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Linking Hedonic Hunger to Ultra-Processed Food Consumption in Young Adult Women: A Cross-Sectional Study

Genç Yetişkin Kadınlarda Hedonik Açlık ile Ultra İşlenmiş Besin Tüketimi Arasındaki İlişki: Kesitsel Bir Çalışma

Gökçe ÜNAL [1] **Özge ESGİN** [2]

[1] *Res. Asst., Ph.D., Ondokuz Mayıs University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Samsun, Türkiye*

[2] *Assist. Prof., Bayburt University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Bayburt, Türkiye*

Sorumlu yazar / Corresponding author
Gökçe ÜNAL

gokce.unal@omu.edu.tr

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ABSTRACT

Aim: *This study examined the relationship between hedonic hunger and ultra-processed food consumption among young adult women.*

Material and Method: *Data were collected using a self-report survey method in this cross-sectional study from April to May 2025, involving 838 young adult women (age range: 20–37 years). Participants completed the Power of Food Scale and a food consumption frequency questionnaire, which included ultra-processed foods based on the NOVA classification. The Power of Food Scale has three sub-scales: food available, food present, and food tasted. Higher scores on the scale demonstrate a greater tendency for hedonic hunger.*

Results: *Consumption of total ultra-processed foods in the highest Power of Food Scale quartile, that is Q4, was significantly higher than in the lower quartiles (Q1-Q2-Q3) ($p<0.001$). A statistically significant correlation was reported between Power of Food Scale sub-scales and consumption of the majority of ultra-processed foods. The strongest correlations with the sub-scales were between consumption of "poultry and fish nuggets and sticks" and "ready-to-heat products, including pre-prepared pies and pasta and pizza dishes" ($p<0.001$) of all ultra-processed foods.*

Conclusion: *Overall, the present study suggests that hedonic hunger is associated with higher ultra-processed food consumption among young adult women.*

Keywords: *Appetite, Diet, Fast foods, Obesity, Satiety response*

ÖZET

Amaç: *Bu çalışmada, genç yetişkin kadınlarda hedonik açlık ve ultra işlenmiş besin tüketimi arasındaki ilişki incelenmiştir.*

Gereç ve Yöntem: *Nisan-Mayıs 2025 tarihleri arasında 838 genç yetişkin kadının (yaş aralığı: 20-37) katıldığı bu kesitsel çalışmada veriler öz bildirim anket yöntemi kullanılarak toplanmıştır. Katılımcılar Besin Gücü Ölçeği'ni ve NOVA sınıflandırmasına göre ultra işlenmiş besinleri içeren bir besin tüketim sıklığı anketini doldurmuştur. Besin Gücü Ölçeği'nin üç alt ölçeği vardır: besine ulaşılabilirlik, besin mevcudiyeti ve besin tadına bakılması. Ölçekten alınan puanın artması hedonik açlığa olan eğilimin arttığını göstermektedir.*

Bulgular: *Besin Gücü Ölçeği'nin en yüksek çeyreği olan 4. çeyrekteki (Q4) toplam ultra işlenmiş besin tüketimi, daha düşük çeyreklere (Q1-Q2-Q3) kıyasla önemli ölçüde daha yüksek bulunmuştur ($p<0,001$). Besin Gücü Ölçeği alt ölçekleri ile ultra işlenmiş besinlerin çoğunluğunun tüketimi arasında istatistiksel olarak anlamlı bir korelasyon bulunduğu kaydedilmiştir. Tüm ultra işlenmiş besinler içerisinde alt ölçeklerle en güçlü korelasyonlar "kümes hayvanları ve balık nugget ve çubukları" ile "önceden hazırlanmış turtalar, makarna ve pizza yemekleri dahil olmak üzere ısıtmaya hazır ürünler" tüketimi arasındadır ($p<0,001$).*

Sonuç: *Sonuç olarak, bu çalışma hedonik açlığın genç yetişkin kadınlarda daha yüksek ultra işlenmiş besin tüketimi ile ilişkili olduğunu göstermektedir.*

