



Assessing the Food Disgust Sensitivity and Its Association with Eating Behaviours in Adults

Yetişkinlerde Besin Tiksinme Duyarlılığının İncelenmesi ve Yeme Davranışları ile İlişkinin Değerlendirilmesi

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Abstract

Aim: The aim of this study was to examine food disgust sensitivity and assess the relationship between food disgust sensitivity and eating behaviours in adults.

Material and Method: In this cross-sectional study, 215 adults were recruited and face-to-face interviews were used to gather data on the demographic information, Food Disgust Scale-short, Adult Picky Eating Questionnaire, and items involving rejection based on texture. Also, anthropometric measurements were taken.

Results: The mean food disgust sensitivity short, adult picky eating questionnaire and texture-based rejection scores of participants were found to be 3.549 ± 0.745 , 2.316 ± 0.472 , 1.190 ± 0.782 , respectively. Income and body mass index were negatively correlated with food disgust sensitivity, although age was positively. People with high food disgust sensitivity were pickier eaters and rejected foods with certain textures more often than those with low scores.

Conclusion: Individuals' food disgust sensitivity should be considered as an important factor influencing picky eating or food rejection.

Keywords: Food disgust; picky eating; texture-based food rejection

Öz

Amaç: Bu çalışmanın amacı yetişkin bireylerde besin tiksinme duyarlılığını incelemek ve besin tiksinme duyarlılığı ile yeme davranışları arasındaki ilişkiyi değerlendirmektir.

Gereç ve Yöntem: Bu kesitsel çalışmaya, 215 yetişkin birey katılmıştır ve demografik bilgiler, Besin Tiksinme Ölçeği-kısa, Yetişkin Seçici Yeme Anketi ve dokuya bağlı besin reddi ile ilgili bilgiler katılımcılardan yüz yüze ve anket teknikleri kullanılarak elde edilmiştir. Ayrıca bireylerin antropometrik ölçümleri alınmıştır.

Bulgular: Katılımcıların besin tiksinme ölçeği-kısa, seçici yeme anketi ve dokuya bağlı ret ortalama puanları sırasıyla $3,549\pm 0,745$, $2,316\pm 0,472$, $1,190\pm 0,782$ olarak bulunmuştur. Besin tiksinme duyarlılığı ile gelir ve beden kütle indeksi arasında pozitif yönde ilişki bulunurken, yaş ile negatif yönde ilişki saptanmıştır. Besin tiksinme duyarlılığı fazla olan bireylerin daha fazla seçici yeme davranışı sergiledikleri ve bazı dokulara sahip besinleri daha fazla reddettikleri saptanmıştır.

Sonuç: Besin tiksinme duyarlılığı, bireylerin seçici yeme veya dokuya bağlı besin reddi davranışlarını etkileyen önemli bir faktör olarak değerlendirilmelidir.

Anahtar Kelimeler: Besin tiksinme; seçici yeme; dokuya bağlı besin reddi



INTRODUCTION

Disgust is an emotion that avoids disease and is characterized by a predisposition to reject and avoid particular stimuli.^[1] People are disgusted with a wide range of objects, including food animals and even their own bodies.^[2-4] While some disgust-related stimuli differ from culture to culture and from individual to individual, bodily secretions (vomit, sweat, spittle, blood, and pus) are universally assumed to elicit disgust in people.^[5] People with disgust sensitivity are predisposed to feel disgusted in response to certain stimuli, known as disgust elicitors.^[6,7] The insular cortex of the brain is associated with disgust and its sensitivity may vary considerably between individuals, contributing to differences in sensitivity to disgust.^[8]

The term food disgust refers to an emotion that prevents the consumption of substances that might be toxic or pathogenic.^[9] Food disgust has functional effects on the eating behaviour of participants by preventing them from consuming potentially toxic foods. On the other hand, high disgust sensitivity may be related to rejection of food sources and a more restrictive eating behaviour.^[10,11]

Picky eating is characterised as an aversion to a wide range of familiar or unfamiliar foods, resulting in limited dietary diversity. Picky eaters tend to be disgusted with frequent and multiple stimuli, which underlies their food rejection.^[12] Furthermore, even non-spoiled food can cause a disgusting reaction.^[13] Although certain foods are safe to eat, their texture characteristics, such as excessive viscosity, can cause disgust.^[14] According to this line of reasoning, a significant amount of avoidance and rejection may be justified by the expected textural characteristics of meals when these are evaluated in the visual domain.^[15]

To our knowledge, no research has examined the association between food disgust and eating behaviours among Turkish population. This study aimed to investigate food disgust sensitivity and assess the relationship between food disgust sensitivity and eating behaviours in adults.

