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Smoking, drinking, and food addiction among youth in Sivas, Türkiye

Türkiye'nin Sivas kentindeki gençler arasında sigara, içki ve yeme bağımlılığı

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ABSTRACT

Aim: Substance abuse is a major issue. The change in eating habits worldwide and the increasing interest in convenience foods are also important issues. The aim of this study is to investigate the relationship between the degree of nicotine dependence, alcohol consumption, and food addiction in young people. It also aimed to assess the role of impulsivity as a mediating variable in this relationship.

Materials and Methods: The study was conducted with 533 students. Data were collected online using the questionnaire form, Fagerström Test for Nicotine Dependence Test (FTND), Alcohol Use Disorders Identification Test (AUDIT-C), UPPS Impulsive Behaviour Scale, and Yale Food Addiction Scale. Correlation, MANCOVA, and mediated regression analysis (Hayes, Model 4) were used to analyze the data.

Results: The study involved 79% female and 21% male participants. The prevalence of smoking and alcohol consumption among the participants was 21.2% and 15.8%, respectively. The prevalence of severe food addiction was estimated at 5.4%. The findings of this study indicate that sex has a significant effect on alcohol consumption and degree of nicotine dependence, with these effects varying depending on impulsive behavior characteristics. The results of the mediated regression analysis also demonstrate that the degree of nicotine dependence has a significant effect on food addiction depending on impulsive behaviors, although this effect is not significant for alcohol use.

Conclusion: The findings of our study indicate that legal substance use and food addiction are prevalent among young people. Furthermore, our results demonstrate a significant correlation between the degree of nicotine dependence and food addiction, which can be attributed to impulsive behaviors. Further research, including the use of different techniques, is required in order to obtain more concrete and reliable information on this subject.

Keywords: Smoking, alcohol use, food addiction, applied psychology.

ÖZ

Amaç: *Madde bağımlılığı önemli bir sorundur. Dünya genelinde beslenme alışkanlıklarının değişmesi ve hazır gıdalara olan ilginin artması da önemli bir konulardandır. Bu çalışmanın amacı, gençlerde nikotin bağımlılığı düzeyi ve alkol kullanımı ile yeme bağımlılığı arasındaki ilişkiyi araştırmaktır. Ayrıca bu ilişkide dürtüselliğin aracı değişken rolünü değerlendirmek amaçlanmıştır.*

Gereç ve Yöntem: *Çalışma 533 öğrenci ile gerçekleştirilmiştir. Veriler anket formu, Fagerström Nikotin Bağımlılığı Testi (FTND), Alkol Kullanım Bozuklukları Tanıma Testi (AUDIT-C), UPPS Dürtüsel Davranış Ölçeği ve Yale Yeme Bağımlılığı Ölçeği kullanılarak çevrimiçi olarak toplanmıştır. Verileri analiz etmek için korelasyon, MANCOVA ve aracılı regresyon analizi (Hayes, Model 4) kullanılmıştır.*

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Bulgular: *Çalışmaya %79 kadın ve %21 erkek katılımcı dahil edilmiştir. Katılımcılar arasında sigara ve alkol tüketimi yaygınlığı sırasıyla %21,2 ve %15,8'dir. Şiddetli düzeyde yeme bağımlılığı prevalansı %5,4 olarak hesaplanmıştır. Bu çalışmanın bulguları, cinsiyetin alkol tüketimi ve nikotin bağımlılığının derecesi üzerinde önemli bir etkisi olduğunu ve bu etkilerin dürtüsel davranış özelliklerine bağlı olarak değiştiğini göstermektedir. Aracı regresyon analizinin sonuçları da nikotin bağımlılığının derecesinin dürtüsel davranışlara bağlı olarak yeme bağımlılığı üzerinde önemli bir etkiye sahip olduğunu, ancak bu etkinin alkol kullanımı için anlamlı olmadığını göstermektedir.*

Sonuç: *Çalışmamızın bulguları, yasal madde kullanımı ve yeme bağımlılığının farklı düzeylerinin gençler arasında yaygın olduğunu göstermektedir. Ayrıca, sonuçlarımız nikotin bağımlılığının derecesi ile dürtüsel davranışlara atfedilebilecek yeme bağımlılığı arasında önemli bir korelasyon olduğunu göstermektedir. Bu konuda daha somut ve güvenilir bilgiler elde etmek için farklı tekniklerin kullanımını da içeren daha fazla araştırma yapılması gerekmektedir.*

Anahtar Sözcükler: *Sigara kullanımı, alkol kullanımı, yeme bağımlılığı, uygulamalı psikoloji.*

INTRODUCTION

Substance abuse is a major global problem. The issue of substance use and mental health problems represents a significant challenge for individuals, families, communities, and, ultimately, societies. When the topic of substance use arises, the initial question that is typically posed is whether the substance in question is legal or illegal. This question remains a crucial aspect in the context of addressing substance use problems. It can be reasonably assumed that governments will continue to devote greater resources to the eradication of illicit substances. The inability to regulate the production and distribution of illicit substances, including cannabis, MDMA, heroin, amphetamines, methamphetamines, and synthetic cannabis, may result in unforeseen consequences on human health and behavior (1).The focus is on treatment and rehabilitation after use, which is a challenging process for both those receiving and providing treatment. Furthermore, only a small proportion of individuals with alcohol or drug use disorders receive treatment despite the well-documented adverse effects of addiction on physical, psychological, and quality of life (1).

