacco cessation training were in the action phase.
Conclusion: The results showed that the board game group participants had a decrease in the level of nicotine addiction. Our suggestion is to use and disseminate games as an alternative method that will attract the attention of adolescents in tobacco cessation education.
Keywords: Adolescent; addiction; board game; change of stage; gamification; tobacco.

ÖZ

Amaç: Bu çalışmanın amacı, sigara içen ergenlerde masa oyunu ve tütün bırakma eğitiminin nikotin bağımlılığı üzerindeki etkisinin karşılaştırılmasıdır.
Gereç ve Yöntemler: Bu randomize kontrollü çalışmaya her gün en az bir adet sigara içtiğini beyan eden 103 adölesan dahil edildi. Veri toplamak için sosyodemografik veri formu, nikotin bağımlılığı için Fagerstom testi ve değişim aşamaları ölçeği kullanıldı. Çalışma grupları masa oyunu, tütün bırakma eğitimi ve bu iki müdahalenin birlikte kullanımını içeren girişimlerden oluşan üç adet müdahale grubu ve bir de kontrol grubundan oluşmaktaydı. Tüm müdahale grupları kontrol grubu ile karşılaştırıldı. Takipler başlangıçta, 8. haftada ve 12. haftada yapıldı.
Bulgular: Tüm katılımcıların %38,8'i (n=40) çok düşük bir düzeyde nikotin bağımlısı iken %6,8'i (n=7) ise yüksek düzeyde nikotin bağımlısı idi. Katılımcıların %37,9'u (n=39) günün ilk sigarasını ilk 5 dakika içinde içtiğini beyan etti. Grupların, ergenlerin nikotin bağımlılık düzeyine anlamlı bir etkisi varken (p=0,031), periyot ve periyot*grup etkileşimi için ise anlamlı bir farklılık yoktu (sırasıyla p=0,472 ve p=0,339). Bu farklılık masa oyunu grubundan kaynaklanmakta idi. Son değerlendirmede, masa oyunu oynayan ergenlerden üçü ve tütün bırakma eğitimi alan ergenlerden ikisi hareket aşamasında idi.
Sonuç: Sonuçlar masa oyunu grubu katılımcılarının nikotin bağımlılığı düzeyinde bir azalma olduğunu göstermiştir. Önerimiz tütün bırakma eğitiminde ergenlerin ilgisini çekecek olan alternatif bir yöntem olarak oyunların kullanılması ve yaygınlaştırılmasıdır.
Anahtar kelimeler: Bağımlılık; ergen; evre değişikliği; masa oyunu; oyunlaştırma; tütün.

Corresponding Author
Sorumlu Yazar
Remziye CAN
drremziyecan@gmail.com

INTRODUCTION

Tobacco use is one of the leading preventable causes of death. The reason for the long-term use of tobacco and the difficulty in quitting is the addictive feature of nicotine in tobacco. Tobacco use is a major risk factor for cardiovascular and respiratory diseases, more than 20 different types or subtypes of cancer, as well as many other debilitating medical conditions (1). In addition; it is possible that the consumption of tobacco products at an early age has a longer duration of tobacco use than those who start at a later age (2). In a study investigating the prevalence of tobacco use among adolescents in 143 countries, the prevalence of any tobacco use for at least 1 day in the last 30 days was reported as 17.9% in boys and 11.5% in girls. It was also reported that the prevalence of smoking at least 1 day in the last 30 days decreased in 80 (57.1%) of 140 countries, remained unchanged in 39 (27.9%), and increased in 21 (15.0%). However, in 81 (59.1%) of 137 countries, it was reported that the prevalence of using tobacco products other than cigarettes did not change or increase (3). Studies conducted in Turkey have reported a smoking prevalence ranging from 15.8 to 36.1% in young groups (4,5). Adolescents are at high risk for tobacco use due to factors such as impulsivity, poor perception, desire to prove themselves, and insufficient neurological development (6). The Centers for Disease Control and Prevention stated that if smoking continues at the current rate among young people, individuals younger than 18 will die prematurely from a smoking-related disease (7).

There are many methods for smoking cessation such as pharmacotherapy, nicotine replacement therapy, and cognitive-behavioral therapies. One of them is the education aiming at intentional behavior change according to the transtheoretical model (TTM). The main goal of the model is to overcome addiction with the use of the stages of change without any medical support. Because the TTM is a model that advocates conscious behavior change. TTM of behavior change is a process of making initiatives in accordance with the change stage of the individual to facilitate the change, otherwise, resistance to behavior change is developed. TTM is a proven model for smoking cessation when used according to the change stages (8). However, these techniques have been reported to have limited success in quitting smoking (9). This has led to the use of different techniques. One of these techniques is games. Gaming is a conscious activity carried out in a certain time period to socialize without any specific financial gain/profit benefit, making the gamer feel like living an extraordinary life and realizing a special purpose according to binding rules (10). As it is very easy to access information thanks to technology in our age, traditional teaching methods are boring and cannot provide motivation (11,12). Therefore, games can create learning environments that make education fun. While the use of games in health education exposes individuals to subjects, it aims to create an internal motivation, targeting the protection and improvement of health (13). Board games are a type of game used to reduce or cease nicotine addiction associated with tobacco use. One of these board games is "Pick-Klop". The aim of "Pick-Klop" is to inform smokers about smoking and/or quitting smoking in a way that does not make them feel guilty about smoking, to increase their self-efficacy regarding smoking cessation skills, change their attitudes

toward tobacco addiction, and assist tobacco addiction treatments and gain quitting behavior (14).

