Research article
Ερευνητική εργασία

Validation study of the Food Craving Questionnaire-Trait: Reduced in Greek population

K. Koutoulogenis, F. Gonidakis, M. Giannakoulia, M. Vasiliadou

First Department of Psychiatry, University of Athens Medical School, Athens, Greece

Psychiatriki 2020, 31:118–128

Food craving (FC) is a behavior which results in an increased total energy intake. It is considered to be a multivariate outcome of (neuro)biologicals and environmental alterations that mostly impacts in bulimic and binge-eating behaviors. FC measurement questionnaires vary in the literature, with the most widely used being the Food Craving Questionnaire-State, Trait and Trait-reduced. The purpose of the current study was the validation of the Food Craving Questionnaire-Trait-reduced (FCQ-T-r) in Greek population. Along with the FCQ-T-r, the Eating Attitude Test-26 (EAT-26) was used for the evaluation of nutritional behavior, as well as the General Health Questionnaire-28 (GHQ-28) for assessing the health of the sample and a self-generated questionnaire for demographic information and anthropometric measurements. The Principal Component Analysis (PCA) confirmation was made with Monte-Carlo Parallel Analysis (PA). The FCQ-T-r showed a high internal consistency (Cronbach's Alpha=0.927) explaining up to 62.5% variance of the sample. The PCA indicated a two-factor solution (Thoughts & Emotions and Lack of Control) highly correlated with 14 questions in contrast from the original version which consists one-factor with 15 questions. The Monte-Carlo PA confirmed these findings. Additionally, statistical significantly and positively weak to moderate correlations have been observed between the total score of FCQ-T-r with the EAT-26 (r=0.28), EAT-Dieting (r=0.27), EAT-Bulimia (r=0.41) and the GHQ (total score and sub-scales r=0.17 to 0.24). Concurrent, its sub-scales Thoughts & Emotions and Lack of Control were statistical significantly stronger correlated with EAT-Dieting (r=0.24/0.38), EAT-Bulimia (r=0.27/0.37) and lower with GHQ and its sub-scales (total score and sub-scales r=0.15 to 0.29). The above results suggest fair psychometric properties and validity of the FCQ-T-r that could be a useful tool for indicating-measuring the tendency of food craving and possibly the eating behavior.

Key words: Food craving, compulsive eating, eating behavior, eating disorders, validation study.

Introduction

Food Craving (FC) is characterized as the urge or impulsion for consuming a specific or unspecific type of food.[1] It mainly presents in obesity,[2] emotional eating,[3,4] binge-eating disorder and bulimia nervosa,[5,6] with multiple factors being involved in its development. Women report higher FC compared to men[7–11] which may be partially explained by differences in their endocrine system. Although race[10] does not seem to be involved in the pathogenesis of FC, different traditions[12] and local nutritional behaviors[13,14] constitute significant environmental factors that influence food intake, and hence could be potential triggers for FC. Neurobiological[15] (serotonergic/dopaminergic system) and endocrinological[16] assumptions (appetite-satiety regulation), as well as medication,[17–19] have been studied in FC. Collectively these assumptions associate FC with the involvement of regulatory brain mechanisms which occur in various regions of the brain cortex.[20,21] Furthermore, the phenomenological aspect of FC has been studied,[22–24] providing differential diagnostic value between Eating Disorders.[25–27] Hallam et al[7] support that food craving is an experience well known to up to 90% of the population. Meule et al[28] created the FQC-T-r based on the longer Food Craving Questionnaire-Trait initially generated by Antonio Cepeda-Benito et al.[29]

The present questionnaire aims to identify the tendency for food consumption among a population with eating disorders.[1,30] The FCQ-T-r has been translated into and used in a variety of languages. Studies conducted among the Italian general population,[31] the USA[9] student population, and German[32] and English[33] populations have shown a high interval consistency and test-retest validity. The FCQ-T-r has been used for the evaluation of FC between men and women,[7,34,35] in people on a diet plan[32] and between overweight and obese samples,[28] suggesting potential associations between FC, body weight and impulsivity.[36]

The purpose of the present study is to evaluate the validity of the FCQ-T-r when used among the Greek population.

Material and method

Permission to use the FCQ-T-r has been granted by its publisher Adrian Meule, researcher at the Salzburg University department of psychology, after contacting him via email. Initially, the questionnaire was translated into the Greek language by a Greek dietician proficient in the English language. Subsequently, the translation was back translated by another Greek dietician PhD candidate. The translations indicated adequate and minor syntax corrections in the Greek version. Then, a pilot study of 13 people was conducted, aiming to estimate the approximate time needed to ensure subject understanding and completion of the questionnaire. The questionnaire was then administered to adult volunteers in Attica, Athens. A total sample of 183 men and women was collected. Sample collection was carried out in gathering places (such as public and private working services and 2 post-graduate programs). The EAT-26, the GHQ-28 and a self-created/self-completed questionnaire with demographic information and anthropometric measurements were also administered to further characterize the dietary intake, demographic status and anthropometry of the participants.

