

ORIGINAL RESEARCH

Relationship among Smoking Addiction, Psychological Flexibility, and Impulsivity in University Students

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Main Points

- Psychological flexibility and impulsivity are among the psychological factors associated with addiction.
- Psychological flexibility was significantly lower and not being able to plan was significantly higher in those who started smoking under the age of 18.
- Parents smoking is significantly higher in female students with cigarette addiction, and father smoking is significantly higher in male students.
- Psychological flexibility and impulsivity predict smoking addiction.

Abstract

In this study, we aimed to investigate the relationship between psychological flexibility and impulsivity levels with nicotine addiction levels, in university students who are addicted to cigarettes. The population of the study consisted of 546 undergraduate students, including 294 non-smokers and 252 smokers, who were addicted to tobacco according to the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) diagnostic criteria and who were studying at the Hamidiye Health Sciences University. The Psychological Flexibility Scale (PFS) and Barratt Impulsivity Scale (BIS) were applied to students who were smokers and non-smokers; and in addition, the Fagerström Nicotine Dependence Test (FNDT) was applied to the smokers. The students with nicotine dependence were compared with the non-addicted group; and values (32.4 ± 8.0 vs. 54.5 ± 11.3 ; $p < 0.001$), presentability (20.8 ± 6.0 vs. 33.7 ± 6.4 ; $p < 0.001$), acceptance (13.7 ± 4.1 vs. 26.3 ± 4.1 ; $p < 0.001$), contextual self (8.6 ± 2.8 vs. 13.2 ± 4.3 ; $p < 0.001$), disintegration (8.9 ± 2.9 vs. 12.7 ± 4.2 ; $p < 0.001$) subscale scores, and PFS total score (84.7 ± 15.8 vs. 140.6 ± 21.4 ; $p < 0.001$) were found to be significantly lower; whereas attention impulsivity (19.5 ± 4.2 vs. 15.5 ± 3.2 ; $p < 0.001$), motor impulsivity (26.4 ± 5.4 vs. 18.3 ± 3.9 ; $p < 0.001$), and the non-planning (30.4 ± 3.1 vs. 17.0 ± 2.1 ; $p < 0.001$) subscale scores of BIS and BIS total score (76.3 ± 11.0 vs. 52.5 ± 7.4 , $p < 0.001$) were found to be significantly higher. In addition, a significant positive relationship was found between the FNDT scores of the participants in the smoking group and the BIS subscale with total scores ($r = 0.330$, $p < 0.001$; $r = 0.277$, $p < 0.001$; $r = 0.222$, $p < 0.001$; $r = 0.330$, $p < 0.001$; respectively). Psychological flexibility and impulsivity have a say in the development or continuation of addiction and are critical in the fight against addiction.

Keywords: Smoking addiction, psychological flexibility, impulsivity, university students, tobacco

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Introduction

Cigarette addiction is a condition in which biological, psychological, behavioral, and social factors play a role together. The role of inadequate skills in coping with stress and stress in addiction is well known (Öztürk, 2014). Nicotine induces pleasure and reduces stress and anxiety. Smokers use it to modulate levels of arousal and to control mood (Knott et al., 2011). The basis of nicotine addiction

is a combination of positive reinforcements, including enhancement of mood and avoidance of withdrawal symptoms. In addition, conditioning has an important role in the development of tobacco addiction (Dani & Heinemann, 1996).

Psychological flexibility is defined as the ability of individuals to be fully in touch with the moment that they are in and to change or maintain their behavior in line with values (Hayes, 2016). This includes pro-

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cesses such as being able to make appropriate choices and take action, even when there are compelling and painful thoughts, memories, emotions, and feelings. There are many actionable options, both physical and cognitive, in which psychologically resilient individuals can act in accordance with their own norms as a result of an event (Ciarrochi et al., 2010). There are many studies in the literature on the relationship between smoking and substance use, and it was found that individuals with cigarette and alcohol addiction had low psychological flexibility (Farris et al., 2016; Garey et al., 2016; Uygur, 2017).

