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Research Article

Does Eating Disorders and Flexible Dietary Control Effects the Food Craving Arise?

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Abstract

It is a hypothesis often thought that food craving may be associated with particularly strict dietary control. However, it is often not thought that a similar situation can be associated with flexible diet control, and even that it can even lead to eating disorder. Therefore, research on flexible diet control and food craving has been very limited to date.

This study was planned on 500 voluntary adults to determine the relationship of eating disorders with flexible diet control and food craving in adults. Data was collected via Scoff Eating Disorders Scale, Flexible Control of Eating Behavior and, Food Craving Questionnaire. Among the participants, 27% of women and 19.5% of men are in a position to be considered at risk for eating disorders and totally, 55.8% of the participants are not predominantly inclined to flexible diet. As the number of skipping meals increased, the score obtained from the Food Craving Questionnaire score increased by 5,120 while the number of dieting increases, the score obtained from the SCOFF scale increases by 0.322. There was a decrease of 18.766 in the Food Craving Questionnaire score, 1.492 in the Flexible Control of Eating Behavior score, and 0.998 in the SCOFF score in individuals who had been on a diet before.

It would be advisable to elicit cravings by means of manipulations able to modulate affective states, feelings of control over eating. The goal would be to elicit and extinguish the craving dimensions that might be most relevant to food craving, negative affect and lack of control according to the present research.

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Introduction

Eating Disorders (EDs) are one of the serious psychiatric disorders with an increasing frequency and prevalence in the world. It is an important disease that negatively affects the quality of life and can pose a life risk. The tendency to become chronic makes both the treatment of EDs and the recognition of risk factors critical. Promoting healthy, viable, and sustainable eating behaviors is one of many goals of public health approaches to eating disorder prevention [1]. Risks, related to the development of EDs, are defined in people who adopt flexible, rigid, or excessive eating patterns.

Because research has reported an association between rigid dietary control and disordered eating, such prevention programs often, encourage a flexible diet approach rather than a rigid dietary approach [2,3]. Rigid dietary control involves an all-or-nothing approach to eating. Flexible diet control involves a gradual approach to eating characterized by behaviors such as eating smaller amounts to regulate body weight, being conscious of the foods consumed, and compensating at subsequent meals if "unhealthy" foods were consumed at previous meals [4]. According to this understanding, if eating behavior is strictly controlled, this restriction pattern may trigger more eating disorder patterns [5]. While previous research has reported links between flexible dietary control and positive health outcomes, there has been some recent concern about this [3,6].

Extreme food demand, especially often seen in adults, is defined as an intense craving for a specific food, which is difficult to resist [7]. In a study conducted with university students, it was determined that 94% of the students had a tendency to extreme food demand [8]. In another study, it was determined that 20.8% of women and 13% of men had an excessive desire for a food once a week [9]. It has been reported that extreme food demand is motivated by factors such as hedonic and physiological hunger and is closely related to EDs [10]. On the other hand, high flexible diet control was found to be associated with low levels of susceptibility to extreme food demand [4].

It is considered that the dramatic increase in EDs in the population, and the progress of nutrition science coupled with the growth of nutritionist in popular discourses have been influencing the search for health by rigid means. EDs represent the best examples of a troubled relationship with food and preoccupation (excessive and constant thoughts) about shape/weight and eating. Thus, it is common to believe that food cravings are wrong or responsible for the failure of treatments. In this scope, we targeted to determine the relationship of EDs with flexible diet control and food craving in adults.

Methods

The study is a descriptive and cross-sectional study conducted in the capital of Turkey, Ankara. The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics

Committee at the Gazi University, Approval issue number 17 and study code 2021-1025. Informed consent was obtained from all the participants and/or their legal guardians. The research was carried out with voluntary adults aged 18-65 years and had no chronic diseases that requires therapeutic dieting. Though according to the G Power analysis, at the 85% confidence interval sample size of 386 participants was sufficient, the study was completed on 500 adults. Data was collected by face-to-face interview method via a questionnaire including socio-demographic information, health and nutrition information, Scoff Eating Disorders Scale, Flexible Control of Eating Behavior and Food Craving Questionnaire.

We used the 12-item Flexible Control subscale of the Cognitive Restraint Scale [4], to measure flexible control. Each item receives one point if the participant provides a response indicative of flexible control. Points are summed and those total scores range from 0 to 12 [11]. The Turkish validity and reliability of the scale was made by Çetin in 2019 [12].

