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Original Article

The role of self-discontentment and impulsivity for youth smoking behavior, nicotine dependence and future smoking intention in a clinical sample of Turkish adolescents

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ABSTRACT

Background. Smoking is one of the most important public health problems among young people. Potential risk factors that may cause vulnerability to smoke in youth should be well known and investigated. The aim of the present study was to evaluate the associations of current smoking behavior and future smoking intention with high-risk personality traits for substance abuse in a clinical sample of Turkish adolescents, and also evaluate nicotine dependence and smoking characteristics with the personality traits in a subsample of regular smokers.

Methods. A cross-sectional study was adopted in which 196 participants took part (aged 14-18 years with a mean of 16.7 years). The assessment consisted of a sociodemographic questionnaire that also questions current smoking behavior and future smoking intention; and additionally, two self-administered instruments including the Substance Use Risk Profile Scale (SURPS) for all participants, and Fagerström Test for Nicotine Dependence (FTND) for only regular smokers.

Results. Regular smokers scored higher than never smokers on the lack of self-contentment subscale of SURPS ($F(2)=3.30$, $p=.039$). Future smoking intention was found to be associated with nicotine dependence ($F(3)=6.67$, $p=.001$). Regular smokers with high levels of nicotine dependence had higher levels of impulsivity and smoked more cigarettes per day than those with low levels of nicotine dependence ($t=2.489$, $p=.017$; and $t=3.530$, $p=.001$, respectively). The structural equation models (SEM) were created based on these results and the personality theory for substance abuse. The SEM results showed that the first evidence that lack of self-contentment positively influences regularly smoking behavior and impulsivity positively influences future smoking intention through nicotine dependence.

Conclusions. Lack of self-contentment and impulsivity may mediate the transition from current smoking behavior to future tobacco use disorders in Turkish adolescents. The assessment and intervention of self-discontentment and impulsivity can be beneficial in reducing the current smoking behavior in Turkish adolescents.

Key words: smoking, adolescent, personality, nicotine.

Smoking of any tobacco product is one of the most important public health problems among young people all over the world, although the hazards of smoking have been entirely demonstrated and governments have made extensive tobacco control efforts. As tobacco use rapidly turns into addiction; this disorder which causes early death, serious illness and disability; affects brain development, cardiovascular and

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respiratory systems, physical maturation and health; burdens adolescents, their families and national health systems.[1,2] In order to develop effective prevention strategies, potential factors that may cause vulnerability to tobacco use disorder in youth should be well known.

Even rare smoking of any tobacco product during adolescence is associated with the emergence of tobacco use disorder.[3] Older age (upper class), low socioeconomic status and poor academic performance increase the risk of smoking in adolescents.[4] Also, individual characteristics like sensation seeking and rebelliousness, susceptibility to smoking and intention to smoke in the future are potential predictors of tobacco use reported in a systematic review of longitudinal population-based youth studies.[5] Among environmental factors, having friends and family members who smoke, and watching commercials about tobacco promotion are likely to facilitate adolescents to start smoking.[6,7]

Individual factors such as personality traits and their relationships to smoking behavior and intention are the focus of researchers' attention who aim to develop personalized prevention interventions in adolescents.[8,9] Conrod et al. showed that higher levels of anxiety sensitivity, hopelessness (lack of self-contentment), sensation seeking, and impulsivity personality traits predict a higher risk for future alcohol and substance use. According to Conrod's theory of personality, the effects of alcohol and substance in reducing anxiety and pain play a negative reinforcement role, while their stimulant and pleasurable effects serve as positive reinforcement in the reward system through learning with operant conditioning.[10] In addition, Conrod developed the prevention program for alcohol and substance use including cognitive-behavioral interventions that target four at-risk personality traits.[11] However, current findings on smoking and personality traits are contradictory and await clarification. Previous studies identified specific personality traits that predispose adolescents to current smoking behavior and future smoking intention, such as impulsivity, sensation seeking and hopelessness, with the exception of anxiety sensitivity.[8,12,13] Unlike adolescents, several studies in adults reported a significant association between anxiety sensitivity and tobacco use, in addition to other personality traits.[14,15] Moreover, adolescent smoking is linked with impulsivity traits according to the meta-analyses including fifty-one studies.[16] On the contrary, Malmberg et al.[17] reported that impulsivity and anxiety sensitivity did not affect smoking behavior during adolescence, while sensation seeking and hopelessness were related to tobacco use. Smoking is thought to be a self-medication behavior to reduce negative affect related to hopelessness, not to anxiety sensitivity.[18] The peripheral effects of smoking on the human body may increase somatic complaints associated with anxiety such as tachycardia, hypertension, sweating, trembling, and increased respiration rather than treating them.[19] Sensation seeking and impulsivity were found to be associated with the anatomical structure of the cognitive control circuitry including anterior cingulate and medial frontal gyrus, so these traits may render adolescents vulnerable to smoking via impaired cognitive control.[20] Therefore, understanding the role of these personality traits in the transition from smoking behavior to nicotine addiction and tobacco use disorder in adolescents will be useful in planning interventions such as the prevention of tobacco product usage.