The aim of this study was to evaluate the effect of a board game and smoking cessation education on nicotine addiction in adolescents.

MATERIAL AND METHODS

Study Design
This study was designed as a single-blind randomized controlled trial to evaluate the effects of the different interventions on smoking cessation. The study was approved by the Ethics Committee of Eskişehir Osmangazi University (21.11.2017, 09) and the Ministry of National Education (16.02.2018, 3401438). The study adhered to the CONSORT guidelines and used a CONSORT-EHEALTH checklist.

Sample Size
The sample size of the study was calculated by the G*Power v.3.1.9 and estimated using Cohen's effect size. Repeated measures: within-between interactions: ANOVA approach was used to calculate effect size (15). For sample size calculation the doctoral thesis carried out by the authors of this study was used. Considering that the number of groups was 4, the number of measurements was 3, the effect size was 0.76, the type I error was 0.05, and the power of the study was 0.80, it was determined that at least 24 participants should be selected for each group.

Participants
Participants consisted of students studying at Eskişehir Mustafa Kemal Atatürk Vocational and Technical High School in Turkey. In order to form the intervention groups, permission was obtained from the school principal and teacher of each class, and the students were informed about the purpose of the study and the participation criteria. Participant recruitment began in October 2018 and end in January 2019. The inclusion criteria were studying at Eskişehir Mustafa Kemal Atatürk Vocational and Technical High School, smoking at least one cigarette a day, and volunteering to participate in the study. There were 103 students who volunteered to participate in the study and declared that they smoked at least one cigarette per day. All students were included in the study.

Randomization
After baseline assessment, eligible students were given an automated number using the Java built-in random number generator and were randomly assigned to four groups; board game (BG), tobacco cessation education (TCE), combined intervention (CI), and the control groups. Randomization was done by a person who was blinded to the study in Excel. Research personnel were blinded to allocation at initial randomization but were briefed after assigning participants to the groups. Participants were informed about the group they were allocated to.

Interventions

Board Game
The Pick-Klop game is a board game played with cards that allows interaction between players. The game aims to help smokers to change their attitudes and cognitions about nicotine/cigarette/tobacco addiction. The goals of the game are to inform smokers about tobacco smoking and quitting in a way that does not make them feel guilty, to increase their level of self-confidence in their ability to

cessate smoking, to change attitudes toward tobacco addiction (perceived advantages and disadvantages), and to help them through the cessation process. The cards of the game consist of three categories: question card, advantage-disadvantage card, and stimulus-punishment card (16). Question cards are cards that include questions about tobacco use, its harms, ways to cessation, problems experienced during cessation, and ways to cope with these problems. If the player gives correct answers in the question category, s/he gets points the same as the number on the dice. Points gained are used in the stimulus-punishment category. Surprise cards are cards that add fun to the game, allowing them to get gifts or hidden cards, and help or hinder another player during the game. Stimulus-punishment cards are cards that vary depending on the player's approach, which can either cause a return to the starting line of the game or prevent a return to the beginning by offering alternative behaviors to tobacco smoking behavior.

The game is played with a minimum of two and a maximum of six people. The player with the highest roll is the player who goes first. The game is managed by a moderator who knows the game. The dice are rolled a second time. The pawn is moved by the number on the rolled dice. Whichever category of the card is in the box, the player draws a card from that category. If the box is in the category of questions, the player who rolls the dice draws a card and gives it to the moderator. The moderator reads the question. If the player answers the question correctly, s/he gets points. If the player comes to the surprise card category with the dice roll, s/he chooses from the surprise cards. The player who rolls the dice and falls into the stimulus-punishment card category chooses a card. In the situation indicated on the card, the player either says "I smoke" or chooses the strategy to prevent smoking. If the player did not answer the question on the question card correctly or did not choose the anti-smoking strategy on the stimulus-punishment card, s/he loses points. If the player does not have enough points, he or she turns to one of three different levels on the game board. The winner is the player who is first to reach the final game box. The duration of each game varies between 15-45 minutes, depending on the speed of the player's response and reaching the final game box (16).

Tobacco Cessation Education Program According to the Transtheoretical Model

TTM was developed by Prochaska and DiClemente in 1982, which is defined as a five-stage process of change, including precontemplation, contemplation, preparation, action, and maintenance, which enables individuals to adapt and determine their readiness for smoking cessation treatment (17). The model's definition of behavior change as a gradual, continuous, and dynamic structure is the most basic feature that distinguishes it from other traditional behavioral approaches that evaluate behavior change as a sharp and direct result. This model, which was first used in smoking cessation programs, includes sensitive tools to measure the individual's cognitive and behavioral processes, self-confidence about change, perception of decision making, and factors that make change difficult. With this feature, it allows for identifying individuals in different stages of behavior change, planning individual-specific interventions, evaluating the effectiveness of implemented interventions, and planning new initiatives (17,18).