The SCOFF questionnaire is a simple and highly effective, five-question screening measure to assess the possible presence of an eating disorder. These memorable, easily applied and scored instrument has been designed by Morgan et al. [13]. The Turkish validity and reliability was done by Aydemir et al. [14]. Answering "yes" to two or more of the following questions indicates a possible case of anorexia nervosa, bulimia nervosa, or other eating disorder.

Food Cravings Questionnaire Trait (FCQ-T) [15], measures the frequency and intensity of a person's food craving experiences in general. Its validity and reliability in Turkish was carried out by Akkurt et al. [16]. The questionnaire consists of 39 items that are scored on a six-point scale ranging from 1 = "never" to 6 = "always" Higher scores indicate more food cravings.

SPSS 22.0 program was used for statistical analysis and significance was evaluated at the $p<0.05$ or $p<0.01$ level. Statistical significance of the scores obtained from the scales was examined with the Chi-square or Mann Whitney U test. Using a multivariate linear regression model, the independent effects of different personal characteristics on scale scores were examined. The correlation levels of the scales with each other were analyzed with Pearson Correlation analysis.

Results

The mean age of the individuals (34.8% male and 65.2% female) was 25.5±9.5. While 28.2% of the participants stated that they skipped a meal during the day, it was determined that the most skipped meal was lunch (49.2%). While 27.2% of the participants stated that they had been on a diet before, 36% stated that they did the diets they heard about through the media, and 30.9% stated that they were on a diet with the help of a dietitian.

The distribution of individuals with and without risk for EDs according to the SCOFF scale is shown in table 1. Accordingly, 27% of women and 19.5% of men are in a position to be considered at risk for EDs. However, these results are not at a statistical significance level ($p>0.05$).

The median value for the Flexible Control of Eating Behavior Scale was determined as six in this study. Those who score below 6 points on this scale are not predominantly inclined to flexible diet, while those who score 6 points and above are predominantly inclined to flexible diet. Accordingly, it can be said that 55.8% of the participants in the study are not predominantly inclined to flexible diet, while 44.2% of them are predominantly inclined to flexible diet. 41.4% of women and 45.7% of men are more inclined to flexible diet. The distribution of the sub-factors of the Food Craving Questionnaire and total score averages by gender is as shown in table 2. According to these values, it is seen that female get higher scores than male only on Factor 2, that is anticipation of positive reinforcement ($p<0.05$). There is no statistical significance between other sub-factors or total scores ($p>0.05$).

Cut-off Value	Male (n=174)		Female (n=326)		Total (n=500)			
	n	%	n	%	n	%	X^2	p^a
<2-no risk	140	80.5	238	73.0	378	75.6	3.41	0.65
≥2-risk	34	19.5	88	27.0	122	24.4		
Total	Mean	SS	Mean	SS	Mean	SS	p^b	
	1.2	0.39	1.2	0.44	1.2	0.42	0.65	

Table 1: Distribution of SCOFF scores according to cut-off value and gender.

Note: a: Chi-square, b: Mann-Whitney U, $p<0.05$

Sub-Factors	Male (n=174)	Female (n=326)	Total (n=500)		
	X ±SS	X ±SS	X ±SS	X^2	p
Factor 1	8.3±3.9	8.5±3.8	8.4±3.9	12.26	0.65
Factor 2	16.2±6.5	16.4±6.1	16.3±6.2	38.43	0.04*
Factor 3	9.4±4.2	9.5±3.8	9.4±3.9	10.41	0.79
Factor 4	15.8±7.4	15.3±7.3	15.5±7.3	28.86	0.52
Factor 5	15.1±8.1	14.6±7.6	14.8±7.8	31.66	0.58
Factor 6	13.1±5.1	12.9±4.7	12.9±4.8	23.44	0.26
Factor 7	9.6±5.6	10.6±5.5	10.3±5.5	26.48	0.15
Factor 8	11.1±5.3	10.9±4.7	11.0±4.9	27.38	0.12
Factor 9	6.8±3.7	7.2±3.8	7.1±3.8	14.08	0.51
Total	105.6±41.4	105.9±39.4	105.8±40.1	130.51	0.83

Table 2: Distribution of Food Craving Questionnaire scores according to sub-factors and gender.

Note: *p<0.005, ** p<0.001

Regression analysis was performed to determine the effect of the factors, are gender, meal skipping status, whether or not dieting before, and the number of dieting, mentioned on the scale scores (Table 3). As a result of the analysis, no significant regression results were found between gender and scales scores. On the other hand, as the number of skipping meals increased, the score obtained from the Food Craving Questionnaire score increased by 5.120. However, no relationship was found between the other scales and the status of skipping meals. In the situation of dieting, it is seen that there is a decrease in the scale scores. It is seen that there is a decrease of 18.766 in the Food Craving Questionnaire score, 1.492 in the Flexible Control of Eating Behavior score, and 0.998 in the SCOFF score in individuals who have been on a diet before. There is a positive correlation between the number of dieting and the SCOFF scale. Accordingly, as the number of dieting increases, the score obtained from the SCOFF scale increases by 0.322.