In one of the definitions of impulsivity, it is mentioned that individuals act fast and unplanned without considering the possible negative consequences for themselves and others in the face of internal and external stimuli. It contains many phenomena within the concept of impulsivity (Özdemir et al., 2012). Barratt examined impulsivity in three dimensions: Impulsivity has characteristic elements such as “motor impulsivity” as a rapid response to external stimuli, having hasty responses, conducting reckless action, and being in a state of unwariness and instability. Furthermore, impulsivity involves impulsive decisions that are not future-oriented, having attention related concentration problems, as well as the uncontrolled surge of ideas floating in mind, and the inability to maintain attention for a sustained period of time (Patton et al., 1995).

The high level of impulsivity parallels engaging in risky behaviors, seeking new and different excitements, quickly reaching pleasure along with an easy self-satisfaction in a shorter response time, and experiencing difficulty in getting back to dealing with an issue. According to this point of view, it has been reported that tobacco addicts generally prefer smaller but relatively faster rewards than larger rewards that they can attain later (Rezvanfard et al., 2010). In a study conducted by Kollins (2002), it was found that people with a high level of impulsivity started smoking as well as consuming alcohol and substance use at an early age.

There are also studies mooted a two-way relationship between addiction and impulsivity. It has been stated that individuals with high levels of impulsivity are prone to addiction, increasing the problems in the impulse control mechanism after substance use, and as a result creating a vicious circle leading to the reinforcement of addiction. In the classification system of addiction, it is asserted that impulsivity should be identified as a sub-marker to establish a diagnosis and treatment goal (Mitchell, 2004; Glicksohn & Nahari, 2007).

Both human and rodent studies have demonstrated links between repeated drug use and alterations in brain pathways involved in behaviors related to decision-making, such as impulsivity (impulsive choice and impulsive action), risk-taking, and cognitive flexibility (Evenden, 1999).

In this study, we aimed to determine the psychological flexibility and impulsivity levels of university students with and without smoking addiction, and their relationships with each other within the scope of sociodemographic data. Smoking addiction, which is a serious addiction problem in Turkey as well as all over the world, also poses a significant threat to young people. In this context, we believe that this study will not only contribute to the literature, but also can be beneficial in psychological treatment programs and social support given to the relevant group.

Methods

Sample and Application

The sample of the study consisted of undergraduate students studying at the Hamidiye Health Sciences University who gave their consent to participate in the study. According to the data of higher education institution information management system, there are approximately 1.5 million university students in İstanbul. Considering the reliability (Yazıcıoğlu & Erdoğan, 2014) with a sampling error of 0.05 from the universe, the number of sub-participation was determined as 384, and the students were selected by simple sampling method and divided into two groups as tobacco addicts and non-tobacco addicts according to the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) diagnostic criteria. A total of 546 students, 252 with smoking addiction, and 294 without cigarette addiction were included in the study. Those with a history of psychiatric and/or neurological disease or using psychiatric medication were excluded from the study.

To conduct the research, approval was obtained from the scientific research ethics committee of Hamidiye Health Sciences University with the registration number 46418926-050.01.04. The study was conducted between January and March 2020 at the Hamidiye campus of the Health Sciences University, and the students were determined by snow-ball sampling method. A questionnaire form was given to the students, and it took approximately 15 minutes for each student to fill out the form. Scales that were not filled in fully or randomly were not included in the evaluation. After the approval, the participants were informed about the study, its purpose, its importance, and the relevant data collection forms. Furthermore, they were informed that no information about their personal details would be included in the questionnaire and that no one besides the researchers could access these surveys. The informed consent form was read to the participants, and it was explained that participation in the study was voluntary. Written consent form was obtained from the participants who agreed to participate in the study.

Data Collection Tools

The sociodemographic data form, Psychological Flexibility Scale (PFS), and Barrat Impulsivity Scale (BIS) were applied to the control group, along with the Fagerstrom Nicotine Dependence Test (FNDT), which was applied to the study group.

Sociodemographic Data Form: It is a form prepared by the researchers within the framework of the purposes of the study and includes sociodemographic data such as age, sex, education level, marital status, and employment status. The evaluation of the student grade point average (GPA) was made within the scope of the undergraduate education regulation in accordance with the Presidential legislation information system.

Psychological Flexibility Scale: PFS was developed by Francis, Dawson, and Golijani Moghaddam (2016). The Turkish validity and reliability study was conducted by Karakuş and Akbay (2020); and the scale consisting of 28 items and five dimensions was reported to have good fit values. The Cronbach's alpha internal consistency reliability coefficient was 0.79. The sub-dimensions of the scale were values, presentability, acceptance, contextual self, and disintegration. The lowest score that can be obtained from the scale is 28, and the highest score is 196. High scores from each subscale in the evaluation of scale items reflect high psychological flexibility.

