Eat Weight Disord (2017) 22:527–533
DOI 10.1007/s40519-017-0421-x

ORIGINAL ARTICLE

Validation of the Italian version of the Yale Food Addiction Scale 2.0 (I-YFAS 2.0) in a sample of undergraduate students

Matteo Aloi[1,2] · Marianna Rania[1,2] · Rita Cristina Rodríguez Muñoz[3] · Susana Jiménez Murcia[3,4] · Fernando Fernández-Aranda[3,4] · Pasquale De Fazio[1] · Cristina Segura-Garcia[1,2]

Received: 25 January 2017 / Accepted: 18 July 2017 / Published online: 5 August 2017

Abstract
Purpose Food addiction (FA) refers to a condition characterized by addiction in relation to some high-fat and high-sugar carbohydrate that leads to clinically significant impairment or distress on several areas of functioning. The Yale Food Addiction Scale 2.0 (YFAS 2.0) has been recently updated to measure FA according to the DSM-5 criteria for substance-related and addictive disorders. This study aimed at validating the Italian version of YFAS 2.0.
Methods A sample of 574 Italian university students was involved in this research. Confirmatory Factor Analysis (CFA) and Kuder–Richardson's alpha for dichotomous data were run to evaluate scale structure and reliability. Correlations between YFAS 2.0 and eating psychopathology, binge eating, sleep, and mood symptoms were evaluated.
Results Analogously to the original version, a single factor structure emerged at the CFA. The alpha coefficient was 0.87. Moreover, sound, from moderate to high, correlations were found with other measures.
Conclusions The Italian version of the YFAS 2.0 has demonstrated in a sample of university students to be a useful tool to investigate food addictions.
Level of evidence Level V, descriptive study.

Keywords Food addiction · YFAS 2.0 · Italian version · Validation · Eating disorders

Introduction

Food addiction (FA) refers to a condition characterized by addiction in relation to some high-fat and high-carbohydrate foods that leads to clinically significant impairment or distress on several areas of functioning [1]. It describes a particular form of uncontrolled eating that is thought to have both behavioral and neurobiological similarities with similar patterns of neural activation as observed in substance use disorders (SUDs) [2, 3].

When analyzing any form of addiction, it is important to look into the cause. In the case of behavioral addiction, the dependence does not involve any substance. Behavioral addiction regards an action rather than a chemical dependency, while in substance addiction, the ingestion of a psychoactive substance is present [4, 5].

The FA has not been formally included in any classification of mental disorders, but the concept was initially developed considering it as an addictive behavior that deserved its inclusion among the substance-related disorders (SRD) in DSM-IV-TR [6]. More recently, researchers in the field of eating disorders (EDs) have claimed that FA should be comprised within the spectrum of ED [7–9].

This article is part of the topical collection on Food addiction.

Electronic supplementary material The online version of this article (doi:10.1007/s40519-017-0421-x) contains supplementary material, which is available to authorized users.

✉ Cristina Segura-Garcia
segura@unicz.it

[1] Department of Health Sciences, University Magna Graecia of Catanzaro, Viale Europa, 88100 Catanzaro, Italy

[2] Center for Clinical Research and Treatment of Eating Disorders, University Hospital Mater Domini, Catanzaro, Italy

[3] Department of Psychiatry, University Hospital of Bellvitge-IDIBELL, Barcelona, Spain

[4] CIBER Fisiopatología Obesidad y Nutrición (CIBEROBN), ISCIII, Barcelona, Spain

The Yale Food Addiction Scale (YFAS) [10] was developed in an attempt to shed light on the controversial discussion about the concept of FA and to provide a standardized measurement of this pathological behavior according to the diagnostic criteria for substance dependence of DSM-IV. As DSM-5 [11] introduced important changes for the diagnosis of substance-related and addictive disorders (SRAD), the authors created an updated version of this test 7 years later, the YFAS 2.0 [12], that has already been translated into German [13], and used in other studies [14].

