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Research Article

Examining the relationship between ultra-processed food consumption and quality of life among middle school students

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Abstract

Objective: With advancing technology and urbanization, traditional dietary habits are increasingly being replaced by ultra-processed foods (UPFs), which are practical, energy-dense, and low in nutritional value. Concerns have arisen that UPF consumption may adversely affect both physical and mental health in young people. This study aimed to examine the relationships between UPF consumption, quality of life, psychological symptoms, and food addiction among middle school students.

Methods: This descriptive cross-sectional study included 207 students 10–15 years aged (predominantly 11–14 years) attending schools in the Yüreğir district of Adana, Türkiye. Data were collected using a Sociodemographic Information Form, the Food Frequency Questionnaire (FFQ), the Yale Food Addiction Scale (YFAS), KIDSCREEN-52, and the Revised Child Anxiety and Depression Scale – Youth Version (RCADS-Y). Statistical analyses were conducted using SPSS 26.

Results: Overall, 46.9% of students met the YFAS diagnostic criteria for food addiction (≥3 symptoms plus clinically significant impairment/distress). UPF consumption frequency was negatively correlated with multiple health-related quality-of-life domains, including Physical Well-being ($r = -0.45$, $p < 0.001$), Moods & Emotions ($r = -0.30$, $p < 0.001$), Friends ($r = -0.18$, $p = 0.012$), and School Environment ($r = -0.30$, $p < 0.001$), while it was positively correlated with Bullying ($r = 0.25$, $p = 0.001$). UPF consumption was positively associated with food addiction ($r = 0.424$, $p = 0.001$). Family income level was significantly associated with UPF intake ($p = 0.037$), with the highest UPF consumption observed among middle-income households. No significant relationship was observed between BMI and food addiction status ($p > 0.05$).

Conclusion: UPF consumption among middle school students was associated with poorer quality of life and higher psychological symptom levels. These findings highlight the importance of addressing dietary habits alongside mental health in children and adolescents. However, as the study was cross-sectional, causal relationships cannot be inferred. Longitudinal and experimental research is recommended to clarify the direction and mechanisms of these associations.

Keywords: Adolescence, Food Addiction, Nutrition, Quality of Life, Ultra-Processed Foods

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Introduction

In the modern world, technological developments, urbanization, and changes in lifestyle have led to a marked transformation in traditional dietary habits. One of the most striking aspects of this transformation is the increasing level of industrial processing applied to foods and the growing presence of ultra-processed foods (UPFs) in daily nutrition. According to the NOVA food classification system (which groups foods based on the nature, extent, and purpose of industrial processing), UPFs are industrially manufactured products that contain numerous ingredients and are typically characterized by the inclusion of various additives, sweeteners, shelf-life–extending chemicals, and high energy density. Examples of UPFs include sugary and carbonated beverages, energy drinks, packaged cakes, cookies, and chips (Çelik, 2023).

The rising consumption of such products during childhood and adolescence has emerged as an important research area not only in terms of physical health, but also with regard to psychosocial well-being and mental health. Frequent consumption of UPFs during these developmental periods is suggested to increase dopamine release in the brain, potentially leading to lasting changes in the reward system. This may reduce satisfaction derived from healthy foods and contribute to the continuation of unhealthy eating behaviors in later life (Bhave et al., 2024).

A growing body of research has shown that UPF consumption is highly prevalent among children and adolescents and is increasingly recognized as an important public health concern (Neri et al., 2022; da Costa Louzada et al., 2021). Evidence from observational studies and umbrella reviews indicates that higher UPF intake is associated with poorer diet quality and unfavorable health outcomes, including cardiometabolic risk and mental health indicators (Pagliai et al., 2021; Askari et al., 2020).

In parallel, the concept of "food addiction" has gained increasing attention as a phenotype characterized by compulsive intake of highly palatable foods despite negative consequences. The Yale Food Addiction Scale (YFAS), originally developed by Gearhardt and colleagues, operationalizes addictive-like eating behaviors by adapting DSM substance dependence criteria to eating-related behaviors (Gearhardt et al., 2009). Meta-analytic evidence suggests that food addiction symptoms and diagnostic-level addictive-like eating are observable in pediatric populations and may be linked to psychosocial impairment (Burrows et al., 2017; Penzenstadler et al., 2019). In addition, systematic reviews report that food addiction prevalence estimates in youth vary across populations, particularly between community samples and clinical/overweight groups (Yekaninejad et al., 2021). Consistent with this, studies in adolescents seeking obesity treatment have reported meaningful associations between food addiction symptoms and disordered eating attitudes (Taş Torun et al., 2022).

Mechanistically, UPFs may be particularly relevant for addictive-like eating because they are industrial formulations designed to deliver highly reinforcing ingredient combinations (e.g., refined carbohydrates and fats), potentially enhancing reward responsivity and cue-triggered craving. Recent reviews emphasize that UPF addiction may represent a clinically meaningful construct that overlaps with—yet may be distinct from—traditional eating disorder phenotypes, and highlight neurobehavioral pathways (reward learning, impulsivity, cue reactivity) as plausible mechanisms (LaFata et al., 2024). Together, these mechanisms provide a plausible framework linking UPF consumption to addictive-like eating behaviors in youth.

In Türkiye, the emerging literature has also begun to examine UPF consumption and its correlates. For example, UPF intake has been associated with food literacy and healthy/sustainable eating behaviors among undergraduate students (Kabasakal-Cetin et al., 2024), and with mental distress and quality of life indicators in university samples (Öztürk & Uzdil, 2025). Moreover, a recent study in children reported an association between UPF consumption and low-

grade inflammation (Mete et al., 2024). However, despite these contributions, evidence remains limited regarding the combined evaluation of UPF consumption, food addiction, and psychosocial outcomes specifically in early adolescence and middle school populations in Türkiye.

