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Psychological distress and food neophobia: the mediating role of food choice motives among university students

Tevfik Kocak¹, Emine Kocyigit² and Yagmur Demirel Ozbek^{3*}

Abstract

Background Food neophobia, defined as the reluctance to try unfamiliar foods, reduces dietary diversity and quality in young adults. University students, often subjected to psychological discomfort including sadness, anxiety, and stress, may be especially susceptible to restrictive eating behaviors. This study examined the link between psychological distress and food neophobia, focusing on the mediating role of food choice motives in Turkish students.

Methods A cross-sectional online survey was conducted among 801 Turkish university students (232 males and 569 females). The data collection included the Food Neophobia Scale (FNS), the Depression, Anxiety, and Stress Scale (DASS-21), and the Food Choice Questionnaire (FCQ). The body mass index was calculated using self-reported anthropometric measurements. Statistical analyses comprised correlations, multivariable linear regression, and mediation modeling using Hayes' PROCESS macro with 5000 bootstrap samples.

Results Food neophobia was positively associated with all DASS-21 subscales ($p < 0.001$). Regression analyses identified depression ($p < 0.001$), stress ($p = 0.001$), convenience ($p = 0.001$), and ethical concern ($p < 0.001$) as significant positive predictors, whereas natural content showed a negative association ($p = 0.046$). Mediation analyses indicated that food choice motives partially explained the associations between psychological distress and food neophobia. Convenience and ethical concern consistently acted as mediators of risk, while natural content demonstrated a more complex role.

Conclusions Food neophobia among university students is influenced by both psychological distress and food choice motives. Depression and stress exert stronger effects than anxiety, with convenience and ethical concern functioning as consistent mediators.

Keywords Anxiety, Depression, Food choice motives, Food neophobia, Psychological distress, Stress, University students

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Background

The university stage is regarded as a crucial transitional period in an individual's life. At this stage, young people separate from their families, adopt new social roles, and build various interpersonal relationships [1]. Students residing in dorms should not only modify their dietary practices but also acclimate to a communal setting and restricted food resources [2, 3]. Economic restrictions, constrained cafeteria selections, restricted food choices, and difficulties in time management substantially affect their dietary patterns [4–6]. Importantly, eating habits developed during this life stage may significantly influence both individual and public health in later years [7, 8].

Food choice was influenced not only by physiological requirements but also by psychological, social, and cultural aspects, making it a multifaceted process [9]. Research among university students has shown that price, convenience, habits, and ethical considerations are among the most prominent determinants of food choice [10, 11]. Habits were essential since individuals frequently preferred foods they had previously encountered and recognized. In this context, the concept of “food neophobia”—defined as reluctance, avoidance, or negative attitudes toward unfamiliar foods—has attracted increasing attention [12, 13]. Research among young individuals indicated that food neophobia diminished dietary variety and adversely impacted diet quality [14, 15]. Likewise, university students frequently showed a preference for familiar cuisine [16]. This phenomenon was shaped by both cultural background and psychological situations, which were key factors [9].

Alongside food neophobia, restrictive eating denoted a more extensive behavioral pattern marked by the planned or inadvertent restriction of dietary variety and the evasion of specific foods or food groups. Food neophobia specifically indicated hesitation towards unknown foods, whereas restrictive eating encompassed a broader spectrum of eating patterns that lead to diminished nutritional diversity [17, 18]. Food neophobia was conceptually seen as a manifestation or process by which restrictive eating practices developed, especially in circumstances with limited food choices, such as academic settings [12, 19].

In recent years, university students encountered significant cultural and economic challenges that may have negatively impacted their mental health. After COVID, there were long breaks in school, social isolation, and uncertainty about future educational and job options. All of these things made young adults more depressed, anxious, and stressed [20, 21]. Simultaneously, persistent economic challenges such as escalating inflation, increased living expenses, and financial insecurity disproportionately affect university students, particularly those residing away from home [22]. Previous studies demonstrated that macro-level stressors significantly

influenced psychological distress and maladaptive coping strategies among students, underscoring the need of considering broader contextual factors in understanding mental health outcomes in this group [23, 24]. Psychological distress, including depression, stress, and anxiety, was more prevalent among university students. Approximately half of students stated that they encountered such symptoms as a result of academic pressure, disrupted sleep patterns, and the difficulties associated with community living [25–27]. These psychological issues directly influenced dietary behaviors. Individuals experiencing depression, stress, or anxiety often favored energy-dense meals high in fat and sugar [28, 29]. Recent research indicated that psychological issues might diminish dietary diversity, hence fostering the emergence of food neophobia [14, 30, 31].