MATERIAL AND METHOD

Study Design

This cross-sectional study comprised of 215 individuals between the ages of 19 and 65. Face-to-face interviews were used to gather data on sociodemographic characteristics, Food Disgust Scale-short (FDS-short), Adult Picky Eating Questionnaire (APEQ), texture-based rejection behaviours, and anthropometric measures.

Subjects

This participants of the study comprised a random sample of 215 individuals who reside in Gaziantep in Turkey. People with food allergies, chronic illnesses, or those who declined to participate were excluded from the research. Pregnant and breastfeeding women were also omitted from the study due to the fact that their dietary habits may alter during this period.

Participants who agreed to contribute voluntarily to this study were asked to sign a written consent form in accordance with the Declaration of Helsinki. This study was approved by the Ethics Board of Gaziantep Islam Science and Technology University (Date: 27.09.2022, Decision No: 2022/146).

Measurement Tools

Food Disgust Scale

In order to measure food disgust sensitivity, that is people's propensities for disgust toward particular food-related (offensive) stimuli, the food disgust scale's shortened form was used⁽⁹⁾. The scale includes eight items that represent various food disgusts: animal flesh, poor hygiene, human contamination, decaying fruits, decaying vegetables, fish, mould, and living contaminants. Items were assessed on a 6-point scale ranging from 1 (not disgusting at all) to 6 (extremely disgusting). All values were averaged to determine the mean. The internal consistency was determined by calculating Cronbach's alpha. Regarding the FDS short scale, Cronbach's Alpha α coefficient was found to be 0.78 in this study. In this scale, a higher score indicates a greater tendency to respond with disgust and to be bothered by the experience of disgust.

Adult Picky Eating Questionnaire

In order to evaluate picky eating behaviours in adults, the Adult Picky Eating Questionnaire (APEQ) was used.^[16] The APEQ is comprised of a total of sixteen items and four subscales (meal representation, food variety, meal disengagement, and taste aversion). Items in the scale were scored between 1 (never) and 5 (always). The mean scale score was calculated. Higher APEQ score indicates pickier eating behaviours. Its Turkish validity and reliability study was conducted by Ayyıldız et al.^[17]

Texture-Based Rejection

The texture-based rejection items were developed based on those used by Kauer et al.^[11] and were previously used by Egolf et al.^[18] to assess texture-based rejection in adults. For example, one item asked if the respondent almost always rejects slimy foods. Other textures that were asked in the same fashion included crunchy, gelatinous, or very chewy. These items were scored with a yes (1) or a 'no' (0), and a total score was computed. Cronbach's Alpha coefficient was determined as 0.89 regarding the texture-based rejection.

Anthropometric measurements

The body weight was measured using electronic scale to the nearest 0.1 kilogram while wearing minimal clothing and without shoes. Using a stadiometer, height was measured while standing on the horizontal Frankfort plane. Body mass index (BMI) was computed by dividing weight (kg) by height squared (m²).

Sociodemographic Characteristics

As sociodemographic characteristics, age, gender, married status, education level (literate, primary school, secondary

school, high school, university), and monthly income (below 3000, 3001–6000, 6001–9000, and over 9001 Turkish Liras) were investigated.

Statistical Analysis

The data was analysed using Statistical Package for the Social Sciences software (version 23.0, Chicago, United States). Visual and analytical methods were used to analyse the normality of data. For continuous and categorical variables, the characteristics of the participants were expressed as mean with standard deviation ($\bar{x}\pm SD$) or frequency with proportions, respectively. Pearson's correlation coefficient was used to examine bivariate correlations in order to determine whether there was a relationship between general characteristics, FDS-short, APEQ, and texture-based rejection scores. The predictive ability of the general characteristic, food disgust sensitivity, was investigated using a multiple linear regression analysis. Utilizing hierarchical linear regression models, the effects of disgust sensitivity on picky eating and texture-based rejection were analysed. In the first step, control variables (sex, age, and income, BMI) were entered, and in the second step, food disgust sensitivity was entered in all regression models to see how much additional variance there was in food disgust sensitivity. The value of $p < 0.05$ was established as statistically significant.

