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Original Research

The Prevalence and Associated Factors of Food Addiction and Internet Addiction in Turkish Adults

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Abstract

Background: It is necessary to know the prevalence and risk and protective factors of a disorder to prevent it, which food addiction (FA) and internet addiction (INTA) are not exception. It has been reported that the prevalence of these two types of addiction has been getting higher, affecting lots of people's psychological health in a detrimental way. Therefore, the aim of this study was to determine the common and distinctive predictive factors of FA and INTA. **Methods**: The sample of the study consisted of 704 adult participants with a mean age of 20.67 ± 2.40 years. Demographic form, The Modified Yale Food Addiction Scale 2.0, Young's Internet Addiction Test-Short Form and Leisure-Time Physical Activity Questionnaire were used to collect data. **Results**: The results showed that the prevalence of FA and INTA were high in Turkish adults were determined to include Body Mass Index, social self-identification, and age. The factors associated with INTA included spending time on the internet and being non-active. Another main finding of the study was FA and INTA were the strongly associated with each other. **Conclusions**: Regarding the results, and it can be said that FA and INTA had a significant risk for each other, meant taking steps to prevent one can diminish the severity of the other. For this, multidisciplinary teams including mental and physical health professional should be established, and strategy programs should be prepared and implemented to individuals who are at risk.

Keywords: food addiction; internet addiction; prevention of addiction; mental health

Prevalencia y factores asociados de la adicción a la comida y la adicción a Internet en adultos Turcos

Resumen

Antecedentes: Es fundamental conocer la prevalencia, así como los factores de riesgo y protección de un trastorno para poder prevenirlo, y la adicción a la comida (AC) y la adicción a Internet (ADI) no son una excepción. Se ha informado que la prevalencia de estos dos tipos de adicciones ha ido en aumento, afectando de manera perjudicial la salud psicológica de muchas personas. Por lo tanto, el objetivo de este estudio fue determinar los factores predictivos comunes y distintivos de la AC y la ADI. **Métodos**: La muestra del estudio estuvo compuesta por 704 participantes adultos con una edad media de 20,67 ± 2,40 años. Para la recopilación de datos se utilizaron un formulario demográfico, la Escala de Adicción a la Comida de Yale Modificada 2.0, la versión corta del Test de Adicción a Internet de Young y el Cuestionario de Actividad Física en el Tiempo Libre. **Resultados**: Los resultados mostraron que la prevalencia de la AC y la ADI en adultos turcos era alta, y que factores como el índice de masa corporal, la autoidentificación social y la edad estaban relacionados con ambas adicciones. En cuanto a la ADI, se observaron asociaciones con el tiempo dedicado a Internet y la inactividad física. Otro hallazgo principal del estudio fue que existía una fuerte asociación entre la AC y la ADI. **Conclusiones**: A la luz de estos resultados, puede afirmarse que la AC y la ADI representan riesgos significativos entre sí, lo que implica que intervenir en una de ellas podría reducir la gravedad de la otra. Para ello, se recomienda la formación de equipos multidisciplinarios que incluyan profesionales de la salud mental y física, así como el desarrollo e implementación de programas estratégicos dirigidos a personas en riesgo.

Palabras Claves: adicción a la comida; adicción a internet; prevención de adicciones; salud mental

1. Introduction

Addiction is described as a complex brain disease caused by the interaction of genetic, neurobiological, and environmental factors (Butelman et al, 2023; Nutt and Nestor, 2018). Behavioral addiction, specifically, is characterized by a pathological dependence to an object such as food and internet even facing significant harmful consequences related to the dependency (Zou et al, 2017). Among various types of behavioral addiction, food addiction (FA) stands out as an important phenomenon (Constant et al, 2020). FA is characterized by compulsively food consuming and a loss of control on eating (Marks, 1990; Praxedes et al, 2022). People with FA experience craving highly processed foods especially and altering reward-sensitivity related to food (Brytek-Matera et al, 2021; Florio et al, 2022; Sönmez Güngör et al, 2021).

The prevalence of FA varies significantly between countries. For instance, it has been reported that 33.7% of obese people and 14% of non-obese people in Turkey suffer from FA (Kircaburun et al, 2020). Additionally, Kircaburun and colleagues (2020) highlighted that 2.3% of individuals in Turkey exhibit maladaptive eating behaviors that may lead to FA, alongside excessive alcohol consumption and serious mental health problems. FA is also associated with impulsivity, mood disorders, neuroticism, and obesity (Mutlu and Hüseyin, 2021; Sönmez Güngör et al, 2021), collectively diminishing the quality of life. Given these negative outcomes, it becomes crucial to identify and mitigate the risks of FA (Constant et al, 2020; De Almeida et al, 2022; Florio et al, 2022). For this purpose, the Yale Food Addiction Scale (YFAS) was developed (Gearhardt et al, 2009). Originally based on the addiction criteria outlined in DSM-IV (American Psychiatric Association, 2000), YFAS was revised in alignment with DSM-V (American Psychiatric Association, 2013; Gearhardt et al, 2016). Detecting FA prevalence using YFAS-Revised could serve as a critical first step in managing the issue and planning treatment strategies.