The training, which is organized according to the stages of the change model, which includes the stages of pre-thinking, contemplation, preparation, action, and care, was designed by the researchers in the light of the Ministry of Health's Tobacco Cessation Guide. In this study, goals and appropriate initiatives were determined in accordance with the stages of precontemplation, contemplation, preparation, action, and maintenance in the stages of the change model.

Precontemplation: The goal of this step is to make those with tobacco addiction consider quitting tobacco use. For this purpose, group members were asked to explain the reasons why they smoke tobacco/cigarettes, discuss the perceived benefits and harms of tobacco addiction, and the negative effects of tobacco addiction on their health. The most important output targeted at the end of the education is to state that tobacco addiction is a harmful habit. During the interviews, the group participants were led to feel confident about a change.

Contemplation: The aim of this stage is that the participants can evaluate themselves, determine their personal motivation points, and summarize their coping skills with stress. Participants were informed about coping with nicotine withdrawal symptoms, ways to get away from nicotine addiction, methods of coping with obstacles to getting away from tobacco addiction, coping with stress, and relaxation exercises.

Preparation: This stage aims to create an action plan for the tobacco addiction behavior of the participants who have recognized their own resources and motivation points. This stage emphasized the importance of recording and controlling stimuli promoting tobacco addiction, examination, the things to be done before getting rid of tobacco addiction, and the importance of avoiding reminders. They were asked to write down their reasons for quitting smoking. The aim was to enable them to see their reasons for quitting smoking concretely. The importance of determining the quit date was mentioned. Alternative behaviors to be developed when tobacco use is discontinued were discussed. The importance of receiving social support systems was explained.

Action: The purpose of this stage is the prevention of reverts to tobacco addiction behavior, development of individual strength, and making a plan to manage possible risky situations. In order to achieve this goal, the importance of self-rewarding, methods of coping with nicotine withdrawal symptoms, and nicotine deficiency were discussed with participants. In addition, how to avoid situations that encourage nicotine consumption behavior, the importance of saying no, the importance of environmental change, and the importance of avoiding relapse were discussed.

Maintenance: Because of the study design and the lack of participants in the maintenance step, interventions specific to this stage were not planned in this study.

Combined Intervention

The combined intervention included the board game together with tobacco cessation education.

Control Group

The scales were applied to the control group at baseline, at the end of the eighth, and twelfth weeks.

Application

The BG and TCE that would play the game were divided into nine groups, with five or six participants in each group. Each group received intervention every two weeks.

Stages of change scale (SCS) was administered after each interview. The groups were rearranged before each intervention and divided into TCE 1 (Precontemplation), TCE 2 (Contemplation), and TCE 3 (Preparation), according to the thinking skills scale. Before interventions, to communicate with the participants on the phone, message groups were created. The purpose of creating these message groups was to announce the classroom and time of each intervention. The interventions were carried out in different classrooms and at different times by the researcher only in order to ensure an atmosphere of trust and full benefit from the interventions.

Measurements

Sociodemographic Data Form

The sociodemographic data form prepared by the researcher consists of questions about age, gender, class, place of residence, daily cigarette consumption, age at onset of smoking, smoking status of parents, and the reason for starting smoking.

Fagerstrom Test for Nicotine Dependence (FTND)

FTND was developed by Heatherton et al. (19) in 1991. The Turkish validity and reliability study of the scale was performed by Uysal et al. (20) in 2003 with a Cronbach's alpha coefficient of 0.56. In scoring the FTND, yes/no items are scored from 0 to 1 and multiple-choice items are scored from 0 to 3. The items are summed to yield a total score of 0-10. The higher the total Fagerstrom score, the more intense the patient's physical dependence on nicotine. Addiction classification is calculated as 0-2 points very low, 3-4 points low, 5 points medium, 6-7 points high, and 8-10 points very high (19).

The reliability analysis results of the FTND administered to the participants in this study were 0.726 in the pre-test, 0.715 in the mid-test, and 0.700 in the post-test.

Stages of Change Scale (SCS)

The SCS scale was developed by Prochaska and DiClemente (17) in 1982. SCC shows the stages of change individuals go through when they are trying to change their problematic behaviors. The scale does not have scoring. The stage of change is determined according to the answers given by the individual to the question. When asked "Have you stopped smoking?, the response of the individual "I don't plan to quit in the next 6 months" indicates the precontemplation stage, "I intend to quit within 6 months" contemplation stage, "I intend to quit within 30 days" preparation stage, "I quit less than 6 months ago" action stage, and "I quit a while ago" maintenance stage (17).

Outcome Measures

The sociodemographic data form was used at the beginning of the study to determine the characteristics of the participants. According to the Russell standard definition, prolonged abstinence was defined as not having smoked more than 5 cigarettes in the past 8 weeks during a 3-month follow-up (21). Based on these criteria, the FTND scale was used at the beginning of the study, at the eighth, and twelfth weeks. The SCS was used at the beginning of the study and after each intervention (every two weeks) to determine the individual's thinking stage.