RESULTS

The general characteristics and scale scores of participants are shown in **Table 1**. The study included 109 (50.7%) women participants and 106 (49.3%) men participants. The mean age of participants was 33.897 ± 12.759 years. Almost half of the participants had a university degree (47.0%). The mean BMI of participants was 24.587 ± 4.405 kg/m². The participants' mean FDS short, picky eating, and texture-based rejection scores were 3.149 ± 0.745 , 2.316 ± 0.472 , 1.190 ± 0.782 , respectively.

The results indicated that there was significant correlation between FDS short score and age, gender, income and BMI ($p < 0.001$). The FDS short score was also shown to significant positive correlation with APEQ and texture based rejection scores (all $p < 0.01$) (**Table 2**).

It was determined through a regression analysis whether food disgust could be predicted using data on age, gender,

income, and BMI (**Table 3**). The regression model showed that 14.1 % of food sensitivity could be explained by age, sex, income, and BMI. It was found that there was a positive correlation between age and FDS-short scores which showed that older people had higher FDS-short scores than younger people. One of the predictors was gender and the FDS short scores of women were found to be higher than those men. Additionally, income and BMI were negatively correlated with the FDS short score.

Table 1. General characteristics and scale scores of participants

Variables	Sample (n=215)
Age(years) $\bar{x}\pm SD$	33.897 \pm 12.759
Gender n (%)	
Men	109 (50.7)
Women	106 (49.3)
Education Level n (%)	
Literate	37 (17.2)
Primary school	12 (5.6)
Secondary school	20 (9.3)
High school	45 (20.9)
University	101 (47.0)
Income (TL/monthly) n (%)	
3000 TL or less	27 (12.5)
3000-6000 TL	66 (30.7)
6001-9000 TL	69 (32.1)
9001 TL or more	53 (24.7)
Body weight (kg) $\bar{x}\pm SD$	68.952 \pm 14.165
BMI(kg/m ²) $\bar{x}\pm SD$	24.587 \pm 4.405
FDS-short $\bar{x}\pm SD$	3.549 \pm 0.745
APEQ $\bar{x}\pm SD$	2.316 \pm 0.472
Texture based rejection $\bar{x}\pm SD$	1.190 \pm 0.782

\bar{x} : mean, SD: standard deviation, TL: Turkish liras, BMI: Body mass index, FDS-short: Food Disgust Scale- Short, APEQ: Adult picky eating questionnaire

Table 3. Multiple linear regression analyses of factors associated with food disgust sensitivity (FDS-short)

Variables	$\beta 1$ (%95 CI)	SE	$\beta 2$	t	p
(Constant)	3.991 (3.371 - 4.612)	0.315		12.675	<0.001
Age	0.014 (0.006 - 0.021)	0.004	0.237	3.664	<0.001
Gender	0.229 (0.038 - 0.420)	0.097	0.154	2.366	0.019
Income	-0.157 (-0.248 - -0.066)	0.046	-0.207	-3.403	0.001
BMI (kg/m ²)	-0.041 (-0.061 - -0.021)	0.010	-0.242	-4.013	<0.001

BMI: Body mass index, Gender: 0=men, 1=women F=17.929; $p < 0.001$; Adj. R²=0.141; SE of the estimate=0.649; 1: Unstandardized Coefficients; 2: Unstandardized Coefficients

Table 2. The correlation between FDS-short score and variables investigated

	FDS short	Age	Gender	Education	Income	BMI	APEQ
Age	0.378**						
Gender	0.319**	0.372**					
Education	-0.079	-0.222**	-0.132				
Income	-0.301**	-0.176**	-0.152*	0.073			
BMI	-0.139*	-0.039	-0.122	0.045	0.030		
APEQ	0.468**	0.364**	0.343**	0.005	-0.086	-0.021	
Texture based rejection	0.383**	0.397**	0.301**	-0.158*	-0.048	-0.117	0.383**

FDS-short: Food Disgust Scale- Short, BMI: Body mass index, APEQ: Adult picky eating questionnaire, Gender: 0=men, 1=women, * $p < 0.05$, ** $p < 0.01$