Similarly, the rapid spread of the internet and its increasing misuse worldwide has led to a rise in internet addiction (INTA) (Kol and Topgul, 2022). INTA, another behavioral addiction, is conceptualized as a modern socio-psychological phenomenon characterized by excessive internet usage that impairs one's function in daily basis over a prolonged period (Petrunko and Teleshun, 2022). INTA could have an impact on people of all age in detrimental ways (Lavadi et al, 2021). For instance, it was found that INTA can be a risk factor of gaining weight, depression, sleep disorders and pain-related problems (Arora et al, 2016). It also reduces daily physical activity levels, which, according to the World Health Organization (World Health Organization (WHO), 2024), increases the risk of death by 20–30%. Therefore, for INTA whose prevalence rate increase day by day it is highly crucial to identify its risk and protective factors and to develop prevention and intervention programs considering the related factors. Even INTA can affect people in all ages, in Turkey, it was stated that young people mostly experience INTA. Research showed that whereas 15.2% of university students have experienced limited symptoms of INTA (Genc and Pirincci, 2024), 18.9% of adolescents are pathological internet users (Köyceğiz et al, 2022). Furthermore, Aydemir (2018) found that while 14.1% of senior high school students are in diagnostic group, 42.6% of them are in the risky group. Considering all the result, INTA especially can be risk for young ones, which can lead to detrimental outcomes not only in individual level but also in social level in long term.

1.1 Common and Distinctive Factors of FA and INTA

When examining FA and INTA together, certain shared and distinctive characteristics emerge. For instance, both conditions share common risk factors such as cigarette smoking (Hoover et al, 2023; Köyceğiz et al, 2022), high body mass index (BMI; Koca et al, 2023), low self-esteem (Yildirim et al, 2018), and disordered eating behaviors (Pape et al, 2021). However, some unique factors have also been identified. For example, low self-esteem and neurotic thinking have been found to increase the risk of INTA during adolescence (Koca and Berk, 2019; Lu, 2023), while rash impulsivity among teenagers is a risk factor for FA (Kidd and Loxton, 2021).

Age also appears to play a critical role, as adolescence has been identified as a period of heightened risk for the development or exacerbation of both addictions. Time spent on the internet is another shared risk factor (Tayhan Kartal and Yabancı Ayhan, 2021). However, while the relationship between internet use and INTA has been well-documented, its direct association with FA remains unexplored.

There are also significant differences between the two conditions. FA is closely related to emotional eating and a loss of control overeating behaviors (Schankweiler et al, 2023), whereas these factors have not been directly linked to INTA. Additionally, hormonal changes, such as fluctuations in estrogen levels, and mood swings have been associated with food-related psychological disorders (Klump et al, 2017), suggesting that being female is a risk factor for FA (Gearhardt et al, 2012). In contrast, research indicates that being male is a risk factor for INTA (Chaudhari et al, 2015; Ghamari et al, 2011).

Finally, research suggests a relationship between FA and INTA (Alpaslan et al, 2015; Rodgers et al, 2013; Tayhan Kartal and Yabancı Ayhan, 2021). For example, Quesnel and colleagues (2018) highlighted that eating disorders and problematic internet use can mutually worsen symptoms. This raises the possibility of comorbidity between FA and INTA. However, only two studies have investigated this relationship: one conducted with obese and non-obese children (Koca et al, 2023) and another with high school students (Yildirim et al, 2018). These limited findings un-

derscore the need for further research to generalize and better understand the comorbidity of FA and INTA.

In addition to all these, studies have shown that eating disorders and disordered eating behaviors develop after coronavirus disease 2019 (COVID-19) (Fernández-Aranda et al, 2020; Levine, 2013; Lydecker and Grilo, 2019; Touyz et al, 2020) and the total time spent on the internet increased significantly compared to before (Chen et al, 2021a; Chen et al, 2021b; Chen et al, 2022). More importantly, the negative consequences of COVID-19 on psychological health may last longer (Shah et al, 2020). Proving this, Çelik et al (2023) found in a study with Turkish students that the psychological distress that emerged in the acute phase of the pandemic persisted in the medium to long term. Therefore, the effect of COVID-19 on FA and INTA should be examined. Thus, determining whether these behavioral addictions that emerged during the COVID-19 period persist will provide a basis for healthcare providers and public authorities to develop protective policies in this direction.