Anahtar Kelimeler: *İştah, Diyet, Hazır gıdalar, Obezite, Doygunluk yanıtı*

INTRODUCTION

Appetite regulation is a multifaceted process governed by neural, gastrointestinal, and endocrine systems, and affected by genetic, social, and environmental factors. The central nervous system integrates hedonic and homeostatic impulses to control appetite (Becetti et al., 2023). Hedonic hunger occurs when a person has frequent thoughts, feelings, and cravings related to eating without experiencing energy deficit. One of the main factors contributing to the development of hedonic hunger is living in an obesogenic environment where inexpensive, hyper-palatable foods are readily available in large quantities (Mankad & Gokhale, 2021). The NOVA classification was developed for classifying ultra-processed foods (UPFs), supporting human health in alignment with the UN Sustainable Development Goals Nutrition (2016–2025). UPFs are industrial formulations made from ingredients sourced from foods or produced from other organic sources. Generally, they are ready to eat or reheat, include little to no whole foods, are fatty, salty, or sweet, and are low in dietary fiber, protein, different micronutrients, and other bioactive substances (Monteiro et al., 2018). Snacks, beverages, prepared meals, and a wide range of other products primarily or exclusively created from ingredients taken out of or derived from food are considered UPFs. Various additives which simulate or improve the sensory aspects of foods or culinary preparations created from foods, enable the production of UPFs. With regard to the methods and ingredients employed in their production, UPFs are both extremely convenient and highly appealing (palatable) to consumers (Monteiro, Cannon, Lawrence, Costa Louzada, & Pereira Machado, 2019). Global UPF consumption has been increasing in recent decades (Vandevijvere et al., 2019). UPF consumption prevalence varies by region, with the United States and the United Kingdom being the countries with the highest percentage of energy intake from UPF (generally >50%), while Italy had the lowest levels (approximately 10%) (Marino et al., 2021). According to the results of Turkey Nutrition and Health Survey 2017, approximately 30% of daily energy intake comes from UPF consumption in Turkish population (Acıduman-Subaşıay, 2022). UPF consumption has been linked with several adverse health outcomes such as obesity, diabetes, hypertension, dyslipidemia, and metabolic syndrome (Shu, Zhang, Zhou, Zhu, & Si, 2023; Vitale et al., 2024). It has also been associated with poor mental health, and high consumption of UPFs has been shown to elevate psychological distress and the risk of depression (Gómez-Donoso et al., 2020; Lane et al., 2023).

Although hedonic hunger is associated with increased consumption of high-fat, sweet, starchy, and fast foods (Chmurzynska, Mlodzik-Czyzewska, Radziejewska, & Wiebe, 2021; Ortega, Bejarano, Hesse, Reed, & Cushing, 2023), there are very few studies on its relationship with consumption of UPFs (Jouppi & Levine, 2024). To the best of our knowledge, no study has shown the association of hedonic hunger with UPF consumption using the NOVA classification, which includes a detailed list (Monteiro et al., 2018). Considering the studies showing that young age and being female increase the susceptibility to hedonic eating behaviors (Şarahman Kahraman & Akçil Ok, 2022; Yalçın, Ayyıldız, Yılmaz, & Asil, 2023), investigating the consequences of hedonic hunger on food consumption in a young adult female population was deemed essential. This study examined the relationship between hedonic hunger and consumption of UPFs among young adult women.

MATERIAL AND METHODS

Research Type

The type of this study was cross-sectional.

Study Population and Sample

Data were collected using a self-report survey method from April to May of 2025. Women employees and students at Bayburt University, a public university in Türkiye, were the target using convenience sampling. Young adult women aged 20-39 (Lachman, 2001) who could understand and answer the survey and voluntarily agreed to participate were included in the study. Women with diseases such as insulin resistance, diabetes, and celiac disease, and pregnant and lactating women were excluded from this study. Prior to their involvement, everyone who participated gave written informed consent. Participants were given comprehensive information about the purpose of the research and methods at the onset of the survey. Additionally, they received assurances that their answers would only be used for scientific analysis and that their personal information would be kept private. The participants were also made aware of their right to leave the study at any moment. A power analysis

based on Horwath, Hagmann, & Hartmann (2020) determined that a minimum sample size of 747 was required for achieving a 95% confidence interval (CI) with 0.12 effect size (w), 0.05 type 1 error (α), and 0.95 test power (1-β). The sample size calculation used the correlation coefficient (0.12) as a result of correlation analysis between hedonic hunger level and high-fat salty food consumption, which was found statistically significant in the relevant study.

The participant flow diagram (Figure 1) summarizes the recruitment and inclusion process for this cross-sectional study. A total of 895 individuals were assessed for eligibility. Of these, 57 were excluded for not meeting the inclusion criteria and due to incomplete survey data. The remaining 838 participants were included in the study and were available for analysis.

