



Ten Years of the Yale Food Addiction Scale: a Review of Version 2.0

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Abstract

Purpose of Review The Yale Food Addiction Scale (YFAS) is a self-report questionnaire for the assessment of addiction-like consumption of high-calorie, processed foods. The original scale was developed in 2009 and—for its tenth anniversary—we now review studies using its revised version—the YFAS 2.0.

Recent Findings The 11 symptoms of food addiction as measured with the YFAS 2.0 demonstrated high internal reliability and a unidimensional structure in several studies, supporting construct validity. Similar to the original YFAS, highest prevalence rates of YFAS 2.0 diagnoses were found in individuals with bulimia nervosa, followed by binge eating disorder, anorexia nervosa, subthreshold eating disorders, obesity, and unselected samples. Scores on the YFAS 2.0 were associated with other disordered eating behaviors and several co-morbid mental disorders.

Summary The YFAS 2.0 is an internal reliable measure that shows factorial validity, yet more studies are needed that demonstrate retest-reliability and predictive validity. Prevalence rates and correlates of YFAS 2.0 diagnoses are largely similar to those observed with the original YFAS.

Keywords Food addiction · Eating addiction · DSM-5 · Substance use disorder · Obesity · Binge eating

Introduction

Throughout the twentieth century until now, researchers have discussed whether certain foods may have an addiction potential and, thus, whether the eating behavior of some people may be addictive [1]. In 2009, the Yale Food Addiction Scale (YFAS) was developed as a self-report measure for the assessment of such an addiction-like eating behavior [2]. Specifically, the questionnaire is based on the diagnostic criteria for substance dependence in the fourth version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and, accordingly, evaluates the presence of seven “food addiction” symptoms. A dichotomous score can also be calculated for classifying

individuals as “food addicted.” The YFAS would turn out to be a popular, widely used instrument and, in fact, the standard measure for capturing addiction-like eating tendencies. Because of this, we provided a comprehensive review about the rationale and scoring of the scale, its different versions and translations, and its psychometric properties and correlates as well as about prevalence of food addiction symptoms and diagnoses, for its fifth anniversary in 2014 [3•].

In 2013, DSM-5 was released, which introduced significant changes to the diagnostic criteria for substance dependence. Specifically, the four symptoms of substance abuse and seven symptoms of substance dependence were merged. Additionally, one symptom—legal troubles because of substance use—was removed from the diagnostic criteria and another symptom—craving—was added as a new diagnostic criterion. Thus, DSM-5 now lists 11 symptoms of—which is now called—substance use disorder [4]. To acknowledge these changes, a revised version of the YFAS—the YFAS 2.0—was published in 2016 [5•]. Similar to our previous work about the YFAS [3•], the current article describes the rationale and scoring of the YFAS 2.0, including a detailed description of the changes made compared with the YFAS. Furthermore, we will review studies that have been conducted with the scale and summarize findings about its psychometric properties, prevalence rates of food addiction, and correlates of YFAS 2.0 scores.

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Yale Food Addiction Scale 2.0

Development and Scoring

The YFAS consisted of 25 items with different response categories for capturing seven food addiction symptoms. Two items assessed a clinically significant impairment or distress due to one's eating behavior. Three items were primer items that were not included in the scoring procedure. For the YFAS 2.0, new items were added, unscored items were removed, and item wordings were reformulated. The YFAS 2.0 consists of 35 items for capturing 11 food addiction symptoms (Table 1). In contrast to the YFAS, each item now has the same response format, ranging from 0 = *never* to 7 = *every day*. Further, changes in item wordings include lowering reading difficulty, consistent use of past tense, and rewording to improve clarity.

Similar to the original YFAS, items are preceded by an instruction, which references the consumption of foods high in fat and/or refined carbohydrates, as these foods are most relevant to food cravings and eating binges. To score the scale, all item scores are transformed to a dichotomous format (0 and 1). The cut-off values (i.e., which scores are coded with 0 and which scores are coded with 1) differ across items (Table 1). Each of the 11 symptoms is assessed by two or three items. Two items assess a clinically significant impairment or distress due to one's eating behavior. The dichotomized responses are summed up for each symptom and for the clinically significant distress/impairment questions. If there is a score of at least 1 within a symptom, then this symptom is met. The number of symptoms can then be added up to a symptom score, which can range between zero and 11 symptoms.