The new version evaluates 11 symptoms of FA following the DSM-5 criteria of SRAD: overeating (Criterion 1), desire to cut down (Criterion 2), time spent (Criterion 3), craving (Criterion 4), related impairment (work/school, family, social relationship) (Criterions 5–7), risky use (physically hazardous, detrimental physical/psychological consequences) (Criterions 8–9), tolerance (Criterion 10), and withdrawal (Criterion 11).

Given the increasing interest on this topic, it is important that researchers and clinicians can benefit of having a reliable tool to evaluate FA at their disposal.

Currently, only the first version of YFAS is available in Italian [15], and to the best of the authors' knowledge, no validation of the YFAS 2.0 has been conducted with an Italian sample. Therefore, with this study, we aimed at translating YFAS 2.0 into Italian and to assess the psychometric properties of this instrument on a non-clinical sample of Italian university students.

Materials and methods

Participants and procedure

Data collection was conducted from October to December 2016. Students in their first and third years of the School of Medicine from the University "Magna Graecia" of Catanzaro (Italy) were given the opportunity to participate in this research. The aim and the description of the research were posted on the Facebook page of the Ambulatory for Clinical Research and Treatment of Eating Disorders of Catanzaro (Italy). The online survey included a contextual informed consent, a self-report form to collect socio-demographic variables, and the questionnaires. Data were collected anonymously.

A total of 574 participants (57% women, $n = 327$) completed all questions. Participants' height and weight were obtained by self-report. Mean age was 21.42 ± 2.3 and no differences were evident between genders (male = 21.62 ± 2.7; female = 21.66 ± 2.0; $t = -1.817$; $p = 0.70$).

Mean body mass index (BMI) was 22.5 ± 3.9 kg/m^{2,} and, as expected, males presented higher BMI than females (male = 23.86 ± 3.9; female = 21.4 ± 3.6; $t = -7.821$; $p < 0.001$). Most participants were normal weight (73.7%; $n = 423$; BMI = 18.50–24.99 kg/m^2) and few were underweight (7.8%; $n = 45$; BMI < 18.50 kg/m^2), overweight (15.2%; $n = 87$; BMI = 25.00–29.99 kg/m^2), or obese (3.3%; $n = 19$; BMI ≥ 30.00 kg/m^2).

Measures

Yale Food Addiction Scale 2.0 (YFAS 2.0)

The Italian translation of the YFAS 2.0 was carried out through a double forward- and back-translation procedure. The authors independently translated the English version of the scale into Italian. After a consensus among translators was achieved, an Italian–English researcher blind to the original version translated this preliminary version back into English. The newly developed Italian version of the YFAS 2.0 was administered to 25 participants (not included in the present study) to check the comprehension of the items before being used in this study. All 25 found it comprehensible and easy to provide ratings.

The YFAS 2.0 assesses addiction-like eating behavior during the past 12 months. The scale consists of 35 items, which are scored on an eight-point scale ranging from never (score = 0) to every day (score = 7) that account for 11 symptoms. Note that there is no sum score calculated from the single items of the YFAS 2.0; each of the 11 diagnostic criteria was considered fulfilled if one or more of the relevant questions for each criterion reached the threshold (Appendix 1 in Electronic supplementary material). A final symptom count score can be calculated by adding up all endorsed symptoms; thus, scores can range from 0 to 11. Another score regards the severity level that is described according to the diagnostic thresholds for SRAD in DSM-5: mild FA (when 2–3 symptoms are present), moderate FA (when 4–5 symptoms have been recognized), and severe FA (when ≥6 symptoms are present). Finally, every FA diagnosis also requires the presence of the impairment or distress criteria.

Beck depression inventory

Depressive symptoms were measured using the Beck Depression Inventory (BDI) [16], which consists of 21 multiple-choice items, rated from 0 to 3. Scores between 0–9, 10–16, 17–29, and ≥30, respectively, indicate minimum, mild, moderate, and severe depression. Participants with total BDI score >16 were considered as clinically depressed in the present study [17]. Cronbach's alpha in the present research was 0.79.

Binge eating scale

We used the Binge Eating Scale (BES) to measure binge eating severity [18]. This test is made up of 16 items

describing the behavioral manifestations, feelings, and cognitions associated with binge eating. A total BES score <17 indicates unlikely binge eating disorder (BED), a score between 17–27 indicates possible BED, and values >27 indicate probable BED. The internal consistency in this study was 0.90.