1.2 Present Study

The primary aim of this study was to identify both shared and unique factors associated with FA and INTA among Turkish adults. Unlike prior studies, which were conducted with age-restricted and relatively small samples (e.g., N = 378, (Yildirim et al, 2018)); N = 360, Koca et al, 2023), this study aimed to overcome these limitations by using a large, diverse adult sample. In addition, identifying the unique and overlapping factors associated with FA and INTA, as well as analyzing their interrelationship, highlights the distinctive contribution of this study to the existing literature. The variables addressed in the current study included gender, time spent on the internet, physical activity, recreational characteristics of the place of residence, smoking cigarettes, sleep patterns, eating patterns, self-identification as a social individual and COVID-19 infection status. The study focuses on two main hypotheses:

H1: There are common and distinctive risk factors associated with FA and INTA.

H2: There are common and distinctive protective factors associated with FA and INTA.

These hypotheses will examine the relationship between the two types of addiction and their distinguishing aspects. By investigating these hypotheses, the study aims to shed light on strategies for preventing these addictions.

2. Method

2.1 Participants

The sample consisted of 704 participants mean age 20.67 years (SD = 2.40), 51.6% of them were female, 56.3% were not smoking cigarette, 52.0% were sleeping regularly, 80.5% were described themselves as a social person and 37.5% of them considered their living place's recreational features were sufficient. 38.9% of the participants were having COVID-19. While 14.6% of the participants' physical activity level was decreased, 8.8% of them ate less after having COVID-19. While the mean of participants' height was 1.71 m (SD = 9.87), the mean of their weight was 66.58 kg (SD = 14.27), and the mean of BMI values was 22.50 kg/m^2 (SD = 3.56).

2.2 Instruments

2.2.1 Demographic Form

The demographic form collected information about the participants' personal and lifestyle characteristics. The demographic form was used to collect information about the participants' age, gender, weight, height, and time spent on the Internet during the day. In addition, the demographic form included the following questions to which 'yes/no' answers were given: "Are the recreational features of the place where you live adequate?", "Do you smoke?", "Do you sleep regularly?", "Would you describe yourself as a social person?", "Have you had COVID-19?". Data were collected through self-reported responses, where participants were asked to provide accurate and honest answers to each question.

2.2.2 Leisure-Time Physical Activity Questionnaire

Leisure - Time Physical Activity Questionnaire developed by Godin and Shephard (1985) was adapted to Turkish by Yerlisu-Lapa and colleagues in 2016. It is used to determine the physical activity levels of the participants. The scale is a survey that includes three questions to determine the levels of vigorous, moderate and light physical activity that participants have participated in in the last week. The level of physical activity was determined with this formula: (9 × strenuous) + (5 × moderate) + (3 × mild). The scores of 24 and above pointed active, the scores between 13–24 pointed moderate active, scores of 13 and below pointed not active enough. In this study, using this formula, the participant was divided into two groups (active or non-active) based on the cut off score of 13. Its Turkish version developed by Yerlisu-Lapa and colleagues (2016) had higher internal consistency ($\alpha = 0.94$). In this study, its Cronbach's alpha was found as 0.78.

2.2.3 The Modified Yale Food Addiction Scale 2.0

The Modified Yale Food Addiction Scale 2.0 (mYFAS 2.0; Schulte and Gearhardt, 2017), revised form of older version (YFAS 2.0; Gearhardt et al, 2016), was developed to assess the severity of food addiction- addictive like-eating. It was 8-point Likert type scale with 13 items, 11 of them represented each symptom criteria and the other were related to clinical impairment. The Turkish version was developed by Tok and colleagues in 2023. For scoring, the calculation recommended by Tok and colleagues (2023) was used (see Table 1). The higher scores participants take, the higher FA participants have. For diagnostic scoring, participants must take 1 point on both the 5th and 6th item on the scale represented as clinical impairment and

take at least 2 points on the remain 11 items. It had high internal consistency (α = 0.80; Tok Ş et al, 2023) and in this study Cronbach's alpha was found as 0.81.

Table 1. The score for the answers of items of the Yale Food Addiction Scale (YFAS) 2.0 used for the calculation.

Items	Answers	Score
3, 7, 12, 13	0-1-2	0
	3-4-5-6-7	1
1, 4, 8, 10	0-1-2-3-4	0
	5-6-7	1
2, 5, 6, 9, 11	0-1-2-3-4-5	0
	6-7	1

2.2.4 Young's Internet Addiction Test-Short Form

Young's Internet Addiction Test-Short Form created to assess the level of INTA (Pawlikowski et al, 2013). It had 12 items ranging by 5-point Likert type scale. Higher scores indicated higher INTA. Problematic internet use, Young's Internet Addiction Test-Short Form (YIBTSF) score >30; Pathological internet use is defined as a YIBTSF score >37 (Pawlikowski et al, 2013). Its Turkish version developed by Kutlu and colleagues (2016) had higher internal consistency (α = 0.91). In this study, its Cronbach's alpha was found as 0.86.