In line with the diagnostic criteria for substance use disorder in DSM-5, there are three different severity levels when calculating the diagnostic score of the scale. When the criterion of a clinically significant impairment or distress is met, two or three symptoms indicate “mild food addiction,” four or five symptoms indicate “moderate food addiction,” and six or more symptoms indicate “severe food addiction.” An SPSS syntax for scoring the scale can be found in Appendix 1.

Psychometric Properties

Factor Structure As item scores of the YFAS 2.0 are not simply added up to a total score, factor structure has been tested at the symptom rather than the item level. That is, factor analyses were applied on the 11 symptom scores (i.e., symptom met vs. symptom not met) instead of the 35 item scores. The distress/impairment criterion was not included here as it reflects the clinical significance of the full syndrome rather than indicators of individual criteria. Across different samples, the 11 symptoms showed a one-factorial structure, indicating that all symptoms represent food addiction as a single construct [5,

6–10]. Factor structure has been found to be invariant across different racial groups (Black vs. White US participants), yet measurement invariance was only partially supported in men versus women [11].

Reliability Internal reliability was good ($\alpha = .80$ – $.90$) or excellent ($\alpha > .90$) in numerous studies [5, 6–10, 12–18]. As researchers often do not indicate how internal reliability was determined exactly in their studies, we again would like to highlight here that it is not advisable to calculate Cronbach's alpha of raw scores of all items as these are not simply summed up to a total score. Instead, we suggest calculating Kuder-Richardson's alpha for the dichotomous scores of the 11 food addiction symptoms. Retest-reliability across 3 weeks was high for the Arabic version [15].

Translated and Modified Versions

The YFAS 2.0 has been translated into German [6], French [9], Italian [7], Turkish [19], Spanish [20], Korean [21], Arabic [15], and Japanese [22]. A modified YFAS 2.0 (mYFAS 2.0) has been developed, which is a short form of the YFAS 2.0 [23]. The mYFAS 2.0 consists of 13 items (one item for each symptom and two items for clinically significant impairment or distress). The specific items of the YFAS 2.0 that form the mYFAS 2.0 are depicted in Table 1. An SPSS syntax for scoring the scale can be found in Appendix 2. Similar to the long version, the mYFAS 2.0 showed a one-factor structure, high internal reliability, and full measurement invariance across racial groups [23–25]. However, the scale was only partially invariant for men and women, suggesting that two of the 11 symptoms may be less associated with food addiction for women compared with men [24]. The mYFAS has also been used in Brazilian Portuguese [26, 27] and Italian [28]. Finally, a 16-item version of the YFAS 2.0 for children and adolescents has recently been developed, for which items are scored dimensionally (i.e., are summed up to a total score) [29]. The English versions of the YFAS 2.0, mYFAS 2.0, and YFAS 2.0 for children can be downloaded along with scoring instructions here: <https://fastlab.psych.lsa.umich.edu/yale-food-addiction-scale>.

Prevalence of YFAS 2.0 Diagnoses

Prevalence rates of food addiction diagnoses from different studies that used the YFAS 2.0 are displayed in Table 2. Figure 1 displays a more schematic depiction of prevalence rates as a function of specific samples studied. In broad samples—some very selective and some more representative for the general population—prevalence rates of YFAS 2.0 diagnoses roughly ranged between 3 and 20%. Using the mYFAS 2.0, food addiction prevalence was 4% in a large

Table 1 Items and scoring of the original and modified Yale Food Addiction Scale 2.0