The motivations behind food choices offered an essential framework for comprehending the connection between food neophobia and psychological distress. The nine dimensions of the Food Choice Questionnaire—health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concerns—capture the complexity of eating behavior [32]. It has been shown that depressed people placed less importance on the “natural content” dimension [33], while students under financial and time constraints prioritized price and convenience [34]. While ethical considerations and weight management often drove intentional eating choices, their impact waned with increased psychological distress [33]. Thus, food choice motives were considered not only as drivers of eating behavior but also as indicators of psychological state.

In summary, food neophobia among university students appeared to be strongly influenced by depression, anxiety, and stress. Understanding this relationship through the framework of food choice motives could improve comprehension of its underlying mechanisms. This study aimed to examine the relationships among psychological distress, food choice motives, and food neophobia within a comprehensive mediation model. To our knowledge, no previous study has simultaneously investigated these three components, making this research a novel contribution to the literature and a potential basis for developing interventions to promote student health.

Materials and methods

Study design and participants

This study employed a cross-sectional design and was conducted on a sample of university students enrolled in higher education institutions in Türkiye. A minimum sample size of 664 individuals was determined to achieve a 5% margin of error at the 99% confidence level, using a 50% prevalence and simple random sampling. This research involved 801 university students (232 males, 569 females). The data was collected from January to

June 2025 using an online questionnaire. The following are the requirements for inclusion: being at least 18 years old, attending a Turkish university, and being willing to participate in the study. Individuals under 18 years of age, those who submitted incomplete survey forms, pregnant and lactating women, those who had chronic mental or psychological disorders, those using antidepressants, and those who had chronic nutritional or metabolic diseases were excluded from the study.

An online questionnaire was utilized, comprising a sociodemographic section, the Food Neophobia Scale (FNS), the Depression, Anxiety, and Stress Scale (DASS-21), the Food Choice Questionnaire (FCQ), and anthropometric measures (body weight and height) as tools for data collection. The individuals self-reported their body weight (in kilograms) and height (in meters). The BMI was calculated by dividing body weight by the square of height and is assessed according to the World Health Organization's BMI categorization [35].

The questionnaire, accessible to participants via an online link, was conducted using Google Forms and intended for completion on mobile devices or computers within a maximum timeframe of 15 min. Participants were recruited through the online distribution of the survey link by researchers via university-affiliated student communication channels, including instant messaging applications and online student groups commonly used for peer communication. The researchers shared the survey link, which was not circulated by course instructors or academic personnel engaged in student assessment, thereby reducing any potential impression of obligation or hierarchical pressure. The personal information of volunteer participants, such as name, surname, and phone number, was not requested. Eligibility was confined to university students and was confirmed using self-reported student status inquiries at the survey's outset.

The survey form indicated that there were no correct or incorrect responses to the questions, that participants would not receive any material or moral compensation after participation, that the data would be used solely for scientific purposes, and that participation was entirely voluntary. Participants were notified that they might exit the study at any moment without repercussions. Due to the personal nature of psychological assessments, participants in the online survey were provided with information regarding mental health assistance resources upon completion. This information encompasses directions to campus counseling services and national mental health support resources.

The study protocol received approval from the Gümüşhane University Scientific Research and Publication Ethics Committee (Meeting Number: 2024/12; Date: 20 December 2024).

Food Neophobia Scale

The Food Neophobia Scale (FNS), developed by Pliner and Hobden [36], assesses an individual's aversion to trying new foods and has been translated into Turkish, with validation by Uçar et al. [37]. Uçar et al. established the Cronbach's alpha coefficient of the FNS for the Turkish population at 0.805. The FNS comprises 10 items, each measured on a 7-point Likert scale. The scale for the items ranges from 1 (strongly disagree) to 7 (strongly agree). Items 1, 4, 6, 9, and 10, which include negative assertions, are evaluated in the opposite direction. The overall score ranges from 10 to 70, with elevated levels indicating the presence of food neophobia [37]. The FNS was utilized in samples of Turkish university students and young adults, exhibiting satisfactory internal consistency (Cronbach's alpha values ranging from 0.642 to 0.790) [12, 38]. However, internal consistency was not re-evaluated in the present study, which should be taken into account when evaluating the results.

Depression, anxiety, and stress scales

The Depression, Anxiety, and Stress Scale (DASS), developed by Lovibond and Lovibond [39] in 1995, consists of 42 items for evaluation. In 1998, Antony et al. developed a 21-item version of the scale [40]. The validity and reliability of the scale were examined in Turkish by Sarıçam [41]. The DASS-21 comprises three subscales, each including seven items for depression, anxiety, and stress, totaling 21 questions. The scale is a 4-point Likert-type instrument, ranging from 0 to 3 for item scoring, which yields scores from 0 to 21 for each sub-dimension. These scores indicate levels of depression, anxiety, and stress categorized as normal, mild, moderate, severe, or extremely severe. As the DASS-21 serves as the abbreviated form of the original 42-item DASS, the ultimate score for each subscale is doubled [39, 40]. The internal consistency reliability coefficients for the Turkish DASS-21 were $\alpha = 0.87$ for the depression subscale, $\alpha = 0.85$ for the anxiety subscale, and $\alpha = 0.81$ for the stress subscale [41]. The Turkish DASS-21 has demonstrated acceptable reliability psychometric reliability within Turkish university populations, with Cronbach's alpha values generally ranging from approximately 0.81 to 0.90 for its subscales, confirming the dependable assessment of depression, anxiety, and stress; however, internal consistency was not reassessed in the current study [42, 43].