Barratt Impulsivity Scale-11: BIS developed by Patton, Stanford, and Barratt (1995) was adapted into Turkish by Güleç et al. (2008). The BIS has a 5-point Likert type rating consisting of 30 items in total. There are three dimensions in BIS: attention impulsivity, motor impulsivity, and non-planning. As per this scale, the higher the scores obtained from the scale, the higher the impulsivity levels of the individuals in the relevant sub-dimension. BIS was administered to 237 college undergraduates and 83 psychiatric patients with bipolar disorder and substance dependence. Cronbach's alpha for internal consistency was 0.78 (students) and 0.81 (patients), and two-month test-retest reliability was 0.83 (students). The total score of the BIS-11 ranged from 30 – 120. The higher scores in each subscale and BIS-11 indicate a higher level of impulsiveness.

Fagerstrom Nicotine Dependence Test: FNDT was developed by Karl O. Fagerstrom to determine the level of physical addiction to smoking and includes six questions (1989). The questions are close-ended. As the level of addiction to smoking increases, the score obtained from the test increases. People with scores less than 5 in the test are defined as mild addicts, a score of 5 or 6 is defined as moderate, and those whose score is 7 and above are defined as severe nicotine addicts. The validity and reliability study

of the test in the Turkish language was carried out by Uysal et al. (2004), and the Cronbach's alpha value was found to be 0.56.

Statistical Analysis

Statistical Package for Social Sciences version 21 package software (IBM SPSS Corp.; Armonk, NY, USA) was used for the analysis of the data. Significance was accepted as $p < 0.05$. The Kolmogorov-Smirnov test was applied to test the conformity to normal distribution. The t-test was used to compare normally distributed data, and the results were expressed as mean $\pm$ standard deviation. Categorical data were shown as percentages. The Chi-squared test was used to compare categorical data. Univariate and multivariate logistic regression analyses were applied to examine whether sex, alcohol, and scale scores constitute a risk factor for smoking status. Stepwise method was used for model selection in multiple regression.

Results

In the study, first, the sociodemographic data of the smoker (study group) and the non-smoker group (control group) were compared (Table 1). As a result of the test, the male sex ratio,

Table 1.
Comparison of the Sociodemographic Data of the Groups

	Smoking (n=252)	Not smoking (n=294)	p	Total n=546
Age, mean $\pm$ SD	21.5 $\pm$ 2.3	22.0 $\pm$ 4.0	0.072	21.7 $\pm$ 3.3
Gender				
Women (%)	93 (29.6)	221 (70.4)	<0.001	314 (57.1)
Men (%)	159 (68.5)	73 (31.5)		232 (42.2)
Class level				
Class level 1 n (%)	44 (37.3)	74 (62.7)	0.030	118 (21.5)
Class level 2 n (%)	90 (54.2)	76 (45.8)		166 (30.2)
Class level 3 n (%)	75 (47.2)	84 (52.8)		159 (28.9)
Class level 4 n (%)	43 (41.7)	60 (58.3)		103 (18.7)
Smoking starting age (%)				
Before 18	70 (27.8)			70 (27.8)
After 18	182 (72.2)			182 (72.2)
Drinking alcohol n (%)	126 (78.8)	34 (21.3)	<0.001	160 (29.3)
Substance use n (%)	18 (90)	2 (10)	<0.001	20 (3.7)
Mother smoking	93 (66)	48 (34)	<0.001	141 (25.8)
Father smoking	153 (60.2)	99 (33.9)	<0.001	254 (46.5)
Close Friend smoking	246 (53.9)	210 (46.1)	<0.001	456 (83.5)
Receiving disciplinary punishment	27 (75)	9 (25)	<0.001	36 (6.6)
GPA				
Below 1.8	9 (52.9)	8(47.1)	<0.001	17 (3.1)
1.8-2.5	87 (73.1)	32 (26.9)		119 (21.8)
2.5-3	60 (45.1)	73 (54.9)		133 (24.4)
3-3.5	75 (41.9)	104 (58.1)		179 (32.8)
3.5-4	21 (21.4)	77 (78.6)		98 (17.9)

*p<0.001, SD: Standard Deviation; GPA: Grade Point Average.