When the relationship between the scales is examined (Table 4), it is seen that there is a positive correlation between the total and all

	Food Craving Questionnaire				Flexible Control of Eating Behavior				SCOFF			
	R^2	B	SE	p	R^2	B	SE	p	R^2	B	SE	p
Gender	0.226	-2.312	3.701	0.532	0.149	-0.008	0.204	0.969	0.179	0.048	0.262	0.600
Skipping Meals		5.120	2.091	0.015*		-0.093	0.115	0.421		-0.027	0.091	0.599
Dieting		-18.766	3.950	0.000**		-1.492	0.218	0.000*		-0.998	0.051	0.000**
Number of Diet		3.110	4.709	0.510		0.411	0.247	0.098		0.322	0.136	0.019*

Table 3: Evaluation of risk factors for scales by linear regression analysis.

Note: *p<0.005, ** p<0.001

sub-factor scores of the Food Craving Questionnaire and the SCOFF scale. A similar positive correlation is seen between SCOFF and the Flexible Control of Eating Behavior. However, while there was a positive correlation between the Flexible Control of Eating Behavior and Factor 1 and Factor 9 of the Food Craving Questionnaire, there was no correlation between other factors or the total score.

Sub-factors of Food Craving Questionnaire	SCOFF	Flexible Control of Eating Behavior
Factor 1	0.392**	0.115*
Factor 2	0.301**	0.032
Factor 3	0.267**	0.016
Factor 4	0.412**	0.062
Factor 5	0.376**	0.072
Factor 6	0.248**	-0.032
Factor 7	0.349**	0.048
Factor 8	0.343**	0.011
Factor 9	0.514**	0.285**
Food Craving Questionnaire Total Point	0.429**	0.074
SCOFF	1.000	0.260**

Table 4: Pearson correlation coefficients between sub-factors of Food Craving Questionnaire, SCOFF and Flexible Control of Eating Behavior scores.

Note: *Correlation is significant at the 0.05 level and 2-tailed correlations were used.

**Correlation is significant at the 0.01 level and 2-tailed correlations were used.

Discussion

In this present study, the relationship among flexible diet controls, disordered eating behavior and excessive food cravings in adults was evaluated and the changes in these parameters were investigated according to gender and dieting status. Although it was not found to be significant it was not surprising that the percentage of females at risk of disordered eating behavior was higher than males. This finding is similar to the study results, conducted by Liu et al, the percentage of those at risk of disordered eating behavior has been found to be higher in females than in males, as a result of the SCOFF scale evaluation [17]. The reason for the higher presence of EDs in women, which is also supported by similar studies [18-20], may be due to the fact that men's food cravings and expressing their eating problems are less reflective [21]. Contrary to these findings, another study in which disordered eating was evaluated using SCOFF found no significant differences by gender [22]. The results of these studies may partly explain the fact that disordered eating was found to be lower in males than in females, although it was not statistically significant. Moreover, in this study, it was shown that "anticipation of positive reinforcement that may result from eating" was significantly higher in females. In support of this finding, many previous studies have reported that uncontrolled eating and emotional eating are more common in females than in males [23,24]. Contrary to these findings, in another study, it was reported that there was no significant difference between genders in eating behaviors and food craving parameters, differing from other studies in the literature [25]. It is thought that this change between studies is due to the difference in the mean age of the individuals included in the study. In the previous study, it has been suggested that the differences in eating behavior between the genders become more evident in middle ages, but that differences may not begin to emerge at younger ages such as 25-30 years [25]. In the present study, differences in eating behavior were determined between males and females in the participants, whose mean age are 25.5±9.5 years and predominantly consist of young adults.