Eating disorder examination-questionnaire

The Eating Disorder Examination-Questionnaire (EDE-Q) is a 28-item instrument for the assessment of eating disorder symptoms within the past 28 days [19]. Twenty-two items can be reduced to four subscales: eating restraint, eating concern, weight concern, and shape concern. The remaining six questions assess the frequency of eating disordered behaviors. Internal consistencies of the subscales ranged between $\alpha = 0.91$–0.95 in the current study.

Pittsburgh sleep quality index

The Pittsburgh Sleep Quality Index (PSQI) measures sleep quality, latency, duration, efficiency, disturbances, daytime dysfunction, and sleep medication use [20]. A global score, obtained by adding the subscales, is used to classify good versus bad sleepers. The internal consistency in this study was 0.66.

The Italian validated versions of the tests were used in the present study.

Data analyses

A confirmatory factor analysis (CFA) for dichotomous data was conducted using M-plus [21] to examine whether the 11 YFAS 2.0 symptoms had an underlying one-factorial structure. Therefore, factor structure and internal consistency of the YFAS 2.0 are calculated at the symptoms and not at the items level [12, 13]. Items assessing impairment or distress were not included in this analysis as they reflect clinical significance of the full syndrome rather than being indicators of individual criteria [12, 13]. The comparative fit index (CFI), Tucker–Lewis index (TLI), weighted-root-mean-square residual (WRMR), and the root-mean-square error of approximation (RMSEA) were used to evaluate the model. Internal consistency of the 11 YFAS 2.0 symptoms was evaluated with Kuder–Richardson's alpha for dichotomous variables.

Construct validity was determined by partial correlations with the respective questionnaires controlling for gender. Finally, following the procedure of Gearhardt et al. [12], the scores of participants to these questionnaires were compared according to the severity levels of YFAS 2.0. A $p < 0.05$ was considered statistically significant.

Results

Prevalence of FA in the sample

Twenty participants (3.4%) from the sample resulted positive for at least two symptoms of the scale with clinically significant/impairment or distress. FA was more frequent among female participants (female = 5.5% vs male = 0.8%; $\chi^2 = 9.223$; $df = 1$; $p = 0.002$). According to severity 3 (0.5), 5 (0.9) and 12 (2.1%) respectively received a mild, moderate, and severe YFAS 2.0 diagnosis.

Women (0.69 ± 1.81) had a higher mean criteria total score than men (0.28 ± 0.96) ($t_{(572)} = 3.243$; $p < 0.001$), and even if this effect was small ($\eta^2 = 0.018$), successive correlations were performed after controlling for gender.

Symptoms' factor structure and reliability

We used a mean- and variance-adjusted weighted least square (WLSMV) estimator which is indicated for categorical data.

The CFI (0.958), the TLI (0.974), the WRMR (0.794), the RMSEA (0.031), the 90% confidence interval of RMSEA (0.015–0.045), and probability RMSEA (0.991) suggested good fit for the one-factor model. Besides, we observed: $\chi^2 = 68.145$, $df = 44$, and $p = 0.0113$.

All criteria had factor loadings for the single factor of 0.79 or higher (Table 1), and Kuder–Richardson $\alpha = 0.87$ suggested good internal consistency reliability.

Table 1 shows the frequencies of participants who met FA criteria as well as the Skewness and Kurtosis indexes. These indicated that the distribution was not normal.

Convergent validity

As displayed in Table 2, the YFAS 2.0 symptom count scores were significantly correlated with other measures (ranging from 0.17 to 0.69).

Anova results show that the severity level of YFAS 2.0 (Table 3) successfully discriminated the severity of eating-related constructs, binge eating, depressive symptoms, and sleep quality index (all $p < 0.001$).