Items	Response options						Symptom	Modified YFAS 2.0		
	never	Less than monthly	Once a month	2–3 times a month	Once a week	2–3 times a week			4–6 times a week	Every day
1. When I started to eat certain foods, I ate much more than planned.	0	1	2	3	4	5	6	7	Amount	
2. I continued to eat certain foods even though I was no longer hungry.	0	1	2	3	4	5	6	7	Amount	
3. I ate to the point where I felt physically ill.	0	1	2	3	4	5	6	7	Amount	X
4. I worried a lot about cutting down on certain types of food, but I ate them anyways.	0	1	2	3	4	5	6	7	Attempts	
5. I spent a lot of time feeling sluggish or tired from overeating.	0	1	2	3	4	5	6	7	Time	X
6. I spent a lot of time eating certain foods throughout the day.	0	1	2	3	4	5	6	7	Time	
7. When certain foods were not available, I went out of my way to get them. For example, I went to the store to get certain foods even though I had other things to eat at home.	0	1	2	3	4	5	6	7	Time	
8. I ate certain foods so often or in such large amounts that I stopped doing other important things. These things may have been working or spending time with family or friends.	0	1	2	3	4	5	6	7	Activities	
9. I had problems with my family or friends because of how much I overate.	0	1	2	3	4	5	6	7	Problems	
10. I avoided work, school or social activities because I was afraid I would overeat there.	0	1	2	3	4	5	6	7	Activities	X
11. When I cut down on or stopped eating certain foods, I felt irritable, nervous or sad.	0	1	2	3	4	5	6	7	Withdrawal	
12. If I had physical symptoms because I had not eaten certain foods, I would eat those foods to feel better.	0	1	2	3	4	5	6	7	Withdrawal	
13. If I had emotional problems because I had not eaten certain foods, I would eat those foods to feel better.	0	1	2	3	4	5	6	7	Withdrawal	X
14. When I cut down on or stopped eating certain foods, I had physical symptoms. For example, I had headaches or fatigue.	0	1	2	3	4	5	6	7	Withdrawal	
15. When I cut down or stopped eating certain foods, I had strong cravings for them.	0	1	2	3	4	5	6	7	Withdrawal	
16. My eating behavior caused me a lot of distress.	0	1	2	3	4	5	6	7	Impairment	X
17. I had significant problems in my life because of food and eating. These may have been problems with my daily routine, work, school, friends, family, or health.	0	1	2	3	4	5	6	7	Impairment	X
18. I felt so bad about overeating that I did not do other important things. These things may have been working or spending time with family or friends.	0	1	2	3	4	5	6	7	Activities	
19. My overeating got in the way of me taking care of my family or doing household chores.	0	1	2	3	4	5	6	7	Obligations	X
20. I avoided work, school or social functions because I could not eat certain foods there.	0	1	2	3	4	5	6	7	Activities	
21. I avoided social situations because people would not approve of how much I ate.	0	1	2	3	4	5	6	7	Problems	
22. I kept eating in the same way even though my eating caused emotional problems.	0	1	2	3	4	5	6	7	Consequences	X
23. I kept eating in the same way even though my eating caused physical problems.	0	1	2	3	4	5	6	7	Consequences	
24. Eating the same amount of food did not give me as much enjoyment as it used to.	0	1	2	3	4	5	6	7	Tolerance	X
25. I really wanted to cut down on or stop eating certain kinds of foods, but I just could not.	0	1	2	3	4	5	6	7	Attempts	
26. I needed to eat more and more to get the feelings I wanted from eating. This included reducing negative emotions like sadness or increasing pleasure.	0	1	2	3	4	5	6	7	Tolerance	
27. I did not do well at work or school because I was eating too much.	0	1	2	3	4	5	6	7	Obligations	
28. I kept eating certain foods even though I knew it was physically dangerous. For example, I kept eating sweets even though I had diabetes or I kept eating fatty foods despite having heart disease.	0	1	2	3	4	5	6	7	Obligations Situations	
29. I had such strong urges to eat certain foods that I could not think of anything else.	0	1	2	3	4	5	6	7	Craving	X
30. I had such intense cravings for certain foods that I felt like I had to eat them right away.	0	1	2	3	4	5	6	7	Craving	
31. I tried to cut down on or not eat certain kinds of food, but I wasn't successful.	0	1	2	3	4	5	6	7	Attempts	

Table 1 (continued)

Items	Response options					Symptom	Modified YFAS 2.0			
	never	Less than monthly	Once a month	2–3 times a month	Once a week			2–3 times a week	4–6 times a week	Every day
32. I tried and failed to cut down on or stop eating certain foods.	0	1	2	3	4	5	6	7	Attempts Situations	X
33. I was so distracted by eating that I could have been hurt (e.g., when driving a car, crossing the street, operating machinery).	0	1	2	3	4	5	6	7	Situations	X
34. I was so distracted by thinking about food that I could have been hurt (e.g., when driving a car, crossing the street, operating machinery).	0	1	2	3	4	5	6	7	Situations	
35. My friends or family were worried about how much I overate.	0	1	2	3	4	5	6	7	Problems	X