The FCQ-T-r contains 15 Likert-type questions with 6 possible answers (Never/Not Applicable-Always). It is self-completed with a score range between 15-90; a low score suggests a low food craving experience while a high score high food craving experience.

The Eating Attitudes Test (EAT-26) by Garner and Garfinkel is the most well-known, self-completed eating behaviors[37] screening tool. Validated by Simos[38] in 1996, it consists of 26 Likert-type questions with 6 possible answers ranging from 1 to 3. A total score of higher than 20 suggests disrupted eating attitude. The questionnaire contains 3 subscales: dieting, bulimia and oral control.

The General Health Questionnaire-28 (GHQ-28), designed by Goldberg,[39] can be used in three distinct editions consisting of 28, 30 and 60 questions respectively. In the initial edition, the 28 questions were categorized under four sub-scales relating to:

(a) somatic symptoms, (b) anxiety and insomnia, (c) social dysfunction and (d) severe depression. The GHQ-28 scale has already been validated for the Greek population.[40] Also, different types of scoring have been suggested for the GHQ scale. The scoring used was on-off type.

Statistical analysis was utilized with SPSS (for Windows, version 25.0, SPSS Inc., Chicago, IL, USA). The nonparametric Spearman's rank correlation test was used to explore potential correlations after a Kolmogorov-Smirnov test indicating a non-nominal variable distribution. Reliability test/internal consistency Cronbach's alpha was computed along with Factor Analysis (Principal Component Analysis, PCA), and the components crossover was evaluated by Monte Carlo (PCA for Parallel Analysis, 2010 by Marley W. Watkins). Results were expressed as medians, minimum-maximum, 25th and 75th quartiles and a p value <0.05 was determined as a statistically significant level.

Results

Participants' characteristics

A sample size of 183 phenotypically healthy adults (table 1) were included in the present survey, with 31.1% being men aged 18 to 69 years, and 68.9% women 20 to 65 years old. The 75% of men were younger than 36 years old, with a BMI lower than 26.6 kg/m^2. Similarly, 75% of women were younger than 35 years old, with a BMI lower than 23.9 kg/m^2 respectively. Of note is the fact that 7% of all participants were receiving a nutritional supplement or medication that do not seem to affect FC.

Most participants were single, having completed higher education; 19.3% and 32.5% of men and women respectively were undergraduate students (table 2).

Characteristics of FCQ-T-r before the rotation

Before the Principal Components Analysis (PCA), interval consistency (Cronbach's alpha) of the scale was calculated, α=0.93, which is considered satisfactory. Subsequently, we applied PCA without rotation. Correlations between the items were posi-

Table 1. Anthropometric measurements of the sample

	Men (N=57, 31.1%)					Women (N=126, 68.9%)				
	Median	**25o quartile**	**75o quartile**	**Minimum**	**Maximum**	**Median**	**25o quartile**	**75o quartile**	**Minimum**	**Maximum**
Age	30	26	36	18	69	27	24	35	20	65
Height	1.79	1.76	1.83	1.68	1.92	1.65	1.60	1.70	1.50	1.87
Weight	78	74	85	55	170	60	53	66	43	95.3
BMI	24.9	22.6	26.6	18.1	38.4	21.8	20	23.9	16,8	33.4

BMI: Body Mass Index

Table 2. Demographic characteristics of the sample

		Men		Women	
		N	(%)	N	(%)
Marital status	Single/Unmarried	44	77.2%	99	78.6%
	Married	13	22.8%	25	19.8%
	Separated	0	–	2	1.6%
Education	Primary school	0	–	0	0%
	Secondary school	0	–	1	0.8%
	High school	6	1.5%	4	3.2%
	Vocational Training institute	3	5.3%	3	2.4%
	Technological Educational institute	7	12.3%	6	4.8%
	Higher Education institutions	21	36.8%	45	35.7%
	Postgraduate studies	17	29.8%	66	52.4%
	PhD studies	1	1.8%	1	0.8%
	Post-doctorate studies	2	3.5%	0	–
Profession/Job	State employee	13	22.8%	14	11.1%
	Private employee	22	38.6%	46	36.5%
	Freelancer	9	15.8%	20	15.9%
	Housekeeping	0	–	3	2.4%
	Student	11	19.3%	41	32.5%
	Unemployed	1	1.8%	1	0.8%
	Retired	1	1.8%	1	0.8%

tive and high, so we continued the analysis with promax rotation.