Discussion

The present study aimed at validating the Italian version of the YFAS 2.0 in a large non-clinical sample. FA has catalyzed the interest of researchers in relation to a wide number of clinical conditions in the last years [22–28] and the number of validations in different languages of the

Table 1 Frequencies, factor loadings, kurtosis, and skewness of the Yale Food Addiction Scale 2.0 criteria

Criteria	Met criteria	Did not meet criteria	Estimate	SE	Kurtosis	Skewness
Consumed more than planned	22 (3.8)	552 (96.2)	0.852***	0.052	21.047	4.797
Unable to cut down or stop	34 (5.9)	540 (94.1)	0.858***	0.042	11.893	3.725
Great deal of time spent	20 (3.5)	554 (96.5)	0.793***	0.064	23.643	5.060
Important activities given up	30 (5.2)	544 (94.8)	0.869***	0.035	14.129	4.013
Use despite physical/emotional consequences	30 (5.2)	544 (94.8)	0.928***	0.028	14.129	4.013
Tolerance	19 (3.3)	555 (96.7)	0.808***	0.064	25.146	5.206
Withdrawal	42 (7.3)	532 (92.7)	0.908***	0.028	8.090	3.174
Craving	19 (3.3)	555 (96.7)	0.911***	0.046	25.146	5.206
Failure in role obligation	22 (3.8)	552 (96.2)	0.869***	0.047	21.047	4.797
Use despite interpersonal/social consequences	34 (5.9)	540 (94.1)	0.830***	0.045	11.893	3.725
Use in physically hazardous situations	23 (4.0)	551 (96.0)	0.848***	0.049	19.918	4.678

*** $p < 0.001$

Table 2 Spearman's correlations between YFAS 2.0 symptom count and convergent and divergent measures

	1	2	3	4	5	6	7	8	9	10
1. YFAS 2.0 symptom count	–									
2. BMI	0.168***	–								
3. EDE-Q restraint	0.339***	0.136**	–							
4. EDE-Q eating concern	0.602***	0.199***	0.607***	–						
5. EDE-Q shape concern	0.401***	0.331***	0.678***	0.683***	–					
6. EDE-Q weight concern	0.438***	0.388***	0.657***	0.720***	0.898***	–				
7. EDE-Q total score	0.476***	0.317***	0.818***	0.802***	0.957***	0.934***	–			
8. Beck depression inventory	0.333***	0.087*	0.319***	0.485***	0.454***	0.453***	0.475***	–		
9. Binge eating scale	0.689***	0.236***	0.448***	0.758***	0.613***	0.627***	0.672***	0.476***	–	
10. Pittsburg sleep quality index	0.302***	0.014	0.277***	0.382***	0.319***	0.304***	0.351***	0.542***	0.385***	–

YFAS Yale Food Addiction Scale, *BMI* body mass index, *EDE-Q* eating disorder examination-questionnaire

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

previous version further supports the importance of this pathological behavior.

The current study indicates that the Italian version of YFAS 2.0 is a solid tool with good psychometric properties and robust reliability and a fully comparable structure to the original version of one-factorial structure. Moreover, severe YFAS 2.0 diagnoses were more common than those with mild or moderate severity, and this is consistent with the English [12] and German [13] versions.

The relationship between FA and age is somehow controversial [29, 30]. We observed no association between YFAS 2.0 and age, but, importantly, our research was done on a sample of young students. Recently, Schulte and Gearhardt [31] found that younger individuals reported elevated addictive-like eating behaviors and that the relationship, although small, was significant for the YFAS 2.0. Instead, more women resulted positive to the screening; this is in line with two studies where a higher prevalence of FA was found in women than in men [9, 32]. Other authors have not found any association between gender and YFAS 2.0 scores [31].

Our data demonstrated a positive correlation between YAS 2.0 and BMI. Recent studies [31, 33–36] have confirmed the higher prevalence of FA among obese participants with the previous version of this test.