2.3 Procedure

The study was designed as a cross-sectional observational study and conducted in accordance with the principles of the Declaration of Helsinki. Ethics committee approval was obtained from the Yalova University Ethics Committee on 14 March 2024, with protocol number 2024/10.

Participants were recruited through online advertisements shared on social media platforms and community networks to ensure a diverse adult sample. Before participation, individuals were provided with a detailed information sheet about the study and were required to sign an informed consent form electronically, confirming their voluntary participation.

Data collection was carried out via Google Forms, which included the demographic form and other measurement tools. To ensure data confidentiality, all responses were anonymized, and no personally identifiable information was collected. The data were securely stored in a password-protected system accessible only to the research team. The entire procedure, including completing the forms, took approximately 20 minutes per participant.

2.4 Statistical Analysis

Data were analyzed using IBM SPSS version 25.0 (IBM-SPSS Statistics, Chicago, IL, USA). For data confidentiality, participants' personal information was not collected. The dataset included only anonymized codes corresponding to the time period during which they completed the survey. Data were securely stored in an encrypted format accessible only to authorized researchers. Based on preliminary analysis, four participants were excluded from the data as outliers based on the score getting on dependent variables (the level of FA and INTA). Normality assumptions of dependent variables were assessed using skewness and kurtosis values, as these are considered robust indicators of normality, especially in larger samples (Kim, 2013). The cut-off points for skewness (–2, +2) and kurtosis (–4, +4) were chosen based on recommendations from Kim (2013), which are appropriate for moderately skewed distributions in large sample sizes. In addition, descriptive analyses and Pearson Corelation analyses were performed. Furthermore, to identify potential explanatory variables for the FA and INTA, Multiple Linear Regression Analyses - Forward Selection Method were carried out. The criteria for adding variables to the model were determined as the probability of F-to-enter $\leq$0.05 and the probability of F-to-remove $\geq$0.100. To conduct correlation and regression analyses, categorical variables were transformed into dummy variables such as being female, smoking cigarette, sleeping regularly, being non-active, self-identification as social, having recreational living places, time spent on the internet more than five hours per day. For correlational analyses, correlation coefficients ranging from 0.0 to 0.09 were categorized as negligible, those between 0.10 and 0.39 as weak, those from 0.40 to 0.69 as moderate, and coefficients of 0.70 or higher were classified as strong (Schober et al, 2018).

3. Result

As showed in Table 2, by descriptive analyses, it was found that the mean of FA was found as 1.60 (SD = 2.34) and the mean of internet addiction was found as 29.72 (SD = 8.49). In addition, the normality assumption for the variables were met based the score of skewness and kurtosis. Moreover, it was found that among 704 participants, 25 of them (3.55%) exceeded threshold score of clinical impairment for FA (based on 5th and 6th item). 21 of the 25 (2.98% of total sample) took at least 2 points based on other 11 items of mYFAS 2.0. In addition, while 44.6% of the participants exceeded the cut-off point of 30 for problematic internet usage,16.3% of the participants exceeded the cut-off point of 37 for pathological internet use.

Considering the result of Independent Sample t-test analysis, there were not significant differences between people having COVID-19 and people not having COVID-19 in terms of the level of either FA or INTA, t (702) = 0.10, $p > 0.05$; t (702) = –0.44, $p > 0.05$, respectively.

As seen in Table 3, there were weak positive relationships between time spent on the internet more than five hours per day, BMI and FA (r = 0.11, $p < 0.001$; r = 0.20, $p < 0.001$, respectively); yet there were weak negative re-

Table 2. Descriptive statistics of dependent variables.

Variables	N	Mean	SD	Min	Max	Skewness	Kurtosis
FA	704	1.60	2.34	0.0	13.0	1.86	3.93
INTA	704	29.72	8.49	12.0	60.0	0.39	0.58

Note. FA, Food Addiction; INTA, Internet Addiction; N, Number of Cases; SD, Standard Deviation; Min, Minimum Score; Max, Maximum Score.