Despite the growing body of research on ultra-processed food (UPF) consumption and its health correlates, important gaps remain in the literature. In particular, evidence is limited regarding the combined examination of UPF consumption, addictive-like eating behaviors (food addiction), and psychosocial outcomes such as quality of life, anxiety, and depression during early adolescence. Moreover, studies focusing specifically on middle school populations remain scarce. Addressing these gaps is important because early adolescence represents a critical developmental period during which eating patterns and reward-related behaviors may become established, and psychosocial vulnerabilities may intensify.

Therefore, the present study aimed to examine the relationships between UPF consumption and food addiction risk, quality of life, depression, and anxiety among middle school students. It is expected that this research will contribute to the limited body of literature in Türkiye evaluating these variables together in youth populations and provide guidance for preventive mental health practices, the development of healthy eating behaviors, and the planning of school-based intervention programs.

Based on previous evidence, the following hypotheses were formulated:

1. Higher UPF consumption frequency would be associated with poorer quality of life (lower KIDSCREEN-52 subscale scores).
2. Higher UPF consumption frequency would be associated with greater emotional distress, reflected by higher anxiety and depressive symptom levels (RCADS-Y subscales).
3. UPF consumption frequency would show an associated with addictive-like eating behaviors (food addiction indicators assessed by YFAS).

Method

Sample

The sample of the study consisted of students aged 11–14 years who were enrolled at Süleyman Şah Middle School, located in the Yüreğir district of Adana province. Data collection instruments were administered to a total of 224 students selected using a simple random sampling method. The study site was selected based on feasibility, as the first author was working at this school and official permissions from the relevant educational authorities were obtained only for this school. Therefore, while students within the school were selected using simple random sampling, the school itself was included through convenience sampling. However, 17 students were excluded from the study due to exclusion criteria such as insufficient language proficiency, cognitive impairment, or a history of psychiatric diagnosis; therefore, the analyses were conducted on 207 students.

The target population comprised all students enrolled in the middle school (grades 5–8; N = 773) during the 2023–2024 academic year. We evaluated whether the achieved sample size provided adequate statistical power for the planned correlation analyses (two-tailed). With $\alpha = 0.05$ and 80% power, the final analytic sample ($n = 207$) was sufficient to detect correlations of approximately $r \geq 0.19$, indicating adequate sensitivity for small-to-moderate associations. To account for potential exclusions and missing data, 224 students were initially recruited; after applying exclusion criteria, 207 students were included in the analyses.

The inclusion criteria were: being 10–15 years of age, being enrolled at Süleyman Şah Middle School, having no known physical or psychiatric diagnosis, possessing sufficient cognitive capacity and language proficiency to complete the questionnaires, and providing voluntary participation. Although the target age range of the study was 11–14 years, a small number of participants aged 10 (n = 5) and 15 (n = 1) were also included due to grade-level enrollment in the participating school.

The exclusion criteria were: insufficient language or cognitive ability to complete the questionnaires and/or identification of a psychiatric diagnosis during brief individual mental health assessment interviews conducted by the first author (psychologist) prior to questionnaire administration. These assessments were based on a clinical interview guided by DSM-5 diagnostic criteria; no semi-structured diagnostic interview (e.g., K-SADS) was used. The interview findings were used solely for eligibility screening.

Data Collection Procedure

The data collection process was carried out between April and June 2024. Ethical approval for the study was obtained from the Çukurova University Research Ethics Committee (dated 08.03.2024, decision number 2024/142), as well as from the Adana Provincial Directorate of National Education and the Yüreğir District Directorate of National Education. Written informed consent was obtained from both the participants and their parents after providing detailed information regarding the purpose of the study.

Data Collection Instruments

Sociodemographic Information Form

A sociodemographic information form was used to collect participants' demographic characteristics, including sex, age, socioeconomic and demographic variables, height, weight, and general health status. Height and weight were measured by the first author during the study visit (not self-reported). Briefly, weight was measured using a calibrated digital scale and height was measured using a stadiometer, with participants wearing light clothing and without shoes. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2). Age- and sex-specific BMI-for-age percentiles were determined using the Centers for Disease Control and Prevention (CDC) 2000 growth charts. Based on CDC percentiles, participants were classified as underweight (<5th percentile), healthy weight (5th to <85th percentile), overweight (85th to <95th percentile), and obesity (≥95th percentile). (Kuczmarski et al., 2000)

Yale Food Addiction Scale

The original Yale Food Addiction Scale (YFAS; Gearhardt et al., 2009) was used (DSM-IV-TR based version). Addiction-like eating behaviors were assessed using the **YFAS,** developed by Gearhardt, Corbin, and Brownell, which operationalizes "food addiction" by adapting **DSM-IV-TR substance dependence criteria** to the consumption of highly palatable foods (e.g., high-fat/high-sugar foods). The YFAS evaluates seven dependence-related criteria and includes additional items assessing clinically significant **impairment** and **distress**, referring to eating behaviors during the **past 12 months**. The scale yields a **symptom count score** (range: **0–7**) and a **diagnostic classification**. Higher symptom count scores indicate greater severity of addictive-like eating behaviors. "Food addiction" defined as endorsement of **≥3 criteria** together with clinically significant impairment and/or distress. The original development study reported good internal consistency (**KR = 0.86** at the item level; **KR = 0.75** at the criterion level) (Gearhardt et al., 2009). The Turkish validity and reliability of the original YFAS has been supported in Turkish samples (Buyuktuncer et al., 2019; Bayraktar et al., 2012). In the present study, internal consistency was acceptable, with a Kuder–Richardson coefficient of 0.71.