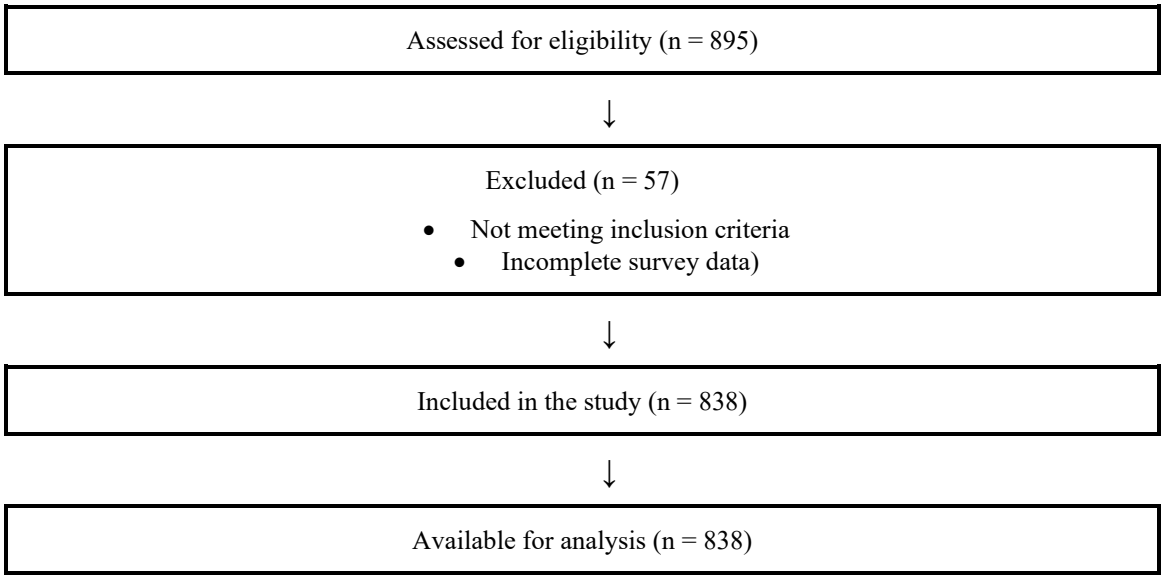

Figure 1. Participant Flow Diagram

Data Collection Tools

The participants reported demographic characteristics such as age, marital status, residency, and smoking status. Body mass index (BMI), which was computed as body weight in kilograms (kg) divided by the square of height in meters (m), was established via self-reported height and body weight data. Underweight was defined as less than 18.50 kg/m^2, normal weight as 18.50–24.99 kg/m^2, overweight as 25.00–29.99 kg/m^2, and obesity as ≥30.00 kg/m^2, by employing the World Health Organization's categorization (World Health Organization, 2000).

Hedonic Hunger: This study used the Power of Food Scale (PFS), developed by Lowe et al., to assess individual differences in appetite response to food and the psychological effect of being in an environment where food is abundant (Lowe et al., 2009). The Turkish validity and reliability study of the scale was conducted by Ulker, Ayyildiz, & Yildiran (2021). In the 13-item 5-point Likert-type scale, the items range from (1) do not agree at all to (5) strongly agree (Ulker et al., 2021). The scale has three sub-scales. The 4-item food available sub-scale explains how people respond to an implicit food environment, where food is constantly available but not physically present. The 4-item food present sub-scale exhibits responses to appetizing food that are physically available but have not been tasted yet. The 5-item food tasted sub-scale includes responses to palatable foods that have not yet been consumed but have been tasted (Lowe et al., 2009). The total score is calculated by dividing the score obtained from all items by the number of items (Total points/13). Similarly, sub-scale scores are calculated by summing the scores obtained from each item and dividing by the number of items in that sub-scale. Higher scores were associated with a greater tendency for hedonic hunger (Ulker et al., 2021). Cronbach's alpha coefficient was 0.895 for the total scale, with sub-scale reliability ranging from 0.723 to 0.813 in the present study.

UPF Consumption: Participants were requested to complete a food consumption frequency questionnaire including UPFs based on the NOVA classification (Monteiro et al., 2018). These UPFs were then classified into UPF groups according to

the NOVA classification. The contents of the ultra-processed foods/food groups are shown in Table 1. The study used a semi-quantitative food frequency questionnaire. The food consumption frequency was recorded as “per meal”, “per day”, “5-6 times a week”, “3-4 times a week”, “1-2 times a week”, “once in 15 days”, “once a month”, or “never”. Participants reported the amount of food they consumed in grams (g) or milliliters (mL) or using household scales (e.g., water glass, coffee cup, scoop, teaspoon, tablespoon, package), then researchers converted them to (g/mL). The amounts of UPFs consumed in one session (g/mL) were recorded. Daily amounts of ultra-processed foods/food groups consumption were calculated.

Table 1. Ultra-processed Foods/Food groups

Ultra-processed foods/food groups	Contents
1	"Carbonated drinks"
2	"Sweet or savoury packaged snacks"
3	"Ice cream, chocolate, candies (confectionery)"
4	"Mass-produced packaged breads, buns, cookies (biscuits), pastries, cakes and cake mixes"
5	"Breakfast cereals, cereal and energy bars"
6	"Margarines and spreads"
7	"Processed cheese"
8	"Energy drinks"
9	"Sugared milk drinks, sugared fruit yoghurts and fruit drinks"
10	"Sugared cocoa drinks"
11	"Meat and chicken extracts and instant sauces"
12	"Infant formulas, follow-on milks and other baby products (which may include expensive ingredients)"
13	"Health and slimming products such as powdered or fortified meal and dish substitutes"
14	"Ready-to-heat products including pre-prepared pies and pasta and pizza dishes"
15	"Poultry and fish nuggets and sticks"
16	"Sausages, burgers, hot dogs and other reconstituted meat products"
17	"Powdered and packaged ‘instant’ soups, noodles and desserts"

Source: Adapted from Monteiro et al., 2018.

Ethical Consideration

The Bayburt University Ethics Committee approved this study on January 16, 2025 (Decision No: 14). The study was conducted in accordance with the Declaration of Helsinki.