Table 2.

Comparison of the Gender of the Students in the Study Group and the Smoking Addiction according to the Gender of the Parents

	Those with nicotine addiction (Female)	Those with nicotine addiction (Male)	p
Mother smoking (n=93)	17 (56.6%)	13 (43.4%)	<0.001
Father smoking (n=153)	21 (23.3%)	69 (76.7%)	<0.001
Mother and father smoking (n=63)	34 (54%)	29 (46%)	0.001
Both non-smokers (n=69)	21 (30.5%)	48 (69.5%)	<0.001

*p<0.001

Table 3.

Comparison of Study and Control Groups in Terms of Psychological Flexibility Scale and Barrat Impulsivity Scale Scores

	Those with nicotine addiction (n=252)	Nicotine non-addicts (n=294)	p
PFS-Values	32.4±8.0	54.5±11.3	<0.001
PFS-Presentability	20.8±6.0	33.7±6.4	<0.001
PFS-Acceptance	13.7±4.1	26.3±4.1	<0.001
PFS-Contextual self	8.6±2.8	13.2±4.3	<0.001
PFS-Disintegration	8.9±2.9	12.7±4.2	<0.001
PFS-Total	84.7±15.8	140.6±21.4	<0.001
BIS-Attention impulsivity	19.5±4.2	15.5±3.2	<0.001
BIS-Motor impulsivity	26.4±5.4	18.3±3.9	<0.001
BIS-Non planning	30.4±3.1	17.0±2.1	<0.001
BIS-Total	76.3±11.0	52.5±7.4	<0.001

*p<0.001, PFS: Psychological Flexibility Scale; BIS: Barratt Impulsivity Scale.

Table 4.

Study Group Correlation Analysis of the Relationship Between Nicotine Addiction Severity and Impulsivity Levels

	r	p
BIS Attention Impulsivity	0.330	<0.001
BIS Motor Impulsivity	0.277	<0.001
BIS Non-Planning	0.222	<0.001
BIS Total	0.330	<0.001

*p<0.001, BIS: Barratt Impulsivity Scale.

drinking alcohol, substance use, having a smoking mother, having a smoking father, having a smoking friend, receiving disciplinary punishment, and low GPA were found to be significantly higher in the study group ($p<0.001$ for all parameters).

As shown in Table 1, according to FNDT applied to the study group, 17.1% of the students were very mildly addicted, 10.3% had a mild addiction, 16.3% moderate, 18.3% high, and 38.1% of the students were very highly addicted.

A series of independent groups t-tests were conducted to determine whether the PFS and BIS total score and subscale scores differed when the study group started smoking under 18 years of age or older. Being in the moment (18.1 ± 3.4 vs. 21.9 ± 0.5 ; $p<0.001$) acceptance (12.5 ± 2.2 vs. 14.2 ± 1.9 ; $p=0.003$), contextual self (7.5 ± 1.5 vs. 9.0 ± 1.3 ; $p<0.001$), dissociation (8.0 ± 1.4 vs. 9.3 ± 1.5 ; $p=0.002$),

and PFS total scores (76.5 ± 10 vs. 87.9 ± 8 ; $p<0.001$) were found to be significantly lower than those who started smoking over the age of 18 years. This situation can be interpreted as psychological flexibility being lower in those who start smoking under the age of 18 years. Although the BIS inability to plan subscale score was significantly higher in those who started smoking under the age of 18 years (31.5 ± 3.2 vs. 29.9 ± 0.0 ; $p<0.001$), no significant difference was found in the other subscales and BIS total scores.

When the smoking status of the students in the study group was examined according to their sex and parental sex, it was seen that the mother, the mother and father smoking was significantly higher in female students, and the father smoking was significantly higher in male students ($p<0.001$, $p=0.001$, $p<0.001$, respectively). The non-smoking rates of parents were significantly higher in male students than in female students ($p<0.001$) (Table 2).

A series of independent group t-tests were conducted to determine whether the PFS and BIS total score and subscale scores differed according to the nicotine addiction status of the participants (Table 3). According to the results, the total and all sub-scores of PFS differed according to nicotine addiction ($p<0.001$ for all parameters). Moreover, it was determined that the scores of the students with nicotine addiction were significantly lower than the control group in terms of values, presentability, acceptance, contextual self, disintegration, and PFS in total. BIS total and all sub-scores differed according to nicotine addiction, and the study group had significantly higher attention impulsivity, motor

Table 5.