Statistical Analysis

Data analysis was performed with IBM SPSS v.26. The distribution of the data was examined by the Shapiro-Wilk test, and skewness and kurtosis values were also considered. Nicotine dependence levels according to groups and tests are given as mean and standard deviation. Categorical variables were summarized as numbers and percentages. Pearson chi-square, Fisher's exact, and continuity correction tests were used to compare the demographic and smoking-related characteristics of the groups. Two-Way ANOVA for repeated measures was used to examine the effect of period*group interaction on nicotine addiction levels of adolescents. LSD post hoc tests were used to test the difference between the groups. The significance level was considered the value of 0.05.

RESULTS

The age of the participants ranged from 14-18 with a mean age of 16.2±0.9 years. Of the participants, 54.4% (n=56) were female students. It was found that 46.6% (n=48) of the participants were studying at 12nd class. Of all participants, 84.5% (n=87) were living in a nuclear family. 69.9% (n=72) of the participants' mothers and 43.7% (n=45) of participants' fathers had an educational level of primary school and below. 22.3% (n=23) of the participants' mothers and 88.3% (n=91) of the participants' fathers were employed. While 91.3% (n=94) of the participants were living with their families, 8.7% (n=9) of the participants were living in a non-family household. The distribution of adolescents' intervention groups by some sociodemographic characteristics was given in Table 1. The distributions of age, gender, class, family type, place of residence, education levels of mother and father, and employment status of mother and father were homogeneous and did not differ according to the groups.

The results of the study showed that 38.8% (n=40) of the participants were very light smokers, and 6.8% (n=7) were very heavy smokers. In the study group, 37.9% (n=39) of the participants smoked the first cigarette of the day within the first 5 minutes. Of the participants, 51.5% (n=53) stated that they experience difficulty when they do not smoke in places where smoking is prohibited. Moreover, 57.3% (n=59) of the participants reported that the cigarette which was most difficult to give up was the cigarette smoked during the day. Of the participants, 52.4% (n=54) stated that they smoked ten or fewer cigarettes per day. The mean number of cigarettes smoked daily by adolescents was found to be 10.5±9.0 (range, 1-50). 53.4% (n=55) of the participants reported that they smoked even when they had a disease that would require hospitalization. The distribution of adolescents' intervention groups by the FTND scale was given in Table 2.

Of the participants, 92.2% (n=95) reported that they had smokers in their close environment, and 74.8% (n=77) reported that their parents smoked. 62.1% (n=64) of the participants reported that smoking for 2 years or less. Of the adolescents, 34.0% (n=35) reported that they started smoking at the age of fourteen. 53.4% (n=55) of the study group stated that they started smoking due to stress. Of the participants, 71.8% (n=74) reported that attempted to quit smoking. The distribution of adolescents' intervention groups by smoking-related characteristics was given in Table 3. According to the groups, the distribution of smoking status in the close environment and family, years of smoking, age of onset of smoking, reason for smoking and attempt to quit smoking were homogeneous and did not differ.

When the nicotine addiction levels of adolescents were compared between the groups by measurement periods, the period*group interaction effect was not found significant (p=0.339). Also, it was determined that there was no significant difference in the nicotine addiction levels of the adolescents participating in the study according to the measure periods (p=0.472). However, a statistically significant difference was found in the nicotine addiction levels between the groups (p=0.031). According to the post hoc test results, it was seen that the nicotine addiction levels of the adolescents in the BG and TCE groups were significantly lower than the nicotine addiction levels of the adolescents in the control group in the post-test (Table 4, Figure 1).

Table 1. Comparison of sociodemographic characteristics of the participants, n (%)

	BG (n=25)	TCE (n=26)	CI (n=26)	Control (n=26)	p	Total (n=103)
Age						
14 years	1 (4.0)	0 (0.0)	2 (7.7)	2 (7.7)		5 (4.9)
15 years	2 (8.0)	9 (34.6)	3 (11.5)	3 (11.5)		17 (16.5)
16 years	9 (36.0)	6 (23.1)	10 (38.5)	3 (11.5)	0.064	28 (27.2)
17 years	13 (52.0)	9 (34.6)	10 (38.5)	17 (65.4)		49 (47.6)
18 years	0 (0.0)	2 (7.7)	1 (3.8)	1 (3.8)		4 (3.9)
Gender						
Female	14 (56.0)	10 (38.5)	14 (53.8)	18 (69.2)	0.183	56 (54.4)
Male	11 (44.0)	16 (61.5)	12 (46.2)	8 (30.8)		47 (45.6)
Class						
9	1 (4.0)	0 (0.0)	2 (7.7)	2 (7.7)		5 (4.9)
10	2 (8.0)	9 (34.6)	3 (11.5)	3 (11.5)	0.054	17 (16.5)
11	9 (36.0)	6 (23.1)	13 (50.0)	5 (19.2)		33 (32.0)
12	13 (52.0)	11 (42.3)	8 (30.8)	16 (61.5)		48 (46.6)
Family type						
Nuclear	21 (84.0)	23 (88.5)	23 (88.5)	20 (76.9)		87 (84.5)
Extended	1 (4.0)	1 (3.8)	1 (3.8)	3 (11.5)	0.900	6 (5.8)
Divorced	3 (12.0)	2 (7.7)	2 (7.7)	3 (11.5)		10 (9.7)
Mother's education						
Primary school and below	18 (72.0)	18 (69.2)	15 (57.7)	21 (80.8)		72 (69.9)
High school	5 (20.0)	5 (19.2)	8 (30.8)	4 (15.4)	0.693	22 (21.4)
University and above	2 (8.0)	3 (11.5)	3 (11.5)	1 (3.8)		9 (8.7)
Father's education						
Primary school and below	9 (36.0)	12 (46.2)	9 (34.6)	15 (57.7)		45 (43.7)
High school	13 (52.0)	10 (38.5)	9 (34.6)	8 (30.8)	0.333	40 (38.8)
University and above	3 (12.0)	4 (15.4)	8 (30.8)	3 (11.5)		18 (17.5)
Mother's work	4 (16.0)	10 (38.5)	6 (23.1)	3 (11.5)	0.101	23 (22.3)
Father's work	21 (84.0)	24 (92.3)	24 (92.3)	22 (84.6)	0.703	91 (88.3)
Living with family	23 (92.0)	26 (100)	21 (80.8)	24 (92.3)	0.119	94 (91.3)