A review of prevalence data can facilitate an understanding of this problem. In 2020, 58.7% (162.5 million people) of people aged 12 years and older are reported to have used tobacco, alcohol, or illicit substances regularly in the past month (2). In the United States, tobacco, alcohol, and cannabis are the substances most commonly used by adolescents and adults (1). The 2024 EUDA (European Union Drugs Agency) report indicates that the lifetime alcohol use rate among young adults aged 15-34 in Türkiye is 22.1% (male: 34.3%, female: 10.7%), while the lifetime tobacco use rate is 47% (male: 61.9%, female: 33.2%). In the same report, the rates of alcohol and tobacco use in the previous year were reported as 14.9 percent and 33.2 percent, respectively (3).

Another significant issue is that addiction is a concept that encompasses a wide range of behaviors. One such behavior is food addiction, which is a type of behavioral addiction that has been specifically defined in the literature. This definition involves examining individuals' eating habits. A critical examination of the underlying causes of this phenomenon reveals that the process of economic progress and globalization has profoundly shaped the dietary patterns and preferences of individuals. In particular, there has been a notable shift away from home-cooked meals towards the pervasive consumption of highly processed convenience foods, which are often referred to as "junk food." This shift has occurred particularly since the 20th century (4, 5). Ultra-processed foods are defined as foods and beverages that undergo a series of mechanical and chemical processes, including heating, freezing, frying, compression, irradiation, and microwave baking (6). These foods are typically composed of extracted food components, exhibiting minimal presence of natural and intact food substances. Ultra-processed foods encompass a range of products, including hydrogenated oils and fats, modified starches, hydrolyzed proteins, and ground or extruded offal "mix" or meat scraps. Furthermore, they contain flavorings, colorings, and other additives that are used to impart a 'hyper-flavor' (7, 8).

Some researchers have identified a high addictive potential in certain foods (9). As in substance addiction, the concept of craving also emerges as a key issue in this context. The issue

of food cravings has been the subject of considerable debate, with binge eating being linked to food craving for some time (10). It has been demonstrated that individuals who experience cravings tend to engage in more frequent snacking, adhere to more restrictive diets (11), and exhibit higher levels of body mass index (12). Moreover, the concept of food addiction has been discussed for some time (13). It has been proposed that obese individuals are predisposed to food addiction (14, 15) and that there may be links between reward regions in the brain and binge eating (15). Despite the substantial overlap between obesity and addictive eating behaviors, it is not possible to account for all cases of obesity. For instance, it is acknowledged that some individuals with a normal weight exhibit addictive eating behaviors (16).

In the context of the aforementioned information, the term “food addiction” is used to describe another eating behavior profile that exhibits a substance-like addiction to highly processed foods (e.g., pizza, potato chips, pastries) (17). Given the neurobiological and behavioral parallels between substance addiction and overeating behavior, it is unsurprising that scientific interest in eating addiction is on the rise (18,19). In particular, interest in the concept of food addiction has been driven by the findings of brain imaging studies that have demonstrated the presence of dopamine activity in brain regions associated with the reward system, as observed in substance addiction (20, 21). Furthermore, the Yale Food Addiction Scale (YFAS), based on the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5), is a widely used instrument for diagnosing this condition. As with substance use disorders, the diagnostic process for food addiction includes criteria such as continued use despite negative consequences and repeated unsuccessful attempts to reduce use (17). There is a substantial body of research utilizing the YFAS scale (22–24).

The use of legal or illicit substances at an earlier age is considered a risk factor for the development of substance use disorders (25). Although the evidence bases for eating addiction is not as extensive as that for substance use disorders, it is widely acknowledged that addictive behaviors typically emerge at an earlier age. Consequently, this study is of significant importance within the field of addiction literature, both in terms of its subject matter and the fact that it was conducted on a young population. The aim of this study is to investigate the relationship between the degree of nicotine dependence and alcohol consumption and food addiction in young people. It also aimed to assess the role of impulsivity as a mediating variable in this relationship.

This study hypothesizes that higher levels of nicotine dependence and alcohol consumption are associated with increased food addiction in young people and that impulsivity mediates this relationship. This suggests that impulsive individuals may be more susceptible to both substance use and food addiction.

MATERIALS and METHODS

Design: The study was conducted using a cross-sectional design. The approval of the Ethics Committee (Decision No. 2023/1-39 dated March 17, 2023) was obtained. Prior to the commencement of the study, informed consent forms were obtained from all participants. No identifying information (such as name and surname) was obtained from the participants. The responses were analyzed and evaluated anonymously and collectively.