Regarding convergent validity, the YFAS 2.0 was highly correlated with EDE-Q subscales and total score, reflecting a positive correlation between FA and eating psychopathology. Accordingly, we do replicate the German validation of YFAS 2.0 [13], with the only exception of the "restraint" dimension. In fact, a small, positive correlation with the restraint subscale of EDE-Q was observed, and

Table 3 Comparison of questionnaires according to YFAS 2.0 severity

	No FA ($n = 554$) M (SD)	Mild FA ($n = 3$) M (SD)	Moderate FA ($n = 5$) M (SD)	Severe FA ($n = 12$) M (SD)	Anova F	P	Effect size η^2	Pairwise differences[a]
Age	21.44 (2.33)	21.33 (2.52)	20.60 (1.16)	20.92 (1.16)	0.409	0.746		
EDE-Q restraint	1.01 (1.23)	3.03 (2.62)	4.04 (2.35)	3.48 (1.88)	26.718	<0.001	0.12	1 < 2, 3, 4
EDE-Q eating concern	0.51 (0.75)	3.87 (0.31)	3.28 (1.72)	3.80 (1.21)	109.876	<0.001	0.37	1 < 2, 3, 4
EDE-Q shape concern	1.46 (1.39)	4.75 (0.50)	5.15 (1.29)	4.31 (1.45)	32.681	<0.001	0.15	1 < 2, 3, 4
EDE-Q weight concern	1.02 (1.23)	4.13 (0.76)	4.72 (1.20)	3.87 (1.64)	40.593	<0.001	0.18	1 < 2, 3, 4
EDE-Q total score	1.09 (1.08)	4.11 (0.65)	4.45 (1.53)	3.97 (1.29)	50.097	<0.001	0.21	1 < 2, 3, 4
Beck depression inventory	7.61 (0.27)	21.67 (3.60)	20.40 (2.82)	19.00 (1.82)	23.955	<0.001	0.11	1 < 2, 3, 4
Binge eating scale	4.67 (4.81)	17.67 (8.62)	20.40 (9.39)	28.83 (9.39)	114.306	<0.001	0.38	1 < 2, 3, 4 4 > 2, 3
Pittsburg sleep quality index	4.51 (0.11)	9.00 (1.46)	7.40 (1.13)	8.33 (0.73)	14.002	<0.001	0.07	1 < 2, 4

FA food addiction, *M* (*SD*) mean (standard deviation), *EDE-Q* eating disorder examination-questionnaire

[a] All reported pairwise differences $p < 0.05$ (Bonferroni corrected): *1* No FA, *2* Mild FA, *3* Moderate FA, *4* Severe FA

this is consistent with the assumption that food addiction can be present among patients with anorexia nervosa (AN) [37]. In fact, not rarely, patients with AN fear not being able to stop eating when they taste a food that they like very much. In other cases, even if AN patients avoid any food that could make them gain weight, they cannot help stop eating a small quantity of some "dangerous food" (e.g., chocolate, sweet drinks, bread, …) to which they are "addicted". In fact, the restrictive behavior driven by AN patients could be interpreted as an effort to fight against an internal subjective impulse for food or hedonic eating [8, 38].

Besides, in our research, we found a high positive correlation between YFAS 2.0 and BES scores. Schulte and Gearhardt [31] obtained a high correlation between food addiction and binge frequency. Curtis and Davis [39] found that both BED and not-BED obese subjects endorse a great number of the DSM-5 criteria for FA, although BED subjects appeared to be more severely addicted, since they endorsed more symptoms than their non-binging counterparts. A study has shown that BED and FA are related but not identical as only 57% of obese adults who had binge eating met the diagnosis of FA [40]. Another investigation [41] has demonstrated that, despite a highly significant relationship between BED and FA, the YFAS covers much more the physical symptoms of withdrawal, while BES focuses on the cognitive aspects and feelings associated with the episode of binge; thus, FA cannot replace binge eating assessment.

We also found a positive correlation between total YFAS 2.0 and PSQI scores. Nolan and Geliebter, studying the relationship between FA and night eating syndrome also found a similar result [42]. In the same way, the high correlation between YFAS 2.0 and BDI is consistent with previous studies, proving that the diagnosis of FA was associated with greater depressive symptomatology [43–45].

Although this study has demonstrated the good psychometric properties of the Italian YFAS 2.0 version, there are few limitations that authors want to address.