Food choice questionnaire

The Food Choice Questionnaire (FCQ) is a comprehensive tool developed by Steptoe et al. [44] to assess the motivations underlying food choices. The questionnaire consists of 36 measures divided into nine categories based on food proximity, including health, sensory appeal, price, convenience, mood, natural content, weight

control, familiarity, and ethical concern. A 4-point Likert scale was used to rate the FCQ scale (1 being not important at all and four being very important). The validity and reliability of the FCQ were assessed in Turkish by Dikmen et al. [45]. In the Turkish validation of the Food Choice Questionnaire, Cronbach's alpha coefficients varied from 0.60 to 0.84 across subscales, providing an overall internal consistency of 0.90, which signifies good to excellent reliability [45].

Data analysis

Statistical analyses were performed by IBM SPSS Statistics v26 (IBM SPSS, Türkiye). The normal distribution was assessed through Kolmogorov–Smirnov and Shapiro–Wilk tests, accompanied by a histogram plot. For continuous variables, we displayed the mean $\pm$ standard deviation (SD), and for categorical variables, the frequency (percentage). Pearson's Chi-square test was employed to investigate the relationship between categorical variables. Kruskal–Wallis/Mann–Whitney U analysis was used to assess the significance of the group mean differences. Pearson correlation coefficient was used to evaluate the relationship between FNS, DASS-21, FCQ scores, and BMI. Prior to conducting the regression and mediation analysis, the multicollinearity among the independent variables was evaluated. To assess potential collinearity of psychological distress components (depression, anxiety, and stress) and food choice motivation dimensions, we examined the variance inflation factor (VIF) and tolerance values. The VIF values were between 1.30 and 3.36, while the tolerance values were between 0.30 and 0.77. This means that the levels of collinearity were acceptable [46]. The results suggested that multicollinearity was not a significant concern and that the calculated regression coefficients could be appropriately interpreted. We performed multivariable linear regression analyses to examine the independent effects of the DASS-21 subscales and food choice motivations as predictors of food neophobia. The DASS-21 and FCQ subdimension scores were designated as independent variables, while sex, age, and BMI were included as covariates to control for any confounding effects. In the analysis of the mediated structural model, data were examined using PROCESS v4.0, developed by Andrew Hayes. The significance of indirect effects was examined using bootstrapping. Bootstrapping was employed to assess the importance of indirect effects. The bootstrap coefficient and confidence intervals were calculated using 5000 bootstrap samples. For the study hypothesis to be accepted in mediation effect studies using the bootstrap technique, the 95% CI values that are produced by the analysis must not contain the value (0). Results were assessed using a 95%

confidence interval, and findings were considered statistically significant at the $p < 0.05$ level.

Results

Table 1 shows the sociodemographic, anthropometric, and psychological characteristics of the research sample. Concerning socioeconomic status, over half of the participants (46.9%) reported that their monthly income met their expenses, while 41.3% indicated that their income was insufficient to cover their expenses. A notable gender difference was observed in income distribution ($p = 0.007$), with a higher percentage of males reporting income exceeding costs compared to females. The percentage of monthly income allocated to food did not differ substantially between genders ($p = 0.308$). The mean BMI was 22.9 ± 8.20 kg/m², with males exhibiting substantially elevated BMI values compared to females ($p < 0.001$). Upon categorization, 71.1% of subjects were within the normal range, 17.5% were classified as overweight, and 3.0% were classified as obese. The prevalence of underweight was higher in females, while the prevalence of overweight was higher in males ($p < 0.001$). The total mean score for FNS was 34.8 ± 14.54 , with males exhibiting significantly higher scores than females (37.7 ± 15.34 vs. 33.6 ± 14.04 ; $p = 0.001$). The mean scores of DASS-21 indicated no significant gender differences in depression (32.6 ± 10.34), anxiety (32.7 ± 10.49), and stress (34.2 ± 10.36) ($p > 0.05$). The severity classifications revealed that most individuals were categorized as extremely severe for depression (69.7%), anxiety (88.0%), and stress (40.8% moderate, 36.3% normal, with the remaining classified as mild to severe). Concerning FCQ, the subscales exhibited no significant differences by gender ($p > 0.05$).