We hypothesized that high-risk personality traits might be associated with current smoking behavior and future smoking intention in a clinical sample of Turkish adolescents. There is limited research on these personality traits being associated with the emergence of nicotine dependence among regular smokers. This is the first study known to investigate the relationship between risky personality traits for substance abuse and nicotine dependence levels in a clinical subsample of Turkish adolescents who smoke regularly. Additionally, we hypothesized that those with high levels of impulsivity, sensation seeking, and hopelessness might have increased nicotine dependence as well as

current smoking behavior and future smoking intention. The aim of the present study was to evaluate current smoking behavior, future smoking intention, high-risk personality traits for substance abuse, the associations of current smoking behavior and future smoking intention with these personality traits in a clinical sample of adolescents, and levels of nicotine dependence and the associations of nicotine dependence and smoking characteristics with the personality traits in a subsample of regular smokers.

Material and Methods

Ethical approval was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Ankara City Hospital (Decision No: E1/20/1003). The cross-sectional study was carried out in the Adolescent Health Unit of Dr. Sami Ulus Maternity and Children's Health and Diseases Training and Research Hospital between August 2020 and November 2020.

The sample consisted of 196 adolescents aged 14-18 years who applied to the Adolescent Health Unit outpatient clinic for any reason and agreed to participate in the study voluntarily. Illiterate adolescents, those with an intellectual disability or scales that were incompletely filled in were not included in the study. Participants with any mental or physical disorders were not excluded from the study. Written consents were obtained after detailed information was given to them about the subject and the purpose of the study. They completed the sociodemographic and clinical information forms, as well as self-report scales, including the Substance Use Risk Profile Scale (SURPS) and Fagerström Test for Nicotine Dependence (FTND).

Measures

The Sociodemographic and Clinical Information Form

The sociodemographic and clinical information form was prepared by the researchers to evaluate the sociodemographic and clinical characteristics of the participants. The form consists of questions about age, sex, educational status (grade), family characteristics (age of mother and father, education and employment status, number of siblings), current smoking behavior (never, occasionally/rarely, and regularly smoking), characteristics of smoking behavior (first smoking age, number of cigarettes smoked, total smoking duration) and future smoking intention (definitely smoking, probably smoking, probably not smoking, and definitely not smoking in the future).

The Substance Use Risk Profile Scale

The SURPS is a 23-item self-report questionnaire developed by Woicik et al. in 2009.[12] The scale evaluates four personality traits including anxiety sensitivity, hopelessness, sensation seeking, and impulsivity, which predict future substance use risk in adolescents. The SURPS is widely used for screening in youth due to its good psychometric properties. Each item of the Likert-type scale, which consists of four subscales representing the risky personality traits mentioned above, is scored between 1 and 4. The Turkish adaptation of SURPS was confirmed in a sample of high school students by Uygun et al. in 2019, showing that the Turkish version of the scale was valid and reliable.[21] Cronbach alpha coefficient for the Turkish version of SURPS was .73, and Cronbach alpha coefficients for lack of self-contentment (as it is called hopelessness in the original study), sensation seeking, impulsivity and anxiety sensitivity subscales were calculated as .76, .71, .67 and .66, respectively.[22]

The Fagerström Test for Nicotine Dependence

The FTND, which is the self-report scale developed by Fagerström et al.[23], consists of 6 items in only one sub-dimension. Each question has specific scores based on its answer. The scores obtained from the test are classified as follows: 1) Very low (0-2 points); 2) Low (3-4 points); 3) Medium (5-6 points); 4) High (7-8 points); and 5) Very high (9-10 points). Uysal et al.[24] showed that the Turkish version of

the Fagerström test was valid and reliable to evaluate nicotine dependence. Cronbach alpha coefficient for the Turkish version of FTND was .56.