In this study, it was observed that as the number of skipping meals increased, the score obtained from the Food Craving Questionnaire increased by 5.120. Similar to this study, in other studies, dietary restrictions such as skipping meals, which could be considered unhealthy, have been determined to increase eating behavior [26,27]. In a similar study, when the relationship between dietary restriction and FCQ was investigated, it was reported that there was an increase in controlled eating deficiency and hunger as a result of restriction. Moreover, in addition to the absence of a significant reduction in food cravings as a result of dietary restriction, only a decrease in carbohydrate cravings has been reported in males [28]. Food cravings have been reported to explain 11% of eating behavior patterns [29]. However, the relationship between dieting and food cravings varies according to the results of the literature. Some of the studies have shown that dieting increases food craving [30], while others report that it decreases [31,32], or no change [33]. In this study, it was shown that dieting significantly reduced food cravings according to the FCQ scores. In addition, flexible diet control and impaired eating behavior scores decreased with dieting status. Diet models that limit total energy intake have been stated to change eating behaviors in a positive way [34]. Diet models that limit food intake by cognitively controlling the individual's eating less than his/her own desire have been known not to increase food cravings and are useful in weight control [35,36]. In addition to these results, it has been shown that hunger perceived by the individual can also decrease after long-term energy restriction [37]. Researchers who argue the opposite said that long-term energy restriction can increase hunger and that more studies are needed to determine this relationship [38]. On the other hand, it has been reported that even in the absence of hunger, the cravings for certain foods change during the implementation of diet models and should be investigated again [39]. In this study, it was shown that the disordered eating score decreased significantly with dieting status. Since dieting behavior usually precedes the disordered eating,

determining the status of dieting has been characterized as a selective factor for individuals at risk of disordered eating [40]. However, since the concept of dieting represents a wide spectrum, different definitions are made for what constitutes the diet and how the diet content characterizes the disordered eating [41]. In addition to the confounding effect of many different diets, such as carbohydrate restriction, energy restriction, and time-restricted eating patterns, studies are needed to evaluate them as risk factors for the onset of disordered eating [42]. However, despite this confusion of concepts, there are also studies that define dieting status as an indicator of disordered eating [43,44], although our study results do not support this approach. It is thought that many factors such as self-esteem, presence of depressive symptoms, level of body satisfaction, unhealthy attitudes in eating behavior should be evaluated in establishing the relationship between dieting and disordered eating. It is a fact that peer dietary norms and environmental pressures should also be evaluated, especially in this study group, where young adults are predominant.

In the current study, a positive statistically significant relationship was found between EDs with flexible diet control and food craving. Studies have similarly shown that the inability to resist the urge to eat is associated with a loss of control over eating, which can be associated with a disordered eating [45,46]. Contrary to the finding obtained in this study, studies have shown that rigid dietary control rather than flexible dietary control is associated with EDs [47,48]. However, it has also been reported that there is no consistently support the relationship between flexible diet control and health outcomes [6], and the significant correlation found between flexible diet and strict diet in several studies leads to question whether these behavioral styles differ from each other [47]. In another study, it has been reported that flexible diet control was associated with a lower risk of disordered eating only when rigid dietary control was taken into account [49]. Therefore, it is premature to recommend flexible dietary control at the public health level until both its effects on health outcomes and its association with disordered eating is further clarified. Although there are studies showing a relationship between flexible diet control and positive health outcomes, it is thought that it is too early to develop a strategy to recommend flexible diet control.

Conclusion

According to the results of the study, it was determined that there is a negative relationship between dieting and food cravings, flexible diet control and disordered eating. It has also been shown that EDs is associated with food cravings and flexible diet control. Although there is a need for more in-depth studies investigating the effects of dieting on food cravings and EDs, this study showed that diet can inhibit the urge to consume food without the feeling of hunger and reduce the risk of disordered eating. In studies investigating EDs, food cravings should also be taken into account to support the treatment. During treatment, the nutrition team works on unconditional permission to eat, combined with signs of hunger and satiety, awareness of food craving and emotional triggers. The act of eating occurs for physical rather than emotional reasons, but food craving can still be fulfilled. For better understanding, further studies should conduct to determine the relation between EDs and controlling the food craving on larger population.

The strength of this study is that it provides the opportunity to evaluate many parameters together. In this way, it has been possible to examine the eating behavior in relation to many variables. On the other hand, as the study participants were predominantly female, the results of the study cannot be attributed to the general population. Also the anthropometric measurements data would clarify the relation between the disordered eating status, flexible diet control scores and food craving scores.

Declarations

Ethics Approval and Consent to Participate

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee at the Gazi University, Approval issue number 17 and study code 2021-1025. All participants were informed and consent was obtained before data collection.

Consent for Publication

Not applicable.

Availability of Data and Materials

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

Competing Interests

The authors declare they have no competing interests.

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Author's Contribution

The authors have contributed to the manuscript as following; SB supervised the project. BA, HM, SK, SNV collected data. BA data analysis. BA, HM wrote the manuscript. All authors have read and approved the final manuscript.

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