Table 2 shows the relationship between FNS, DASS-21, FCQ scores, and BMI. Pearson correlation analyses revealed a positive association between food neophobia and all DASS-21 subscales: depression ($r = 0.428$, $p < 0.001$), anxiety ($r = 0.316$, $p < 0.001$), and stress ($r = 0.339$, $p < 0.01$) in the total sample. The strength of these correlations was stronger in males, especially for depression ($r = 0.510$) and stress ($r = 0.470$). In terms of food choice motives, substantial positive correlations were identified between food neophobia and all subdimensions of the FCQ (health, sensory appeal, price, convenience, mood, weight control, familiarity, and ethical concern; $p < 0.001$), except natural content, which exhibited a weaker association ($r = 0.140$, $p < 0.001$) and did not have significance among males. Weight control ($r = 0.356$) and familiarity ($r = 0.324$) had stronger associations in males than in females. No significant association was identified between BMI, age, and food neophobia in the whole sample or among gender subgroups ($p > 0.05$).

Table 1 General characteristics of participants classified by gender

	Total (n = 801)	Male (n = 232)	Female (n = 569)	Z	X²	p-value
Age (year), mean ± SD	21.5 ± 1.70	21.6 ± 1.61	21.5 ± 1.74	-1.570		0.116
Monthly income, n (%)						
Income < expenses	331 (41.3)	93 (40.1)	238 (41.8)		9.826	< 0.01
Income = expenses	376 (46.9)	99 (42.7)	277 (48.7)			
Income > expenses	94 (11.7)	40 (17.2)	54 (9.5)			
Monthly income allocated for purchasing food, n (%)						
One-fourth of monthly income	173 (21.6)	57 (24.6)	116 (20.4)		3.600	0.308
One-third of monthly income	341 (42.6)	88 (37.9)	253 (44.5)			
Half of the monthly income	263 (32.8)	81 (34.9)	182 (32.0)			
Total monthly income	24 (3.0)	6 (2.6)	18 (3.2)			
BMI (kg/m ²), mean ± SD	22.9 ± 8.20	24.0 ± 6.48	22.5 ± 8.77	-7.757		< 0.001
BMI category, n (%)						
Underweight	67 (8.4)	7 (3.0)	60 (10.6)		33.598	< 0.001
Normal weight	567 (71.1)	154 (66.7)	413 (72.8)			
Over weight	140 (17.5)	65 (28.1)	75 (13.2)			
Obese	24 (3.0)	5 (2.2)	19 (3.4)			
FNS scores, mean ± SD	34.8 ± 14.54	37.7 ± 15.34	33.6 ± 14.04	-3.436		< 0.01
DASS-21 scores						
Depression, mean ± SD	32.6 ± 10.34	32.9 ± 9.97	32.4 ± 10.49	-0.759		0.448
Depression status, n (%)						
Moderate	142 (17.7)	34 (14.7)	108 (19.0)		3.931	0.140
Severe	101 (12.6)	36 (15.5)	65 (11.4)			
Extremely severe	558 (69.7)	162 (69.8)	396 (69.6)			
Anxiety, mean ± SD	32.7 ± 10.49	32.7 ± 10.75	32.8 ± 10.40	-0.242		0.809
Anxiety status, n (%)						
Moderate	57 (7.1)	36 (6.3)	21 (9.1)		1.999	0.368
Severe	39 (4.9)	29 (5.1)	10 (4.3)			
Extremely severe	705 (88.0)	504 (88.6)	201 (86.6)			
Stress, mean ± SD	34.2 ± 10.36	33.9 ± 9.89	34.3 ± 10.56	-0.389		0.697
Stress status, n (%)						
Normal	270 (36.3)	77 (36.8)	193 (36.1)		3.118	0.538
Mild	132 (17.8)	38 (18.2)	94 (17.6)			
Moderate	307 (41.3)	89 (42.6)	218 (40.8)			
Severe	34 (4.6)	5 (2.4)	29 (5.4)			
FCQ						
Health, mean ± SD	17.2 ± 3.54	17.2 ± 3.44	17.2 ± 3.58	-0.050		0.960
Sensory appeal, mean ± SD	11.8 ± 2.56	11.7 ± 2.53	11.8 ± 2.58	-0.864		0.388
Price, mean ± SD	8.7 ± 1.93	8.8 ± 1.83	8.6 ± 1.96	-0.940		0.347
Convenience, mean ± SD	14.5 ± 2.93	15.6 ± 2.77	14.4 ± 3.00	-0.948		0.343
Mood, mean ± SD	17.2 ± 3.55	17.3 ± 3.42	17.1 ± 3.60	-0.698		0.485
Natural content, mean ± SD	8.4 ± 1.87	8.4 ± 1.78	8.4 ± 1.90	-0.304		0.761
Weight control, mean ± SD	8.6 ± 2.01	8.7 ± 1.95	8.5 ± 2.03	-1.394		0.163
Familiarity, mean ± SD	8.4 ± 1.95	8.3 ± 1.88	8.4 ± 1.98	-0.537		0.591
Ethical concern, mean ± SD	8.0 ± 2.20	8.1 ± 2.02	7.9 ± 2.27	-1.044		0.296