KIDSCREEN-52: Health-Related Quality of Life Questionnaire for Children and Adolescents

KIDSCREEN-52 is a multidimensional instrument designed to assess health-related quality of life among children and adolescents aged 8–18 years across 12 countries. It comprises 10 subscales (Ravens-Sieberer et al., 2005): Physical Well-being, Psychological Well-being, Moods and Emotions, Self-Perception, Autonomy, Parent Relations and Home Life, Social Support and Peers, School Environment, Social Acceptance (Bullying), and Financial Resources. Higher scores indicate better perceived quality of life in the corresponding domain. The Turkish adaptation and reliability–validity

studies were conducted by Baydur et al. (2016). Internal consistency for the KIDSCREEN-52 was satisfactory in the current sample, with Cronbach's alpha coefficients ranging from 0.68 to 0.99 across subscales. In the original European validation study, Cronbach's alpha values were reported to range between 0.77 and 0.89 (Ravens-Sieberer et al., 2005), while the Turkish validation conducted by Baydur et al. reported alpha coefficients ranging from 0.69 to 0.90 for the child/adolescent version.

Revised Child Anxiety and Depression Scale – Youth Version (RCADS-Y)

The RCADS-Y is a 47-item self-report scale developed to assess levels of anxiety and depression among children and adolescents (Chorpita et al., 2000). The RCADS-Y includes subscales assessing Separation Anxiety Disorder, Social Phobia, Generalized Anxiety Disorder, Panic Disorder, Obsessive–Compulsive symptoms, and Major Depressive Disorder. Higher scores indicate greater anxiety and depressive symptom severity. The internal consistency of the Turkish version has been reported to be strong to excellent, with a Cronbach's alpha coefficient of .95 (Gormez et al., 2017). In the current sample, the RCADS-Y demonstrated excellent internal consistency (Cronbach's α = 0.99).

Food Frequency Questionnaire (FFQ)

Originally developed in the 1980s, the FFQ is a dietary assessment tool designed to determine how often, in what quantities, and over what period of time individuals consume specific food groups. The number of food and beverage items included typically ranges from 80 to 120 (Willett et al., 1998). Participants' retrospective dietary intake was recorded using the FFQ. Food consumption frequencies were scored on a 0–6 scale, consistent with commonly used FFQ frequency scoring approaches. Higher scores indicating more frequent consumption. For the purposes of this study, FFQ items corresponding to ultra-processed foods (UPFs) were identified based on the NOVA classification system. A total UPF consumption frequency score was then calculated by summing the 0–6 frequency scores across these UPF items, with higher scores reflecting more frequent UPF consumption.

Data Analysis

Data analysis was conducted using SPSS version 26. A sensitivity analysis indicated that the final sample size (n = 207) provided 80% power to detect correlations of approximately $r \geq 0.19$ at $\alpha = 0.05$ (two-tailed). First, the distributional characteristics of the variables were examined. To evaluate the assumption of normality, the Kolmogorov–Smirnov test, histograms, Q–Q plots, and skewness–kurtosis values were collectively considered. As most of the scale scores were found to fall within acceptable normal distribution limits, parametric tests were deemed appropriate for group comparisons. Independent samples t-tests were used for comparisons between two groups, while one-way analysis of variance (ANOVA) was used for comparisons involving three or more groups. Where homogeneity of variance was not met, suitable post-hoc tests were applied. Pearson correlation analysis was used to examine linear relationships between variables. A significance level of $p < 0.05$ was adopted.

Results

Findings Related to Demographic Characteristics

The demographic characteristics of the students who participated in the study were analyzed and are presented in Table 1 as frequencies and percentages. No participant met the CDC criteria for obesity (≥95th percentile).

Table 1. Demographic Characteristics of the Students			
Variable	**Category**	**n**	**%**
Age (years)	*10–11*	*55*	*26.57*
	12	*63*	*30.43*
	13	*46*	*22.22*
	14–15	*43*	*20.77*
Mean ± SD	*12.35 ± 1.15*		
Grade level	*5th grade*	*61*	*29.47*
	6th grade	*60*	*28.99*
	7th grade	*42*	*20.29*
	8th grade	*44*	*21.26*
Gender	*Female*	*142*	*68.60*
	Male	*65*	*31.40*
Regular physical activity	*Yes*	*173*	*83.57*
	No	*34*	*16.43*
BMI (weight status*)	*Underweight*	*102*	*49.28*
	Normal weight	*93*	*44.93*
	Overweight	*12*	*5.80*
BMI (kg/m²)	*Mean ± SD*		*18.96 ± 3.33*
	Range		*12.65–29.49*
Food addiction status(YFAS diagnosis)	*Non-addicted*	*110*	*53.14*
	Addicted	*97*	*46.86*

**BMI categories were classified using CDC 2000 BMI-for-age percentiles (underweight: <5th percentile; normal weight: 5th to <85th percentile; overweight 85–<95, obesity ≥95).*

A total of 207 middle school students participated in the study. The ages of the participants ranged from 10 to 15 years, with a mean age of 12.35 ± 1.15 years. Of the students, 68.6% were female and 31.4% were male. In addition, 83.6% of the participants reported engaging in regular physical activity. According to the BMI classification, 49.3% of the students were underweight, 44.9% were of normal weight, and 5.8% were overweight. Food addiction status (YFAS diagnosis) was operationalized as a categorical variable based on the YFAS diagnostic classification (0 = absent, 1 = present). According to the YFAS diagnostic algorithm, 46.9% of the students met the criteria for food addiction (≥3 symptoms plus clinically significant impairment/distress) (Table 1). Students' height values ranged between 128 and 180 cm (M = 151.85, SD = 9.57), while their weight values ranged between 25 and 87 kg (M = 43.99, SD = 10.11). BMI values ranged between 12.65 and 29.49 (M = 18.96, SD = 3.33).

Frequency of UPF (NOVA Group 4) Consumption

Examination of the UPF consumption frequency in Table 2 reveals that a considerable proportion of items such as flavoured or chocolate milk, ice cream, chips, chocolate, and packaged snack foods are consumed more than once per week. Notably, products such as ice cream, chips, and chocolate–wafer snacks are regularly incorporated into students' weekly and even daily dietary patterns. These results suggest that a substantial proportion of students frequently consume foods classified as UPFs.