Results of Univariate and Multivariate Logistic Regression Analysis Examining whether Gender, Alcohol and Scale Scores Constitute a Risk Factor on Smoking Status

Parameters	Univariate analysis			Multivariate Analysis			
	OR (95% CI)	p	R ²	OR (95% CI)	p	R ²	VIF
Based on Total scores						0.961	
Gender (Ref. Female)	5.18 (3.58-7.47)	<.001	0.189	5.05 (1.27-20.15)	.022		1.076
Alcohol (Ref. No)	7.64 (4.95-11.81)	<.001	0.225	26.57 (2.75-256.14)	.004		2.134
PFS Total score	0.85 (0.82-0.87)	<.001	0.877	0.85 (0.80-0.90)	<.001		2.056
BIS Total score	1.46 (1.35-1.57)	<.001	0.840	1.36 (1.21-1.52)	<.001		1.203
Based on sub-factor scores						0.954	
Gender (Ref. Female)	5.18 (3.58-7.47)	<.001	0.189	-			
Alcohol (Ref. No)	7.64 (4.95-11.81)	<.001	0.225	-			
PFS-Values	0.83 (0.81-0.85)	<.001	0.684	0.87 (0.81-0.93)	<.001		1.124
PFS-Presentability	0.69 (0.65-0.74)	<.001	0.687	0.84 (0.74-0.95)	.009		1.158
PFS-Acceptance	0.46 (0.40-0.53)	<.001	0.880	0.57 (0.46-0.69)	<.001		1.262
PFS-Contextual self	0.73 (0.68-0.77)	<.001	0.355	-			
PFS-Contextual self	0.76 (0.71-0.80)	<.001	0.278	-			
BIS-Attention impulsivity	1.33 (1.25-1.41)	<.001	0.296	-			
BIS-Motor impulsivity	1.49 (1.39-1.59)	<.001	0.567	1.37 (1.15-1.61)	<.001		1.100
BIS-Non planning	12.53 (1.78-87.83)	0.11	0.995	-			

VIF: Variance inflation factor; OR: odds ratio; CI: confidence intervals; R²: Nagelkerke's pseudo coefficient; *p<0 .001, PFS: Psychological Flexibility Scale; BIS: Barratt Impulsivity Scale

impulsivity, failure to plan, and BDI total scores (p<0.001 for all parameters).

As shown in Table 3, Pearson correlation analysis was conducted to examine the relationship between the variables in the study. The results indicated that there was a positive and significant relationship between the participants' FNDT scores and BIS scores. Correlation analysis has been carried out by taking the FNDT scores as a continuous variable, that is, as the addiction severity of the participants increases, their impulsivity scores also increase (Table 4). There was no significant relationship between the FNDT scores of the participants and their PFS scores.

Parameters that could be associated with cigarette addiction were evaluated using univariate regression analysis. Sub-parameters of sex and alcohol use total PFS and BIS scores were associated with cigarette addiction. The multivariate regression analysis model used to evaluate the parameters independently associated with cigarette addiction is shown in Table 5.

Discussion

Cigarettes cause addiction owing to more than 4,000 harmful substances in them, including nicotine. Cigarette addiction is becoming a growing public health problem in the world and in Turkey, and it is possible to talk about a multifactorial situation involving the interaction of socio-cultural, neuropsychological, and genetic factors. Studies with special groups beyond the general population are also needed to better understand the psychological effects and interactions of cigarette addiction (HHS, 2012). In this study, the

relationship between nicotine addiction and impulsivity and psychological flexibility was mainly investigated, and these two psychological factors were found to be associated with nicotine addiction. Psychological flexibility and impulsivity predict smoking addiction. The start of smoking usually occurs during adolescence; and the earlier it starts, the less likely it is possible to quit smoking (HHS, 2012). Approximately, 90% of tobacco-addicted adults start smoking before the age of 18 years and 99% before the age of 26 years. In a study conducted with 1,323 university students, smoking addiction was found to be higher in male students. Although in a study conducted in China, higher rates of nicotine addiction were observed in men (Cai et al., 2015); in a study conducted in Turkey, no significant difference in sex was found (Yağcı et al., 2019). In another study conducted with university students, no difference was found in terms of sex (Çakıcı et al., 2014). In our study, the number of male students with cigarette addiction was found to be significantly higher, and 72.2% of smokers started smoking before the age of 18 years.