Characteristics of FCQ-T-r after the rotation

The Barlett Test was statistically significant, indicating that the correlation matrix is significantly different from the identity matrix. The KMO Test calculates the adequality of the sample. Values greater than 0.5 are satisfactory (KMO of the analysis was 0.909). The eigenvalues of components and scree plot (figure 1) showed the existence of 2 components. The verification of this result was achieved by using the parallel analysis of Monte Carlo, which replicates the analysis of the matrix 1 to 1000 times, calculating the average of every component's eigenvalues. If the eigenvalues of SPSS are greater than the Monte Carlo algorithm, then the factor can be accepted. The eigenvalues

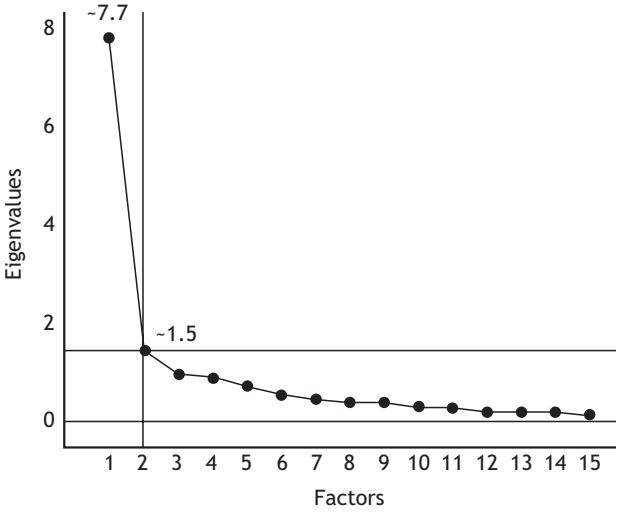

Figure 1. Scree plot from the Principal Component Analysis revealed 2 factor components. Although, a third factor was present but rejected. Two-factor solution was more suitable because 3rd factor's eigenvalue was approximately 1.1 and consisted only 1 question.

yielded from parallel analysis of the 1st component was 1.523 (7.735 from SPSS) and was 1.402 for the 2nd (1.477 from SPSS). PCA indicated a two-factor solution. Together, the two factors explained 61.4% of the variance. The 15 items presented high communalities in the factor to which they belonged. However, item 8 was loaded highly in both factors. In the 1st and 2nd the loads were 0.432/0.352 respectively. PCA was applied again with the model without item 8, the same rotation but with 2 fixed numbers of factors. The main focus was to evaluate the new model in total and compare it with the previous one. Finally, without item 8 in the 1st factor 9 items were loaded and in the 2nd 5 items highly and separately (table 3). There was a slight increase of the explained variance (about 62.5%) and KMO Test (0.898) while Cronbach's Alpha (α=0.927) slightly decreased. Lastly, after reviewing the items of each factor, the 1st was found to be associated with thoughts and feelings about food, and the 2nd was about the loss of control, while one question related to food stimuli. Accordingly, the 2-factor structure was named ''Thoughts & Emotions'' and ''Lack of Control.''

Main focus was to evaluate in total and comparatively the new model with the previous. Finally, without item 8, in the 1st factor 9 items were loaded and in the 2nd 5 items highly and separately (table 3). There was a slightly increase of the explained variance (about 62.5%) and KMO Test (0.898) as well as Cronbach's Alpha (α=0.927) slightly decreased. Lastly, after reviewing the items of each factor, the 1st was found associated with thoughts and feelings about food, in addition with the 2nd which was about the loss control and one question related with food stimuli. Accordingly, the 2-factor structure were named ''Thoughts & Emotions'' and ''Lack of Control.''

Correlations with FCQ-T-r

The total score of the FCQ-T-r and its 2 sub-scales were weakly positively correlated with the EAT-26 except for the FCQ-T-r total score which was moderately positively correlated with the sub-scale EAT-bulimia. The EAT-oral control was not associated

Table 3. Factor/Item loading before and after the rotation promax

	Loading with presence of item 8		Loading without presence of item 8	
Factors/Components	**1**	**2**	**1**	**2**
item12	0.914		0.908	
item6	0.856		0.849	
item14	0.805		0.800	
item4	0.755		0.754	
item13	0.704		0.704	
item5	0.687		0.684	
item3	0.682		0.680	
item7	0.599		0.598	
item10	0.594		0.594	
item8	0.432	0.352	-	-
item2		0.970		0.963
item9		0.921		0.911
item1		0.864		0.860
item11		0.693		0.694
item15		0.629		0.626

with any score of the FCQ-T-r. Likewise, very weakly to moderately positive correlations were presented between the FCQ-T-r, the GHQ and sub-scales. As for the anthropometric measurements, a weakly positive correlation was found between the Lack of Control sub-scale and weight and BMI (table 4).