Sample: The study sample consists of students of Sivas Cumhuriyet University with an average age of 21 years. The non-probability sampling method (snowball sampling) was used. Five hundred eighty students participated in the research, and the number of valid questionnaires was calculated as 533. Forty-seven students were not included in the statistical analyses because they did not answer the questions on the scales and some socio-demographic information, and the analyses were carried out on the data of 533 students.

Data collection: The data collection was conducted online using Google Forms, a free software. The data collection period was defined as spanning from 31 March 2023 to 19 December 2023. The process was conducted utilizing the following scales and questionnaires.

Questionnaire Form: It is a form prepared by the researcher and includes information on age, sex, class, weight, height, waist circumference and health status. The participants’ body weight in kilograms (kg), height in centimeters (cm), and waist circumference were measured using the personal declaration method. From these measurements, the participants’ body mass index (BMI) was calculated separately by dividing their

body weight (in kilograms) by the square of their height (in meters). The ranges of values were categorized according to the World Health Organization classification for adults (26): **Weak** (low weight): <18.50, **Normal**: 18.50-24.99, **Overweight**: 25.00-29.99, **Obese**: ≥30.

Fagerström Test for Nicotine Dependence (FTND): The scale was developed by Heatherton and colleagues (27). In 2004, Uysal et al. conducted a Turkish validity and reliability study and adapted a scale to assess risk and measure the degree of physical dependence on nicotine (28). Suppose the total score obtained from the test is less than or equal to 4. In that case, it means mild nicotine dependence, 5 means moderate nicotine dependence, and greater than or equal to 6 means severe nicotine dependence.

Alcohol Use Disorders Identification Test-Short Form (AUDIT-C): This scale (AUDIT) is a scale developed by the World Health Organisation to measure alcohol-related problems in the past 12 months. It is a 10-item scale that measures drinking habits, alcohol consumption, and alcohol-related problems. There is also a short form of the scale (AUDIT-C) that includes only the first three questions about alcohol use. The short form is most commonly used in screening for hazardous alcohol use (29). The scale enables the evaluation of risky alcohol use levels according to the obtained scores. The corresponding points are as follows: 0 to 4; low risk, 5 to 7; increasing risk, 8 to 10; higher risk and 11 to 12; possible dependence. The validity and reliability of the revised Turkish version was conducted by Saatçioğlu et al. The Cronbach alpha coefficient of internal consistency was 0.85 (30).

UPPS Impulsive Behaviour Scale: This scale, which includes a total of 45 questions, was developed by Whiteside and Lynam in 2001 to measure impulsivity (31). The validity and reliability study of the Turkish version of this scale was conducted by Yargıç et al. (2011), and it was reported to be a good tool for screening the traits related to impulsivity. The scale consists of 4 sub-dimensions: Urgency, Premeditation, Perseverance, and Sensation-Seeking (32).

Yale Food Addiction Scale (YFAS): This scale was developed by Gearhardt and colleagues in 2009 and is a 27-item scale that measures food addiction similarly to substance addiction symptoms (33). The scale has two scoring methods. At least one of the symptoms must be present to meet the criteria for food addiction, and three or more of the symptoms must be present in the past 12 months to be diagnosed with food addiction, in addition to clinical worsening. In our country, the validity and reliability study of the scale was first carried out by Bayraktar et al. in 2012, and the internal consistency coefficient was found to be 0.93 (34). Furthermore, a validity study was conducted by Büyüktuncer et al. in 2019, according to the DSM-V (35).

Data Analysis: The data was analyzed using SPSS v.25. Correlation, MANCOVA, and Mediated Regression Analysis were used to analyze. The statistical significance was accepted as 0.05 ($p < .05$).

Mediated regression analysis was conducted to examine whether or not impulsive behavior has a mediating role in the relationship between the degree of nicotine dependence or alcohol use and food addiction. The indirect effects macro of Preacher and Hayes (36) was used in the analyses. Bootstrapping, a computationally efficient method of resampling the dataset and estimating the indirect effect in each resampled dataset, was considered. Preacher and Hayes (36) defined mediation processes with only one mediating variable as simple mediation.

RESULTS

Participants' descriptive findings

Table-1 presents a descriptive overview of the participants. Most participants were female (79%), while the remaining 21% were male. Most participants were enrolled in social fields of study, including social work, psychology, political science, and Turkish language and literature (66.2%). The remaining 33.8% were enrolled in fields such as dentistry, medicine, computer science, electrical engineering, and architecture. The majority of the participants were in their first year of study.

A total of 4.9% of participants had been diagnosed with a physical illness, while 3.9% had been diagnosed with a psychiatric illness. The physical conditions reported included allergic rhinitis, asthma, diabetes, hepatitis B, anemia, migraine, reflux, rheumatism, thyroid, and pancreatitis. Psychiatric disorders were reported as anxiety disorder, depressive disorder, body dysmorphic disorder, bulimia nervosa, attention deficit hyperactivity disorder, epilepsy, obsessive-compulsive disorder, conversion disorder, generalized anxiety disorder, and social phobia. Additionally, 12.4% of participants reported recent regular use of a medicine with a doctor's recommendation, while 2.3% reported recent regular use of a medicine without a doctor's recommendation (Table-1).

Table-1. Descriptives Statistics.