Data Analysis

Data were analyzed using the IBM Statistical Package for the Social Sciences, Version 21. Descriptive statistics, including percentages, frequencies, means, standard deviations, medians, and interquartile ranges (IQRs), were used to summarize the study variables (Table 2). The normality of the data was examined with Kolmogorov-Smirnov and Shapiro-Wilk tests. As the data were not normally distributed, nonparametric statistical tests were performed. The overall PFS score was divided into quartiles (Q1-Q2-Q3-Q4), and a non-parametric Kruskal-Wallis test evaluated the amounts of UPFs consumed according to each quartile category. If statistical significance had been found as a result of the Kruskal-Wallis test, Dunn's pairwise tests were carried out as post-hoc analyses. UPF consumption according to BMI classification has been analyzed using the same tests. Median and IQRs with p values were provided to report the results (Table 3 and Table 5). Correlations

between scores of PFS sub-scales (food available, food tasted, and food present) and amounts of UPFs consumed were evaluated by Spearman's correlation test. Spearman's correlation coefficient (r) and p values were provided to report the results (Table 4 and Table 5). Statistical significance was set at $p<0.05$, with a 95% CI.

RESULTS

A total of 838 young adult women with an average age of 24.1 ± 3.5 years (age range: 20–37 years) participated in the study. The majority of participants were single (88.3%), resided in the dormitories (57.5%), and had a normal weight according to BMI classification (67.6%). (Table 2).

Table 2. Participant Characteristics

Characteristics	**Total sample** (n = 838)
Age (years), Mean ± SD (age range)	24.1 ± 3.5 (20–37 years)
Marital status, n (%)	
Single	740 (88.3)
Married	98 (11.7)
Residency, n (%)	
Dormitory	482 (57.5)
Living with family	234 (27.9)
Living alone or with non-family members	118 (14.1)
Other	4 (0.5)
Smoking status, n (%)	
Yes	239 (28.5)
No	599 (71.5)
Body Mass Index (kg/m^2), Mean ± SD	22.6 ± 3.6
Body Mass Index class, n (%)	
Underweight	89 (10.6)
Normal	566 (67.6)
Overweight	150 (17.9)
Obese	33 (3.9)
Food available, Mean ± SD / Median (IQR)	3.34 ± 0.98 / 3.50 (2.75–4.0)
Food present, Mean ± SD / Median (IQR)	3.34 ± 0.89 / 3.50 (2.75–4.0)
Food tasted, Mean ± SD / Median (IQR)	3.62 ± 0.89 / 3.80 (3.00–4.2)
Power of food scale (overall), Mean ± SD / Median (IQR)	3.45 ± 0.80 / 3.46 (3.00–4.0)

SD, Standard deviation; IQR, Interquartile Range (25th-75th); n, number; %: percent.

Table 3 presents nonparametric independent samples test results (Kruskal-Wallis test) between PFS quartiles and consumption of UPFs classified according to the NOVA classification. Accordingly, consumption of total UPFs in the highest PFS quartile (Q), that is Q4 (indicating higher hedonic hunger), was significantly higher than in the lower PFS quartiles (Q1-Q2-Q3) ($p<0.001$). Additionally, consumption of most of the groups (Group 2, 3, 4, 5, 6, 7, 9, 11, 14, 15, 16, and 17) was significantly higher in the higher PFS quartiles than the lower ones ($p<0.05$).

Table 3. Ultra-processed Food Consumption by Power of Food Scale Quartiles (n = 838)

Total PFS score quartiles / Ultra-processed foods/food groups	Unit	**Q1** (n = 232) Median	IQR	**Q2** (n = 164) Median	IQR	**Q3** (n = 266) Median	IQR	**Q4** (n = 176) Median	IQR	*p*
1	(mL)	42.8	0.0–107.0	42.8	6.6–100.0	42.8	6.6–107.0	42.8	13.4–115.2	0.070
2	(g)	[a]22.7	10.8–51.2	32.1	10.7–70.8	28.6	12.7–71.4	[b]41.0	20.0–90.0	**0.001**
3	(g)	[a]34.9	13.5–68.8	45.1[ab]	15.1–85.3	[bc]43.7	19.1–118.5	[d]68.6	28.5–176.4	**<0.001**
4	(g)	[a]31.9	10.7–68.8	35.5	12.3–67.0	[b]40.9	18.9–110.0	[b]48.7	16.5–160.9	**0.001**
5	(g)	6.6	0.0–24.9	[a]2.3	0.0–30.0	6.4	0.0–30.5	[b]8.6	0.0–45.0	**0.006**
6	(g)	[a]6.4	0.5–24.0	[a]6.1	1.4–17.0	[a]7.1	2.0–19.5	[b]12.1	3.0–82.5	**<0.001**
7	(g)	15.9	5.4–30.0	[a]12.8	2.0–30.0	15.0	4.3–39.5	[b]21.4	8.8–40.0	**0.005**
8	(mL)	0.0	0.0–0.0	0.0	0.0–4.5	0.0	0.0–7.1	0.0	0.0–0.0	0.757
9	(mL)	[a]116.0	50.8–282.7	[a]144.0	53.2–256.9	[a]176.2	64.1–348.5	[b]232.1	128.7–417.9	**<0.001**
10	(mL)	0.0	0.0–13.4	0.0	0.0–11.6	0.0	0.0–15.1	0.7	0.0–26.8	0.114
11	(g)	[ab]4.3	0.0–20.0	[ac]3.9	0.7–10.5	[bd]5.5	1.1–21.4	[d]9.7	2.8–25.0	**<0.001**
12	(mL)	0.0	0.0–0.0	0.0	0.0–0.0	0.0	0.0–0.0	0.0	0.0–0.0	0.078
13	(g)	0.0	0.0–0.0	0.0	0.0–0.0	0.0	0.0–0.0	0.0	0.0–0.0	0.928
14	(g)	[ab]14.0	0.0–52.7	[ac]10.7	2.0–42.6	[bd]17.4	6.6–75.6	[d]39.1	7.3–109.7	**<0.001**
15	(g)	[a]4.7	0.0–21.4	[ab]6.6	2.0–21.4	[cd]6.7	3.3–42.8	[d]12.7	3.3–42.8	**<0.001**
16	(g)	[a]23.2	6.7–47.1	[a]18.6	8.2–46.8	22.1	11.1–57.8	[b]33.2	12.8–116.6	**0.001**
17	(g)	[a]0.0	0.0–1.5	[ab]0.0	0.0–1.5	[bc]0.0	0.0–9.4	[c]0.0	0.0–23.9	**<0.001**
Overall ultra-processed food consumption		[a]479.3	286.1–1114.4	[a]494.5	311.8–734.8	[a]534.8	302.8–1417.3	[b]776.2	428.7–2007.5	**<0.001**