Table 3. Result of correlation analysis.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	1	–0.05	0.01	0.00	0.03	0.02	0.00	0.02	–0.04	0.13**	–0.09*	–0.06
2. Being female		1	0.14**	0.05	–0.11**	–0.10**	–0.10**	0.08*	–0.03	–0.27**	0.01	–0.04
3. Being non-active			1	0.08*	0.07	–0.04	–0.00	–0.04	0.05	–0.08*	0.07	0.13**
4. Having recreational living place				1	–0.02	–0.13**	–0.08*	–0.04	0.07	0.05	0.08*	0.06
5. Smoking cigarette					1	–0.09*	0.05	0.04	0.06	0.07	0.07*	0.03
6. Sleeping regularly						1	0.10**	0.03	–0.07	0.01	–0.07	–0.12**
7. Self-identification as social							1	–0.05	–0.10**	–0.06	–0.16**	–0.14**
8. Having covid-19								1	0.02	–0.02	–0.01	0.02
9. Time spent on the internet[a]									1	0.12**	0.11**	0.30**
10. BMI										1	0.20**	0.06
11. FA											1	0.35**
12. INTA												1

Note. BMI, Body Mass Index; FA, Food Addiction; INTA, Internet Addiction. [a]More than five hours per day, *$p < 0.05$, **$p < 0.001$.

lationships between self-identification as social and FA (r = –0.16, $p < 0.001$). Moreover, INTA was weakly positively related to being non-active ($r = 0.13$, $p < 0.001$) and time spent on the internet more than five hours per day (r = 0.30, $p < 0.001$); yet, INTA was weakly negatively related to sleeping regularly (r = –0.12, $p < 0.001$) and self-identification as social (r = –0.14, $p < 0.001$). Furthermore, FA was weakly positively associated with INTA ($r = 0.35$, $p < 0.001$).

The result of Multiple Linear Regression-Forward Selection Method conducted to identify factors associated with of FA was showed in Table 4. While INTA added to the first model explained the variance of 12% in FA (Adjusted R^2 = 0.12, F [1, 702] = 99.30, $p < 0.001$), BMI added to the second model contributed 0.03% to explain the variance in FA (ΔF [1, 701] = 27.86, $p < 0.001$) and self-identification as social included to third model contributed 0.01% to explain the variance in FA (ΔF [1, 700] = 8.28, $p < 0.05$). Including INTA in the first model indicated that it was the strongest factor associated with FA. Moreover, in contrast to other factors, INTA showed the strongest association with FA across all models ($\beta = 0.35$, $p < 0.001$; $\beta = 0.34$, $p < 0.001$; $\beta = 0.33$, $p < 0.001$). In addition, in the final model, while INTA and BMI were positively associated with FA ($\beta = 0.33$, $p < 0.001$; $\beta = 0.18$, $p <$ 0.001, respectively), self-identification as social was negatively associated with FA (β = –0.10, $p < 0.05$).

The result of Multiple Linear Regression-Forward Selection Method conducted to identify factors associated with of INTA was followed in Table 5. While FA added to the first model explained the variance of 12% in INTA (Adjusted R^2 = 0.12, F [1, 702] = 99.30, $p < 0.001$), time spent on the internet more than five hours per day added to the second model increased the variance of INTA by 0.07% (ΔF [1, 701] = 61.31, $p < 0.001$), being non-active included to third model increased the variance of INTA by 0.01% (ΔF [1, 700] = 8.49, $p < 0.05$) and sleeping regularly added to fourth model increased the variance of INTA by 0.01% (ΔF [1, 699] = 4.64, $p < 0.05$). Being placed FA in the first model indicated that it was the strongest predictor of INTA. Moreover, compared to other factors, FA showed the strongest association with INTA across all models (β = 0.35, $p < 0.001$; $\beta = 0.32$, $p < 0.001$; $\beta = 0.32$, $p < 0.001$; $\beta = 0.31$, $p < 0.001$, respectively). In addition, in the final model, while FA, time spent on the internet more than five hours per day and being non-active were positively related to INTA ($\beta = 0.31$, $p < 0.001$; $\beta = 0.26$, $p < 0.001$; $\beta = 0.09$, $p < 0.05$, respectively), sleeping regularly was negatively related to INTA (β = –0.07, $p < 0.05$).

4. Discussion

The aim of this study was to determine the prevalence of FA and INTA in Turkish adults and to examine the common and distinctive predictive factors of these two addictions. Regarding the results of the study, it was found that while 3.55% of the participants experienced clinical impairment related to FA, 2.98% of the participants can get diagnosed with FA. Likewise, Kircaburun et al. (2020) showed that 2.3% of Turkish individuals have eating habits that can lead to addiction. Ayaz et al. (Ayaz et al, 2018) found this rate to be 11.4% in adults and found that 13% of women

Table 4. Result of Multiple Linear Regression-Forward Selection Method for FA (N = 704).