Discussion

To our knowledge, this is the first study that validates the FCQ-T-r in the Greek population. The FCQ-T-r showed high interval consistence (α=0.927), explaining up to 62.5% variance of the sample. In the Greek version of the FCQ-T-r, PCA indicated a two-factor solution, with 1st consisting of nine items associated with thoughts and emotions about food, and the 2nd of five items associated with loss of control while eating or exposed to food stimuli. The Greek version of the FCQ-T-r has a comprehensively different structure from the existent validations carried out in various populations. It should be mentioned that the FCQ-T-r is a shortened form of the widely used FCQ-T with 39 items and 7 factors/components. The fifteen items of FCQ-T with the higher item loading composed the FCQ-T-r belonging in a single factor.[28] Validations in different populations revealed one factor as well[31,33,40,41] with high interval consistency but also the full version of the questionnaire had been previously validated. However, PCA of the questionnaire performed on an English population revealed a two-factor structure which afterwards was rejected by parallel analysis.[40]

Positive yet weak correlations were presented between the total score of FCQ-T-r and EAT-26 (r=0.28), and EAT-Dieting (r=0.27), but moderate correlation with EAT-Bulimia (r=0.41). Similarly were the correlations between the sub-scales Thoughts & Emotions and Lack of Control with EAT-Dieting and EAT-Bulimia (r=0.24/0.38 and r=0.27/0.37 respectively). Very weak to weak positive correlations were found between total score of FCQ-T-r with GHQ and its sub-scales (r= 0.16 to 0.26). Consistent to previous results, weight and BMI were only correlated with Lack of Control (r=0.22 and r=0.24 respectively). It is noteworthy to report that, controlling for gender, Spearman analysis showed higher statistically significant correlations near the moderate cut-off level. Nevertheless, we must consider the proportion of the gender in the sample.

The results of this study are partially in agreement with previous research. Hormes and Meule revealed the one factor structure of FCQ-T-r correlating slightly higher (moderatly) with the sub-scales of EAT-26, but not with BMI[39] as was found herein. In another study, Meule et al[28] found BMI to correlate with the score of FCQ-T-r. There is no direct references to evaluate the results regarding the relationship between the FCQ-T-r and the GHQ-28 but stress-depression[42] and sleep disorders[43,44] could affect food craving.

Limitations include the unequal distribution of males and females on age and education, the self-completed questionnaire of the anthropometric measurements, and the modest sample size. Previous studies which have been double or triple the size of the current study and have used online questionnaires, have produced findings not much different as from the correlations suggested herein.

In conclusion, the present study reveals that the Greek version of FCQ-T-r presents good psychometric properties and validity. As such, it could be used as a screening tool to detect problematic attitudes towards food such as inability of resisting or exercise control over food consumption, forced eating and generally problematic behaviors related to weight gain and obesity. Definitions of cravings have varied considerably across studies including a dual interpretation that could be used as an evaluation index and therapy for Eating Disorders. Food craving has mostly been used to study bulimia nervosa and binge-eating disorder. On the other hand, absence of food craving or propulsion for food consumption in patients with anorexia nervosa could provide useful information about the course of treatment. Intense propulsion could prognosticate the psychopathological alteration between restricting to binge-eating anorexia nervosa which commonly presents in clinical practice.

Table 4. Correlation of FCQ-T-r and sub-scales between the psychometric questionnaires and the anthropometric measurements

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. FCQ-T-r														
2. Thoughts & Emotions	0.95**													
3. Lack of Control	0.84**	0.64**												
4. EAT-26	0.28**	0.25**	0.28**											
5. EAT-Dieting	0.27**	0.24**	0.27**	0.83**										
6. EAT-Bulimia	0.41**	0.38**	0.37**	0.57**	0.28**									
7. EAT–Oral control	–0.13	–0.12	–0.11	0.38**	0.02	0.06								
8. GHQ-28	0.24**	0.25**	0.15*	0.29**	0.27**	0.27**	–0.05							
9. GHQ-Somatic Symptoms	0.24**	0.26**	0.15*	0.22**	0.18*	0.29**	–0.05	0.83**						
10. GHQ–Stress/ Insomnia	0.19**	0.21**	0.12	0.25**	0.22**	0.25**	–0.02	0.89**	0.66**					
11. GHQ–Social Dysfunction	0.17*	0.20**	0.07	0.27**	0.22**	0.24**	0.04	0.76**	0.48**	0.62**				
12. GHQ–Severe depression	0.17*	0.13	0.16*	0.09	0.15*	0.03	–0.08	0.57**	0.34**	0.49**	0.47**			
13. Weight	0.06	–0.05	0.22**	0.12	0.25**	0.05	–0.17*	–0.03	–0.12	–0.08	0.04	0.05		
14. BMI	0.09	0	0.24**	0.17*	0.33**	0.08	–0.25**	–0.03	–0.13	–0.06	–0.06	0.13	0.86**	