PFS, Power of Food Scale; Q, Quartile; IQR, Interquartile Range (25th-75th); n, number; Q1 ≤3.00, Q2 >3.00-≤3.46, Q3 >3.46-≤4.00, Q4 >4.00. Kruskal-Wallis test was conducted. Different letters indicate differences between groups after post-hoc tests (Dunn's pairwise tests). At least one letter being the same indicates that there is no difference between the groups. Values in bold are significant at $p < 0.05$ according to Kruskal-Wallis test results.

Table 4 displays the correlations between the PFS sub-scales and consumption of UPFs. A statistically significant correlation was found between all PFS sub-scales and overall consumption of UPFs ($p<0.05$). A statistically significant correlation was reported between PFS sub-scales and the consumption of the majority of UPFs. The strongest correlations with food available and food tasted sub-scales were between consumption of Group 15 ($r = 0.231$ and $r = 0.148$, respectively, $p<0.001$), while the food present sub-scale was correlated with consumption of Group 14 ($r = 205$; $p<0.001$) strongest out of all UFPs.

Table 4. Correlation Between Ultra-processed Food Consumption and Scores of Food Available, Food Present, Food Tasted Sub-scales of Power of Food Scale (n = 838)

PFS sub-scales / Ultra-processed foods/food groups	Food available		Food present		Food tasted	
	r	*p*	r	*p*	r	*p*
1	0.085	**0.014**	0.063	0.067	0.072	**0.037**
2	0.162	**<0.001**	0.144	**<0.001**	0.102	**0.003**
3	0.172	**<0.001**	0.196	**<0.001**	0.134	**<0.001**
4	0.133	**<0.001**	0.139	**<0.001**	0.115	**0.001**
5	0.106	**0.002**	0.074	**0.031**	0.050	0.146
6	0.103	**0.003**	0.088	**0.011**	0.109	**0.002**
7	0.097	**0.005**	0.089	**0.010**	0.048	0.165
8	–0.005	0.876	0.039	0.257	0.022	0.533
9	0.177	**<0.001**	0.189	**<0.001**	0.127	**<0.001**
10	0.032	0.355	0.105	**0.002**	0.080	**0.020**
11	0.128	**<0.001**	0.116	**0.001**	0.107	**0.002**
12	0.012	0.729	–0.044	0.202	–0.029	0.399
13	0.053	0.129	–0.036	0.297	0.006	0.855
14	0.143	**<0.001**	0.205*	**<0.001**	0.132	**<0.001**
15	0.231*	**<0.001**	0.204	**<0.001**	0.148*	**<0.001**
16	0.118	**0.001**	0.151	**<0.001**	0.114	**0.001**
17	0.131	**<0.001**	0.182	**<0.001**	0.121	**<0.001**
Overall ultra-processed food consumption	0.164	**<0.001**	0.161	**<0.001**	0.102	**0.003**

PFS, Power of Food Scale; r, Spearman's correlation coefficient. Values in bold are significant at $p < 0.05$. *Marks the UPFs that correlate most strongly with the PFS sub-scale in the corresponding column.

Table 5 demonstrates a comparison of UPF consumption by BMI classes and correlations between consumption of UPFs and total PFS scores. The consumption of UPF groups 3, 6, 7, 11, 15, and 17 differed statistically according to BMI classes. Ice cream, chocolate, candies (confectionery) (Group 3) consumption was lower in individuals with a normal BMI than in individuals who are underweight or overweight ($p=0.013$). Consumptions of margarines and spreads (Group 6) and powdered and packaged 'instant' soups, noodles and desserts (Group 17) were higher among individuals in the obese BMI category than among individuals in other categories ($p=0.005$ and $p=0.014$, respectively). Consumption of processed cheese (Group 7) and meat and chicken extracts and instant sauces (Group 11) among individuals in the overweight and obese classes was higher than that among individuals with a normal BMI ($p<0.001$ and $p=0.017$, respectively). Poultry and fish nuggets and sticks (Group 15) consumption among individuals in the overweight BMI category was higher than consumption among individuals in the normal BMI category ($p=0.009$). Significant correlations were found between the consumption of many UPF groups and the total PFS score in different BMI classes. There was an inverse correlation between the consumption of five UPF groups (Group 8, 10, 12, 13, and 14) and the PFS total score among individuals in the underweight BMI class ($p<0.05$). PFS total score was positively correlated with 13 UPF groups in the normal BMI category, 8 in the overweight category, and 10 in the obese category ($p<0.05$). Total UPF consumption showed a statistically significant positive correlation with the PFS total score in individuals in the normal, overweight, and obese BMI categories, while the correlation was not significant in individuals in the underweight category.