Variables		n	%
Sex	Female	421	79
	Male	112	21
Department	Social science	353	66.2
	Natural science	180	33.8
Grade	1st grade	213	40
	2st grade	122	22.9
	3st grade	71	13.3
	4st grade	105	19.7
	postgraduate	22	4.1
Physical illness	Yes	26	4.9
	No	507	95.1
Psychiatric disease	Yes	21	3.9
	No	512	96.1
Use of medicines with doctor's advice	Yes	66	12.4
	No	467	87.6
Use of medicines without doctor's advice	Yes	12	2.3
	No	521	97.7

Descriptive Statistical Findings on Participants' Smoking, Drinking, and Food Addiction

Figures-1 and 2 illustrate the prevalence of smoking and alcohol consumption among the study participants. The data indicates that 21.2% of the participants engage in smoking habits, while 15.8% engage in alcohol consumption.

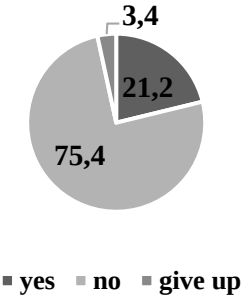

Figure-1. Cigarette use (%).

The final scoring using the YFAS scale revealed that 5.4% of the participants met the diagnostic criteria for severe food addiction, 1.1% for moderate food addiction, and 0.4% for mild food addiction. Additionally, 27% of the participants were assessed as not having a food addiction because they did not meet the clinical criteria, although they exhibited some symptoms of a food addiction (see Figure-3).

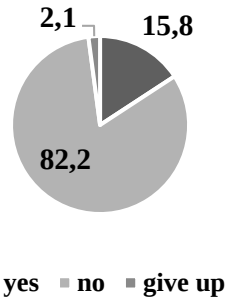

Figure-2. Alcohol use (%).

Findings on Correlation Analysis

Table-2 presents descriptive statistics and Pearson correlation coefficient values. Age, BMI, and alcohol consumption exhibited a significant positive correlation. The subscales of premeditation and perseverance demonstrated a negative relationship with food addiction, whereas impulsivity and sensation-seeking exhibited a positive and significant relationship. Additionally, there was a significant positive relationship between food addiction and degree of nicotine dependence. Alcohol use exhibited a significant negative relationship with premeditation and perseverance subscales. Furthermore, there is a significant positive correlation between alcohol consumption and the degree of nicotine dependence.

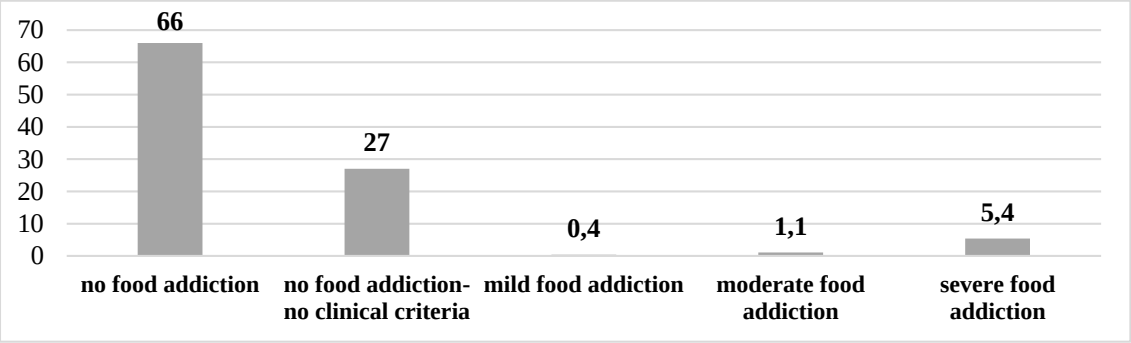

Figure-3. Rates of participants' food addiction diagnosis (%)

Table-2. Correlations between Variables.

Variables	1	2	3	4	5	6	7	8	9	10
1. Age	-									
2. Sex	-.138**	-								
3. BMI	.113**	-.077	-							
4. YFAS	-.052	.073	.032	-						
5. UPPS-premeditation	.049	-.034	-.010	-.137**	-					
6. UPPS-urgency	-.078	.044	-.024	.345**	-.205**	-				
7. UPPS-sensation seeking	-.051	-.164**	-.032	.163**	.090*	.268**	-			
8. UPPS-perseverance	.065	.001	.021	-.086*	.522**	-.257**	.164**	-		
9. FTND	.155	-.326**	-.018	.241**	-.009	-.043	-.008	-.002	-	
10. AUDIT-C	.194*	-.317**	-.004	.082	-.260**	-.049	-.046	-.245**	.304**	-
M	21.74	0.79	22.71	1.83	35.56	25.91	34.69	29.22	2.80	2.94
SD	4.576	0.41	8.04	2.76	5.09	6.92	7.53	5.12	2.52	2.32

Note. * $p < .05$; ** $p < .01$; **Sex:** 0: Male 1: Female, **BMI:** Body Mass Index**, YFAS:** Yale Food Addiction Scale, **UPPS:** Impulsive Behavior Scale, **FTND:** Fagerström Test for Nicotine Dependence, **AUDIT-C:** Alcohol Use Disorder Identification Test-Short form