Table 2. Frequency of UPF (NOVA Group 4) Consumption							
Food Items	**Never**	**< 1 time/ month**	**1–3 times/ month**	**1 time/week**	**2–3 times/week**	**4–5 times/ week**	**6–7 times/ week**
Flavored or chocolate milk							
n(%)	*27(13,04)*	*18(8,70)*	*11(5,31)*	*20(9,66)*	*46(22,22)*	*21(10,14)*	*64(30,92)*
Ice cream							
n(%)	*0(0,00)*	*0(0,00)*	*2(0,97)*	*19(9,18)*	*52(25,12)*	*72(34,78)*	*62(29,95)*
Pastry products (bakery items)							
n(%)	*3(1,45)*	*0(0,00)*	*6(2,90)*	*27(13,04)*	*87(42,03)*	*53(25,60)*	*31(14,98)*
Biscuits / crackers							
n(%)	*3(1,45)*	*0(0,00)*	*13(6,28)*	*23(11,11)*	*61(29,47)*	*60(28,99)*	*47(22,71)*
Packaged fruit juices							
n(%)	*8(3,86)*	*5(2,42)*	*8(3,86)*	*14(6,76)*	*49(23,67)*	*59(28,50)*	*64(30,92)*
Processed meats (salami, sausage, etc.)							
n(%)	*25(12,08)*	*3(1,45)*	*23(11,11)*	*31(14,98)*	*46(22,22)*	*51(24,64)*	*28(13,53)*
Candy / Turkish delight / chewing gum							
n(%)	*5(2,42)*	*7(3,38)*	*10(4,83)*	*29(14,01)*	*50(24,15)*	*44(21,26)*	*62(29,95)*
Ketchup, mayonnaise and similar sauces							
n(%)	*14(6,80)*	*6(2,91)*	*18(8,74)*	*25(12,14)*	*39(18,93)*	*47(22,82)*	*57(27,67)*
Carbonated soft drinks							
n(%)	*5(2,42)*	*12(5,80)*	*2(0,97)*	*17(8,21)*	*62(29,95)*	*60(28,99)*	*49(23,67)*
Iced teas							
n(%)	*54(26,09)*	*17(8,21)*	*22(10,63)*	*34(16,43)*	*15(7,25)*	*34(16,43)*	*31(14,98)*
Chocolate / wafers							
n(%)	*0(0,00)*	*0(0,00)*	*8(3,86)*	*13(6,28)*	*57(27,54)*	*44(21,26)*	*85(41,06)*
Cream-filled bakery / pastry products							
n(%)	*19(9,18)*	*22(10,63)*	*26(12,56)*	*43(20,77)*	*39(18,84)*	*25(12,08)*	*33(15,94)*
Packaged cakes							
n(%)	*2(0,97)*	*8(3,86)*	*27(13,04)*	*20(9,66)*	*58(28,02)*	*37(17,87)*	*55(26,57)*
Hamburger / onion rings							
n(%)	*23(11,11)*	*21(10,14)*	*56(27,05)*	*21(10,14)*	*38(18,36)*	*23(11,11)*	*25(12,08)*
Chips / corn snacks							
n(%)	*0(0,00)*	*1(0,48)*	*6(2,90)*	*13(6,28)*	*45(21,74)*	*72(34,78)*	*70(33,82)*

Group Differences in Scale Scores and Student Characteristics by Food Addiction Status

Based on Table 3, when the relationship between food addiction status and psychological symptoms was examined, it was found that the total scores of the Revised Child Anxiety and Depression Scale were significantly higher among students with food addiction compared to those without food addiction ($t = -4.199$, $p = 0.001$). Similarly, the subscale scores for separation anxiety disorder, generalized anxiety disorder, panic disorder, social phobia, obsessive–compulsive symptoms, and major depressive disorder were also higher among students with food addiction ($p < 0.05$). These findings indicate that symptoms of food addiction tend to coexist with higher levels of anxiety and depression in students.

Among the students who participated in the study, 50.0% of those without food addiction were underweight according to their BMI values, 45.45% were of normal weight, and 4.55% were overweight.

Among the students with food addiction, 48.45% were underweight, 44.33% were of normal weight, and 7.22% were overweight. No statistically significant association was found between BMI levels and food addiction status ($p > 0.05$) (Table 4).

Table 3. Comparison of RCADS-Y Total and Subscale Scores According to Students' Food Addiction Status

Scale / Subscales	Food Addiction Status	n	Mean ± SD	t	df	p
RCADS-Y Total Score	*Non-addicted*	*110*	*48,46 ± 26,15*	*−4,199*	*205*	*0,001**
	Addicted	*97*	*65,02 ± 30,58*			
Separation Anxiety Disorder (SAD)	*Non-addicted*	*110*	*5,20 ± 4,06*	*−5,019*	*205*	*0,001**
	Addicted	*97*	*8,57 ± 5,56*			
Generalized Anxiety Disorder (GAD)	*Non-addicted*	*110*	*7,02 ± 4,18*	*−3,088*	*205*	*0,002**
	Addicted	*97*	*8,79 ± 4,03*			
Panic Disorder (PD)	*Non-addicted*	*110*	*7,35 ± 5,57*	*−2,739*	*205*	*0,007**
	Addicted	*97*	*9,57 ± 6,11*			
Social Phobia (SP)	*Non-addicted*	*110*	*10,45 ± 5,42*	*−4,615*	*205*	*0,001**
	Addicted	*97*	*14,46 ± 7,06*			
Obsessive–Compulsive Disorder (OCD)	*Non-addicted*	*110*	*7,40 ± 4,58*	*−2,466*	*205*	*0,014**
	Addicted	*97*	*8,89 ± 4,09*			
Major Depressive Disorder (MDD)	*Non-addicted*	*110*	*9,45 ± 5,66*	*−3,880*	*205*	*0,001**
	Addicted	*97*	*12,91 ± 7,18*			

Independent samples t-test was used. $p < 0,05$ is considered statistically significant.