Abbreviations: BMI Body mass index, DASS-21 Depression, anxiety, and stress scales, FCQ Food choice questionnaire, FNS Food neophobia scale

Bold values denote statistical significance at the $p < 0.05$ and $p < 0.001$

Multiple regression analysis was used to identify the factors contributing to food neophobia, while adjusting for age and BMI (Table 3). Among the DASS-21 subscales indicators, depression ($\beta = 0.268$, $p < 0.001$) and stress ($\beta = 0.144$, $p = 0.001$) were significant positive predictors

of food neophobia, although anxiety exhibited no significant correlation ($p > 0.05$). In terms of food choice motivations, convenience ($\beta = 0.176$, $p = 0.001$) and ethical concern ($\beta = 0.210$, $p < 0.001$) exhibited a positive correlation with food neophobia, whereas natural content ($\beta =$

Table 2 The relationship between FNS, DASS-21, FCQ scores, and BMI

	FNS		
	Total (n = 801)	Male (n = 232)	Female (n = 569)
	r	r	r
DASS-21			
Depression	0.428*	0.510*	0.396*
Anxiety	0.316*	0.369*	0.296*
Stress	0.339*	0.470*	0.293*
FCQ			
Health	0.207*	0.262*	0.186*
Sensory appeal	0.204*	0.250*	0.192*
Price	0.219*	0.272*	0.194*
Convenience	0.302*	0.340*	0.287*
Mood	0.206*	0.245*	0.188*
Natural content	0.140*	0.117	0.150*
Weight control	0.229*	0.356*	0.169*
Familiarity	0.186*	0.324*	0.133*
Ethical concern	0.302*	0.339*	0.285*
BMI	0.015	-0.079	0.032
Age	-0.032	-0.023	-0.043

Values are Pearson correlation coefficients (r) between food neophobia scale scores and depression, anxiety, and stress scales subscales, food choice motives, and body mass index, presented for the total sample, males, and females. * $p < 0.001$

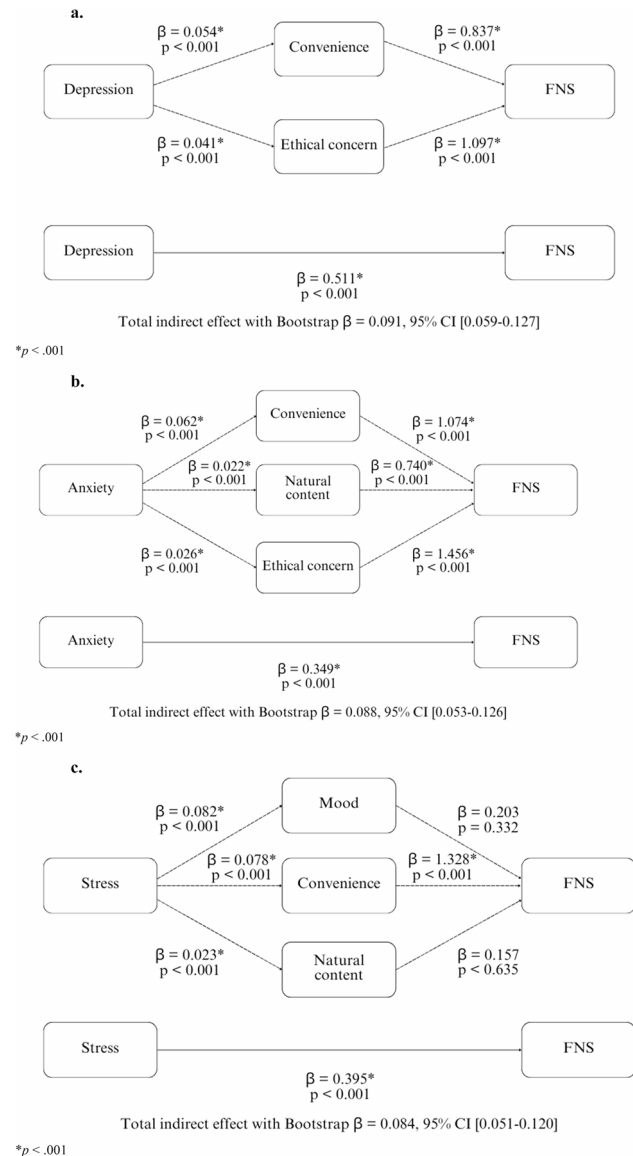
Table 3 Multiple regression analysis of DASS-21 subscales and food choice motivations as predictors of food neophobia