Table 4 displays the results of hierarchical regression. The model containing age, gender, income and BMI explained $R^2=24.5\%$, 15.7% , respectively, the amount of variation in picky eating and texture-based rejection ($p<0.01$). When FDS short score was added as an independent variable, the model the model R^2 for picky eating ($\Delta R^2=11.2\%$, $p<0.001$), texture based rejection ($\Delta R^2=9.6\%$, $p<0.001$) increased. Picky eating and texture based food rejection were both predicted by age, gender and food disgust sensitivity. In comparison to those with low FDS-short scores, those with high FDS short scores also had higher APEQ scores. People who report higher FDS short score are more likely to reject foods with a certain texture than people who report lower FDS short score.

DISCUSSION

The purpose of this study was to assess the associations between food disgust sensitivity and eating habits, especially picky eating and texture-based rejection. It was determined that food disgust was connected to picky eating as well as texture based rejection. The findings indicated that age, gender income and BMI are predictors of food disgust sensitivity. The FDS score was a predictor of adult picky eating and texture-based rejection in addition to age and gender. People with high FDS scores were found to have a pickier eating behaviour and more frequently reject foods due to texture than people with low FDS scores.

In a study conducted in ten countries, the FDS short scores ranged from 3.47 to 4.09.^[5] In the current research, FDS short score of participants was 3.549 ± 0.745 . The mean of the FDS short score is between the means reported in a previous study.^[5] Furthermore, the findings indicated that age, gender income, and BMI were predictors of food disgust sensitivity.

Women had a higher sensitivity to food disgust than men in this study which is consistent with the findings of previous studies on disgust.^[15,18,19] Studies pointing to the existence of an association between food disgust sensitivity and gender have offered varying explanations for the higher food disgust sensitivity among women.^[19] First, the reproductive role of women may be one of the factors. In a study conducted by Fessler et al., it was reported that during the first trimester of pregnancy, a woman's sensitivity to disgust is heightened. They thought that since embryos are most vulnerable during the first three months of pregnancy, a higher level of disgust sensitivity might be a way for the foetus to keep safe.^[20] Second explanation relates to our ancestry: in the past, women were often more active in food washing, preparation, and cooking than males.^[5,21] Consequently, greater disgust sensitivity may have been a characteristic of ancient women (during the period when the disgust system was predominantly created) since it led to more hygienic food-related behaviour.^[5]

Contemporary evidence on the connection between age and disgust is contradictory, with indications of negative relationship^[13,22] and positive.^[18,23] The results of this study corroborate those of other studies in showing that individuals' sensitivity to food disgust increases with age.^[18,23] Older people believe themselves to be more susceptible to diseases due to the association between old age and sensitivity to (infectious) diseases.^[10,18,23]

Disgust sensitivity is crucial since it can affect eating patterns and, indirectly, body mass index.^[7] Higher disgust sensitivity scores are connected with decreased appetite for high-calorie foods, suggesting that a reduced sensitivity to disgust may contribute to obesity by enabling overconsumption of particular foods.^[24,25] In line with previous research, we find