Table 4. Comparison of Student Characteristics According to Food Addiction Status

BMI Levels	Food Addiction Absent (n = 110)	Food Addiction Present (n = 97)	χ^2	p
	n %	*n %*	**0,674**	**0,714**
Underweight	*55 50*	*47 48,4*		
Normal weight	*50 45,4*	*43 44,3*		
Overweight	*5 4,55*	*7 7,22*		

χ^2 = Chi-square test. $p > 0,05$ indicates no statistically significant difference.

In order to further examine the association between food addiction and body weight indicators, BMI values were also compared between students with and without food addiction. Mean BMI was 18.83 ± 3.09 in the non-addicted group and 19.11 ± 3.59 in the addicted group, and this difference was not statistically significant ($p = 0.550$). Similarly, BMI category distributions did not differ significantly according to food addiction status ($\chi^2 = 0.674$, $p = 0.714$) (Table 4). These findings suggest that, in the present sample, food addiction status was not associated with BMI or BMI-based weight status. In addition, in regression analysis adjusting for age and sex, food addiction status was not a significant predictor of BMI ($\beta = 0.144$, $p = 0.747$).

Correlations Between UPF Consumption Frequency and KIDSCREEN-52 Subscale Scores

When the relationships between students' food group consumption frequencies and KIDSCREEN-52 health-related quality-of-life subscales were examined, ultra-processed food (UPF; NOVA Group 4) consumption frequency showed statistically significant negative correlations with most quality-of-life domains (Table X). Specifically, higher UPF consumption was associated with lower scores in Physical Well-being ($r = -0.45$, $p < 0.001$), Moods & Emotions ($r = -0.30$, $p < 0.001$), General Mood ($r = -0.35$, $p < 0.001$), Self-Perception ($r = -0.28$, $p < 0.001$), Leisure ($r = -0.20$, $p = 0.002$), Financial Resources ($r = -0.25$, $p = 0.001$), Friends ($r = -0.18$, $p = 0.012$), and School Environment ($r = -0.30$, $p < 0.001$). In contrast, UPF consumption was not significantly correlated with the Family and Home Life subscale ($r = -0.10$, $p = 0.110$). UPF consumption was also positively correlated with Bullying (victimization) ($r = 0.25$, $p = 0.001$), indicating higher exposure to bullying as UPF consumption increased.

Pearson correlation analyses indicated that UPF consumption was positively correlated with depressive symptoms ($r = 0.152$, $p = 0.029$), generalized anxiety symptoms ($r = 0.201$, $p = 0.004$), and social phobia symptoms ($r = 0.183$, $p = 0.008$). In contrast, no significant correlation was observed between UPF consumption and obsessive–compulsive symptoms ($r = -0.043$, $p = 0.540$).

Correlations Between KIDSCREEN-52 and RCADS-Y Subscale Scores

When the correlations between KIDSCREEN-52 health-related quality-of-life domains and RCADS-Y symptom scores were examined, several statistically significant negative associations were observed (Table 5). Depressive symptoms (MDD) showed the strongest associations, particularly with the Moods & Emotions domain ($r = -0.55$, $p < 0.001$) and Psychological Well-being ($r = -0.49$, $p < 0.001$). Similarly, generalized anxiety (GAD) and social phobia (SP) were negatively correlated with Moods & Emotions (both $r = -0.45$, $p < 0.001$). Notably, multiple RCADS-Y subscales were also associated with lower quality-of-life ratings in School Environment (e.g., GAD: $r = -0.16$, $p = 0.021$; Separation Anxiety: $r = -0.17$, $p = 0.014$) and Social Support & Peers (e.g., GAD: $r = -0.21$, $p = 0.002$). Overall, higher anxiety and depressive symptom levels tended to be accompanied by less favorable evaluations across several psychosocial domains.

Table 5. Correlations Between KIDSCREEN-52 and RCADS-Y Subscale Scores

RCADS-Y subscale	Physical Well-being	Psychological Well-being	Moods & Emotions	Self-Perception	Autonomy & Leisure	Parent Relations & Home Life	Financial Resources	Social Support & Peers	School Environment	Bullying
Separation Anxiety Disorder	**−0.24 (0.001)**	**−0.32 (<0.001)**	**−0.36 (<0.001)**	**−0.23 (0.002)**	**−0.20 (0.006)**	**−0.27 (<0.001)**	*−0.09 (0.180)*	*−0.12 (0.089)*	**−0.17 (0.014)**	**0.21 (0.004)**
Social Phobia	**−0.23 (0.001)**	**−0.38 (0.001)**	**−0.45 (<0.001)**	**−0.31 (<0.001)**	**−0.25 (<0.001)**	**−0.30 (<0.001)**	*−0.12 (0.083)*	**−0.20 (0.004)**	**−0.21 (0.002)**	**0.25 (<0.001)**
Generalized Anxiety Disorder	**−0.26 (<0.001)**	**−0.37 (< 0.001)**	**−0.45 (<0.001)**	**−0.33 (<0.001)**	**−0.28 (<0.001)**	**−0.32 (<0.001)**	**−0.15 (0.033)**	**−0.21 (0.002)**	**−0.16 (0.021)**	**0.24 (0.001)**
Panic Disorder	**−0.21 (0.003)**	**−0.29 (< 0.001)**	**−0.33 (<0.001)**	**−0.24 (0.001)**	**−0.21 (0.004)**	**−0.26 (<0.001)**	*−0.10 (0.149)*	*−0.09 (0.176)*	**−0.15 (0.028)**	**0.20 (0.006)**
Obsessive–Compulsive Disorder	**−0.23 (0.002)**	**−0.34 (< 0.001)**	**−0.45 (<0.001)**	**−0.30 (< 0.001)**	**−0.24 (0.001)**	**−0.29 (<0.001)**	*−0.13 (0.057)*	**−0.14 (0.045)**	**−0.15 (0.037)**	**0.22 (0.002)**
Major Depressive Disorder	**−0.40 (<0.001)**	**−0.49 (<0.001)**	**−0.55 (<0.001)**	**−0.42 (<0.001)**	**−0.37 (<0.001)**	**−0.36 (<0.001)**	**−0.17 (0.015)**	*−0.06 (0.357)*	*−0.06 (0.420)*	**0.31 (<0.001)**

Pearson correlation coefficients are presented as r (p). Statistically significant correlations ($p < 0.05$) are shown in **bold**.