Statistical Analysis

Statistical analyses were performed using the SPSS Statistics for Windows, version 22.0.[25] The variables were investigated using the Kolmogorov-Smirnov test to determine whether or not they were normally distributed. Descriptive analyses were presented using means and standard deviations for normally distributed variables, and medians and minimum-maximum values for non-normally distributed variables. Categorical variables were presented using frequencies (n) and percentages (%). While investigating the associations between non-normally distributed variables, the correlation coefficients and their significance were calculated using Spearman test. Since the substance use risk profiles and nicotine dependence were normally distributed, these parameters were compared using one-way ANOVA among the current smoking status (never, occasionally/rarely, and regularly smoking) and future intention status (definitely smoking, probably smoking, probably not smoking, and definitely not smoking in the future) groups. Levene test was used to assess the homogeneity of the variances. An overall p-value of less than .05 was considered to show a statistically significant result. When an overall significance was observed, pairwise post-hoc tests were performed using Tukey's test. Since nicotine dependence level was a 5-level categorical variable, those with very low and low levels of nicotine dependence among regular smokers were classified as low nicotine dependence group, and those with medium, high and very high levels were classified as high nicotine dependence group.[24] Since the substance use risk profiles and the number of cigarettes smoked per day showed normal distributions, these parameters were compared using Student's t test between the groups with high and low nicotine dependence. Since the first smoking age and total smoking duration were not normally distributed, these parameters were compared using the Mann-Whitney U test between the groups with high and low nicotine dependence. Pearson-$\chi 2$ and Fisher's exact tests were used for categorical variables. To test models based on Conrod's theory of personality for youth's current smoking behavior, nicotine dependence, and future smoking intention the structural equation modelling (SEM) was performed using the "lavaan" package in the R Project for Statistical Computing (version 4.0.0) program.[26-28] The path coefficients were estimated using diagonally weighted least squares (DWLS) method and hypothesizes were tested. The chi-square/degree of freedom ($\chi 2$/sd), Root Mean Square of Error Approximation (RMSEA), Goodness of Fit Index (GFI), Normed Fit Index (NFI), Comparative Fit Index (CFI) fit indices were used to evaluate the fitness of the SEM model. A 5% type-I error level was used to infer statistical significance.

Results

Of the participants, 161 (82.1%) were male. The mean age of the sample was 16.7 (±1.0) years. Details about the descriptive characteristics of the participants are shown in Table I. The participants who reported never smoking, occasionally or rarely smoking, and regularly smoking were 63% (n=123), 10.8% (n=21), and 26.2% (n=51), respectively. When asked about the future, the percentages of participants that responded as "definitely not smoking", "probably not smoking", "probably smoking", and "definitely smoking" were 53.1% (n=103), 21.6% (n=42), 17.5% (n=34), and 7.7% (n=15), respectively. The median age of first smoking in adolescents who smoked at least once was 13 (5-17) years. The mean number of cigarettes smoked per day by regular smokers was 15.3 (±8.1). The median total smoking duration of regular smokers was 4 (0.4-9) years.

Regular smokers scored higher than never smokers on lack of self-contentment subscale of SURPS (See Table II; F(2)=3.30, p=.039).

Table I. Sociodemographic characteristics, future smoking intention, current smoking behavior, characteristics of smoking behavior, levels of nicotine dependence and substance use risk profiles.

Variables	Outcome
Age (years)[a]	16.7 (1.0)
Sex, n (%)	
Males	161 (82.1)
Females	35 (17.9)
Grades, n (%)	
9	31 (16.1)
10	24 (12.4)
11	49 (25.4)
12	89 (46.1)
Maternal age (years)[a]	41.0 (5.9)
Maternal education status, n (%)	
Primary school	93 (48.0)
Middle school	73 (37.6)
High school	26 (13.4)
University	2 (1.0)
Maternal employment status, n (%)	
Not working	172 (91.0)
Working	16 (8.5)
Retired	1 (0.5)
Paternal age (years)[a]	45.4 (6.1)
Paternal education status, n (%)	
Primary school	79 (41.0)
Middle school	74 (38.3)
High school	33 (17.1)
University	7 (3.6)
Paternal employment status, n (%)	
Not working	10 (5.3)
Working	167 (88.4)
Retired	12 (6.3)
Number of siblings[b]	3 (1-6)
Future smoking intention, n (%)	
Definitely smoking	15 (7.7)
Probably smoking	34 (17.5)
Probably not smoking	42 (21.6)
Definitely not smoking	103 (53.1)
Current smoking behavior, n (%)	
Regularly smoking	51 (26.2)
Occasionally or rarely smoking	21 (10.8)
Never smoking	123 (63)
First smoking age (years)[b]	13 (5-17)*
Number of cigarettes smoked (per day)[a]	15.3 (8.1)**
Total smoking duration (years)[b]	4 (0.4-9)**
Nicotine Dependence by FTND (n, %)[a]	51 (100.0); 5.0 (2.4)**
Very Low	8 (15.7)
Low	15 (29.4)
Medium	6 (11.8)
High	12 (23.5)
Very High	10 (19.6)
Substance Use Risk Profile by SURPS[a]	
Lack of self-contentment (Hopelessness)	13.9 (4.7)
Sensation seeking	16.0 (4.0)
Impulsivity	10.6 (3.1)
Anxiety sensitivity	11.6 (3.2)