In a study examining smoking addiction and related factors in university students, answering the question of how they started smoking, a majority of students stated that the most effective factors were environmental; parents smoking, friends smoking and the desire to be accepted into the social circle of friend-groups, envying, starting because of an obvious problem. Furthermore, addiction was determined to have a more frequent incidence in male students than in female students (Gerçek et al., 2010). The factors that affect the smoking in young people include parental smoking, smoking in their social circle of friends, drinking alcohol, and psychoactive substance use (Gerçek et al.,

2010; Eren, 2018; Çakıcı et al., 2014; Kollins, 2002). In our study, in accordance with the literature, the mother and/or the father smoking, close friend smoking, and receiving disciplinary punishment were significantly higher in the smokers group, whereas the study group's GPA was significantly lower. A remarkable finding about sex in our study; parents smoking was significantly higher in female students with cigarette addiction, and father smoking is significantly higher in male students with addiction. This may be owing to the fact that female students are more behaviorally influenced by their mothers and male students by their fathers.

Studies on impulsivity and smoking show that smokers are typically more impulsive than non-smokers, and impulsivity is associated with starting, maintaining, quitting, and nicotine addiction (Reynolds et al., 2007; Doran et al., 2009; Perkins et al., 2008). Studies with adolescents report that the increased impulsivity seen in smokers begins before they even start smoking. Moreover, it has been suggested that impulsive smokers are less likely to quit because they have a higher severity of addiction, and experience severe withdrawal symptoms (Doran et al., 2007). In a cross-sectional study conducted with university students, a positive relationship was found between impulsivity and smoking (Kollins, 2002). In a study conducted with 251 participants, impulsivity was found to be a predictor of smoking (Yağcı et al., 2019). In a thesis study examining the relationship between cigarette addiction and impulsivity, the smoking group was compared with the non-smoking group, and it was found that smokers were more impulsive than non-smokers. In our study, it was found that impulsivity was significantly higher in the smoking group than in the control group, and there was a positive relationship between the severity of nicotine addiction and impulsivity levels.

Psychological flexibility is when individuals do not live in the past and the future, but touches the moment they are in and perform behaviors according to their values (Luoma et al., 2010). The concept of psychological flexibility comes to the forefront in treatment methods related to smoking cessation, and its mediator role is emphasized (Zvolensky et al., 2014). In acceptance and commitment therapy, which is the most commonly used and most effective method in quitting smoking, it helps to connect with negative experiences with a sense of identity called "self-as-context." According to this approach, individuals pave the way on how to take a position on the subject by clarifying their own values. All of these stages and teachings point to psychological flexibility (Harris, 2006). In our study, psychological flexibility scores in the smoker group were significantly lower than in the non-smoker group. No relationship was found between the degree of addiction and psychological flexibility. Psychological flexibility and impulsivity predict smoking addiction.

Limitations and Directions/Suggestions for Future Research

This study had some limitations. First, our study was a cross-sectional study and the sample consisted of students from a single university, and therefore, may not generalize to more heterogeneous cultural and socioeconomic samples. Second, using self-rated measures, which may only show high risk rather than the diagnosis, limit the generalizability of these findings.

Nicotine is the chemical in tobacco products that plays a major role in the development of addiction. The rapidly developing

brains of children and adolescents are particularly sensitive to nicotine addiction. Considering the difficulties adolescents experience in quitting tobacco use, the need to prevent tobacco use is high. Psychotherapeutic approaches are used as well as psychopharmacological treatments in quitting smoking. In cases where psychotherapy is added, the results are more pleasant and permanent. Furthermore, knowing the success rates, the risk factors, and related factors in anti-addiction treatments, as well as organizing psychotherapeutic treatments by considering these factors will increase the success of treatment programs. In this context, the study we conducted is important in terms of both evaluating psychological risk factors in smoking, and evaluating these psychological factors and their relationships in psychotherapeutic treatment programs.

Ethics Committee Approval: Ethics committee approval was received for this study from Scientific Research Ethics Committee of Hamidiye Health Sciences University with the registration number 46418926-050.01.04.