Table 6. Correlations Between Food Addiction and Food Group Consumption		
Food Group	**Correlation Coefficient (r)**	**Significance Level (p)**
Group 1: Unprocessed Foods	*0.128*	*0.061*
Group 2: Processed Culinary Ingredients	*0.314*	*0.017**
Group 3: Processed Foods	*0.371*	*0.006**
Group 4: Ultra-Processed Foods (UPFs)	*0.424*	*0.001**

Pearson correlation analysis was used. $p < 0.05$ indicates statistical significance.

Correlation Between Food Addiction and Food Groups

In Table 6, a positive, significant, and relatively strong correlation is shown between UPF consumption and food addiction ($r = 0.424$, $p = 0.001$). In contrast, the association between food addiction and unprocessed or minimally processed foods is weak and not statistically significant ($r = 0.128$, $p = 0.061$). In correlation analyses, food addiction was operationalized as a binary variable (0 = absent, 1 = present) based on the YFAS diagnostic criteria.

The Relationship Between Income Level and Consumption of Food Groups

A statistically significant association was observed between family income level and ultra-processed food (UPF; NOVA Group 4) consumption ($\chi^2 = 6.609$, $p = 0.037$), indicating that UPF consumption frequency differed across income categories. Descriptively, UPF consumption was highest among students from middle-income families.

Discussion

In summary, this study examined the associations between ultra-processed food (UPF) consumption, food addiction, psychological symptoms, and health-related quality of life among middle school students. The findings indicated that higher UPF consumption was significantly associated with poorer quality of life and higher levels of anxiety and depressive symptoms. Nearly half of the participants met the YFAS diagnostic criteria for food addiction. UPF intake differed significantly by family income level, whereas no significant association was observed between food addiction and BMI/weight status in the present sample.

The key outcome of this research is the identification of a positive association between the frequency of UPF consumption and food addiction risk in middle school students. Higher intake of UPF-category snacks and sugar-sweetened beverages appears to parallel an increase in food addiction symptoms. This finding aligns with the growing body of literature indicating that the high palatability, energy density, refined sugar, and additive content of UPFs may stimulate reward pathways and reinforce eating behaviour (Gearhardt et al., 2011).

Our results demonstrated that UPF consumption frequency was positively correlated with depressive symptoms, generalized anxiety symptoms, and social phobia symptoms; however, no significant association was observed with obsessive–compulsive symptoms. These results parallel recent epidemiological findings that have identified meaningful associations between UPF consumption and common psychiatric symptoms across both adolescent and adult cohorts (Amelia, 2025; Lane, 2022). Consistent reports of heightened mental health symptomatology among adolescents with high UPF intake reinforce the relevance of dietary quality as a factor associated with psychosocial functioning and well-being.

With regard to quality-of-life indicators, our findings showed that students with higher UPF consumption and an elevated risk of food addiction reported lower scores in perceived physical health and school-related quality of life. This result appears to be consistent with studies conducted in larger populations, which have similarly reported that UPF consumption is associated with poorer overall quality of life and reduced mental well-being (Öztürk, 2025). Such associations suggest that dietary quality is linked not only to metabolic outcomes

but also to psychosocial processes, underscoring the importance of supporting healthy dietary patterns and the preference for nutrient-dense foods during childhood and adolescence (Öztürk, 2025).

In addition, a positive association was identified in our study between the frequency of UPF consumption and BMI. Importantly, this association reflects the relationship between BMI and UPF consumption frequency, and should not be confused with the separate analysis examining BMI in relation to YFAS-based food addiction status. This finding is consistent with previous research reporting that UPFs, despite their low nutritional value, are associated with obesity-related indicators due to their high energy density. In particular, diets characterized by high UPF intake have been shown to be related to increases in body weight and fat mass (Hall et al., 2019; Asgari et al., 2022). However, it should be taken into account that obesity is a multifactorial condition influenced not only by dietary patterns but also by physical activity levels, genetic predisposition, and various environmental factors.

Notably, while UPF consumption frequency was positively associated with BMI, food addiction status itself was not significantly related to BMI or BMI-based weight status in the current sample. This finding contrasts with several previous reports indicating that food addiction symptoms tend to be more prevalent among adolescents with obesity and in clinical samples of youth seeking treatment for obesity (Taş Torun et al., 2022). However, the association between food addiction and BMI may vary depending on the characteristics of the study population. In school-based, non-clinical adolescent samples, food addiction symptoms may be driven more strongly by psychosocial and behavioral factors (e.g., maladaptive eating attitudes, emotional eating, or impulsivity) rather than by body weight alone (Davis et al., 2011; Meule & Gearhardt, 2014). In addition, the limited number of participants in the overweight category in the present study may have reduced statistical power to detect meaningful group differences. Future studies using larger samples with wider representation across weight status categories, and analyses based on BMI-for-age percentiles and/or z-scores, may provide a more sensitive examination of this relationship.

Among the sociodemographic findings, the increase in UPF consumption frequency with age — and particularly its higher prevalence among students in adolescence — is consistent with previous observations suggesting that peer influence, the school environment, and media exposure may increasingly shape dietary choices as children grow older (Monteiro et al., 2019). In addition, the higher prevalence of UPF consumption among children from low–middle income families suggests that sociocultural factors such as economic accessibility, food environments, and awareness of healthy nutrition may play a role in shaping eating behaviors (Hutchinson & Tarasuk, 2022; Asgari et al., 2022). Taken together, these findings highlight the complex structure of the modern food environment and the multidimensional factors influencing children's everyday food preferences.