[a]: Mean (standard deviation), [b]: Median (minimum-maximum), SURPS: Substance Use Risk Profile Scale, FTND: Fagerström Test for Nicotine Dependence, *: in adolescents smoking at least once, **: in adolescents smoking regularly.

Apart from this finding, current smoking behavior and future smoking intention for all participants; nicotine dependence and characteristics of smoking behavior for regular smokers were not associated with the risky personality dimensions (Table II and III; for all variables p>.05). Adolescents who definitely want to smoke in the future have higher levels of nicotine dependence than those who probably or definitely don't want to smoke in the future (Table IV; F(3)=6.67, p=.001).). Regular smokers with high levels of nicotine dependence had higher levels of impulsivity and smoked more cigarettes per day than those with low levels of nicotine dependence (Table V; t=2.489, p=.017; and t=3.530, p=.001, respectively).

Table II. Comparison of substance use risk profiles in all adolescents (n=195) and regular smokers (n=51) according to future smoking intention and current smoking behavior.

	Substance Use Risk Profile Scale (SURPS) dimensions[a]			
	Lack of Self-contentment	Impulsivity	Sensation Seeking	Anxiety Sensitivity
Future smoking intention				
Definitely smoking	16.1 (6.1)	11.4 (3.0)	15.9 (5.4)	10.3 (3.3)
Probably smoking	15.4 (4.2)	11.1 (2.9)	16.9 (4.2)	11.7 (3.2)
Probably not smoking	13.8 (4.4)	10.5 (2.8)	15.7 (4.0)	11.8 (2.8)
Definitely not smoking	13.3 (4.7)	10.4 (3.3)	15.8 (3.8)	11.7 (3.3)
ANOVA	F(3) = 2.33	F(3) = 0.59	F(3) = 0.57	F(3) = 0.66
p value	.076	.617	.632	.575
Current smoking behavior				
Regularly smoking	15.4 (4.6)	10.6 (3.0)	16.1 (4.3)	11.4 (3.3)
Occasionally/rarely smoking	14.5 (5.6)	10.4 (2.7)	16.3 (3.8)	10.8 (2.7)
Never smoking	13.3 (4.5)	10.6 (3.2)	15.9 (3.9)	11.9 (3.2)
ANOVA	F(2) = 3.30	F(2) = 0.03	F(2) = 0.15	F(2) = 0.93
p value	**.039**	.964	.853	.397
Regularly smoking - Never smoking;	Tukey **p = .035**			
Future smoking intention*				
Definitely smoking	15.0 (6.2)	11.3 (3.3)	15.5 (6.0)	10.1 (3.7)
Probably smoking	15.7 (4.2)	11.0 (2.9)	16.6 (4.2)	11.9 (3.3)
Probably not smoking	15.0 (4.9)	9.2 (2.8)	16.0 (3.7)	11.1 (3.0)
Definitely not smoking	16.0 (0)	10.0 (0)	13.0 (0)	14.0 (0)
ANOVA	F(3) = 0.07	F(3) = 1.09	F(3) = 0.31	F(3) = 0.79
p value	.972	.364	.813	.502

a: Mean (standard deviation), *: in adolescents smoking regularly (n=51).

Table III. Correlation analysis of substance use risk profiles with nicotine dependence level and characteristics of smoking behavior.

			Substance Use Risk Profile Scale (SURPS) dimensions			
	n		Lack of Self-contentment	Impulsivity	Sensation Seeking	Anxiety Sensitivity
Cigarettes' number smoked (per day)	44	rho	-.143	.000	.119	-.007
		p	.354	.998	.440	.962
Total smoking (years)	50	rho	-.008	-.084	-.009	.076
		p	.955	.563	.951	.599
First smoking age (years)	62	rho	-.179	-.049	.099	-.073
		p	.164	.703	.443	.573
Nicotine dependence	43	rho	-.076	.160	.021	.013
		p	.630	.305	.895	.933

rho: Spearman correlation coefficient

Table IV. The relationship between nicotine dependence level and future smoking intention in adolescents smoking regularly (n=51).