Notes. Item scores are recoded to 0 and 1 (numbers that are printed in bold in this table are scored with 1). If the recoded items have a score of at least 1 within each symptom, then this symptom is met. X marks items that are included in the modified Yale Food Addiction Scale 2.0. *Amount*, substance taken in larger amount and for longer period than intended; *Attempts*, persistent desire or repeated unsuccessful attempts to quit; *Time*, much time/activity to obtain, use, and recover; *Activities*, important social, occupational, or recreational activities given up or reduced; *Consequences*, use continues despite knowledge of adverse consequences; *Tolerance*, marked increase in amount/marked decrease in effect; *Withdrawal*, characteristic withdrawal symptoms/substance taken to relieve withdrawal; *Problems*, continued use despite social or interpersonal problems; *Obligations*, failure to fulfill major role obligations; *Situations*, use in physically hazardous situations; *Craving*, strong desire or urge to use; *Impairment*, use causes clinically significant impairment or distress

sample in Brazil [27], 6% in a sample in Italy [28], and ranged between 13 and 15% in US samples [23, 25].

In samples with obesity, prevalence rates of YFAS 2.0 diagnoses ranged between approximately 20 and 50%. In samples with individuals with eating disorders, prevalence rates were higher than 60%, with the highest numbers found in individuals with bulimia nervosa. In fact, about 95% of individuals with bulimia nervosa received a YFAS 2.0 diagnosis across different studies [20•, 30, 31]. In individuals with anorexia nervosa, those with binge/purge anorexia subtype have higher prevalence rates than those with restrictive anorexia. Yet, still more than half of individuals with restrictive anorexia receive a food addiction diagnosis [31].

Interestingly, it appears that severe food addiction diagnoses are more prevalent than moderate or mild food addiction diagnoses [5•, 6–8, 10, 14–16, 32, 33]. That is, most people that meet the distress/impairment criterion also endorse at least six of the 11 symptoms (or vice versa). Although many individuals may meet several (up to five) symptoms, it is rather uncommon that these also report significant distress or impairment.

Correlates of the YFAS 2.0

Sex

Similar to findings with the YFAS, women tend to have a higher likelihood of meeting the YFAS 2.0 diagnosis than men in unselected or nationally representative samples [5•, 7, 9, 11, 33]. It has also been found that men and women had similar YFAS 2.0 symptom counts and that the sex difference was driven by women endorsing the distress/impairment criterion more often [11]. Moreover, the correlation between YFAS 2.0 scores and body mass index was descriptively higher in men ($r = .54$) than in women ($r = .36$) in an unselected sample (yet the difference in the size of these correlations was not statistically tested) [13]. Among samples with obesity, however, those with and without a YFAS 2.0 diagnosis did not differ regarding sex distribution in the majority of studies [6, 8, 34•]. In a study with bariatric surgery candidates, however, a significantly higher percentage of women than men received a YFAS 2.0 diagnosis, but this effect was small [16]. Thus, it might be that sex differences in food addiction diagnoses in non-obese samples can be explained by the fact that individuals with bulimia and anorexia nervosa are mostly women who are under- or normal-weight and these conditions highly overlap with YFAS 2.0 diagnoses.

Body Weight

Body mass index usually shows small, positive associations with YFAS 2.0 scores in unselected samples [5•, 6, 7, 9, 15,

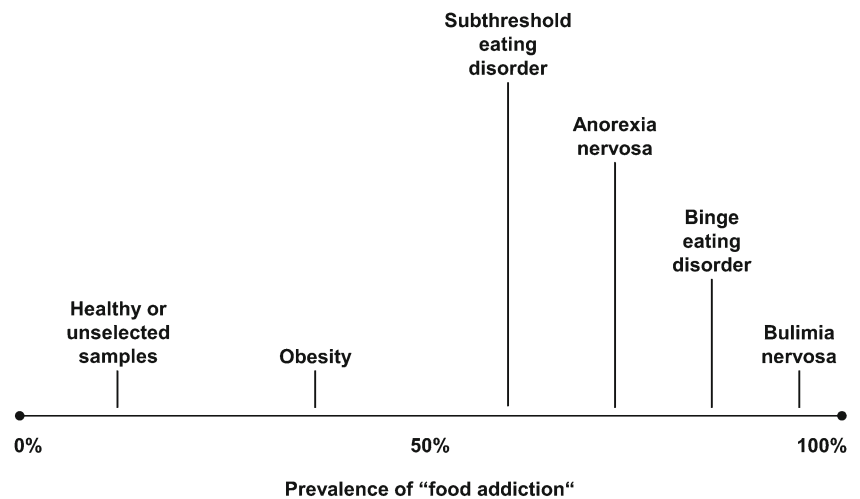
Table 2 Prevalence of food addiction as assessed with the Yale Food Addiction Scale 2.0