Figures-4 and 5 illustrate the distribution of degree of nicotine dependence and alcohol consumption by sex. Furthermore, multivariate analysis of covariance (MANCOVA) was employed to ascertain whether there was a statistically significant difference between female and male scores on the AUDIT-C and FTND, controlling for participants' scores on the UPPS impulsive behavior. Consequently, the dependent variables were the degree of nicotine dependence and alcohol consumption, the independent variable was sex, and the covariate was impulsive behavior (see Table-3). The MANCOVA analysis revealed a statistically significant correlation between the degree of nicotine dependence ($F(1, 74) = 4.547$, $p < .05$, $\eta_p^2 = .06$) and alcohol use ($F(1, 74) = 25.427$, $p < .001$, $\eta_p^2 = .26$) among the youth. The male participants exhibited a higher degree of nicotine dependence (M = 4.18, SD = 2.78) and alcohol use (M = 4.03, SD = 2.91) than the female participants (M = 2.50, SD = 2.36; M = 2.50, SD = 1.76).

Findings on Degree of Nicotine Dependence and Alcohol Consumption By Sex

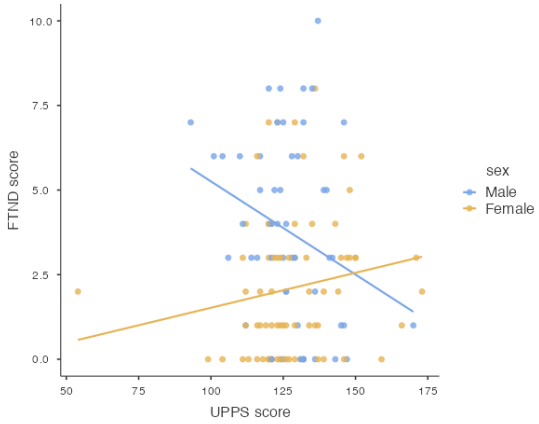

Figure-4. Scatter plot for FTND scores

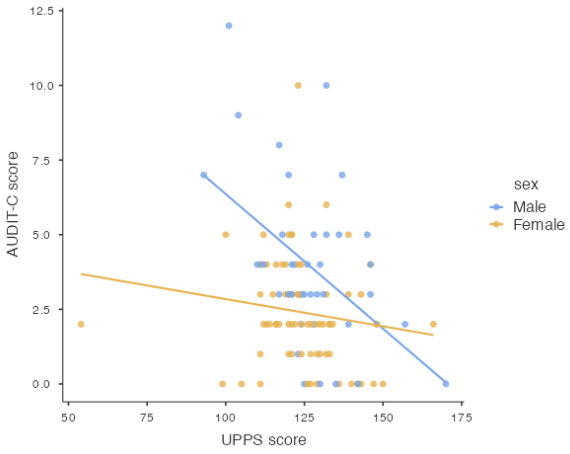

Figure-5. Scatter plot for AUDIT-C scores

Table-3. Findings on MANCOVA Analysis

	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	*p*	Partial Eta Squared (η_p^2)
Corrected model	FTND	83.762[a]	3	27.921	4.452	.006	.153
	AUDIT-C	111.734[b]	3	37.245	7.986	.000	.245
Intercept	FTND	28.516	1	28.516	4.547	.036	.058
	AUDIT-C	118.581	1	118.581	25.427	.000	.256
Sex	FTND	39.681	1	39.681	6.327	.014	.079
	AUDIT-C	35.721	1	35.721	7.660	.007	.094
UPPS	FTND	3.246	1	3.246	.518	.474	.007
	AUDIT-C	55.942	1	55.942	11.996	.001	.139
Sex * UPPS	FTND	29.723	1	29.723	4.739	.033	.060
	AUDIT-C	26.785	1	26.785	5.743	.019	.072
Error	FTND	464.084	74	6.271			
	AUDIT-C	345.099	74	4.664			

a. R Squared = .153 (Adjusted R Squared = .119)

b. R Squared = .245 (Adjusted R Squared = .214)

Table-4. Direct and Indirect Effects of Cigarette Use on Food Addiction.

	Unstand.	SE	*t*	*p*	LLCI	ULCI
Total Effect	0.3216	0.0953	3.3748	**0.01***	0.1329	0.5102
Direct Effect (*c'*-path)	0.3237	0.0946	3.4201	**0.0009***	0.1262	0.4603
Covariates						
Sex	1.0563	0.4825	2.1893	**0.0305***	0.1010	2.0117
BMI	0.0120	0.0181	0.6654	0.5071	-4.6987	-1.4673
Indirect Effect (a*b-path)	**Unstand.**	**BootSE**			**BootLLCI**	**BootULCI**
	0.0021	0.0135	-	-	0.0307	0.0263

Notes. **p<.05*

Cigarette use *(independent),* ***impulsive behavior*** *(mediator),* ***food addiction*** *(dependent)*

cov= c("sex", "BMI") , **LLCI:** Lower limit confidence interval, **ULCI**: Upper limit confidence interval **Unstand.:** Unstandardized regression coefficient, **SE:** Standard error.