* $p<0.05$, ** $p<0.01$

APPENDIX

FOOD CRAVING QUESTIONNAIRE-TRAIT: REDUCED (FCQ-T-r)

ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ ΣΦΟΔΡΗΣ ΕΠΙΘΥΜΙΑΣ ΓΙΑ ΚΑΤΑΝΑΛΩΣΗ ΤΡΟΦΗΣ

Οδηγίες: Παρακαλείσθε να αναφέρετε με το Χ πόσο συχνά είναι αληθές κάθε από τα παρακάτω σχόλια για εσάς ΓΕΝΙΚΑ

	Ποτέ/ Δεν ισχύει	**Σπάνια**	**Μερικές φορές**	**Συχνά**	**Συνήθως**	**Πάντα**
1. Όταν έντονα λαχταρώ κάτι, ξέρω ότι δεν θα μπορέσω να σταματήσω να τρώω μόλις ξεκινήσω.						
2. Εάν φάω κάτι όταν το λαχταρώ έντονα, συχνά χάνω τον έλεγχο και τρώω πάρα πολύ.						
3. Κατά κανόνα, η σφοδρή λαχτάρα για τροφή με κάνει να σκέφτομαι τρόπους για να αποκτήσω αυτό που θέλω να φάω.						
4. Νιώθω ότι έχω το φαγητό στο μυαλό μου όλη την ώρα.						
5. Πιάνω τον εαυτό μου να απασχολείται με την ιδέα του φαγητού.						
6. Οποτεδήποτε έχω σφοδρή λαχτάρα για τροφή, πιάνω τον εαυτό μου να κάνει σχέδια να φάει.						
7. Λαχταρώ έντονα τροφές όταν είμαι θυμωμένος, στεναχωρημένος ή βαριέμαι.						
8. Μόλις ξεκινήσω να τρώω, δυσκολεύομαι να σταματήσω.						
9. Δεν μπορώ να σταματήσω να σκέφτομαι το φαγητό όσο σκληρά και να προσπαθώ.						
10. Εάν υποκύψω σε μια έντονη λαχτάρα για φαγητό, χάνω τον έλεγχο τελείως.						
11. Οποτεδήποτε έχω έντονη λαχτάρα για τροφή, εξακολουθώ να σκέφτομαι το φαγητό μέχρι πράγματι να το φάω.						
12. Εάν λαχταρώ έντονα/σφοδρά κάτι, οι σκέψεις για να το φάω με κατακλύζουν.						
13. Συχνά τα συναισθήματά μου με κάνουν να θέλω να φάω.						
14. Είναι δύσκολο για μένα να αντισταθώ στον πειρασμό να φάω εύγευστα φαγητά που μου είναι εύκολα προσβάσιμα.						

Μελέτη εγκυρότητας Ερωτηματολογίου Σφοδρής Επιθυμίας για Κατανάλωση Τροφής-Χαρακτηριστικά: Σύντομη έκδοση σε ελληνικό πληθυσμό