Informed Consent: Written consent form was obtained from the participants who agreed to participate in the study.

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References

- Cai, L., Cui, W., You, D., He, J., & Zhao, K. (2015). Socioeconomic variations in nicotine dependence in rural southwest China. *BMC Public Health*, 15(1), 1-6. [\[Crossref\]](#)
- Ciarrochi, J., Bilich, L., & Godsell, C. (2010). Psychological flexibility as a mechanism of change in acceptance and commitment therapy. Assessing mindfulness and acceptance processes in clients: Illuminating the theory and practice of change, 51-75.
- Çakıcı, E., Çakıcı, M., Eş, A., & Ergün, D. (2014). The prevalence and risk factors of substance use among university students in Turkish Republic of Northern Cyprus. *Anatolian Journal of Psychiatry/Anadolu Psikiyatri Dergisi*, 15(2), 108-115. [\[Crossref\]](#)
- Dani, J. A., & Heinemann, S. (1996). Molecular and cellular aspects of nicotine abuse. *Neuron*, 16(5), 905-908. [\[Crossref\]](#)
- Doran, N., Cook, J., McChargue, D., & Spring, B. (2009). Impulsivity and cigarette craving: differences across subtypes. *Psychopharmacology*, 207(3), 365-373.
- Doran, N., McChargue, D., & Cohen, L. (2007). Impulsivity and the reinforcing value of cigarette smoking. *Addictive behaviors*, 32(1), 90-98.
- Eren, M. (2018). Disiplin Cezası Alan ve Almayan Lise Öğrencilerinin Saldırganlık Empati Becerisi ve Anne-Baba Tutumları Açısından Değerlendirilmesi (Master's thesis, İstanbul Gelişim Üniversitesi Sosyal Bilimler Enstitüsü).
- Evenden, J. L. (1999). Varieties of impulsivity. *Psychopharmacology*, 146(4), 348-361. [\[Crossref\]](#)
- Fagerstrom, K., Shneider, N.G. (1989). Measuring nicotine dependence: a review of the Fagerstrom Tolerance Questionnaire. *J Behav Med*, 12, 159-182. [\[Crossref\]](#)