Model		B	SE	B 95% CI [LL, UL]	β	t
1	Constant	–1.28	0.30	[–1.87, –0.69]		–4.26**
	INTA	0.10	0.10	[0.08, 0.12]	0.35	9.97**
	R = 0.35, Adjusted R^2 = 0.12, F (1,702) = 99.30, $p < 0.001$					
2	Constant	–3.90	0.58	[–5.03, –2.77]		
	INTA	0.09	0.01	[0.08, 0.11]	0.34	9.82**
	BMI	0.12	0.02	[0.08, 0.17]	0.18	5.28**
	R = 0.40, Adjusted R^2 = 0.16, F (2,701) = 65.48, $p < 0.001$					
3	Constant	–3.23	0.62	[–4.45, –2.01]		–5.21**
	INTA	0.09	0.01	[0.07, 0.11]	0.33	9.39**
	BMI	0.12	0.02	[0.07, 0.16]	0.18	5.14**
	Self-identification as social	–0.59	0.21	[–1.00, –0.19]	–0.10	–2.88*
	R = 0.41, Adjusted R^2 = 0.16, F (3,700) = 46.86, $p < 0.001$					

Note. INTA, Internet Addiction; BMI, Body Mass Index. *$p < 0.05$, **$p < 0.001$. LL, lower limit; UL, upper limit.

Table 5. Result of Multiple Linear Regression-Forward Selection Method for INTA (N = 704).

Model		B	SE	B 95% CI [LL, UL]	β	t
1	Constant	27.68	0.36	[26.96, 28.39]		76.19**
	FA	1.28	0.13	[1.03, 1.53]	0.35	9.97**
	R = 0.35, Adjusted R^2 = 0.12, F (1,702) = 99.30, $p < 0.001$					
2	Constant	25.73	0.43	[24.89, 26.57]		
	FA	1.17	0.12	[0.93, 1.42]	0.32	9.46**
	Time spent on the internet[a]	4.54	0.58	[3.40, 5.68]	0.27	7.83**
	R = 0.44, Adjusted R^2 = 0.19, F (2,701) = 84.57, $p < 0.001$					
3	Constant	25.41	0.44	[24.54, 26.27]		57.75**
	FA	1.15	0.12	[0.91, 1.39]	0.32	9.31**
	Time spent on the internet[a]	4.47	0.58	[3.34, 5.60]	0.26	7.74**
	Being non-active	2.19	0.75	[0.71, 3.66]	0.10	2.91**
	R = 0.45, Adjusted R^2 = 0.20, F (3,700) =59.81, $p < 0.001$					
4	Constant	26.14	0.55	[25.05, 27.23]		47.14**
	FA	1.13	0.12	[0.89, 1.38]	0.31	9.20**
	Time spent on the internet[a]	4.40	0.58	[3.26, 5.53]	0.26	7.63**
	Being non-active	2.03	0.75	[0.55, 3.51]	0.09	2.70*
	Sleeping regularly	–1.24	0.58	[–2.37, –0.11]	–0.07	–2.15*
	R = 0.45, Adjusted R^2 = 0.21, F (4,699) = 46.25, $p < 0.001$					

Note. FA, Food Addiction. [a]more than five hours per day, *$p < 0.05$, **$p < 0.001$.

and 9.2% of men were addicted to food. Taymur et al. (Taymur et al, 2019) determined that 7.8% of the Turkish population had FA in their study. On the other hand, within the scope of the current study, it was determined that while 44.6% of Turkish adults had problematic internet use, 16.3% had pathological INTA. As can be seen, FA and INTA are among the types of addiction commonly experienced in the Turkish population. It is also necessary to take necessary precautions to prevent their prevalence and to determine their frequency of occurrence in more specific samples.

Looking at the effect of having COVID-19 on FA and INTA, no difference was found in terms of addiction levels of FA and INTA between participants who had COVID-19 and those who did not. This finding contradicts studies in the literature showing an increase in impaired eating behaviors and FA (Cherikh et al, 2020; Tavolacci et al, 2021) and an increase in INTA (Sun et al, 2020) after COVID-

19 pandemic. The reason for the different finding obtained in this study compared to other studies may be related to the long-term consequences of COVID-19. It is known that addictions develop/worsen especially during times of stress to cope with negative emotions (Sinha, 2001). During the COVID-19, it was observed that the prevalence of substance addiction increased with this motivation (Czeisler et al, 2020). Similarly, although the pandemic has a short-term effect on FA and INTA, these effects may have disappeared in the long term. Based on this, there may not have been a significant difference between those who had COVID-19 and those who did not have COVID-19 in the current study.