	Future smoking intention a			
	Definitely smoking	Probably smoking	Probably not smoking	Definitely not smoking
Nicotine dependence[a]	6.8 (1.9)	5.0 (2.2)	3.3 (1.8)	2.0 (0)
ANOVA	F(3) = 6.67, **p = .001**			
Definitely smoking - Probably not smoking; Tukey **p = .002**				
Definitely smoking - Definitely not smoking; Tukey **p = .007**				

a: Mean (standard deviation).

Table V. Comparison of substance use risk profiles, characteristics of smoking behavior and future smoking intention in regular smokers (n=51) according to the levels of nicotine dependence.

	High Nicotine Dependence Group (≥5)	Low Nicotine Dependence Group (<5)	t or z value	p value
SURPS Lack of Self-contentment[a]	15.71 (4.86)	15.09 (4.57)	.434	.667
SURPS Sensation Seeking[a]	16.05 (4.87)	16.32 (3.99)	-.200	.843
SURPS Impulsivity[a]	11.76 (3.18)	9.59 (2.52)	2.489	**.017**
SURPS Sensation Seeking[a]	11.95 (3.58)	11.00 (3.12)	.931	.357
Number of cigarettes smoked (per day)[a]	18.79 (7.69)	11.41 (6.86)	3.530	**.001**
First smoking age (years)[b]	12 (5-17)	12 (9-16)	-.200	.841
Total smoking duration (years)[b]	4 (0.4-9)	4 (1-8)	-.790	.430

a: Mean (standard deviation), b: Median (minimum-maximum), SURPS: Substance use risk profile scale. Since nicotine dependence level was a 5-level categorical variable, those with very low and low levels of nicotine dependence among regular smokers were classified as low nicotine dependence group, and those with medium, high and very high levels were classified as high nicotine dependence group.

Based on Conrod's theory of personality and our analysis results, two separate SEM models were created.[26] As seen in Figures 1 and 2, the structural models and hypotheses were examined. The SEM models based on polychoric correlations were performed using the R Project for Statistical Computing (ver. 4.0.0) program.[27,28] Diagonally weighted least squares (DWLS) method was used to estimate path coefficients. The estimated path coefficients with both p values and their associated z values and the results of the hypothesis for Model 1 were displayed in Table VI. Hypothesis 1a claims that "lack of self-contentment" positively influences "regularly smoking behavior" (Fig. 1). As seen in Table VI, the path from "lack of self-contentment" to "regularly smoking behavior" was positive and significant. Therefore, hypothesis 1a was supported. Other path coefficients were not found to be significant and other hypotheses were not supported. The fit indices were obtained to assess the fitness of the SEM for Model 1. The value of $\chi 2/sd$ was found to be 1.69 ($p<.001$), indicating that the model fit was good (i.e. $\chi 2/sd$ between 1-3). The RMSEA value was .062, indicating a fair fitness (i.e. RMSEA between .05-.08). The GFI value was obtained as .965, showing that the model had a very good degree of fitness (>.95 = very good). The CFI value was .907 (>.95 = good). According to these results, the model demonstrated a fair fitness.[29,30] The estimated path coefficients with both p values and their associated z values and the results of the hypothesis for Model 2 were displayed in Table VII. Hypothesis 1 claims that "impulsivity" positively influences "high nicotine dependence" (Fig. 2). As seen in Table VII, the path from "impulsivity" to