	FNS			p-value
	β	95% CI Lower Upper		
Sex	-0.109	-5.396 -1.592		< 0.001
DASS-21				
Depression	0.268	0.276 0.477		< 0.001
Anxiety	0.050	-0.039 0.178		0.209
Stress	0.144	0.088 0.316		< 0.01
FCQ				
Health	0.070	-0.931 4.367		0.203
Sensory appeal	0.030	-1.413 2.770		0.524
Price	-0.008	-2.141 1.764		0.850
Convenience	0.176	1.894 6.840		< 0.01
Mood	-0.092	-4.878 0.339		0.088
Natural content	-0.091	-4.219 -0.036		< 0.05
Weight control	0.047	-0.848 2.870		0.286
Familiarity	-0.042	-2.850 0.980		0.338
Ethical concern	0.210	2.848 5.497		< 0.01

The results are shown as β coefficients and their 95% confidence interval (CI). $R^2 = 0.287$; $p < 0.001$

Linear regression models were adjusted for age and body mass index. Significant predictors are indicated in bold ($p < 0.05$). Sex: 0-female; 1-male; DASS-21 depression, anxiety, and stress scales, FCQ food choice questionnaire, FNS food neophobia scale

-0.091, $p = 0.046$) demonstrated a negative correlation. Other FCQ subdimensions (health, sensory appeal, price, mood, weight management, familiarity) did not serve as

**Fig. 1** **a** Mediation model of depression on food neophobia through food choice motives. * $p < .001$. **b** Mediation model of anxiety on food neophobia through food choice motives. * $p < .001$. **c** Mediation model of stress on food neophobia through food choice motives. * $p < .001$

significant predictors. Among the confounders, sex was a significant predictor ($\beta = -0.109$, $p < 0.001$), indicating that females exhibited lower food neophobia scores than males.

Figure 1a–c illustrates the mediation models linking depression, anxiety, and stress with food neophobia through food choice motives. Solid arrows represent direct effects, while dashed arrows indicate indirect (mediated) effects. All models were adjusted for age, sex, and BMI. Depression, anxiety, and stress each significantly predicted food neophobia (Depression: $\beta = 0.511$, $p < 0.001$; Anxiety: $\beta = 0.349$, $p < 0.001$; Stress: $\beta = 0.395$, $p < 0.001$). Mediation analyses further revealed

that depression directly predicted food neophobia, with convenience and ethical concern partly accounting for this relationship (total indirect effect $\beta=0.091$, 95% CI [0.059–0.127]). For anxiety, convenience, ethical concern, and natural content emerged as significant mediators (total indirect effect $\beta=0.088$, 95% CI [0.053–0.126]). For stress, convenience was identified as the main mediator, whereas mood and natural content were nonsignificant (total indirect effect $\beta=0.091$, 95% CI [0.059–0.127]). The coefficient of determination (R^2) for the adjusted models, which included depression, anxiety, and stress together with food choice motives, indicated that approximately 20% of the variance in food neophobia was explained.

Discussion

The study examined the link between psychological distress and food neophobia in Turkish university students, focusing on the mediating role of food choice motives. Food neophobia showed significant, positive correlations with all DASS-21 subscales, with depression and stress as stronger predictors than anxiety. Multivariable regression showed that, among students with psychological distress, motives such as convenience and ethical concern were associated with greater food neophobia, whereas a preference for natural content was protective. Mediation analysis confirmed that convenience and ethical concerns indirectly connected psychological distress to food neophobia. Overall, psychological distress and food choice motives appear to be jointly associated with the expression of food neophobia in young adults.

The current study revealed that food neophobia ratings were elevated in male university students (37.70 ± 15.34) compared to their female peers. Sex remained a notable independent predictor of food neophobia in the multivariable regression model, even after adjusting for age, BMI, psychological distress, and reasons for food choices, indicating higher neophobia scores among male students. Previous studies revealed contradictory findings about sex differences in food neophobia, with certain studies revealing higher levels in females [12, 19, 31], while others reported no significant gender differences [13, 47]. The heightened food neophobia scores among male students may be ascribed to differences in food exposure and dietary practices, as males may rely more on habitual or convenience-based meal choices. Heightened psychological distress may intensify avoidant behaviors related to food. However, sex variations in food neophobia should be treated with caution, as they appear to depend on the situation.

The finding of this study is that no significant differences were observed between men and women across any FCQ subscales, including the weight control dimension.