Κ. Κουτουλογένης, Φ. Γονιδάκης, Μ. Γιαννακούλια, Μ. Βασιλειάδου

Α' Ψυχιατρική Κλινική, Ιατρική Σχολή, Πανεπιστήμιο Αθηνών

Ψυχιατρική 2020, 31:118–128

Η Σφοδρή Επιθυμία για Κατανάλωση Τροφής (ΣΕΤ, Food Craving) αποτελεί συμπεριφορά που επιφέρει αύξηση της συνολικής ενεργειακής πρόσληψης. Η συμπεριφορά θεωρείται ότι είναι αποτέλεσμα (νευρο) βιολογικών μεταβολών και διατροφικών συνηθειών, κυρίως βουλιμικών και υπερφαγικών. Τα ερωτηματολόγια μέτρησης του ΣΕΤ ποικίλλουν στη βιβλιογραφία, με τα πλέον πιο διαδεδομένα το Food Craving Questionnaire-State, Trait και Trait-reduced. Στην παρούσα μελέτη, ερωτηματολόγιο Σφοδρής Επιθυμίας για Κατανάλωση Τροφής-Χαρακτηριστικά-σύντομη έκδοση (ΣΕΤ-Χ-σε, Food Craving Questionnaire-Trait-reduced) χορηγήθηκε σε ελληνικό πληθυσμό 183 ατόμων. Εκτός από το ΣΕΤ-Χ-σε χρησιμοποιήθηκε το Ερωτηματολόγιο Συνηθειών Διατροφής-26 (ΕΣΔ-26) για την αξιολόγηση της διατροφικής συμπεριφοράς καθώς, το Ερωτηματολόγιο Γενικής Υγείας-28 (ΕΓΥ-28) για την αξιολόγηση της υγείας του δείγματος καθώς και αυτο-συμπληρωμένο ερωτηματολόγιο δημογραφικών πληροφοριών και ανθρωπομετρικών στοιχείων. Η στατιστική ανάλυση πραγματοποιήθηκε με τη χρήση του SPSS έκδοση 25 και η επιβεβαίωση της Διερευνητικής Ανάλυσης Παραγόντων (ΔΑΠ) έγινε με τη χρήση της Παράλληλης Ανάλυσης (ΠΑ) Monte-Carlo. Το ΣΕΤ-Χ-σε παρουσίασε υψηλή εσωτερική συνέπεια (Cronbach's Alpha=0,927) η οποία ερμήνευε το 62,5% της διακύμανσης του δείγματος. Η ΔΑΠ υπέδειξε την ύπαρξη δύο παραγόντων (Σκέψεις & Συναισθήματα και Έλλειψη Ελέγχου) οι οποίες συσχετίζονταν ισχυρά με 14 λήμματα σε αντίθεση με την πρωτότυπη έκδοση που αποτελείται από έναν παράγοντα με 15 λήμματα. Η ΠΑ Monte-Carlo επιβεβαίωσε τα παραπάνω ευρήματα. Επιπροσθέτως, στατιστικά σημαντικές θετικά αδύναμες έως μέτριες συσχετίσεις παρατηρήθηκαν ανάμεσα στη συνολική βαθμολογία του ΣΕΤ-Χ-σε με το ΕΣΔ-26 (r=0,28), το ΕΣΔ-Δίαιτα (r=0,27), το ΕΣΔ-Βουλιμία (r=0,41) και το ΕΓΥ-28 (συνολική βαθμολογία και υποκλίμακες r=0,17 έως 0,24). Ταυτόχρονα, οι υποκλίμακες Σκέψεις & Συναισθήματα και Έλλειψη Ελέγχου συσχετίστηκαν στατιστικώς σημαντικά ισχυρότερα με το ΕΣΔ-Δίαιτα (r=0,24/0,38), το ΕΣΔ-Βουλιμία (r=0,27/0,37) και ασθενέστερα με το ΕΓΥ-28 και τις υποκλίμακές του (r=0,15 το 0,29). Τα παραπάνω ευρήματα υποδεικνύουν καλές ψυχομετρικές ιδιότητες και εγκυρότητα του ερωτηματολογίου ΣΕΤ-Χ-σε το οποίο θα μπορούσε να αποτελέσει ένα χρήσιμο εργαλείο για την αξιολόγηση της τάσης επιθυμίας για κατανάλωση τροφής και πιθανότατα της διατροφικής συμπεριφοράς.

Λέξεις ευρετηρίου: Σφοδρή επιθυμία, καταναγκαστική κατανάλωση, διατροφική συμπεριφορά, Διαταραχές Πρόσληψης Τροφής, μελέτη εγκυρότητας.

References

1. Taylor M. A review of food craving measures. *Eat Behav* 2019, 32:101–10, doi: 10.1016/j.eatbeh.2019.01.005
2. Boswell RG, Koberh H, Kober H. Food cue reactivity and craving predict eating and weight gain: a meta-analytic review. *Obes Rev* 2016, 17:159–77, doi: 10.1111/obr.12354
3. Van Strien T, Cebolla A, Etchemendy E, Gutiırrez-Maldonado J, Ferrer-Garcva M, Botella C et al. Emotional eating and food intake after sadness and joy. *Appetite* 2013, 66:20-5, doi: 10.1016/j.appet.2013.02.016