First, in the present study, all information was obtained via self-report, which could be potentially biased (e.g., height and weight); and second, it was an Internet-based data collection that could result in a selection or response bias [46]. Yet, online surveys have demonstrated to produce comparable results to those obtained from paper-and-pencil versions and that psychometric properties of questionnaires do not benefit or prejudice from the different methods [46, 47].

Third, our sample predominantly consisted of young, normal weight medical students, so it could be argued that results should be circumscribed and comparable to similar populations. Several explanations can be given to justify this choice. Most addictions (substance or behavioral addictions) have the onset in young age, and this was the main reason to drive our choice towards young participants. On the other hand, the validation of a test in a foreign language has the goal to demonstrate

that the new version matches with the original one, whose validity has been already demonstrated by the authors who created the test. In our case, the results have demonstrated that the Italian validation of the YFAS 2.0 widely overlaps with those of the original version [12] in this large sample of medical students. Nevertheless, authors consider that future studies with a clinical sample of Italian patients could replicate and extend the present findings.

Conclusions

In conclusion, the psychometric properties of the Italian version of YFAS 2.0 are largely equivalent to the original version with a high internal consistency. Thus, the Italian version of the YFAS 2.0 has demonstrated in a sample of university students to be a useful tool to investigate food addiction.

Acknowledgements Authors are grateful to Prof. Ashley N. Gearhardt from University of Michigan for her selfless support and her suggestions.

Compliance with ethical standards

Conflict of interest FFA was partially supported by FIS (PII4/290). CIBERON is an initiative of ISCIII. The other authors declare that they have no conflicts of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Funding No grant was obtained for this research.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

1. Cathelain S, Brunault P, Ballon N, Réveillère C, Courtois R (2016) Food addiction: definition, measurement and limits of the concept, associated factors, therapeutic and clinical implications. Presse Med 45(12 Pt 1):1154–1163. doi:10.1016/j.lpm.2016.03.014
2. Gearhardt AN, Yokum S, Orr PT, Stice E, Corbin WR, Brownell KD (2011) Neural correlates of food addiction. Arch Gen Psychiatry 68(8):808–816. doi:10.1001/archgenpsychiatry.2011.32
3. Meule A, Gearhardt AN (2014) Food addiction in the light of DSM-5. Nutrients 6(9):3653–3671. doi:10.3390/nu6093653
4. Kardefelt-Winther D, Heeren A, Schimmenti A, van Rooij A, Maurage P, Carras M, Edman J, Blaszczynski A, Khazaal Y, Billieux J (2017) How can we conceptualize behavioural addiction without pathologizing common behaviours? Addiction. doi:10.1111/add.13763
5. Sussman S, Rozgonjuk D, van den Eijnden RJJM (2017) Substance and behavioral addictions may share a similar underlying process of dysregulation. Addiction. doi:10.1111/add.13825