Since the design of this study is cross-sectional, direct causal inferences regarding the direction of the observed relationships and the underlying mechanisms cannot be made. However, the findings reflect consistent patterns of association between UPF consumption and food addiction, psychological symptoms, and quality of life. Therefore, the evaluation of dietary habits in children and adolescents should be considered together with mental health, quality of life, and behavioural patterns. Future longitudinal and experimental studies are needed to clarify the temporal course of these relationships and to better identify potential mediating variables.

This study was limited to 207 middle school students enrolled in schools located in the Yüreğir district of Adana during the 2023–2024 academic year. Data collection was limited to a single school due to administrative permission procedures, which may limit the generalizability of the findings. Therefore, the extent to which this sample represents the wider population may be limited. In

addition, the gender distribution was unbalanced, with girls representing 68.6% of the sample. This may have introduced gender-related sampling bias and may limit the generalizability of the findings, as the associations between UPF consumption, food addiction indicators, and psychological symptoms may differ by sex. The use of self-report instruments to collect data also carries a risk of response bias. This limitation may be particularly relevant for the sociodemographic questionnaire and the food frequency assessment, in which recall bias may occur. In addition, the cross-sectional design of the study allowed for the examination of relationships between variables at a single time point; however, it precludes causal inference. Therefore, the findings should be interpreted as associations rather than causal relationships. Finally, although the scales used in this study are valid and reliable measurement tools, they are not diagnostic instruments. Therefore, the findings should be interpreted as reflecting symptom levels rather than clinical diagnoses and should not be considered equivalent to formal psychiatric assessment.

Conclusions

In this study, the relationships between UPF consumption and food addiction risk, psychological symptoms, and quality of life were examined among middle school students. Higher UPF intake was associated with greater food addiction symptoms, anxiety, and depression, lower quality-of-life scores, and higher BMI. UPF consumption also tended to increase with age and appeared to be influenced by family and household characteristics. These findings highlight important public health implications, suggesting that taxation, stricter regulation, clearer labelling, and preventive strategies involving children, parents, and schools may help reduce UPF consumption and its potential physical and psychological consequences. Future longitudinal and experimental studies are needed to clarify the causal links between UPF intake and mental health outcomes in young people.

References

Amelia, F. (2025). Ultra-processed food (UPF) consumption and the risk of mental health problems among adolescents: A narrative review. *Jurnal Kesmas dan Gizi (JKG), 8*(1), 192–199.

Asgari, E., Askari, M., Bellissimo, N., & Azadbakht, L. (2022). Association between ultra-processed food intake and overweight, obesity, and malnutrition among children in Tehran, Iran. *International Journal of Clinical Practice, 2022*(1), 8310260.

Askari, M., Heshmati, J., Shahinfar, H., Tripathi, N., & Daneshzad, E. (2020). Ultra-processed food and the risk of overweight and obesity: a systematic review and meta-analysis of observational studies. *International journal of obesity*, *44*(10), 2080-2091.

Baydur, H., Ergin, D., Gerçeklioğlu, G., & Eser, E. (2016). Reliability and validity study of the KIDSCREEN Health-Related Quality of Life Questionnaire in a Turkish child/adolescent population. *Anadolu Psikiyatri Dergisi, 17*(6), 496–504.

Bayraktar, F., Erkman, F., & Kurtuluş, E. (2012). Adaptation study of Yale food addiction Scale. *Psychiatry and Clinical Psychopharmacology*, *22*, S38-S38.

Bhave, V. M., Oladele, C. R., Ament, Z., Kijpaisalratana, N., Jones, A. C., Couch, C. A., ... Kimberly, W. T. (2024). Associations between ultra-processed food consumption and adverse brain health outcomes. *Neurology, 102*(11), e209432. https://doi.org/10.1212/WNL.0000000000209432

Burrows, T., Kay-Lambkin, F., Pursey, K., Skinner, J., & Dayas, C. (2018). Food addiction and associations with mental health symptoms: A systematic review with meta-analysis. *Journal of human nutrition and dietetics*, *31*(4), 544-572.

Buyuktuncer, Z., Akyol, A., Ayaz, A., Nergiz-Unal, R., Aksoy, B., Cosgun, E., Ozdemir, P., Pekcan, G., & Besler, H. T. (2019). Turkish version of the Yale Food Addiction Scale: preliminary results of factorial structure, reliability, and construct validity. *Journal of health, population, and nutrition*, *38*(1), 42. https://doi.org/10.1186/s41043-019-0202-4

Çelik, B. (2023). *Relationship between ultra-processed food consumption classified by NOVA system and body mass index in a private university* (Master's thesis). Yeditepe University, Institute of Health Sciences, Department of Nutrition and Dietetics, İstanbul, Türkiye.

Chorpita, B. F., Yim, L., Moffitt, C., Umemoto, L. A., & Francis, S. E. (2000). Assessment of symptoms of DSM-IV anxiety and depression in children: A revised child anxiety and depression scale. *Behaviour Research and Therapy, 38*(8), 835–855.

da Costa Louzada, M. L., Ricardo, C. Z., Steele, E. M., Levy, R. B., Cannon, G., & Monteiro, C. A. (2018). The share of ultra-processed foods determines the overall nutritional quality of diets in Brazil. *Public health nutrition*, *21*(1), 94-102.

Davis, C., Curtis, C., Levitan, R. D., Carter, J. C., Kaplan, A. S., & Kennedy, J. L. (2011). Evidence that "food addiction" is a valid phenotype of obesity. Appetite, 57(3), 711–717. https://doi.org/10.1016/j.appet.2011.08.017

Gearhardt, A. N., Corbin, W. R., & Brownell, K. D. (2009). Preliminary validation of the Yale Food Addiction Scale.