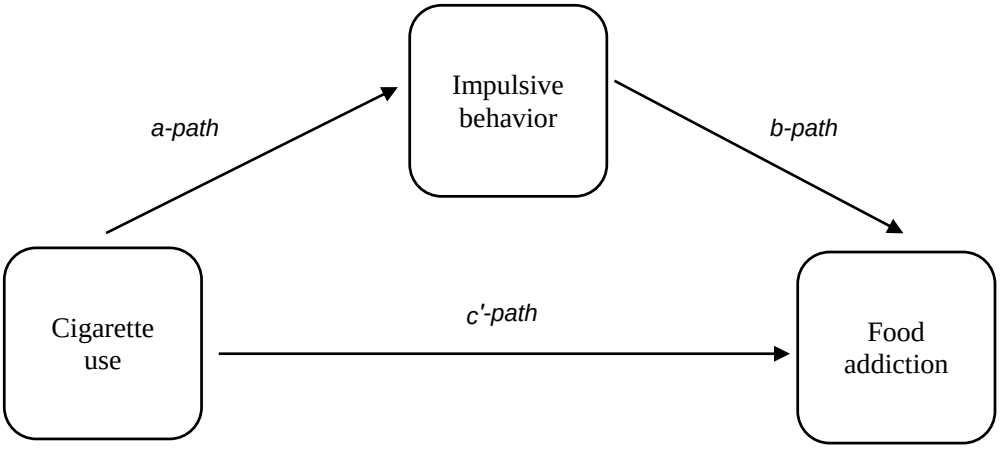

Figure-6. The mediating role of impulsive behavior on food addiciton in cigarette use (***a*b:****indirect effect*, ***c'-path:****direct effect*)

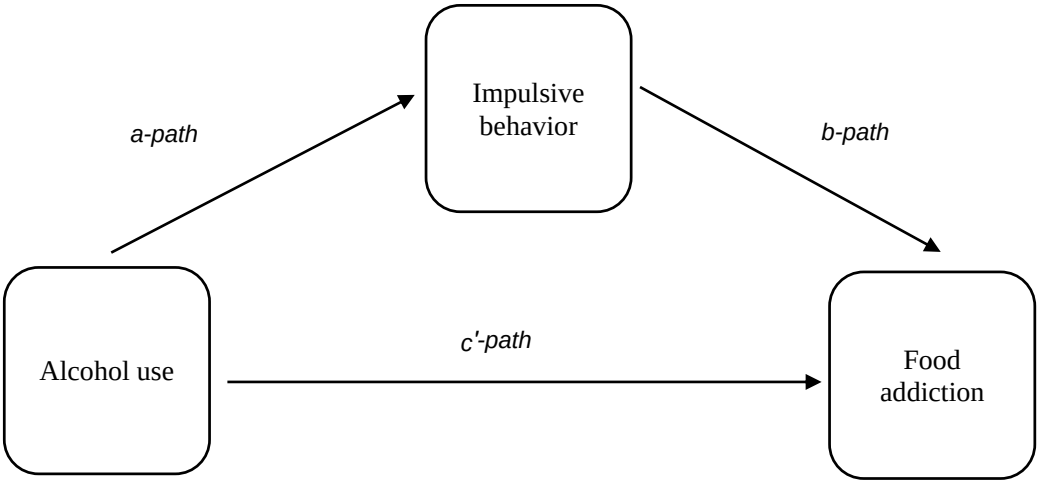

Figure-7. The mediating role of impulsive behavior on food addiction in alcohol use (***a*b:*** *indirect effect*, ***c'-path:*** *direct effect*)

Table-5. Direct and Indirect Effects of Alcohol Use on Food Addiction.

	Unstand.	**SE**	***t***	***p***	**LLCI**	**ULCI**
Total Effect	0.1459	0.1334	1.0938	0.2765	-0.1186	0.4104
Direct Effect (*c'*-path)	0.1895	0.1392	1.3611	0.1764	-0.0866	0.4656
Covariates						
Sex	0.6987	0.6522	1.0713	0.2865	-0.5945	1.9919
BMI	0.0100	0.0225	0.4446	0.6575	-0.0346	0.0546
Indirect Effect (a*b-path)	**Unstand.**	**BootSE**			**BootLLCI**	**BootULCI**
	-0.0436	0.0408	-	-	-0.1216	0.0440

Notes. *$p<.05$

Alcohol use *(independent),* ***impulsive behavior*** (*mediator),* ***food addiction*** *(dependent)*

cov= c("sex", "BMI") , **LLCI:** Lower limit confidence interval, **ULCI**: Upper limit confidence interval

Unstand.: Unstandardized regression coefficient, **SE:** Standard error.