	Model 1					Model 2				
	$\beta 1$ (%95 CI)	SE	$\beta 2$	t	p	$\beta 1$ (%95 CI)	SE	$\beta 2$	t	p
Picky Eating										
(Constant)	2.001 (1.592 - 2.41)	0.208		9.633	<0.001	1.424 (0.892 - 1.956)	0.270		5.277	<0.001
Age	0.013 (0.008 - 0.017)	0.002	0.338	5.024	<0.001	0.011 (0.006 - 0.015)	0.003	0.284	4.185	<0.001
Gender	0.191 (0.071 - 0.311)	0.061	0.203	3.138	0.002	0.126 (0.001 - 0.25)	0.063	0.133	1.986	0.018
Income	0.02 (-0.04 - 0.08)	0.030	0.041	0.652	0.515	0.043 (-0.018 - 0.103)	0.031	0.088	1.391	0.166
BMI	-0.01 (-0.023 - 0.003)	0.007	-0.092	-1.466	0.144	-0.004 (-0.017 - 0.01)	0.007	-0.037	-0.578	0.564
FDS		----				0.144 (0.057 - 0.232)	0.045	0.228	3.245	0.001
Adj. R ²	F=18.327; p<0.001; Adj.R ² = 0.245					F=24.630; p<0.001; Adj.R ² = 0.356				
Δ Adj. R ²	----					F=37.204; p<0.001; Adj.R ² = 0.112				
Texture Based Rejection										
(Constant)	0.428 (-0.256 - 1.111)	0.347		1.234	0.219	-1.008 (-1.868 - -0.148)	0.436		-2.310	0.022
Age	0.017 (0.009 - 0.025)	0.004	0.274	4.034	<0.001	0.012 (0.004 - 0.020)	0.004	0.192	2.903	0.004
Gender	0.377 (0.167 - 0.587)	0.107	0.241	3.538	<0.001	0.295 (0.093 - 0.496)	0.102	0.189	2.881	0.004
Income	-0.001 (-0.102 - 0.099)	0.051	-0.002	-0.029	0.977	0.055 (-0.042 - 0.153)	0.049	0.069	1.113	0.267
BMI	0.004 (-0.022 - 0.023)	0.011	0.003	0.044	0.965	0.015 (-0.007 - 0.037)	0.011	0.086	1.379	0.169
FDS		----				0.360 (0.218 - 0.502)	0.072	0.342	4.999	<0.001
Adj. R ²	F=11.697; p<0.001; Adj.R ² = 0.157					F=15.424; p<0.001; Adj. R ² = 0.252				
Δ Adj. R ²	----					F= 24.986; p<0.001; Adj.R ² = 0.096				

Model 1: Age and sex, income, BMI as variables. Model 2: Additionally, added FDS short score. 1: Unstandardized Coefficients; 2: Unstandardized Coefficients Gender: 0=men, 1=women; Bold values p<0.05

that there is an inverse correlation between disgust sensitivity and body mass index.^[7,26]

Another demographic component, income level, was found to be associated with food aversion, and a negative correlation was discovered. It is assumed that as one's income increases, so does one's exposure to a wider range of foods. As a result, these individuals are more likely to be exposed to a wider range of food disgust elicitors, which may lead to a decrease in food disgust sensitivity.^[27]

We also examined, whether or not a disgust for food is linked to picky eating and the rejection of foods based on their textures in this study. The results indicated that participants with a higher FDS-short score had a higher APEQ score and texture-based rejection score. In the study by Egolf et al.^[18] food disgust sensitivity alone explained 11.4% of the variance in picky eating and 14.1% of texture-based rejection. Our results in line with previous study^[18] and model (Table 4) indicates that food disgust alone accounted for 11.2% of the variance in picky eating and 9.6% of texture-based rejection. It has been hypothesized by Kauer et al. (2015), it's possible that picky eaters are hypersensitive to some aspects of food's sensory qualities (such its taste, appearance, or texture), which causes them to reject food.^[11] People who have a high sense of disgust are more prone to reject foods with lumps and foreign objects, which can trigger associations with contamination and decay. Additionally, it's likely that disgust and picky eating can strengthen each other.^[18] Food texture may indicate potentially dangerous deterioration conditions.^[28] Foods having a chewy, slippery, or creamy texture are more likely to be rejected by people with high food disgust sensitivity.^[11] It would appear that slimy surfaces or changes in texture are common causes of disgust since they frequently suggest the presence of microorganisms and foods that might be dangerous.^[28] Given the preventative role of disgust in illness avoidance, it is not surprising that sensitivity to certain textural qualities and sensitivity to food distaste are linked.

Finally, some important limitations and strengths must be considered to be evaluated. Firstly, the study's use of a cross-sectional design, which prevented the establishment of causal conclusions. Secondly, only behavioural measurements were utilised in this research, which may restrict the generalizability of the results. In spite of these limitations, the findings of the research are significant for future research since this was the first study to investigate the association between food disgust and picky eating, as well as texture based rejection of foods, in Turkish adults.

CONCLUSION

Finally, the results of this research showed that there was a relationship between food disgust and picky eating and texture-based rejection. This study revealed that those with high FDS scores had pickier eating habits and rejected items with a certain texture more frequently than those with low FDS scores.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the Ethics Board of Gaziantep Islam Science and Technology University (Date: 27.09.2022, Decision No: 2022/146).

Informed Consent: All participants signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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