- Farris, S. G., Zvolensky, M. J., Norton, P. J., Hogan, J., Smith, A. H., Talkovsky, A. M., et al. (2016). Smoking-specific experiential avoidance is indirectly associated with trait worry and smoking processes among treatment-seeking smokers. *Behavioral Medicine*, 42(4), 254-263. [\[Crossref\]](#)
- Francis, A.W., Dawson, D.L., Golijani-Moghaddam, N. (2016). The development and validation of the Comprehensive assessment of Acceptance and Commitment Therapy processes (CompACT). *Journal of Contextual Behavioral Science*, 5, 134-145. [\[Crossref\]](#)
- Garey, L., Farris, S.G., Schmidt, N.B., Zvolensky, M.J. (2016). The role of smoking specific experiential avoidance in the relation between perceived stress and tobacco dependence, perceived barrier to cessation, and problems during quit attempts among treatment-seeking smokers. *Journal of Contextual Behavioral Science*, 5(1), 58-63. [\[Crossref\]](#)
- Gerçek, Ç., Gümüş, G., Demir, S., Deniz, M., Sürücü, Z., Konuk, M., Türkmay, M., Taner, H., Mayda, A. (2010). Düzce Üniversitesi Orman Fakültesi Öğrencilerinde Sigara, Alkol ve Madde Kullanımı Sıklığı ve Kullanmaya Başlama Nedenleri. *Duzce Medical Journal*, 12(3), 7-14.
- Glicksohn, J., & Nahari, G. (2007). Interacting personality traits? Smoking as a test case. *European Journal of Personality*, 21(2), 225-234. [\[Crossref\]](#)
- Güleç, H., Tamam, L., Turhan, M., Karakuş, G., Zengin, M., Stanford, M.S. (2008). Psychometric Properties of the Turkish Version of the Barratt Impulsiveness Scale 11. *Bulletin of Clinical Psychopharmacology*, 18(4), 251-258.
- Harris, R. (2006). Embracing your demons: An overview of acceptance and commitment therapy. *Psychotherapy in Australia*, 12(4).
- Hayes, S.C. (2016). Acceptance and Commitment Therapy, Relational Frame Theory, and the Third Wave of Behavioral and Cognitive Therapies - Republished Article. *Behav Ther.* 47(6), 869-885. [\[Crossref\]](#)
- Karakuş, S., Akbay, S.E. (2020). Psikolojik Esneklik Ölçeği: Uyarlama, Geçerlik ve Güvenirlik Çalışması. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, 16(1), 32-43. [\[Crossref\]](#)
- Knott, V., Heenan, A., Shah, D., Bolton, K., Fisher, D., & Villeneuve, C. (2011). Electrophysiological evidence of nicotine's distracter-filtering properties in non-smokers. *Journal of psychopharmacology*, 25(2), 239-248.
- Kollins, S.H. (2002). Delay discounting is associated with substance use in college students. *Addict Behav*, 28(6), 1167-1173. [\[Crossref\]](#)
- Luoma, J.B., Hayes, S.C., Walser, R.D. (2010). Learning ACT: An Acceptance & Commitment Therapy skills-training manual for therapists. *New Harbinger Publications*, 60, 549-552. [\[Crossref\]](#)
- Mitchell, S. H. (2004). Measuring impulsivity and modeling its association with cigarette smoking. *Behavioral and Cognitive Neuroscience Reviews*, 3(4), 261-275. [\[Crossref\]](#)
- Özdemir, P.G., Selvi, Y., Aydın, A. (2012). Impulsivity and Its Treatment. *Psikiyatride Güncel Yaklaşımlar*, 4(3), 293-314. [\[Crossref\]](#)
- Öztürk, M. O., & Uluşahin, A. (2014). Ruh sağlığı ve bozuklukları. Nobel Tıp Kitabevleri.
- Patton, J.H., Stanford, M.S., Barratt, E.S. (1995). Factor structure of the Barratt impulsiveness scale. *J Clin Psychol*, 51(6), 768-774. [\[Crossref\]](#)
- Perkins, K.A., Lerman, C., Coddington, S.B., Jetton, C., Karelitz, J.L., Scott, J.A., Wilson, A.S. (2008). Initial nicotine sensitivity in humans as a function of impulsivity. *Psychopharmacology (Berl)*, 200(4), 529-44. [\[Crossref\]](#)
- Reynolds, B., Patak, M., Shroff, P., Penfold, R.B., Melanko, S., Duhig, A.M. (2007). Laboratory and self-report assessments of impulsive behavior in adolescent daily smokers and nonsmokers. *Exp Clin Psychopharmacol*, 15(3), 264-271. [\[Crossref\]](#)
- Rezvanfar, M., Ekhtiari, H., Mokri, A., Djavid, G., Kaviani, H. (2010). Psychological and behavioral traits in smokers and their relationship with nicotine dependence level. *Arch Iran Med*, 13(5), 395-405.
- US Department of Health and Human Services. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
- Uygur, H. (2017). Madde Kullanımı ve Psikolojik Esneklik Modelinin İlişkisi: Kabul ve Eylem Formu Madde Versiyonu (Kef-M) Türkçe Geçerlik ve Güvenirliği. (TıptaUzmanlıkTezi). Sağlık Bilimleri Üniversitesi Konya Eğitim ve Araştırma Hastanesi, Konya.
- Uysal, M.A., Kadakal, F., Karşıdağ, C., Bayram, N.G., Uysal, O., Yılmaz, V. (2004). Fagerstrom test for nicotine dependence: reliability in a Turkish sample and factor analysis. *Tuberk Toraks*, 52(2), 115-121.
- Yağcı, İ., Perincek, G., Kıvrak, Y. (2019). D-Type Personality, Impulsiveness, Childhood Traumas, Anxiety and Depression Levels Among Patients Applying to The Smoking Cessation Polyclinic. *Ankara Medical Journal*, 19(3), 582-590. [\[Crossref\]](#)
- Yazıcıoğlu, Y., Erdoğan, S. (2014). Spss uygulamalı bilimsel araştırma yöntemleri. Ankara: Detay Yayıncılık.
- Zvolensky, M.J., Farris, S.G., Schmidt, N.B., Smits, J.A.J. (2014). The role of smoking inflexibility/avoidance in the relation between anxiety sensitivity and tobacco use and beliefs among treatment-seeking smokers. *Exp Clin Psychopharmacol*, 22(3), 229-237. [\[Crossref\]](#)