6. American Psychiatric Association (2000) Diagnostic and statistical manual of mental disorders, 4th edn. American Psychological Association, Washington
7. Hebebrand J, Albayrak Ö, Adan R, Antel J, Dieguez C, de Jong J, Leng G, Menzies J, Mercer JG, Murphy M, van der Plasse G, Dickson SL (2014) "Eating addiction", rather than "food addiction", better captures addictive-like eating behavior. Neurosci Biobehav Rev 47:295–306. doi:10.1016/j.neubiorev.2014.08.016
8. Wiss DA, Brewerton TD (2016) Incorporating food addiction into disordered eating: the disordered eating food addiction nutrition guide (DEFANG). Eat Weight Disord. doi:10.1007/s40519-016-0344-y
9. Rogers PJ (2017) Food and drug addictions: similarities and differences. Pharmacol Biochem Behav 153:182–190. doi:10.1016/j.pbb.2017.01.001
10. Gearhardt AN, Corbin WR, Brownell KD (2009) Preliminary validation of the Yale Food Addiction Scale. Appetite 52(2):430–436. doi:10.1016/j.appet.2008.12.003
11. American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders, 5th edn. American Psychiatric Association, Washington
12. Gearhardt AN, Corbin WR, Brownell KD (2016) Development of the Yale Food Addiction Scale Version 2.0. Psychol Addict Behav 30(1):113–121. doi:10.1037/adb0000136
13. Meule A, Müller A, Gearhardt AN, Blechert J (2016) German version of the Yale Food Addiction Scale 2.0: prevalence and correlates of 'food addiction' in students and obese individuals. Appetite. doi:10.1016/j.appet.2016.10.003
14. de Vries SK, Meule A (2016) Food addiction and bulimia nervosa: new data based on the Yale Food Addiction Scale 2.0. Eur Eat Disord Rev 24(6):518–522. doi:10.1002/erv.2470
15. Innamorati M, Imperatori C, Manzoni GM, Lamis DA, Castelnuovo G, Tamburello A, Tamburello S, Fabbricatore M (2015) Psychometric properties of the Italian Yale Food Addiction Scale in overweight and obese patients. Eat Weight Disord 20(1):119–127. doi:10.1007/s40519-014-0142-3
16. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J (1961) An inventory for measuring depression. Arch Gen Psychiatry 4:561–571
17. Sprinkle SD, Lurie D, Insko SL, Atkinson G, Jones GL, Logan AR, Bissada NN (2002) Criterion validity, severity cut scores, and test-retest reliability of the beck depression inventory-II in a university counseling center sample. J Couns Psychol 49(3):381–385. doi:10.1037/0022-0167.49.3.381
18. Gormally J, Black S, Daston S, Rardin D (1982) The assessment of binge eating severity among obese persons. Addict Behav 7(1):47–55
19. Fairburn CG, Beglin SJ (1994) Assessment of eating disorders: interview or self-report questionnaire? Int J Eat Disord 16(4):363–370
20. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ (1989) The Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. Psychiatry Res 28(2):193–213. doi:10.1016/0165-1781(89)90047-4
21. Muthén LK, Muthén BO (2015) Mplus User's Guide, 7th edn. Muthén & Muthén, Los Angeles
22. Mason SM, Flint AJ, Field AE, Austin SB, Rich-Edwards JW (2013) Abuse victimization in childhood or adolescence and risk of food addiction in adult women. Obesity (Silver Spring) 21(12):E775–E781. doi:10.1002/oby.20500
23. Raymond KL, Lovell GP (2016) Food addiction associations with psychological distress among people with type 2 diabetes.