Table 5. Comparison of Ultra-Processed Food Consumption and Correlations with Power of Food Scale by Body Mass Index Classes (n = 838)

BMI classes / UPFs/ UPF groups	**Underweight** (n = 89)		**Normal** (n = 566)		**Overweight** (n = 150)		**Obese** (n = 33)		
	Median (IQR)	**Total PFS score r/*p***	**Median (IQR)**	**Total PFS score r/*p***	**Median (IQR)**	**Total PFS score r/*p***	**Median (IQR)**	**Total PFS score r/*p***	***p*[1]**
1	42.8 (0.0–1400.0)	–0.028/0.793	42.8 (0.0–1400.0)	0.108/**0.010**	42.8 (0.0–700.0)	0.125/0.127	42.8 (0.0–200)	0.023/0.900	0.491
2	32.1 (0.0–700.0)	–0.074/0.493	27.4 (0.0–1050.0)	0.123/**0.003**	40.0 (0.0–1697.1)	0.275/**0.001**	21.4 (0.0–200.0)	0.459/**0.007**	0.051
3	60.5 (0.0–2514.4)[b]	–0.079/0.460	39.6 (0.0–1500.0)[a]	0.200/**<0.001**	56.8 (0.0–3225.4)[b]	0.255/**0.002**	43.9 (0.0–356.7)	0.360/**0.040**	**0.013**
4	36.1 (0.0–403.5)	0.177/0.098	35.2 (0.0–1080.0)	0.100/**0.018**	44.9 (0.0–1585.8)	0.173/**0.034**	49.5 (0.0–414.2)	0.464/**0.006**	0.110
5	6.4 (0.0–300.0)	–0.168/0.116	6.5 (0.0–900.0)	0.107/**0.011**	6.4 (0.0–378.6)	0.102/0.216	3.02 (0.0–217.9)	0.521/**0.002**	0.736
6	8.3 (0.0–628.8)[a]	–0.039/0.714	7.0 (0.0–1415.7)[a]	0.112/**0.008**	6.7 (0.0–424.6)[a]	0.172/**0.035**	32.1 (0.0–1400.0)[b]	0.477/**0.005**	**0.005**
7	15.0 (0.0–180.0)	–0.089/0.404	15.0 (0.0–900.0)[a]	0.053/0.210	25.0 (0.0–630.0)[b]	0.149/0.068	30.0 (1.0–150.0)[b]	0.461/**0.007**	**<0.001**
8	0.0 (0.0–750.0)	–0.230/**0.030**	0.0 (0.0–600.0)	0.054/0.198	0.0 (0.0–786.0)	0.051/0.533	0.0 (0.0–150.0)	0.145/0.421	0.519
9	216.0 (0.0–2060.0)	–0.112/0.296	157.9 (0.0–4632.8)	0.206/**<0.001**	180.4 (0.0–2111.3)	0.192/**0.019**	177.1 (1.0–688.4**)**	0.497/**0.003**	0.174
10	0.0 (0.0–400.0)	–0.274/**0.009**	0.0 (0.0–625.0)	0.104/**0.014**	0.0 (0.0–500.0)	0.198/**0.015**	0.0 (0.0–235.8**)**	0.342/0.052	0.844
11	7.5 (0.0–138.0)	0.179/0.093	5.0 (0.0–405.0)[a]	0.090/**0.032**	6.4 (0.0–303.4)[b]	0.255/**0.002**	20.0 (0.0–178.6)[b]	0.336/0.056	**0.017**
12	0.0 (0.0–142.8)	–0.224/**0.035**	0.0 (0.0–600.0)	0.027/0.527	0.0 (0.0–250.0)	–0.018/0.825	0.0 (0.0–0.0)	–	0.071
13	0.0 (0.0–21.4)	–0.215/**0.043**	0.0 (0.0–600.0)	0.029/0.497	0.0 (0.0–300.0)	0.101/0.218	0.0 (0.0–0.0)	–	0.822
14	20.1 (0.0–605.0)	–0.287/**0.006**	13.4 (0.0–4950.0)	0.240/**<0.001**	21.4 (0.0–364.2)	0.139/0.089	46.1 (0.0–257.2)	0.494/**0.003**	0.316
15	7.04 (0.0–300.0)	–0.034/0.750	6.7 (0.0–3800.0)[a]	0.223/**<0.001**	9.0 (0.0–314.4)[b]	0.298/**<0.001**	6.7 (0.0–157.2)	0.244/0.172	**0.009**
16	29.4 (0.0–342.8)	–0.135/0.206	20.8 (0.0–1164.2)	0.160/**<0.001**	26.7 (0.0–1421.4)	0.141/0.085	42.8 (1.0–350.0)	0.488/**0.004**	0.080
17	0.0 (0.0–250.0)[a]	0.043/0.691	0.0 (0.0–750.0)[a]	0.172/**<0.001**	0.0 (0.0–763.4)[a]	0.133/0.106	4.3 (0.0–300.0)**[b]**	0.485/**0.004**	**0.014**
Overall UPF consumption	612.9 (0.0–7551)	–0.176/0.099	510.2 (47.4–13089)	0.161/**<0.001**	650.5 (60.3–8735)	0.208/**0.011**	515.6 (96.6–2787)	0.531/**0.001**	0.056