This contrasts with prior FCQ-based research, which typically indicates that women (adults and teens) prioritize health, natural ingredients, and weight control, whereas men tend to focus more on price, convenience, and familiarity; however, cultural and age-related factors can modify these trends [48–50]. The gap could result from the homogeneity of the sample, as university living imposed comparable academic responsibilities, time constraints, and dining environments, thereby diminishing gender-based differences in food selection motivations.

Psychological distress has been increasingly recognized as a key factor influencing food choices among university populations. A recent Brazilian study showed that increased intake of fresh or minimally processed foods correlated with reduced likelihood of depression (OR = 0.62; $p = 0.011$), anxiety (OR = 0.58; $p = 0.003$), and stress (OR = 0.69; $p = 0.043$) among students, thereby reinforcing the connection between mental health and nutritional choices in educational environments [12]. In line with this evidence, our study observed significant positive associations between food neophobia and all DASS-21 subscales, with the strongest effects for depression and stress. Similar patterns of restrictive food-related tendencies are reported in contemporary student samples: among Turkish university students, ~ 15% were food-neophobic, and ~ 47% exhibited orthorexic tendencies, underscoring the salience of avoidant/restrictive eating in this population [12]. These findings imply a dual influence: improved diet quality may mitigate psychological discomfort, but distress itself seems to heighten aversion to novel foods. Future treatments should concurrently target mental health and nutritional education to enhance psychological resilience and promote dietary variety among young adults.

In our study, food neophobia showed positive correlations with all FCQ subscales, with the strongest associations observed for convenience ($r = 0.302$) and ethical concern ($r = 0.302$). These findings correspond with prior studies demonstrating that convenience and ethical principles are primary factors influencing food-related decision-making among young individuals [15, 51]. Jaeger et al. similarly found that familiarity ($r = 0.82$), convenience ($r = 0.29$), and price ($r = 0.34$) exhibited a positive correlation with food neophobia, whereas health ($r = -0.46$) and natural ($r = -0.59$) content had a negative relationship; sensory appeal, weight control, and mood were not significant predictors [51]. Similar patterns were identified in research conducted in the United States, Australia, and New Zealand [52]. A study of Polish individuals found that food neophobics preferred bland, healthy options, whereas food neophilics chose more delicious yet less nutritious foods [15]. Our findings revealed a weak association between natural content and food neophobia,

which was not significant among men, suggesting that appreciation of natural ingredients may not significantly mitigate neophobic views in this group. Conversely, ethical concerns may correlate with more stringent moral or value-based dietary constraints, thereby diminishing individuals' willingness to experiment with novel foods and resulting in more restrictive eating patterns, as evidenced by prior research on ethical and value-driven food selections [53, 54].

In the present study, multivariable regression analysis adjusted for age and BMI explained nearly 20% of the variance in food neophobia. These findings indicate that psychological distress and food choice motives play an important role in shaping neophobic eating behaviors among university students. Among the DASS-21 subscales, depression ($\beta = 0.268$, 95% CI: 0.276–0.477, $p < 0.001$) and stress ($\beta = 0.144$, 95% CI: 0.088–0.316, $p < 0.01$) emerged as significant independent predictors, whereas anxiety was not. This suggests that depressive and stress-related symptoms exert stronger influences on restrictive eating attitudes than anxiety, consistent with earlier evidence linking these conditions to unhealthy eating patterns and reduced dietary variety [55–57]. This distinction may show that melancholy and stress tend to lower motivation and encourage habitual behaviors, but anxiety doesn't always lead to restrictive eating. Regarding food choice motives, convenience and ethical concern were significant positive predictors of food neophobia, whereas natural content showed an inverse association. This pattern suggests that students who prioritize readily available foods or hold strong ethical concerns may be more reluctant to try unfamiliar foods, whereas those who value natural ingredients may be more open to novel foods. Therefore, the inverse correlation between natural content and food neophobia must be understood descriptively, as the cross-sectional design precludes causal or protective conclusions.

The mediation analyses conducted in this study provide new insights into the mechanisms underlying the relationship between university students' psychological distress with food neophobia. Depression and stress exhibited notable direct effects on neophobic attitudes, whereas food choice motives—particularly convenience and ethical concerns—served as significant mediators. This suggests that students with elevated distress levels may avoid unfamiliar foods because their food-related decisions are strongly influenced by practical and value-based considerations. Recent evidence also indicates that convenience serves as a prominent explanatory factor: in contexts characterized by low energy, time constraints, or academic pressures, distressed individuals may rely on readily available foods, thereby limiting dietary variety [8, 14]. The influence of ethical concerns, although rarely reported in prior research, suggests that strong moral or

environmental principles may strengthen inflexible eating patterns and lead to the rejection of unfamiliar foods [52].