%	N	Sample	Reference
2.8	36	Normal-weight women	Steward et al. (2018) [35]
3.3	152	Predominantly women (82%)	Granero et al. (2018) [20•]
3.4	574	Medical students	Aloi et al. (2017) [7]
4.1	121	Women without eating disorders	Carlson et al. (2018) [31]
5.1	236	Liver transplant recipients	Saab et al. (2017) [36]
6.3	79	Predominantly women (84%)	Carter et al. (2019) [14]
7.8	166	Patients with gambling disorder	Granero et al. (2018) [20•]
7.9	1034	Diverse sample	Hauck et al. (2017) [37]
8.2	330	Predominantly women (80%)	Brunault et al. (2017) [9]
9.7	455	Predominantly women (89%)	Meule et al. (2017) [6]
11.0	236	Medical students	Fawzi and Fawzi (2018) [15]
14.3	105	Obese treatment-seeking persons	Brunault et al. (2019) [12]
14.4	341	Women without eating disorders	de Vries and Meule (2016) [30]
14.6	536	Diverse sample	Gearhardt et al. (2016) [5•]
14.7	231	Diverse sample	Schulte et al. (2018) [18]
15.8	208	Diverse sample	Gearhardt et al. (2016) [5•]
18.8	642	College students	Carr et al. (2017) [11]
22.2	1027	Predominantly women (80%)	Burrows et al. (2017) [33]
24.2	33	Obese women	Steward et al. (2018) [35]
25.0	128	Obese bariatric surgery candidates	Benzerouk et al. (2018) [8]
26.4	110	Obese bariatric surgery candidates	Guerrero Pérez et al. (2018) [34•]
27.3	216	Obese bariatric surgery candidates	Müller et al. (2018) [16]
29.7	64	Obese treatment-seeking persons	Hauck et al. (2016) [38]
37.1	105	Obese treatment-seeking persons	Aguirre et al. (2018) [32]
38.6	44	Overweight and obese women	Schulte et al. (2019) [39]
42.3	220	Predominantly women (94%) with regular binge eating	Linardon and Messer (2019) [10]
47.4	133	Obese bariatric surgery candidates	Meule et al. (2017) [6]
62.2	37	Patients with other specified feeding or eating disorder	Granero et al. (2018) [20•]
62.5	82	Women with other specified feeding or eating disorder	Carlson et al. (2018) [31]
69.2	26	Patients with anorexia nervosa	Granero et al. (2018) [20•]
71.3	43	Women with anorexia nervosa	Carlson et al. (2018) [31]
79.3	29	Patients with binge eating disorder	Granero et al. (2018) [20•]
80.6	36	Women with binge eating disorder	Carlson et al. (2018) [31]
91.6	71	Patients with binge eating disorder	Carter et al. (2019) [14]
94.9	59	Women with bulimia nervosa	Carlson et al. (2018) [31]
95.3	43	Patients with bulimia nervosa	Granero et al. (2018) [20•]
95.7	115	Women with bulimia nervosa	de Vries and Meule (2016) [30]

33]. Furthermore, samples with obesity have a higher prevalence of food addiction than non-obese samples (Table 2). However, it has been previously observed that the relationship between food addiction and body mass index appears to be non-linear [40]. Specifically, food addiction positively relates to body mass index, but this slope levels off in higher body weight ranges: *within* samples with obesity, for example, those with and without a YFAS 2.0 diagnosis

usually do not differ in body mass index [6, 8, 12, 16, 39]. As of this writing, there has been only one study that examined the prospective relationship between YFAS 2.0 scores and body weight change. In morbidly obese patients seeking bariatric surgery, those with a food addiction diagnosis lost less weight during a dietary and lifestyle intervention prior to surgery than those without a food addiction diagnosis [34•].