J Diabetes Complicat 30(4):651–656. doi:10.1016/j.jdiacomp.2016.01.020
24. Davis C (2013) A narrative review of binge eating and addictive behaviors: shared associations with seasonality and personality factors. Front psychiatry 4:183. doi:10.3389/fpsyt.2013.00183
25. Ferrario CR (2017) Food addiction and obesity. Neuropsychopharmacology 42(1):361. doi:10.1038/npp.2016.221
26. Wolz I, Hilker I, Granero R, Jiménez-Murcia S, Gearhardt AN, Dieguez C, Casanueva FF, Crujeiras AB, Menchón JM, Fernández-Aranda F (2016) "Food addiction" in patients with eating disorders is associated with negative urgency and difficulties to focus on long-term goals. Front Psychol 7:61. doi:10.3389/fpsyg.2016.00061
27. Criscitelli K, Avena NM (2016) The neurobiological and behavioral overlaps of nicotine and food addiction. Prev Med 92:82–89. doi:10.1016/j.ypmed.2016.08.009
28. Şanlier N, Türközü D, Toka O (2016) Body image, food addiction, depression, and body mass index in University students. Ecol Food Nutr 55(6):491–507. doi:10.1080/03670244.2016.1219951
29. Murray S, Kroll C, Avena NM (2015) Food and addiction among the ageing population. Ageing Res Rev 20:79–85. doi:10.1016/j.arr.2014.10.002
30. Ivezaj V, White MA, Grilo CM (2016) Examining binge-eating disorder and food addiction in adults with overweight and obesity. Obesity (Silver Spring) 24(10):2064–2069. doi:10.1002/oby.21607
31. Schulte EM, Gearhardt AN (2017) Development of the Modified Yale Food Addiction Scale version 2.0. Eur. Eat Disord. doi:10.1002/erv.2515
32. Carr MM, Catak PD, Pejsa-Reitz MC, Saules KK, Gearhardt AN (2016) Measurement invariance of the Yale Food Addiction Scale 2.0 across gender and racial groups. Psychol Assess. doi:10.1037/pas0000403
33. Gearhardt AN, Boswell RG, White MA (2014) The association of "food addiction" with disordered eating and body mass index. Eat Behav 15(3):427–433. doi:10.1016/j.eatbeh.2014.05.001
34. VanderBroek-Stice L, Stojek MK, Beach SR, vanDellen MR, MacKillop J (2017) Multidimensional assessment of impulsivity in relation to obesity and food addiction. Appetite. doi:10.1016/j.appet.2017.01.009
35. Brunault P, Ducluzeau PH, Bourbao-Tournois C, Delbachian I, Couet C, Réveillère C, Ballon N (2016) Food addiction in bariatric surgery candidates: prevalence and risk factors. Obes Surg 26(7):1650–1653. doi:10.1007/s11695-016-2189-x
36. Pursey KM, Stanwell P, Gearhardt AN, Collins CE, Burrows TL (2014) The prevalence of food addiction as assessed by the Yale Food Addiction Scale: a systematic review. Nutrients 6(10):4552–4590. doi:10.3390/nu6104552
37. Granero R, Hilker I, Agüera Z, Jiménez-Murcia S, Sauchelli S, Islam MA, Fagundo AB, Sánchez I, Riesco N, Dieguez C, Soriano J, Salcedo-Sánchez C, Casanueva FF, De la Torre R, Menchón JM, Gearhardt AN, Fernández-Aranda F (2014) Food addiction in a Spanish sample of eating disorders: DSM-5 diagnostic subtype differentiation and validation data. Eur Eat Disord Rev 22(6):389–396. doi:10.1002/erv.2311
38. Albayrak Ö, Föcker M, Kliewer J, Esber S, Peters T, de Zwaan M, Hebebrand J (2017) Eating-related psychopathology and food addiction in adolescent psychiatric inpatients. Eur Eat Disord Rev 25(3):214–220. doi:10.1002/erv.2509
39. Curtis C, Davis C (2014) A qualitative study of binge eating and obesity from an addiction perspective. Eat Disord 22(1):19–32. doi:10.1080/10640266.2014.857515
40. Gearhardt AN, White MA, Masheb RM, Morgan PT, Crosby RD, Grilo CM (2012) An examination of the food addiction construct in obese patients with binge eating disorder. Int J Eat Disord 45(5):657–663. doi:10.1002/eat.20957
41. Ahmed AY, Sayed AM, Alshahat AA, Abd El-aziz EA (2016) Can food addiction replace binge eating assessment in obesity clinics? Egypt J Med Hum Genet. doi:10.1016/j.ejmhg.2016.07.002
42. Nolan LJ, Geliebter A (2016) "Food addiction" is associated with night eating severity. Appetite 98:89–94. doi:10.1016/j.appet.2015.12.025
43. Frayn M, Sears CR, von Ranson KM (2016) A sad mood increases attention to unhealthy food images in women with food addiction. Appetite 100:55–63. doi:10.1016/j.appet.2016.02.008
44. Eichen DM, Lent MR, Goldbacher E, Foster GD (2013) Exploration of "food addiction" in overweight and obese treatment-seeking adults. Appetite 67:22–24. doi:10.1016/j.appet.2013.03.008
45. Davis C, Curtis C, Levitan RD, Carter JC, Kaplan AS, Kennedy JL (2011) Evidence that 'food addiction' is a valid phenotype of obesity. Appetite 57(3):711–717. doi:10.1016/j.appet.2011.08.017
46. Mayr A, Gefeller O, Prokosch HU, Pirkl A, Frohlich A, de Zwaan M (2012) Web-based data collection yielded an additional response bias-but had no direct effect on outcome scales. J Clin Epidemiol 65(9):970–977. doi:10.1016/j.jclinepi.2012.03.005
47. Naus MJ, Philipp LM, Samsi M (2009) From paper to pixels: a comparison of paper and computer formats in psychological assessment. Comput Hum Behav 25(1):1–7. doi:10.1016/j.chb.2008.05.012