Findings on Mediated Regression Analysis

The variables are presented in Figures-6 and 7 in accordance with Model 4, developed by Hayes (37). The dependent variable is food addiction, which is represented by the total score on the YFAS, which encompasses 11 criteria as outlined in the DSM-5. The independent variable is the total score on the FTND for the degree of nicotine dependence and the AUDIT-C for alcohol. The mediating variable is impulsive behavior, as indicated by the UPPS scores. As illustrated in Figures 5 and 6, the impact of nicotine dependence and alcohol consumption on the UPPS impulsive behavior score (a-path), the influence of the UPPS impulsive behavior score on nicotine dependence and alcohol use (b-path), and the effect of nicotine dependence and alcohol on food addiction (c′-path) were analyzed. Sex and BMI variables were also included in the analysis as covariates.

The degree of nicotine dependence, sex, and BMI variables did not have a statistically significant effect on UPPS impulsive behavior scores ($F_{3.121}$=0.0995, R^2=0.0025, p>.05). Therefore, the model (a-path) is not significant. The degree of nicotine (β=0.0953, p<.05) and sex (β=0.4854, p<.05) were found to have a significant effect on the YFAS scores. Consequently, the model (c′-path) was found to be significant ($F_{3.121}$=4.3686, R^2=0.0977, p<.01). Furthermore, the effect of the mediator and other variables on the YFAS scores was found to be significant ($F_{3.121}$=3.9862, R^2=0.1173, p<.01). The degree of nicotine dependence (β=0.0946, p<.001) and sex (β=0.4825, p<.05) were found to have a statistically significant effect on food addiction scores. The effect results regarding the mediating role of UPPS impulsive behavior are also presented in Table-4. Accordingly, the indirect effect (a*b-path) is significant, as evidenced by the bootstrap confidence interval, which does not include zero *(y*=.0021, SE=.0135, 95%CI [.0307, .0263]).

The results of the analysis of the direct and indirect effects of alcohol consumption on food addiction are presented in Table-5. No statistically significant difference was identified ($F_{4.105}$=0.5866, R^2=0.0163, p>.05).

DISCUSSION

The objective of this study was to examine the degree of nicotine dependence and alcohol consumption, as well as food addiction, in young people. Additionally, the study aimed to investigate the relationship between the degree of nicotine dependence and alcohol consumption of young people and food addiction and to assess whether the level of impulsive behavior plays a mediating role in this relationship. The findings of this study indicate that sex has a significant effect on alcohol consumption and degree of nicotine dependence, with these effects varying depending on impulsive behavior characteristics. The results of the mediated regression analysis also demonstrate that the degree of nicotine dependence has a significant effect on food addiction depending on impulsive behaviors, although this effect is not significant for alcohol use.

Tobacco use represents one of the most significant public health concerns globally. The World Health Organization (2022) reports that tobacco is the leading cause of preventable mortality, killing more than 8 million people annually. Of these deaths, over 7 million are attributed to direct tobacco use, while an additional 1.2 million are attributable to second-hand smoke exposure (38). The use of tobacco in the form of cigarettes or in various other forms results in the development of an addiction pattern, which is dependent on the duration and quantity of use. It is well-established that nicotine is the primary factor in the formation of this pattern (39). The present study indicates that the prevalence of smoking and alcohol consumption among the participants was 21.2% and 15.8%, respectively.

A considerable number of studies have been conducted on the issue of smoking among university students. For instance, a study conducted among undergraduate students in Greece reported a tobacco use rate of 35% (40). Another study conducted in Türkiye revealed that 23.4% of university students exhibited mild nicotine dependence, 2.8% exhibited moderate dependence, and 3.4% exhibited severe dependence. The same study calculated that the rate of risky alcohol consumption was 2.5%, risk-free alcohol consumption was 23.4%, and alcohol dependence was 2% (41).

Ethyl alcohol is the most commonly abused psychostimulant worldwide, following caffeine and tobacco. (39). The World Health Organization (WHO) has determined that the average value of pure alcohol consumption per

capita per year is 12.33 for France, 12.91 for Germany, 11.19 for Russia, 9.87 for the United States and that this value for our country is calculated at 1.4 liters for 2018 (42). A study conducted in Italy revealed that 19% of university students exhibited risky alcohol use (44). In a recent study in Türkiye, Atlam et al. (45) calculated the rate of risky alcohol use as 12% in a sample that included different segments of society (including university students). Although these data and other similar findings (including our own) were obtained through self-reporting, it can be said that the rates are remarkable.

It is well-established that sex plays a significant role in the consumption of tobacco and alcohol. Our study revealed that female and male young people exhibited distinct patterns of nicotine dependence and alcohol use, which were dependent on impulsive behavior. A study conducted on university students in our country revealed that the frequency of smoking and alcohol use was higher in males than in females, a finding that aligns with our own (46). These and similar findings suggest that males and young people may be at an elevated risk for legal substance use. In addition to substance use, the dietary habits of young people also warrant investigation. The consumption of food and drink outside the home has become a popular and alternative way of eating. Research has demonstrated that 2.5 billion people worldwide consume what is commonly referred to as “street food” (47). A report covering the years 2015-2018 in the US indicated that the rate of fast food consumption among children and adolescents on a given day was 36.3% (49). A further report published in the United States covering the years 2013-2016 indicates that 36.6% of adults consume fast food on a given day. Men consume fast food at a higher rate than women, with 37.9% of men consuming fast food on a given day compared to 35.4% of women (48).