Fig. 1 Schematic depiction of prevalence rates of food addiction diagnoses as assessed with the Yale Food Addiction Scale 2.0. Percentages ranged between approximately 3 and 20% in healthy or unselected samples and between approximately 20 and 50% in samples with obesity. Prevalence rates were approximately 60% in individuals with a subthreshold eating disorder, 70% in individuals with anorexia nervosa, 80% in individuals with binge eating disorder, and 95% in individuals with bulimia nervosa



Eating Behaviors

Scores on the YFAS 2.0 are strongly associated with disinhibited eating behavior, experiences of food cravings, binge eating symptoms, and frequency of binge eating episodes [5•, 6, 7, 9, 14, 32, 33]. Relationships with other eating disorder symptoms (e.g., eating, weight, and shape concern) and eating styles (e.g., emotional eating, grazing) are typically of moderate magnitude [6–9, 17]. Restrained eating has been linked inconsistently to YFAS 2.0 scores with studies finding either no or only small associations [5•, 6–9, 14]. Regarding nutritional profiles, one study showed that those with food addiction reported higher intakes of confectionary, fast food, snack foods, hot chips, potato crisps, and soft drinks and lower intakes of core foods like fruits and vegetables and were less likely to eat breakfast every day than those without food addiction [13]. Yet, it has also been found that those with a YFAS 2.0 diagnosis report decreased enjoyment of eating highly processed foods [39].

Co-morbid Mental Disorders

Food addiction diagnoses as assessed with the YFAS 2.0 are associated with a range of mental disorders such as depression, anxiety disorders, posttraumatic stress disorder, and attention deficit hyperactivity disorder [7, 8, 12, 14, 16, 32]. Some studies also reported relations to higher stress, hopelessness, suicidality, non-suicidal self-injury, difficulties in emotion regulation, and lower sleep quality [7, 8, 10, 13, 31]. In obese patients seeking bariatric surgery, no associations were detected between YFAS 2.0 scores and substance-related addictions such as alcohol use disorder or tobacco use disorder [8, 16], but one study suggested that food addiction relates to a higher prevalence of other addictive behaviors such as compulsive buying and Internet use [16].

Executive Functioning and Personality

Obese individuals with a YFAS 2.0 diagnosis (either with or without binge eating disorder) did not differ in executive functioning from obese individuals without a YFAS 2.0 diagnosis (either with or without binge eating disorder) [41]. Another study found weak, inconsistent support for deficits in executive functioning with higher YFAS 2.0 scores in a small sample [35]. Higher YFAS 2.0 scores relate to higher self-reported impulsivity, particularly to attentional impulsivity (e.g., having problems concentrating), motor impulsivity (e.g., acting without thinking), and negative urgency (i.e., acting rashly in response to negative emotions) [6, 35, 42]. A study which differentiated between impulsivity and sensation seeking—two positively related constructs—found that although those with food addiction reported higher impulsivity, they showed lower sensation seeking than those without food addiction [13]. A study using the Spanish version of the YFAS 2.0 found no association with novelty seeking, but a positive association with harm avoidance and a negative association with self-directedness [20•].

Summary and Outlook

YFAS Vs. YFAS 2.0

Although the changes from the YFAS to YFAS 2.0 have been quite substantial, it appears that psychometric properties, food addiction prevalence rates, and correlates of the YFAS 2.0 (and mYFAS 2.0) are largely similar to findings with the YFAS. These include, for example, their good-to-excellent internal reliability, unidimensional structure, very high food addiction prevalence rates in samples with eating disorders, and a positive—but non-linear—relationship with body weight [3•]. Few exceptions include, for example, the child version of the YFAS 2.0. Here, the newly added symptoms

received very low endorsement rates, which necessitated refinement of the scale through item selection and a different scoring procedure [29]. Thus, future revisions of the YFAS 2.0 for children may be required so that the scale can be used in children and adolescents as an equivalent to the YFAS 2.0 in adults.

After the changes of substance dependence criteria from DSM-IV to DSM-5, one concern regarding the YFAS 2.0 was that food addiction prevalence may now be substantially higher than with the YFAS as meeting only two symptoms (and the distress/impairment criterion) suffices to receive a food addiction diagnosis [43]. Yet, it appears that this concern was unjustified. As described above, most individuals who endorse only two symptoms on the YFAS 2.0 rarely meet the distress/impairment criterion and those who meet the distress/impairment criterion usually endorse several symptoms. In other words, although many people may experience food cravings and feel that they lost control of their consumption, they do not suffer from it. This suggests that the YFAS 2.0 may have high specificity to detect individuals with an addiction-like eating behavior.