BG: board game, TCE: tobacco cessation education, CI: combined intervention

Table 2. Comparison of Fagerstrom test for nicotine dependence, n (%)

	BG (n=25)	TCE (n=26)	CI (n=26)	Control (n=26)	p	Total (n=103)
Nicotine dependence						
Very light	13 (52.0)	9 (34.6)	10 (38.5)	8 (30.8)		40 (38.8)
Light	7 (28.0)	6 (23.1)	8 (30.8)	7 (26.9)		28 (27.2)
Moderate	3 (12.0)	5 (19.2)	6 (23.1)	5 (19.2)	0.669	19 (18.4)
High	1 (4.0)	3 (11.5)	2 (7.7)	3 (11.5)		9 (8.7)
Very high	1 (4.0)	3 (11.5)	0 (0.0)	3 (11.5)		7 (6.8)
First cigarette after waking up						
<5 minutes	13 (52.0)	10 (38.5)	10 (38.5)	6 (23.1)		39 (37.9)
5-30 minutes	5 (20.0)	5 (19.2)	7 (26.9)	10 (38.5)	0.074	27 (26.2)
31-60 minutes	4 (16.0)	5 (19.2)	9 (34.6)	7 (26.9)		25 (24.3)
>60 minutes	3 (12.0)	6 (23.1)	0 (0.0)	3 (11.5)		12 (11.7)
Number of cigarettes per day						
≤10	14 (56.0)	12 (46.2)	15 (57.7)	13 (50.0)		54 (52.4)
11-20	11 (44.0)	12 (46.2)	11 (42.3)	10 (38.5)	0.264	44 (42.7)
≥21	0 (0.0)	2 (7.7)	0 (0.0)	3 (11.5)		5 (4.9)
Most hated cigarettes to quit						
First one of the morning	15 (60.0)	9 (34.6)	11 (42.3)	9 (34.6)	0.217	44 (42.7)
Any other	10 (40.0)	17 (65.4)	15 (57.7)	17 (65.4)		59 (57.3)
Difficulty in forbidden places	17 (68.0)	10 (38.5)	15 (57.7)	11 (42.3)	0.123	53 (51.5)
Smoking more in the first hours	5 (20.0)	9 (34.6)	4 (15.4)	6 (23.1)	0.403	24 (23.3)
Smoking when so ill	10 (40.0)	14 (53.8)	15 (57.7)	16 (61.5)	0.442	55 (53.4)

BG: board game, TCE: tobacco cessation education, CI: combined intervention

**Table 3.** Comparison of groups by smoking-related characteristics, n (%)

	BG (n=25)	TCE (n=26)	CI (n=26)	Control (n=26)	p	Total (n=103)
Smoking in close environment	22 (88.0)	23 (88.5)	25 (96.2)	25 (96.2)	0.569	95 (92.2)
Smoking in family						
Parents	17 (68.0)	18 (69.2)	22 (84.6)	20 (76.9)		77 (74.8)
Siblings	5 (20.0)	5 (19.2)	3 (11.5)	5 (19.2)	0.737	18 (17.5)
Other	3 (12.0)	3 (11.5)	1 (3.8)	1 (3.8)		8 (7.8)
Smoking year						
≤2 years	15 (60.0)	15 (57.7)	22 (84.6)	12 (46.2)		64 (62.1)
3-4 years	8 (32.0)	7 (26.9)	4 (15.4)	11 (42.3)	0.082	30 (29.1)
≥5 years	2 (8.0)	4 (15.4)	0 (0.0)	3 (11.5)		9 (8.7)
Age to start smoking						
≤12 years	1 (4.0)	4 (15.4)	1 (3.8)	4 (15.4)		10 (9.7)
13 years	6 (24.0)	6 (23.1)	2 (7.7)	6 (23.1)		20 (19.4)
14 years	11 (44.0)	7 (26.9)	8 (30.8)	9 (34.6)		35 (34.0)
15 years	3 (12.0)	7 (26.9)	10 (38.5)	6 (23.1)	0.256	26 (25.2)
16 years	4 (16.0)	1 (3.8)	4 (15.4)	1 (3.8)		10 (9.7)
17 years	0 (0.0)	1 (3.8)	1 (3.8)	0 (0.0)		2 (1.9)
Reason for smoking						
Curiosity	15 (60.0)	15 (57.7)	8 (30.8)	10 (38.5)	0.094	48 (46.6)
Stress	10 (40.0)	11 (42.3)	18 (69.2)	16 (61.5)		55 (53.4)
Attempt to quit smoking	17 (68.0)	17 (65.4)	18 (69.2)	22 (84.6)	0.407	74 (71.8)