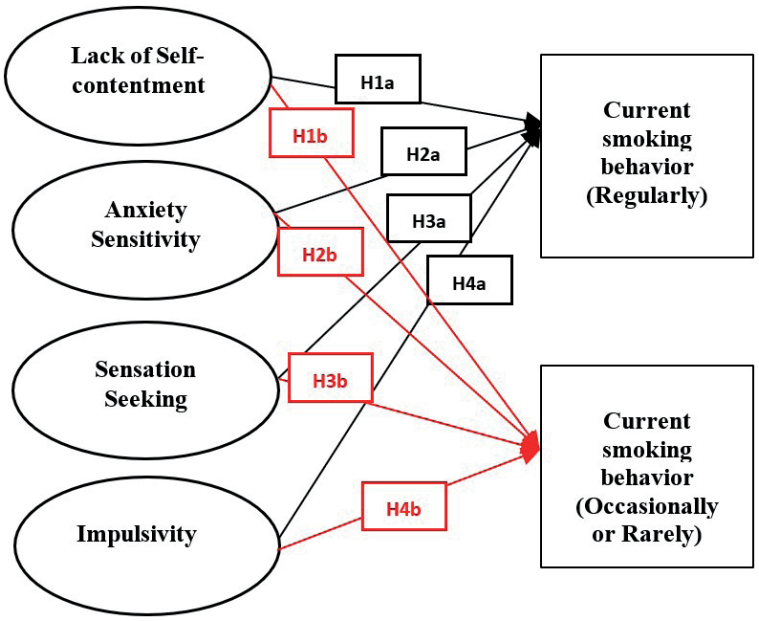

Fig. 1. Theoretical research framework for Model 1.

Since current smoking behavior was a 3-level categorical variable, 2 dummy variables were created by taking non-smokers as the reference category. The hypotheses required to investigate the effect of each latent variable on dummy variables are given below.

H1a: Lack of Self-contentment positively influence regularly smoking behavior.
H1b: Lack of Self-contentment positively influence occasionally or rarely smoking behavior.
H2a: Anxiety Sensitivity negatively influence regularly smoking behavior.
H2b: Anxiety Sensitivity negatively influence occasionally or rarely smoking behavior.
H3a: Sensation Seeking positively influence regularly smoking behavior.
H3b: Sensation Seeking positively influence occasionally or rarely smoking behavior.
H4a: Impulsivity positively influence regularly smoking behavior.
H4b: Impulsivity positively influence occasionally or rarely smoking behavior.

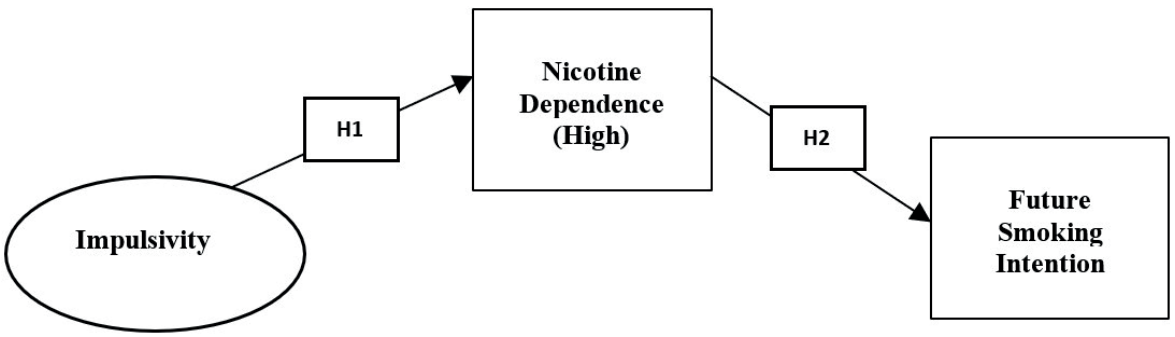

Fig. 2. Theoretical research framework for Model 2.

This model was created for regular smokers. Since nicotine dependence level was a 5-level categorical variable, very low and low levels were grouped as low nicotine dependence, medium, high and very high levels were grouped as high nicotine dependence, and low nicotine dependence was taken as the reference category. Since future smoking intention was a 4-level categorical variable, 2 dummy variables were created as smoking and not smoking in the future by taking not smoking in the future as the reference category. The hypotheses to be investigated for Model 2 are given below.

H1: Impulsivity positively influence high nicotine dependence.
H2: High nicotine dependence positively influence future smoking intention.

Table VI. The structural equation modelling results for Model 1.

Scale Items	Path Coefficients	z value	p value	Results
(I) Impact of Lack of Self-contentment				
H1a: Lack of Self-contentment → Regularly smoking behavior	.098	2.132	**.033**	Supported
H1b: Lack of Self-contentment → Rarely smoking behavior	.003	.078	.938	Not Supported
(II) Impact of Anxiety Sensitivity				
H2a: Anxiety Sensitivity → Regularly smoking behavior	-.014	-.296	.767	Not Supported
H2a: Anxiety Sensitivity → Rarely smoking behavior	-.039	-1.122	.262	Not Supported
(III) Impact of Sensation Seeking				
H3a: Sensation Seeking → Regularly smoking behavior	.028	.807	.420	Not Supported
H3b: Sensation Seeking → Rarely smoking behavior	.001	.034	.973	Not Supported
(IV) Impact of Impulsivity				
H4a: Impulsivity → Regularly smoking behavior	-.031	-.516	.606	Not Supported
H4b: Impulsivity → Rarely smoking behavior	.008	.185	.853	Not Supported

Table VII. The structural equation modelling results for Model 2.