BMI, Body Mass Index; PFS, Power of Food Scale; UPF, Ultra-processed Food; IQR, Interquartile Range (25th-75th); n, number.; r, Spearman's correlation coefficient. The *p*-value indicates the statistical significance of the correlation between UPF consumption and total PFS score by different BMI classes. p^1-value indicates the statistical significance of the difference in UPF consumption according to BMI classes (Kruskal-Wallis test). Different letters indicate differences between groups after post-hoc tests (Dunn's pairwise tests). Values in bold are significant at $p < 0.05$.

DISCUSSION

The purpose of the current study was to examine the cross-sectional relationship between hedonic hunger and the consumption of UPFs according to the NOVA classification, among young adult women. The findings indicate that the total amount of UPFs consumed is higher among those with high levels of hedonic hunger. The UPF groups showing the strongest relation with hedonic hunger sub-scales are (1) poultry and fish nuggets and sticks, and (2) ready-to-heat products.

In this study, where the overall hedonic hunger (measured via the PFS) score was analyzed by quartiles, women in the highest category for hedonic hunger consumed higher total UPFs (sum of the ultra-processed foods/food groups) than women in the lower quartiles. Similarly, past research in young Polish adults reported a positive association between hedonic hunger and high-fat snack intake (Chmurzynska et al., 2021). In Swiss adults, higher hedonic hunger was correlated with higher intakes of palatable, high-fat, salty snack foods and high-sugar foods (Horwath et al., 2020). Further, high hedonic hunger has been reported to increase the consumption of unhealthy foods (sweet and high-fat foods) and beverages (sweet drinks) in a study in adolescents (Mason, Smith, Lavender, & Leventhal, 2020). Another study in adolescents showed that those with higher hedonic hunger consumed more processed foods (i.e., carbonated drinks, fast foods, ice cream) than those with lower hedonic hunger and reported that higher hedonic hunger was associated with poor diet quality (Depboylu & Şimşek, 2025). Women represent a vulnerable group regarding hedonic hunger and may be more affected by the adverse health outcomes (e.g., increased BMI) of hedonic hunger (Şarahman Kahraman & Akçil Ok, 2022). Given that two-thirds of adult women in Türkiye have a BMI of 25.0 or higher (Republic of Turkey Ministry of Health General Directorate of Public Health, 2019), mindfulness-based interventions should be prioritized to mitigate obesity and health problems caused by hedonic hunger in women (Mercado, Werthmann, Antunes-Duarte, Campbell, & Schmidt, 2023). Mindful eating focuses on tuning into internal hunger and fullness signals while using external strategies—like smaller portions, fewer distractions, and slower eating—to prevent overeating and enhance awareness (Monroe, 2015). Higher eating distraction levels were reported to be linked to greater UPF consumption (López-Gil et al., 2025). Behavioral interventions on food and nutrition literacy to empower nutrition knowledge and cooking skills may help reduce UPF consumption while boosting adherence to a healthy diet (Jeans et al., 2023). Taxes on unhealthy, highly processed foods and beverages could be an effective way to reduce the purchase of targeted products (Sacks, Kwon, & Backholer, 2021). Additionally, warning labels on processed foods may be an effective way to reduce UPF consumption by increasing the preference for less processed foods (Gomez, 2025).

The current study further revealed that the hedonic hunger response, which increases in situations where food is continuously available but not physically present (indicated by the "food available sub-scale"), correlates with the consumption of most UPFs according to the NOVA classification. The strongest association was with the consumption of poultry and fish nuggets and sticks. Interestingly, in Polish young adults, the food available sub-scale was positively associated with healthy high-fat food intake (Chmurzynska et al., 2021). The current study specifically investigated the consumption of unhealthy UPFs and did not include healthy foods, such as unprocessed or minimally processed foods. Therefore, no comparison can be performed. In the same study, increased hedonic responses to appetizing foods that were physically present but not yet tasted (food present sub-scale) were associated with increased intake of sweet high-fat food and fast-food (Chmurzynska et al., 2021), which is similar to the findings of the present study, where the strongest correlation was found with the consumption of ready-to-heat products (including pre-prepared pies and pasta and pizza dishes). Fast-food consumption has been associated with adverse mental health outcomes in young women (Lee & Allen, 2022). On the other hand, mental distress has also been reported to increase fast-food consumption in the same population (Begdache, Sadeghzadeh, Derose, & Abrams, 2020). Considering that stress also increases hedonic hunger (Betts et al., 2021), all these variables can cause each other in a cyclical manner. Among women, hedonic hunger has been related to psychological distress conditions such as depression, anxiety, and stress (Yalçın et al., 2023). Psychological distress is known to be associated with UPF consumption (Hoffman et al., 2024; Mengi Çelik, Güler, & Ekici, 2025). The excessive consumption of palatable foods such as UPF, which activate