Future Directions

While the YFAS 2.0 shows good psychometric properties, only one study has reported retest-reliability (over a relatively short time period of 3 weeks) [15]. Thus, additional studies using longer follow-up periods are necessary to evaluate the long-term stability of YFAS 2.0 scores appropriately. Similarly, more longitudinal studies are necessary that examine the prospective relationship between YFAS 2.0 scores and outcomes such as weight change. To date, only one study has examined such associations and points towards poorer weight loss in individuals with food addiction during a weight-loss intervention [34].

An ongoing debate is the distinctiveness of food addiction as measured with the YFAS and YFAS 2.0 with established eating disorder diagnoses [44, 45]. While discriminant validity of the YFAS 2.0 is supported regarding constructs such as dietary restraint, it highly overlaps with conditions such as bulimia nervosa and binge eating disorder. Therefore, future research needs to determine not only the cross-sectional relationship between these conditions but also examine other characteristics such as their predictive power regarding eating and weight outcomes, for example after psychotherapy or weight management programs.

Yet, the high degree of overlap is somewhat expected given the overlapping mechanisms implicated in both binge-related eating disorders and addictive disorders (e.g., impulsivity, emotion dysregulation, craving), but there are also mechanistic explanations that are unique to an addiction perspective [46]. Specifically, the addiction perspective proposes that the types of foods commonly consumed during binge eating episodes (e.g., foods high in refined carbohydrates and fat) may

be capable of causing reward-related adaptations that drive forward compulsive patterns of behavior [46]. Although there is strong animal evidence in support of this concept [47, 48], additional studies are needed to investigate this hypothesis in humans. Such studies may reveal a clearer picture about the distinctiveness of food addiction and binge-related eating disorders. Further, the relatively high rates of YFAS 2.0 food addiction in patients with restrictive-type anorexia nervosa are unexpected and may require qualitative work to investigate whether the scale may be interpreted differently in this population.

Conclusions

In conclusion, the development of the YFAS 2.0 has provided an updated assessment tool to support continued investigation into the food addiction hypothesis based on the current diagnostic understanding of addiction. The YFAS and YFAS 2.0 exhibit similar psychometric properties and estimate similar prevalence rates of food addiction. Importantly, the YFAS 2.0 is associated with clinically relevant correlates, including obesity, disordered eating, depression, and some measures of executive functioning difficulties. Future longitudinal research, particularly regarding the ability of the YFAS 2.0 to predict treatment outcomes, is needed. As the scientific understanding of the best ways to conceptualize and assess addictive disorders evolves, future iterations of the YFAS will likely be needed to reflect these advances.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

Appendix 1. SPSS syntax for the YFAS 2.0

**Dichotomize all 35 items*

Recode YFAS01 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 0) (6 = 1) (7 = 1).

Recode YFAS02 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 0) (6 = 1) (7 = 1).

Recode YFAS03 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS04 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 0) (6 = 1) (7 = 1).

Recode YFAS05 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS06 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 0) (6 = 1) (7 = 1).

Recode YFAS07 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 0) (6 = 1) (7 = 1).

Recode YFAS08 (0 = 0) (1 = 0) (2 = 0) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS09 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS10 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS11 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS12 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS13 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS14 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS15 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 0) (6 = 1) (7 = 1).

Recode YFAS16 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS17 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS18 (0 = 0) (1 = 0) (2 = 0) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS19 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS20 (0 = 0) (1 = 0) (2 = 0) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS21 (0 = 0) (1 = 0) (2 = 0) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS22 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS23 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS24 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS25 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 0) (6 = 1) (7 = 1).

Recode YFAS26 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS27 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS28 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS29 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS30 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS31 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS32 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS33 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS34 (0 = 0) (1 = 0) (2 = 0) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode YFAS35 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Execute.

**Compute sum scores for each symptom and dichotomize.*

Compute YFASamount = YFAS01 + YFAS02 + YFAS03.

If (YFASamount >= 1) YFASamount = 1.

Execute.

Compute YFASattempts = YFAS04 + YFAS25 + YFAS31 + YFAS32.

If (YFASattempts >= 1) YFASattempts = 1.

Execute.