Scale Items	Path Coefficients	z value	p value	Results
(I) Impact of Impulsivity				
H1a: Impulsivity → High nicotine dependence	.243	3.995	**<.001**	Supported
(II) Impact of High Nicotine Dependence				
H2a: High nicotine dependence → Future intention	.488	4.887	**<.001**	Supported

"high nicotine dependence" was positive and significant. Therefore, hypothesis 1 was supported. Hypothesis 2 claims that "high nicotine dependence" positively influences "future smoking intention" (Fig.2). As seen in Table VII, the path from "high nicotine dependence" to "future smoking intention" was positive and significant. Therefore, hypothesis 2 was supported. The fit indices were obtained to assess the fitness of the SEM for Model 2. The value of $\chi 2/sd$ was found to be .63 (p=.838), indicating that the model fit was good (i.e. $\chi 2/sd$ between 1-3). The RMSEA value was .001, indicating a good fitness (≤.06). The GFI value was obtained as .998, showing that the model had a very good degree of fitness (>.95 = very good). The CFI value was 1.000 (>.95 = good). According to these results, the model demonstrated a good fitness.[29,30]

Discussion

We examined the effect of high-risk personality traits on smoking behavior and intention in a clinical sample of adolescents, as well as the effect of these personality traits on nicotine dependence in regular smokers. Preliminary evidence showed that self-discontentment might be playing a role in current smoking behavior, while impulsivity might influence future smoking intention through nicotine dependence.

We found that the rate of adolescents who stated that they had never smoked was 63%. Memetovic et al.[8] determined that 91.8% of 8th and 9th grade students from a community-based cohort of adolescents had never tried smoking. Öztekin et al.[31] also found the rate of smoking at least once as 41.2% in Turkish high school students. When the prevalence

of smoking among adolescents in Canada, England and the United States was examined in 2017 and 2018, it was shown that 31.9-40.4% of adolescents smoked at least once, similar to our rate of 37%.[1] Moreover, 26.2% of our sample reported smoking regularly. According to the Center for Disease Control's 2018 National Youth Tobacco Survey, 27.1% of high school students reported using any tobacco product in the past 30 days.[32] The rate of regular smokers among Turkish high school students varied between 12.2% and 34%.[31,33] It is estimated that adolescent tobacco consumption especially in developing countries has increased over the years.[32] We observed that 7.7% of the adolescents definitely intended to smoke in the future, while 53.1% of them definitely did not intend to smoke. In the study of Memetovic et al.[8], there were no participants who stated that they would definitely smoke in the future, and 71% of the participants had no intention to smoke. Differences in smoking behavior and intention rates between previous studies and our study may be due to demographic characteristics of samples, such as age, sex, and ethnicity; or types of samples, such as population-based or clinical. Considering a cross-sectional study identifying demographic variables such as older age (15 and 16 years old) and male sex to predict smoking status and smoking risk in Malaysian adolescents, the high rates of current smoking behavior and future smoking intention in our clinical sample are not surprising.[34] Because the majority of our sample, whose mean age was 16.7 (±1.0), were male (82.1%), about half of them were 12th grade students (46.1%), and their parental education level and employment status were low. The median age of first smoking in our sample was found to be similar to the mean age of 13-14 years in Polish peers.[35] The mean nicotine dependence score (by FTND) of regular smokers was 5.0 (±2.4) and 45.1% of our sample belonged to the low dependence group, similar to the findings (4.2 ±2.4 and 45.4%, respectively) of a community-based study conducted among 1354 adolescent tobacco users from West Bengal.[36]