BG: board game, TCE: tobacco cessation education, CI: combined intervention

Table 4. Comparison of nicotine addiction levels by period and groups

Period	BG (n=25)	TCE (n=26)	CI (n=26)	Control (n=26)	Total (n=103)
Pre-test	2.64±2.51	4.04±2.57	3.11±1.90	3.96±2.59	3.44±2.44
Intermediate	2.96±2.05	4.46±2.56	3.81±2.05	3.53±3.03	3.69±2.48
Post-test	2.52±2.40	3.57±2.38	2.92±1.88	4.34±2.34	3.35±2.33

BG: board game, TCE: tobacco cessation education, CI: combined intervention, F and p values for the period, group, and period*group were 0.878 and 0.472, 3.089 and 0.031, 1.145 and 0.339, respectively, according to the post hoc LSD test results, in the post-test, nicotine addiction levels of the adolescents in the BG and TCE were lower than in the control group
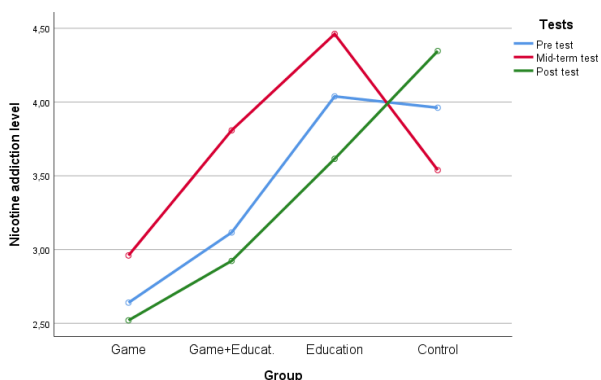
Figure 1. Nicotine addiction levels by period and groups

DISCUSSION

There is no safe level of nicotine, which is an addictive substance. For this reason, all levels of nicotine addiction starting in the adolescence period are important. This study demonstrated that 38.8% of the adolescents were very light smokers, 8.7% were heavy smokers, and 6.8% were very heavy smokers. Studies have reported a very low level of nicotine addiction in 32.6-68.2% (22,23), a moderate level of nicotine addiction in 45.7% (24), a high level of nicotine addiction in 23.9-31.8% (22,25), and a very high level of nicotine addiction in 5.5% of adolescents (22). Studies in the literature and this study show that nicotine addiction remains an important health issue all over the world.

One of the most important determinants of the level of nicotine addiction is the time of the first cigarette smoked in the morning (26). This study showed that 37.9% of the adolescents, almost four out of ten, smoked their first cigarette within the first five minutes after waking up. The study by Petrelli et al. (23) reported this rate as 6.6%.

It is an expected situation for adolescents to smoke even in the school environment due to the "willingness to do what is prohibited". The results of this study revealed that 51.5% of the adolescents had difficulty in stopping smoking in places where smoking was prohibited. Studies on adolescents have reported the rates of having difficulty in staying away from smoking as 59.3% in Türkiye (26) and 85.5% in Romania (23). Considering these results, we can state that the rate of difficulty in staying away from smoking was lower in this study compared to the study conducted by Petrelli et al. (23).

One of the indicators of addiction is an excessive desire for the substance anywhere (25). In this study, 57.3% of the adolescents stated that it was difficult to give up smoking at other times of the day (except in the morning). In the study by Petrelli et al. (23), 73.3% of the adolescents reported that it was difficult to give up smoking at other times of the day. Moreover, the results of this study showed that 76.7% of the adolescents mostly smoked at other times of the day rather than during morning hours. In other words, the results of the difficulty in stopping smoking and/or indispensable smoking time can be explained by the fact that adolescents regard smoking as a means of socializing due to reasons such as acceptance and proof among their peers (27).

The number of cigarettes smoked daily is one of the most important determinants of the level of addiction (26). This study revealed that 52.4% of the adolescents smoked less than 10 cigarettes a day, while 4.9% of them smoked 21 cigarettes and more a day. The study by Petrelli et al. (23) reported that 54.1% of the adolescents smoked less than 10 cigarettes and 6.2% smoked 21 cigarettes and more. However, it should be kept in mind that regular consumption of nicotine, which does not have a safe dose, is sufficient for addiction, even though the number of cigarettes smoked is small.