In the study, it was determined that the level of BMI increased as the level of FA increased in adults. In addition, BMI was found to be the strongest predictor of FA after INTA. When looked at, it can be said that the increase in BMI is a strong risk factor of FA. As BMI increases, FA increases, and as FA increases, BMI increases, which may reveal a vicious circle. Similarly, studies show that FA is associated with high BMI (Sönmez Güngör et al, 2021; Koca et al, 2023; Wang et al, 2023). On the other hand, no relationship was found between INTA and BMI in the current study. However, a relationship between INTA and BMI has been detected in obese children (Koca et al, 2023), adolescents (Canan, 2016) and university students (Sarı and Aydın, 2014). This difference may be due to the fact that the sample group of the current study consists of adults aged 17–40 years. It is recommended that future studies should address populations in different age groups and make comparisons in terms of BMI effect.

Studies have found that young individuals have higher FA scores than older individuals (Escrivá-Martínez et al, 2023; Hauck et al, 2017). It is suggested that this is because young individuals are exposed to psychological and physiological changes that may make them more prone to addiction than older individuals (Harris and Fleming-Milici, 2019). However, the relationship between age and FA was not examined in these studies. In the current study, a negligible negative relationship was found between age and FA. Another study result is that there is no relationship between age and INTA. In support of this, although a relationship between INTA and age was found in studies conducted with adolescents (Asghari , 2018; Ozcinar, 2011), no significant relationship was found in studies conducted with adults (Devine et al, 2022). When examined, age does not affect INTA in adults and does not have a significant effect on FA. However, studies should be conducted to detail the relationship between age and FA.

In the study, no relationship was found between gender and FA and INTA. Studies showing that there is no relationship between FA and gender are available in the literature (Ahmed and Sayed, 2017; Escrivá-Martínez et al, 2023; Hauck et al, 2017). On the contrary, there are studies arguing that there is a relationship between FA and gender (Gearhardt et al, 2016; Pursey et al, 2014). However, these studies differ from the current study as they were generally conducted in overweight and obese individuals (Pursey et al, 2014), adolescents (Piko et al, 2022) and a sample group with eating disorders (Praxedes et al, 2022). Similarly, studies showing the relationship between INTA and gender were conducted on different sample groups (medical students or adolescents) than the current study (Anderson and E, 2017; Chaudhari et al, 2015; Chen et al, 2015; Ghamari et al, 2011). Based on these results, it can be said that FA and INTA do not differ according to gender in adults.

In the study, it was determined that the level of FA and INTA decrease as the level of self-identification as social increased. In fact, self-identification as social is among the predictive factors of FA. In the literature, it has been shown that loneliness increases the tendency towards eating disorders and FA and is associated with excessive internet use (Cortés-García et al, 2022; Sirois et al, 2023; Tatsi et al, 2019). Therefore, in contrast to loneliness, it can be said that self-identification as social is a protective factor of FA and INTA. Based on this, the number of social activities and accessibility of social activities should be increased. Increasing the recreational feature of the living area may be one of the ways to achieve this goal. Because the presence of recreational features of the place they live in enables individuals to spend their leisure time more efficiently (Karaküçük, 2014). Thus, with increasing participation in leisure time activities, the person's health and welfare level increases and the level of psychological well-being increases (Karaküçük and Ekenci, 1995; Özdemir et al, 2016). Since it is known that FA is affected by the person's psychological state and chronic stress level (Kalon et al, 2016), an increase in participation in recreational activities may be an effective strategy to prevent FA. However, in the current study, a negligible negative relationship was found between the recreational feature of the place of residence and FA, indicating that while the recreational feature affects the psychological state, FA does not directly affect it. In addition, no relationship was found between the recreational features of the place of residence and INTA. In the current study, information about the recreational features of the place of residence was determined by asking the participants. The validity of the question is questionable due to the fact that the definition of the concept of "recreation" is not given in the question and/or it is based on the subjective evaluations of the participants. It is recommended that more valid methods be used to examine recreational features in future studies.

In the study, it was determined that there was a negative relationship between regular sleep and INTA. Being parallel to this result, there are studies showing that INTA causes a decrease in sleep quality and that poor sleep is associated with INTA (Dresp-Langley and Hutt, 2022; Guclu et al, 2024; Pandey, 2024; Tarrahi and Zhaleh, 2022). In the study, no relationship was found between FA and regular

sleep. However, there are studies showing that food addiction is less in those who sleep regularly (Arslan Kabasakal and Satılmış, 2024). In addition, studies have shown that a decrease in sleep quality is associated with FA and leads to eating habits, especially at night (Najem et al, 2020; Nolan and Geliebter, 2017; Romero-Blanco et al, 2021). The fact that sleep quality was not measured in the current study may have led to no findings parallel to this result. It is recommended that sleep quality be measured and examined in similar studies.