In our country, there is a great deal of interest in the eating behavior of individuals and, consequently, weight gain. This has led to a plethora of studies being conducted in the literature. In particular, these studies focus on obesity. A review of the general statistics (TÜİK, 2019) reveals that, based on body mass index calculations, the prevalence of obesity among individuals aged 15 years and above in Turkey was 19.6% in 2016, with this figure increasing to 21.1% in 2019. In terms of gender, it has been demonstrated that there is a greater prevalence of obesity among females than males (female; 24.8%, male; 17.3%). It has been reported that obesity and overweight have become a global epidemic in both adults and children (15,50). One of the factors thought to be contributing to this epidemic is the easy accessibility of excessively fatty, salty, or sugary foods. However, it has been suggested that there are other factors influencing this epidemic (51).

The diagnostic process for food addiction, as with substance use disorders, includes criteria such as continued use despite negative consequences and repeated unsuccessful attempts to reduce consumption (17). In our study, food addiction was calculated using the YFAS scale (v.2.0). It was found that 5.4% of the adolescents met the diagnostic criteria for severe food addiction. A considerable body of research utilizing the YFAS scale is available in the literature (22–24). The findings of these studies indicate that the group with the highest consumption of processed foods exhibits more problematic eating behaviors than the group with the lowest consumption of processed foods (e.g., vegetables, fruit, protein).

A study conducted in Poland among individuals aged 18 to 82 years revealed that individuals in the younger age group and those with a higher body mass index (BMI) exhibited a greater preference for unhealthy foods, including crisps, salty snacks, fast food, and sugary fizzy drinks (52). A study conducted with university students in Istanbul reported a food addiction rate of 21.7% (n=65) and identified a significant relationship between food addiction and the level of impulsivity (53). In a further study conducted among university students, it was reported that 3.4% of the students were in the high-risk group in terms of food addiction (54). Given that impulsivity is a factor thought to be associated with alcohol/substance use (55, 56) and eating behavior (57), this study also investigated the participants’ levels of impulsivity.

It has been proposed that there are parallels between drug addiction and food addiction, with changes and activation observed in certain brain regions. In this context, neurobiological evidence is particularly pertinent. Consequently, research examining the interrelationships between substance abuse issues and food addiction at various levels is crucial. For instance, a study conducted on individuals aged 14-21 (2017) revealed a significant positive correlation between smoking, alcohol consumption, substance use, and food addiction (58). In the

present study, we employed a mediation analysis approach, utilizing Hayes' Model 4, to examine the relationship between nicotine dependence and alcohol consumption and their respective effects on impulsive behavior. Our findings revealed that the direct and indirect effects of nicotine dependence on food addiction were statistically significant, whereas the direct and indirect effects of alcohol consumption on food addiction were not. In particular, our results indicate that the cultural characteristics of the sample studied may also be an effective variable. The fact that this relationship, which is clear for the degree of nicotine dependence, is not found for alcohol consumption may also be explained by the generally accepted patterns of alcohol consumption in the province of Sivas.

A significant finding of our study is that certain psychological characteristics of individuals were considered. In our study, the level of impulsive behavior in young people was found to be associated with legal substance use and food addiction. Appropriate statistical models were used to analyze the data. Previous studies (59, 60) have also highlighted the importance of impulsivity in eating behavior. These studies have suggested that individuals with high levels of impulsivity may have a lower ability to control their eating behavior than those with lower levels of impulsivity. However, further research is needed to confirm this association.

Limitations

The most significant limitation of our research is the potential for social desirability. Although this effect has been the subject of debate, the use of questionnaires and scales to obtain information from individuals can provide accurate and reliable data to some extent. Furthermore, the fact that the sample was selected using non-probabilistic methods may have influenced participants' motivation to participate in the research, with some individuals being more likely to volunteer than others. For instance, individuals with higher levels of smoking and/or alcohol consumption may have chosen not to participate in this research. Consequently, in subsequent studies where university students are selected as the target sample group, these limitations can be mitigated by employing more systematic sampling methods. In summary, it should be noted that sampling was not possible in this study, and therefore, the findings cannot be generalized to the entire population.

Furthermore, it is important to acknowledge that most of our research sample is female, which may influence the interpretation of the findings.

CONCLUSION

The findings of our study indicate that legal substance use and food addiction are prevalent among young people. Furthermore, our results demonstrate a significant correlation between the degree of nicotine dependence and food addiction, which can be attributed to impulsive behaviors. The abuse of substances or drugs is regarded as a social, security, physical, and mental health problem. There is a wealth of evidence indicating that the use of drugs at an early age can result in a high-risk clinical and psychosocial profile in the future (61). It is, therefore, necessary to identify other factors that may increase or encourage substance use behaviors among young people and to plan preventive research on these factors. At times, eating behavior and substance use can be seen as behaviors that trigger each other and/or occur together. Further research, including the use of different techniques, is required in order to obtain more concrete and reliable information on this subject.

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