Anxiety, although a weaker direct predictor compared to depression and stress, was indirectly associated with food neophobia through convenience, ethical concern, and natural content. This research highlights that anxiety may affect food neophobia not through directly restricting behaviors, but by modifying motivational priorities that guide food-related decision-making in unclear circumstances or under cognitive load. Natural content demonstrated a positive indirect association in the mediation model but a negative correlation in the regression analysis. This difference may be due to the inclusion of multiple interrelated motives at the same time. Simultaneous examination of multiple interrelated motives within a single model can alter the relative strength and direction of associations among individual motivational components due to shared variance. Previous studies also demonstrated variability in the relationships between health- and nature-related motivations and restricted eating behaviors, depending on the analytical methods employed [14, 15]. The findings indicate that the impact of natural content motives on food neophobia may fluctuate across contexts and be shaped by the interaction among multiple motivational pathways [51, 58].

Models related to stress also indicated an indirect mechanism, primarily through convenience, underscoring the importance of practical, accessible food options in shaping eating decisions under psychological pressure [11, 29]. Collectively, these findings suggest that food choice motives serve not merely as correlates but also as explanatory processes linking psychological distress with food neophobia. The consistent mediation of convenience and ethical concern across models highlights their importance as robust risk factors, whereas natural content demonstrated a more complex role—acting as protective in regression analyses but appearing less straightforward in the mediation models. These findings extend previous research by showing that motivational priorities may either exacerbate or buffer the effects of psychological discomfort on neophobic eating, underscoring their dual function as both risk and protective mediators [31, 52]. The results support a multidimensional framework of food choice, reflecting the dynamic interplay between psychological, motivational, and cultural determinants in shaping dietary acceptance.

These findings indicate that public health interventions should focus on enhancing mental well-being and motivational education, specifically by decreasing dependence on convenience-driven food choices and promoting health- and natural-content-oriented motivations. These strategies may reduce the negative effects of

psychological distress on dietary diversity and promote receptiveness to new foods among student populations.

This study has several strengths. First, its large sample size ($n=801$) increases representativeness and statistical power. Validated, reliable instruments like the FNS, DASS-21, and FCQ support measurement reliability. Second, advanced statistical methods, such as multivariable regression and mediation analyses with bootstrap resampling and covariate adjustment for age, sex, and BMI, clarify relationships. Finally, this research offers new evidence from an underrepresented Turkish university population, providing valuable cultural and contextual insights. Limitations should also be noted. The cross-sectional design prevents causal inferences, and self-reported questionnaires may increase reporting bias. The homogeneity of the sample—young people from one cultural setting—limits generalizability. Although the assessment tools were previously validated, online administration lacked prior psychometric validation, which should be considered. Unmeasured variables like socioeconomic status, parental impact, and personality may also influence food neophobia. Future longitudinal and cross-cultural studies are needed to validate these correlations and improve generalizability.

Conclusions

In conclusion, the present study finds that food neophobia in university students is a multifactorial phenomenon influenced by psychological distress, food choice motives, and demographic characteristics. Depression and stress were identified as more significant factors of food neophobia than anxiety. In contrast, convenience and ethical concerns consistently served as risk-related motivations, and natural content performed as a protective factor. These findings underscore the importance of evaluating both psychological well-being and motivational factors that influence food choices when addressing food neophobia among young adults. From a public health perspective, interventions aimed at reducing food neophobia may be enhanced by promoting positive attributes, such as natural ingredients and health benefits, while opposing overreliance on convenience. Future research should utilize longitudinal designs to elucidate the causal relationships among psychological distress, food choice motives, and food neophobia. Cross-cultural comparisons are necessary to assess whether the identified mediating mechanisms are consistent across various sociocultural contexts. Furthermore, including additional psychosocial factors, such as personality characteristics, familial influences, or peer dynamics, may further clarify the intricate relationship between mental health and eating patterns in young people.

Abbreviations

DASS-21	Depression, Anxiety, and Stress Scale
FNS	Food Neophobia Scale
FCQ	Food Choice Questionnaire
SD	Standard deviation
BMI	Body Mass Index
CI	Confidence Interval
R ²	Coefficient of determination

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Authors' contributions

Tevfik Kocak: Conceptualization (equal); data curation (lead); formal analysis (lead); investigation (equal); writing – original draft (equal); writing – review and editing (equal). Emine Kocyigit: Conceptualization (equal); methodology (lead); visualization (lead); writing – original draft (lead); writing – review and editing (lead). Yagmur Demirel Ozbek: Conceptualization (equal); writing – original draft (equal); writing – review and editing (equal).

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study protocol received approval from the Gümüşhane University Scientific Research and Publication Ethics Committee (Meeting Number: 2024/12; Date: 20 December 2024). The research was conducted in compliance with the principles outlined in the Declaration of Helsinki. All participants provided informed consent.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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