4. Christensen L. The effect of food intake on mood. *Clin Nutr* 2001, 20(Suppl 1):161–166, doi: 10.1054/clnu.2001.0420
5. Meule A, Küppers C, Harms L, Friederich H-C, Schmidt U, Blechert J et al. Food cue-induced craving in individuals with bulimia nervosa and binge-eating disorder. *PLoS One* 2018, 13:e0204151, doi: 10.1371/journal.pone.0204151
6. Cepeda-Benito A, Fernandez MC, Moreno S. Relationship of gender and eating disorder symptoms to reported cravings for food: construct validation of state and trait craving questionnaires in Spanish. *Appetite* 2003, 40:47–54, doi: 10.1016/s0195-6663(02)00145-9
7. Hallama J, Boswella RG, Devito EE, Kober H. Gender-related differences in food craving and obesity. *Yale J Biol Med* 2016, 89:161–73, doi: 10.1017/s0033291700021644
8. Rogers PJ, Smit HJ. Food craving and food "addiction": A critical review of the evidence from a biopsychosocial perspective. *Pharmacol Biochem Behav* 2000, 66:3–14, doi: 10.1016/S0091-3057(00)00197-0
9. Rodríguez-Martín BC, Meule A. Food craving: new contributions on its assessment, moderators, and consequences. *Front Psychol* 2015, 6:21, doi: 10.3389/fpsyg.2015.00021
10. Chao AM, Grilo CM, Sinha R. Food cravings, binge eating, and eating disorder psychopathology: Exploring the moderating roles of gender and race. *Eat Behav* 2016, 21:41–47, doi: 10.1016/j.eatbeh.2015.12.007
11. Souza LB de, Martins KA, Cordeiro MM, Rodrigues Y de S, Rafacho BPM, Bomfim RA. Do Food Intake and Food Cravings Change during the Menstrual Cycle of Young Women? *Rev Bras Ginecol Obstet* 2018, 40:686–692, doi: 10.1055/s-0038-1675831
12. Leroy F, Praet I. Meat traditions. The co-evolution of humans and meat. *Appetite* 2015, 90:200–11, doi: 10.1016/j.appet.2015.03.014
13. Komatsu S. Rice and sushi cravings: A preliminary study of food craving among Japanese females. *Appetite* 2008, 50:353–8, doi: 10.1016/j.appet.2007.08.012
14. Morris MJ, Beilharz JE, Maniam J, Reichelt AC, Westbrook RF. Why is obesity such a problem in the 21st century? The intersection of palatable food, cues and reward pathways, stress, and cognition. *Neurosci Biobehav Rev* 2015, 58:36-45, doi: 10.1016/j.neubiorev.2014.12.002
15. Ventura T, Santander J, Torres R, Contreras AM. Neurobiologic basis of craving for carbohydrates. *Nutrition* 2014, 30:252–256, doi: 10.1016/j.nut.2013.06.010
16. Begg DP, Woods SC. The endocrinology of food intake. *Nat Rev Endocrinol* 2013, 9:584–597, doi: 10.1038/nrendo.2013.136
17. Zimmermann U, Rechlin T, Plaskacewicz GJ, Barocka A, Wildt L, Kaschka WP. Effect of naltrexone on weight gain and food craving induced by tricyclic antidepressants and lithium: An open study. *Biol Psychiatry* 1997, 41:747–749, doi: 10.1016/S0006-3223(96)00523-9
18. Abbas MJ, Liddle PF. Olanzapine and food craving: A case control study. *Hum Psychopharmacol* 2013, 28:97–101, doi: 10.1002/hup.2278
19. Kluge M, Schuld A, Himmerich H, Dalal M, Schacht A, Wehmeier PM et al. Clozapine and olanzapine are associated with food craving and binge eating: Results from a randomized double-blind study. *J Clin Psychopharmacol* 2007, 27:662–666, doi: 10.1097/jcp.0b013e31815a8872
20. Contreras-Rodríguez O, Cano M, Vilar-López R, Rio-Valle JS, Verdejo-Romɑn J, Navas JF et al. Visceral adiposity and insular networks: associations with food craving. *Int J Obes* 2019, 43:503–511, doi: 10.1038/s41366-018-0173-3
21. Contreras-Rodríguez O, Martín-Pérez C, Vilar-López R, Verdejo-Garcia A. Ventral and Dorsal Striatum Networks in Obesity: Link to Food Craving and Weight Gain. *Biol Psychiatry* 2017, 81:789–96, doi: 10.1016/j.biopsych.2015.11.020
22. Snapper Isidore. Food preferences in man: Special Cravings and Aversions. *Ann N Y Acad Sci* 1955, 63:92–106, doi: 10.1111/j.1749-6632.1955.tb36548.x
23. Weingarten HP, Elston D. The phenomenology of food cravings. *Appetite* 1990, 15:231–246, doi: 10.1016/0195-6663(90)90023-2
24. Tiggemann M, Kemps E. The phenomenology of food cravings: The role of mental imagery. *Appetite* 2005, 45:305–13, doi: 10.1016/j.appet.2005.06.004
25. Ferrer-Garcia M, Pla-Sanjuanelo J, Dakanalis A, Vilalta-Abella F, Riva G, Fernandez-Aranda F et al. Eating behavior style predicts craving and anxiety experienced in food-related virtual environments by patients with eating disorders and healthy controls. *Appetite* 2017, 117:284–293, doi: 10.1016/j.appet.2017.07.007
26. Innamorati M, Imperatori C, Balsamo M, Tamburello S, Belvederi Murri M, Contardi A et al. Food cravings questionnaire-trait (FCQ-T) discriminates between obese and overweight patients with and without binge eating tendencies: The italian version of the FCQ-T. *J Pers Assess* 2014, 96:632–639, doi: 10.1080/00223891.2014.909449
27. Moreno S, Warren CS, Rodríguez S, Fernández MC, Cepeda-Benito A. Food cravings discriminate between anorexia and bulimia nervosa. Implications for "success" versus "failure" in dietary restriction. *Appetite* 2009, 52:588–594, doi: 10.1016/j.appet.2009.01.011
28. Meule A, Hermann T, Kübler A. A short version of the food cravings questionnaire-trait: The FCQ-T-reduced. *Front Psychol* 2014, 5:1–10, doi: 10.3389/fpsyg.2014.00190
29. Cepeda-Benito A, Gleaves DH, Williams TL, Erath SA. The development and validation of the state and trait food-cravings questionnaires. *Behav Ther* 2000, 31:151–173, doi: 10.1016/S0005-7894(00)80009-X
30. Potenza MN, Grilo CM. How Relevant is Food Craving to Obesity and Its Treatment? *Front psychiatry* 2014, 5:164, doi: 10.3389/fpsyt.2014.00164
31. Simpson SG, Nesci JB, Health A, Marcus Mund A, Iani L, Barbaranelli C et al. Cross-validation of the reduced form of the Food Craving Questionnaire-Trait using confirmatory factor analysis. *Front Psychol* 2015, 6:433, doi: 10.3389/fpsyg.2015.00433