It is known that adolescents have low awareness of the negative effects of smoking on health and the relationship between disease and smoking (28). In this study, 53.4% of the adolescents reported that they smoked even if they had a disease that would require hospitalization. This result shows that one of two adolescents continues the negative behavior that will cause the disease process to prolong. The study by Petrelli et al. (23) reported this rate as 24.5%. The presence of a smoker in the environment is important in the development of smoking behavior (22,28). In this study, 92.2% of the adolescents were found to have a smoker in their close environment. Most of the mothers and fathers smoked in the adolescents' families (74.8%). A study conducted by Sezer et al. (22) with high school students reported that 55.5% of fathers and 36.0% of mothers smoked cigarettes. Another study conducted in Northern Ireland found that 48% of family members smoked (29). These rates are quite high. Considering that parents are one of the important role models in shaping their children's lives, it can be stated that one of the groups who should be motivated to quit smoking is family members.

It is known that adolescents start smoking because of many factors such as difficulties, fear, curiosity, and stress (30). In this study, 53.4% of the students reported that they smoked due to stress. In the study by Sezer et al. (22), 46% of the adolescents stated that they smoked due to stress, while this rate was found to be 37.3% in the study by Gungormus and Erci (18).

It is known that starting smoking at an early age is a risk factor for a high level of addiction that may occur in older ages and that decreases the quality of life (27,30). The results of our study showed that adolescents started smoking at an average age of thirteen years. In addition, it was found that 40% of adolescents started smoking under the age of thirteen. In the literature, adolescents have been reported to start smoking at similar ages, while some studies have reported the age at onset of smoking as sixteen and above (18,22). Results of this study and other studies in the literature reveal the necessity of giving information about the effects of cigarette addiction on the quality of life at an early age and the risks that smoking will pose in older ages, starting from primary school years the adolescence period.

Social influences and pressures, such as appearing "cool" during adolescence, can lead to the initiation of tobacco use (31). It is difficult to solve the nicotine addiction in the adolescent group who always say no. Games have been used increasingly to prevent smoking among adolescents or to motivate and support them to quit smoking (32). In this study, the post-test score of nicotine addiction was found to be lower in the adolescents in the BG and TCE groups compared to the control group. This result suggests that a learning technique such as play, in which adolescents can be active in quitting their nicotine addiction may be effective. In the literature, we have not yet encountered an intervention study for nicotine addiction of adolescents using the game method. Comparing the effectiveness of play and psychoeducation in individuals over the age of 18, Khazall et al. (14) stated that games and psychoeducation had a similar effect on nicotine addiction. This result can be attributed to the fact that the intervention was limited to twelve weeks and adolescents are a difficult group to create behavioral changes due to their developmental characteristics. However, what was pleasing that the SCS post-test evaluation, it was determined that three adolescents from the BG group and two adolescents from the TCE group were in the action stage. In addition, when Figure 1 is examined, it can be said that the addiction levels of the adolescents in the control group were higher than the addiction levels of the BG, TCE, and CI groups.

The most important limitation of this study was that the time to evaluate smoking cessation was limited to three months. It is recommended for future studies to keep the study period longer in order to make sure that the behavior of smoking cessation has become definite.

CONCLUSION

In conclusion, this study demonstrated that the BG provided a more decrease in the FTND score. In line with the results of this study, the BG is recommended to be used in smoking cessation programs and in smoking cessation and/or nicotine addiction studies designed according to the stages of behavior changes as this game has been designed for the stages of behavior changes.

Author Contributions: Idea/Concept: RC, ÖÖ; Design: RC, ÖÖ; Data Collection/Processing: RC, ÖÖ; Analysis/Interpretation: RC, ÖÖ; Literature Review: RC, ÖÖ; Drafting/Writing: RC, ÖÖ; Critical Review: RC, ÖÖ.

REFERENCES

1. Badrooh A, Mozaffari N, Barikani A, Dadkhah B. The effect of individual and group education done by nurses on smoking dependency and smoking cessation motivation in patients with coronary artery disease. Addict Health. 2020;12(4):269-77.
2. Drope J, Schluger N, Cahn Z, Drope J, Hamill S, Islami F, et al. The Tobacco Atlas. 6th ed. Atlanta, GA, USA: American Cancer Society and Vital Strategies; 2018.
3. Ma C, Xi B, Li Z, Wu H, Zhao M, Liang Y, et al. Prevalence and trends in tobacco use among adolescents

aged 13-15 years in 143 countries, 1999-2018: findings from the Global Youth Tobacco Surveys. Lancet Child Adolesc Health. 2021;5(4):245-55.

4. Oztekin C, Batra M, Abdelsalam S, Sengezer T, Ozkara A, Erbas B. Impact of individual, familial and parental factors on adolescent smoking in Turkey. Int J Environ Res Public Health. 2021;18(7):3740.

5. Fırat M, Demir Gökmen B, Özcan M. The effect of social appearance anxiety on smoking in high school students: Agri example. Turkish J Sci Health. 2021;2(1):104-12.

6. Mahajan SD, Homish GG, Quisenberry A. Multifactorial etiology of adolescent nicotine addiction: a review of the neurobiology of nicotine addiction and its implications for smoking cessation pharmacotherapy. Front Public Health. 2021;9:664748.

7. Singh T, Arrazola RA, Corey CG, Husten CG, Neff LJ, Homa DM, et al. Tobacco use among middle and high school students--United States, 2011-2015. MMWR Morb Mortal Wkly Rep. 2016;65(14):361-7.