In line with our results, Uygun et al.[21] also found that the mean scores for lack of self-contentment, sensation seeking, impulsivity and anxiety sensitivity subscales of SURPS were 13.96 (±4.34), 16.28 (±4.36), 10.57 (±3.46), and 11.00 (±3.50) in a population-based sample of Turkish adolescents, respectively. Spillane et al.[37] evaluated impulsivity-like traits and smoking behavior in 359 college students. Different personality tendencies associated with impulsivity were identified: negative urgency (acting impulsively in response to negative mood), positive urgency (acting impulsively in response to positive mood), sensation seeking (seeking out new and exciting experiences), lack of perseverance (the inability to focus on a task), and lack of planning (acting rashly). They found that all personality tendencies predicted smoker status separately, but when the scores were entered into a logistic regression equation, controlling for age and gender, only "sensation seeking" had significant incremental validity over the others. On the other hand, only "positive urgency" was related to the level of nicotine dependence.[37] Crawford et al.[38] evaluated two adolescent samples for substance use according to their sensation-seeking behavior and found that sensation-seeking had a strong predictive value for coexisting and future marijuana and alcohol use; but only in one sample the initial level of sensation-seeking predicted initial level of tobacco use during high school. In this study, the effect of sensation seeking on smoking was less than expected. This was attributed to the different levels of perceived risk associated with these substances. They argued that high sensation seeking was more predictive of marijuana use, because cigarettes and alcohol were perceived to be more acceptable.[38] Spillane et al.[39] showed that greater sensation-seeking scores at baseline predicted daily smoking for females, but not for males in American-Indian high school students. They explained this gender difference with two mechanisms; they suggested that sensation seeking may affect boys at an earlier age than girls (which is not involved in this study), or tobacco use may be normative in boys and they don't need a specific

personality trait to trigger regular smoking. Consequently, high levels of impulsivity, hopelessness (lack of self-contentment), and sensation seeking were expected to predict tobacco use in Turkish adolescents. Contrary to expectations, we could not find any association between certain personality traits, such as sensation seeking, and smoking-related variables. Current literature has reported that there are sex- and age-related differences in the relationship between personality and smoking during adolescence.[40,41] Kelly et al.[41] found that sensation seeking at age 13 was associated with starting smoking at age 14, while impulsivity at age 13 was associated with starting smoking at age 15 and hopelessness at age 13 was associated with starting smoking at age 16. Also, personality traits may vary differently between girls and boys during adolescence. Mathijssen et al.[40] reported that hopelessness was found to be increased in only girls; impulsivity, sensation seeking and smoking behavior which was related to all personality traits were found to be increased in both girls and boys during early adolescence and the increase in sensation seeking and impulsivity was higher for girls than for boys. In this study, the relationships between smoking behavior and personality traits were evaluated in the entire sample, but sex- and age-specific relationships were not examined. Given the current findings, our results may reflect some characteristics such as sex and age for the majority of the sample.

We gathered the first evidence that impulsivity positively influences future smoking intention through nicotine dependence in Turkish adolescents. Although meta-analyses showed that impulsive traits might play an important role in adolescent cigarette consumption, there were only two studies on the association between adolescent nicotine dependence and impulsive traits, and the strength of the associations was weak in a small range.[16] Novelty seeking as an indirect measure of impulsivity may influence nicotine dependence via a decrease in the ability to inhibit the desire to engage in the behavior as well as a decrease in self-efficacy.[42] The relationship between impulsivity and nicotine addiction may be related not only to the amount and frequency of tobacco use, but also to tobacco use disorder etiologically.[43] The strength of our study comes from including measures of nicotine dependence and future smoking intention while examining the relationship between impulsivity and adolescent smoking. Our preliminary findings suggest that impulsivity may contribute to the transition from casual cigarette consumption to more problematic tobacco use disorder. Therefore, identifying and intervening against impulsivity may be protective for future nicotine dependence and tobacco use disorder. We also showed that self-discontentment (hopelessness) positively influences regularly smoking behavior in Turkish adolescents, similar to the current literature.[40,41] As a result, evaluation of self-discontentment (hopelessness) and the development of personalized cognitive behavioral approaches specific to self-discontentment may be beneficial in reducing the current smoking behaviors of Turkish adolescents.

The results of our study should be evaluated considering some limitations. The sample of the cross-sectional study consisted of a very small clinical-based population. The vast majority of the participants were male and in late adolescence. This dominance in the sample may explain the high prevalence of current smoking behavior and future smoking intention in our clinical-based sample. Our models should be longitudinally retested in a large population-based sample, and sex- and age-specific associations between personality and smoking should be demonstrated.

Ethical approval

Clinical Research Ethics Committee of the University of Health Sciences Ankara City Hospital (Decision No: E1/20/1003).

Author contribution

The authors confirm contribution to the paper as follows: study conception and design: SDU, DAA, SÇ; data collection: SDU, DAA; analysis and interpretation of results: SDU, HKÜ; draft manuscript preparation: SDÜ, DAA, HKÜ, SÇ. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

The authors declare that there is no conflict of interest.

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