32. Meule A, Lutz A, Vögele C, Kóbler A. Food cravings discriminate differentially between successful and unsuccessful dieters and non-dieters. Validation of the Food Cravings Questionnaires in German. *Appetite* 2012, 58:88–97, doi: 10.1016/j.appet.2011.09.010

33. Rodríguez-Martín BC, Molerio-Pérez O. Exploring the factor structure of the Food Cravings Questionnaire-Trait in Cuban adults. *Front Psychol* 2014, 5:214, doi: 10.3389/fpsyg.2014.00214

34. Camilleri M, Caroline M, Kesse-guyot E, Andreeva VA, Bellisle F, Hercberg S et al. The Associations between Emotional Eating and Consumption of Energy-Dense Snack Foods Are Modified by Sex and Depressive. *J Nutr* 2014, 144:1264–1273, doi: 10.3945/jn.114.193177.1

35. Torres SJ, Nowson CA. Relationship between stress, eating behavior, and obesity. *Nutrition* 2007, 23:887-94. doi: 10.1016/j.nut.2007.08.008

36. Meule A, Blechert J. Indirect effects of trait impulsivity on body mass. *Eat Behav* 2017, 26:66–9, doi: 10.1016/j.eatbeh.2017.01.012

37. Garner DM, Garfinkel PE. The Eating Attitudes Test: An index of the symptoms of anorexia nervosa. *Psychol Med* 1979, 9:273-9, doi: 10.1017/S0033291700030762

38. Simos GM. *Investigation of Potential Preventive Interventions for Eating Disorders*. Aristotle University of Thessaloniki 1996, Thessaloniki, Greece (in Greek)

39. Goldberg DP, Hillier VF. A scaled version of the General Health Questionnaire. *Psychol Med* 1979, 9:139–145, doi: 10.1017/s0033291700021644

40. Hormes JM, Meule A. Psychometric properties of the English Food Cravings Questionnaire-Trait-reduced (FCQ-T-r). *Eat Behav* 2016, 20:34–38, doi: 10.1016/j.eatbeh.2015.11.011

41. Queiroz de Medeiros AC, Pedrosa L de FC, Yamamoto ME. Exploring the structural and construct validity of the Brazilian Food Cravings Questionnaire-Trait-reduced (FCQ-T-r). *Braz J Psychiatry* 2019, 41:66–9, doi: 10.1590/1516-4446-2017-0019

42. Jáuregui-Lobera I, Bolaños-Rvos P, Valero E, Ruiz Prieto I, Ruiz I. Induction of Food Craving Experience: The Role of Mental Imagery, Dietary Restraint, Mood and Coping Strategies. *Nutr Hosp* 2012, 27:1928–1935, doi: 10.3305/nh.2012.27.6.6043

43. Lv W, Finlayson G, Dando R. Sleep, food cravings and taste. *Appetite* 2018, 125:210–6, doi: 10.1016/j.appet.2018.02.013

44. Yang C-L, Schnepp J, Tucker RM. Increased Hunger, Food Cravings, Food Reward, and Portion Size Selection after Sleep Curtailment in Women Without Obesity. *Nutrients* 2019, 11:663, doi: 10.3390/nu11030663

Corresponding author: Konstantinos Koutoulogenis. Department of Nutrition & Dietetics, School of Health Science & Education, Harokopio University of Athens, Athens, Greece
e-mail: konkoutoul@gmail.com