As a result of the study, it was found that FA and INTA increased as the level of spending time on the internet increases, and that the time spent on the internet was one of the strongest factors associated with INTA. No study has been found that directly examines the relationship between internet use time and FA, but Tayhan Kartal and Yabancı Ayhan (2021) showed that time of internet use was associated eating disorders and INTA. Şenel and Tolan (Şenel and Çakmak, 2022) also found that the time spent on the internet was among the factors associated with INTA in their study. It can be argued that the increase in time spent on the internet plays a role in the development of INTA. In addition, it is an inevitable fact that spending long periods of time on the internet leads to a decrease in physical activity levels (Ballard et al, 2009; Hazar et al, 2017). Similarly, Genc and Pirincci (2024) found non-activity was associated with INTA, as in the current study. In the current study, it was found not only being physically non-active was related to INTA but also it was one of the risk factors of INTA Based on these, it can be said that spending a long time on the internet is a risk factor for INTA both directly and indirectly by reducing the level of physical activity.

Finally, in the present study, the strongest factors associated with INTA and FA were found to be each other. It can be said that these two addictions can influence each other's severity and worsen the course of the addiction. When the literature is examined, it is emphasized that the comorbidity rates of some addiction types are high, especially in adolescents, and significantly impact the treatment results in a detrimental way (Essau, 2020). For this reason, it is recommended that future studies should examine the comorbidities of FA and INTA in detail.

As a result, in this study, the prevalence rate of FA was found to be 2.98% in the Turkish adult sample, while the prevalence rate of pathological INTA was found to be 16.3%. While FA has a positive relationship with spending too much time on the Internet, BMI and INTA, it has been revealed that there is a negative relationship with self-identification as social. In the current study, risk factors for FA include INTA level and high BMI value, and social self-identification are protective factors. On the other hand, the study determined that INTA had a positive relationship with being non-active, spending time on the internet, and FA, and a negative relationship with regular sleep and self-identification as social. As a result of the regression analysis of the current study, the risk factors of INTA include having a FA, spending too much time on the internet, and having a low level of physical activity, while the protective factor includes having a regular sleeping habit.

4.1 Limitations and Future Research Directions

Although the study has many valuable findings, it is not free from limitations. The collection of weight and height values for BMI value through self-report, the measurement sociability levels with a question instead of a measurement tool and measuring recreational feature of living palace based on subjective evaluation call into question the validity of these variables of the study. In addition, the lack of an examination of the participants' sleep duration as well as their sleep quality may have led to an inability to fully understand the effect of sleep on addictions. In future studies, it is recommended to examine the effect of BMI on these two addiction types in different age groups, to detail the effect of sleep quality and sociability level in adults, and to determine how FA and INTA differ in individuals living in regions with high and limited recreational opportunities. In addition, since this study found that FA and INTA are the strongly associated with each other, it is recommended to examine the factors that may lead to this situation in more detail by examining the comorbidity rates of these two addictions in future studies.

4.2 Clinical Implications

Considering the findings of the study, it can be said that individuals with a behavioral addiction are in the risk group for other addictions. Therefore, while psychological or physical assessment process, it can be highly important to evaluate and screen individuals for other possible addictions to improve the prognosis. In addition, because BMI is a risk factor in the treatment of FA and that FA gets stronger as BMI increases, it can be beneficial to advance a multidisciplinary process to be progressed with help from dietitians in the treatment of this addiction. Additionally, since it has been found that self-identification as social reduces FA, components that will strengthen interpersonal relationships should be added to the treatment process. Considering specifically INTA, it is thought that it would be beneficial to use a strategy of Behavioral Activation that limit individuals' internet time, create/improve a sleep pattern, which could enable them to be more active. Moreover, it is important to take beneficial steps before the addictions become stronger. For instance, carrying out awareness and prevention studies for both individuals and families regarding FA and INTA, especially in schools, and managing a multidisciplinary process by adding other health professionals such as dietitians in addition to mental health professionals such as psychiatrists/psychologists will be beneficial to reduce the prevalence of FA and INTA.

5. Conclusions

As a result of the study, it was determined that FA and INTA are common in the Turkish adults. Furthermore, even though it was not found any common protective and risk factors of FA and INTA, it was revealed they are the strongest factors associated with each other and pose a high risk for each other. Based on this, it is concluded that an intervention for one of the FA or INTA in the adult sample will also be beneficial for the course of the other.

Availability of Data and Materials

The data are contained within this article.

Author Contributions

SAK designed the research study. SAK performed the research. SAK and EÇ analyzed the data. Both authors contributed to editorial changes in the manuscript. Both authors read and approved the final manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study complies with the Declaration of Helsinki and informed consent was obtained from the participants. All procedures in studies involving human participants were performed in accordance with the ethical standards of the Yalova University Human Research Ethics Committee on 14.03.2024 with number 2024/10.

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Conflict of Interest

The authors declare no conflict of interest.

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