Appetite, 52(2), 430–436. https://doi.org/10.1016/j.appet.2008.12.003

Gearhardt, A. N., Yokum, S., Orr, P. T., Stice, E., Corbin, W. R., & Brownell, K. D. (2011). Neural correlates of food addiction. *Archives of General Psychiatry, 68*(8), 808–816.

Görmez, V., Kılınçaslan, A., Örengül, A. C., Ebesutani, C., Kaya, İ., Ceri, V., ... Chorpita, B. (2017). Psychometric properties of the Turkish version of the Revised Child Anxiety and Depression Scale–Child Version in a clinical sample. *Psychiatry and Clinical Psychopharmacology, 27*(1), 84–92.

Hall, K. D., Ayuketah, A., Brychta, R., Cai, H., Cassimatis, T., Chen, K. Y., ... Darcey, V. (2019). Ultra-processed diets cause excess calorie intake and weight gain: An inpatient randomized controlled trial of ad libitum food intake. *Cell Metabolism, 30*(1), 67–77. https://doi.org/10.1016/j.cmet.2019.05.008

Hutchinson, J., & Tarasuk, V. (2022). The relationship between diet quality and the severity of household food insecurity in Canada. *Public Health Nutrition, 25*(4), 1013–1026.

Kabasakal-Cetin, A., Aksaray, B., & Sen, G. (2024). The role of food literacy and sustainable and healthy eating behaviors in ultra-processed foods consumption of undergraduate students. *Food Quality and Preference*, *119*, 105232.

Kuczmarski, R. J., Ogden, C. L., Grummer-Strawn, L. M., Flegal, K. M., Guo, S. S., Wei, R., Mei, Z., Curtin, L. R., Roche, A. F., & Johnson, C. L. (2000). *CDC growth charts: United States*. National Center for Health Statistics. Advance Data, (246), 1–190.

LaFata EM, Allison KC, Audrain-McGovern J, Forman EM. Ultra-Processed Food Addiction: A Research Update. *Curr Obes Rep*. 2024;13(2):214-223. doi:10.1007/s13679-024-00569-w

Lane, M. M., Gamage, E., Travica, N., Dissanayaka, T., Ashtree, D. N., Gauci, S., Lotfaliany, M., O'Neil, A., Jacka, F. N., & Marx, W. (2022). Ultra-processed food consumption and mental health: A systematic review and meta-analysis of observational studies. *Nutrients, 14*(13), 2568. https://doi.org/10.3390/nu14132568

Mescoloto, S. B., Pongiluppi, G., & Domene, S. M. Á. (2024). Ultra-processed food consumption and children and adolescents' health. *Jornal de pediatria*, *100*(1), 18-30.

Meule, A., & Gearhardt, A. N. (2014). Five years of the Yale Food Addiction Scale: Taking stock and moving forward. *Current Addiction Reports, 1*(3), 193–205. https://doi.org/10.1007/s40429-014-0021-z

Moghames, P., Hammami, N., Hwalla, N., Yazbeck, N., Shoaib, H., Nasreddine, L., & Naja, F. (2016). Validity and reliability of a food frequency questionnaire to estimate dietary intake among Lebanese children. *Nutrition Journal, 15*, 4.

Monteiro, C. A., Cannon, G., Levy, R. B., Moubarac, J. C., Louzada, M. L., Rauber, F., & Jaime, P. C. (2019). Ultra-processed foods: What they are and how to identify them. *Public Health Nutrition, 22*(5), 936–941.

Neri, D., Steele, E. M., Khandpur, N., Cediel, G., Zapata, M. E., Rauber, F., ... & NOVA Multi-Country Study Group on Ultra-Processed Foods, Diet Quality and Human Health. (2022). Ultraprocessed food consumption and dietary nutrient profiles associated with obesity: A multicountry study of children and adolescents. *Obesity Reviews*, *23*, e13387.

Öztürk, Y. E., & Uzdil, Z. (2025). Ultra-processed food consumption is linked to quality of life and mental distress among university students. *PeerJ, 13*, e19931.

Pagliai, G., Dinu, M., Madarena, M. P., Bonaccio, M., Iacoviello, L., & Sofi, F. (2021). Consumption of ultra-processed foods and health status: a systematic review and meta-analysis. *British journal of nutrition*, *125*(3), 308-318.

Penzenstadler, L., Soares, C., Karila, L., & Khazaal, Y. (2019). Systematic review of food addiction as measured with the Yale Food Addiction Scale: implications for the food addiction construct. Current neuropharmacology, 17(6), 526-538.

Ravens-Sieberer, U., Gosch, A., Rajmil, L., Erhart, M., Bruil, J., Duer, W., … KIDSCREEN Group Europe. (2005). KIDSCREEN-52 quality-of-life measure for children and adolescents. *Expert Review of Pharmacoeconomics & Outcomes Research, 5*(3), 353–364. https://doi.org/10.1586/14737167.5.3.353.

Taş Torun, Y., İçen, S., Gül, H., & Döğer, E. (2022). A cross-sectional study on the correlates of food addiction symptoms in adolescents seeking treatment for obesity: Eating attitudes and gender differences. *Journal of Addictive Diseases, 40*(3), 326–335. https://doi.org/10.1080/10550887.2021.1990638

Willett, W. C. (1998). *Nutritional epidemiology* (2nd ed.). Oxford University Press.

Yekaninejad, M. S., Badrooj, N., Vosoughi, F., Lin, C. Y., Potenza, M. N., & Pakpour, A. H. (2021). Prevalence of food addiction in children and adolescents: A systematic review and meta-analysis. *Obesity reviews : an official journal of the International Association for the Study of Obesity*, *22*(6), e13183. https://doi.org/10.1111/obr.13183

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Ethical Declaration

Ethical permission was obtained from the Cukurova University, Medical Faculty Clinical / Human Research Ethics Committee for this study with date 08.03.2024 and number 142, and Helsinki Declaration rules were followed to conduct this study.

Authorship Contributions

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