dopaminergic reward-related neurons in the striatum and insula due to their addictive properties, and the associated hedonic reward mechanism often leads to food addiction, which is commonly used to regulate emotions (Ribeiro et al., 2023; Stover et al., 2023). Difficulties in emotion regulation were found to be more prevalent among women (Hamurcu & Çamlıbel, 2023). A previous study indicated that greater challenges in emotion regulation correlate with elevated levels of hedonic hunger in young adults (Hamurcu & Çamlıbel, 2023). Given that emotional regulation is linked to a rise in the consumption of UPFs, individuals' negative emotions may be effective in increasing UPF consumption by increasing hedonic hunger (Smaira et al., 2021). Therefore, interventions to minimize the negative consequences of hedonic hunger on nutrition and health must incorporate mental health, neural, behavioral, and environmental factors. A previous study in adolescents found negative correlations between the three hedonic hunger sub-scales and diet quality (Depboylu & Şimşek, 2025). Diet quality decreases as UPF consumption increases (Marchese, Livingstone, Woods, Wingrove, & Machado, 2022; Shim, Shim, Cha, Kim, & Kim, 2022). This suggests that increased hedonic hunger may reduce diet quality by causing an increase in UPF consumption. Conversely, future interventions to regulate hedonic hunger may mediate diet quality improvements through reduced UPF consumption.

Consistent with previous studies (Machado et al., 2020; Shim, Ha, Kim, & Kim, 2023), the current study found higher UPF consumption among individuals in the overweight and obese BMI categories. Studies showing the effect of hedonic hunger on UPF consumption have either been analyzed without any classification for BMI or have analyzed BMI as a covariate in this relationship (Horwath et al., 2020; Mengi Çelik et al, 2025). The relationship between hedonic hunger and UPF consumption was investigated in pregnant individuals in the overweight category in one study, and no association was found (Jouppi & Levine, 2024). The present study analyzed the relationship between UPF consumption and hedonic hunger in women of different BMI categories. A direct relationship was found between UPF consumption and hedonic hunger in individuals in the normal, overweight, and obese categories, whereas, conversely, consumption of some of the UPF groups was found to be inversely associated with hedonic hunger in the underweight category. Although this result is noteworthy, the fact that the BMI groups were not homogeneously distributed (most participants were in the normal BMI category) and that there were few individuals in the obese category may have influenced the outcome. Future studies should confirm the results of the present study by including a sufficient number of samples from different BMI classes and applying advanced analyses.

The study's utilization of a large sample is a significant strength. Another strength of the study is the use of the NOVA food processing classification system to characterize UPFs. This is the first study we know of that examines the relationship between hedonic hunger and UPF consumption according to the NOVA classification. This study has some limitations that must be addressed. First, the participants were selected via convenience sampling, and their involvement in the study was voluntary, potentially leading to self-selection bias, as those with a pre-existing interest in the subject may have been more inclined to participate. Second, the participants were selected from a particular location in Türkiye; hence, their findings may not be pertinent to the entire population of Turkish adults. Third, using a self-report survey method may have resulted in social desirability bias, causing participants to respond with favorable remarks rather than completely factual ones. Fourth, the daily food consumption of individuals was not collected, and total energy could not be assessed, so the percentage of energy from UPFs in the diet could not be determined. One limitation of the study is that psychological distress, a potential variable that could influence hedonic hunger, was not examined. Another limitation is that non-parametric tests were used because the data in the study were not normally distributed. As a result, advanced parametric test analyses could not be performed. Despite these limitations, this study significantly contributes to the literature by presenting evidence that women with higher levels of hedonic hunger consume more UPFs.

CONCLUSION

UPF consumption is significantly higher among young adult women with elevated levels of hedonic hunger. Sub-scales of hedonic hunger (food available, food tasted, and food present) are positively correlated with most of the UPF groups according to the NOVA classification.

Interventions to improve hedonic hunger might be helpful to decrease UPF consumption in women. Psychological distress and emotional eating, which often play a mediating role in hedonic hunger and UPF consumption, should be examined in greater detail in clinical settings. Behavioral interventions, taxation policies, and food labeling, which are assumed to have potential positive effects in reducing UPF consumption, should be considered as measures aimed at enhancing public health. Future research should focus regulating individual and environmental factors to improve hedonistic hunger and UPF consumption in women.

Ethics Committe Approval

Ethics committee approval was received for this study from the Bayburt University Ethics Committee (Date: 16.01.2025, and Approval Number: 14).

Author Contributions

Idea/Concept: G.Ü., Ö.E. Design: G.Ü., Ö.E. Supervision/Consulting: G.Ü., Ö.E. Analysis and/or Interpretation: G.Ü., Ö.E. Literature Search: G.Ü., Ö.E. Writing the article: G.Ü., Ö.E. Critical Review: G.Ü., Ö.E.

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Conflict of Interest

The authors have no conflict of interest to declare.

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