8. Prochaska JO. Decision making in the transtheoretical model of behavior change. Med Decis Making. 2008;28(6):845-9.

9. Martinez U, Simmons VN, Sutton SK, Drobes DJ, Meltzer LR, Brandon KO, et al. Targeted smoking cessation for dual users of combustible and electronic cigarettes: a randomised controlled trial. Lancet Public Health. 2021;6(7):e500-9.

10. Sezgin S, Bozkurt A, Yılmaz EA, van der Linden N. Gamification, education and theoretical approaches: motivation, dedication and sustainability in learning processes. Mehmet Akif Ersoy University Journal of Education Faculty. 2018;2018(45):169-89. Turkish.

11. Şenocak D, Bozkurt A. Gamification, player types and gamification design frameworks. Açıköğretim Uygulamaları ve Araştırmaları Dergisi. 2020;6(1):78-96. Turkish.

12. Arabacı İB, Polat M. Digital natives, digital immigrants and classroom management. Electronic Journal of Social Sciences. 2013;12(47):11-20. Turkish.

13. Pimentel J, Cockcroft A, Andersson N. Impact of co-designed game learning on cultural safety in colombian medical education: protocol for a randomized controlled trial. JMIR Res Protoc. 2020;9(8):e17297.

14. Khazaal Y, Chatton A, Prezzemolo R, Zebouni F, Edel Y, Jacquet J, et al. Impact of a board-game approach on current smokers: a randomized controlled trial. Subst Abuse Treat Prev Policy. 2013;8:3.

15. Serdar CC, Cihan M, Yücel D, Serdar MA. Sample size, power and effect size revisited: simplified and practical approaches in pre-clinical, clinical and laboratory studies. Biochem Med (Zagreb). 2021;31(1):010502.

16. Khazaal Y, Chatton A, Prezzemolo R, Hoch A, Cornuz J, Zullino D. A game for smokers: a preliminary naturalistic trial in a psychiatric hospital. Patient Educ Couns. 2008;70(2):205-8.

17. Prochaska JO, DiClemente CC. Transtheoretical therapy: toward a more integrative model of change.

Psychotherapy: Theory, Research & Practice. 1982;19(3);276-88.

18. Gungormus Z, Erci B. Transtheorethical model-based education given for smoking cessation in higher school students. Southeast Asian J Trop Med Public Health. 2012;43(6):1548-59.

19. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström test for nicotine dependence: A revision of the Fagerström Tolerance Questionnaire. Br J Addict. 1991;86(9):1119-27.

20. Uysal MA, Kadakal F, Karşidağ C, Bayram NG, Uysal O, Yilmaz V. Fagerstrom test for nicotine dependence: reliability in a Turkish sample and factor analysis. Tuberk Toraks. 2004;52(2):115-21.

21. West R, Hajek P, Stead L, Stapleton J. Outcome criteria in smoking cessation trials: proposal for a common standard. Addiction. 2005;100(3):299-303.

22. Erol S, Balci AS, Sisman FN. Effect of transtheoretical model based smoking cessation program on high school students. J Nutr Health Sci. 2018;5(3):301.

23. Petrelli F, Scuri S, Tanzi E, Nguyễn TTC, Grappasonni I. Lifestyles and discomfort in a sample of young Romanian students. J Prev Med Hyg. 2018;59(3):E230-5.

24. Johnson JM, Muilenburg JL, Rathbun SL, Yu X, Naeher LP, Wang JS. Elevated nicotine dependence scores among electronic cigarette users at an electronic cigarette convention. J Community Health. 2018;43(1):164-74.

25. Islam K, Datta AK, Seth S, Roy A, Das R. A study on the prevalence and correlates of nicotine dependence among adolescents of Burdwan Town, West Bengal. Indian J Psychiatry. 2019;61(1):89-93.

26. Bozkurt N, Bozkurt Aİ. Assessment of the Fagerström test for nicotine dependence (FTND) used in the determination of nicotine dependence and developing a new test for the nicotine dependence. Pam Med J. 2016;9(1):45-51. Turkish.

27. Gumus Dogan D, Ulukol B. Factors contributing to smoking and efficiency of two different education models among adolescents. Ann Med Res. 2010;17(3):179-85. Turkish.

28. Bilgiç N, Günay TA. A method for supporting smoking cessation in adolescents: peer education. Turk Thorac J. 2014;15(3):102-5. Turkish.

29. Badham J, McAneney H, Dunne L, Kee F, Thurston A, Hunter RF. The importance of social environment in preventing smoking: an analysis of the Dead Cool intervention. BMC Public Health. 2019;19(1):1182.

30. Kim DJ, Kim SJ. Impact of nearby smoking on adolescent smoking behavior in Korea. Medicine (Baltimore). 2018;97(45):e13125.

31. Bernat D, Gasquet N, Wilson KO, Porter L, Choi K. Electronic cigarette harm and benefit perceptions and use among youth. Am J Prev Med. 2018;55(3):361-7.

32. Derksen ME, van Strijp S, Kunst AE, Daams JG, Jaspers MWM, Fransen MP. Serious games for smoking prevention and cessation: A systematic review of game elements and game effects. J Am Med Inform Assoc. 2020;27(5): 818-33.