Compute YFAStime = YFAS05 + YFAS06 + YFAS07.

If (YFAStime >= 1) YFAStime = 1.

Execute.

Compute YFASactivities = YFAS08 + YFAS10 + YFAS18 + YFAS20.

If (YFASactivities >= 1) YFASactivities = 1.

Execute.

Compute YFASconsequences = YFAS22 + YFAS23.

If (YFASconsequences >= 1) YFASconsequences = 1.

Execute.

Compute YFAStolerance = YFAS24 + YFAS26.

If (YFAStolerance >= 1) YFAStolerance = 1.

Execute.

Compute YFASwithdrawal = YFAS11 + YFAS12 + YFAS13 + YFAS14 + YFAS15.

If (YFASwithdrawal >= 1) YFASwithdrawal = 1.

Execute.

Compute YFASproblems = YFAS09 + YFAS21 + YFAS35.

If (YFASproblems >= 1) YFASproblems = 1.

Execute.

Compute YFASobligations = YFAS19 + YFAS27.

If (YFASobligations >= 1) YFASobligations = 1.

Execute.

Compute YFASsituations = YFAS28 + YFAS33 + YFAS34.

If (YFASsituations >= 1) YFASsituations = 1.

Execute.

Compute YFAScraving = YFAS29 + YFAS30.

If (YFAScraving >= 1) YFAScraving = 1.

Execute.

Compute YFASimpairment = YFAS16 + YFAS17.

If (YFASimpairment >= 1) YFASimpairment = 1.

Execute.

**Compute symptom count*

Compute YFASsymptoms = YFASamount + YFASattempts + YFAStime + YFASactivities + YFASconsequences + YFAStolerance + YFASwithdrawal + YFASproblems + YFASobligations + YFASsituations + YFAScraving.
Execute.

**Compute diagnostic score separated by severity level*

Compute YFASdiagnosis = 0.

If (YFASsymptoms >= 2 & YFASimpairment >= 1) YFASdiagnosis = 1.

If (YFASsymptoms >= 4 & YFASimpairment >= 1) YFASdiagnosis = 2.

If (YFASsymptoms >= 6 & YFASimpairment >= 1) YFASdiagnosis = 3.

Execute.

Value labels YFASdiagnosis 0 “no food addiction” 1 “mild food addiction” 2 “moderate food addiction” 3 “severe food addiction.”

Execute.

**Compute diagnostic score without differentiating between severity levels*

Compute YFASdiagnosis_dichotomous = 0.

If (YFASsymptoms >= 2 & YFASimpairment >= 1) YFASdiagnosis = 1.

Execute.

Value labels YFASdiagnosis_dichotomous 0 “no food addiction” 1 “food addiction.”

Execute.

**Make your variables look nicer*

Alter type

YFAS01 YFAS02 YFAS03 YFAS04 YFAS05 YFAS06 YFAS07 YFAS08 YFAS09 YFAS10 YFAS11 YFAS12 YFAS13 YFAS14 YFAS15 YFAS16 YFAS17 YFAS18 YFAS19 YFAS20 YFAS21 YFAS22 YFAS23 YFAS24 YFAS25 YFAS26 YFAS27 YFAS28 YFAS29 YFAS30 YFAS31 YFAS32 YFAS33 YFAS34 YFAS35 YFASamount YFASattempts YFAStime YFASactivities YFASconsequences YFAStolerance YFASwithdrawal YFASproblems YFASobligations YFASsituations YFAScraving YFASimpairment YFASsymptoms YFASdiagnosis YFASdiagnosis_dichotomous (F8.0).

Execute.

Appendix 2. SPSS syntax for the mYFAS 2.0

**Dichotomize all 13 items*

Recode mYFAS01 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS02 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS03 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS04 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS05 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS06 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS07 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS08 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS09 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS10 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS11 (0 = 0) (1 = 0) (2 = 0) (3 = 0) (4 = 0) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS12 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Recode mYFAS13 (0 = 0) (1 = 0) (2 = 1) (3 = 1) (4 = 1) (5 = 1) (6 = 1) (7 = 1).

Execute.

**Compute sum scores for all symptoms and the distress/impairment criterion*

Compute mYFASimpairment = mYFAS05 + mYFAS06.

Execute.

Compute mYFASsymptoms = mYFAS01 + mYFAS02 + mYFAS03 + mYFAS04 + mYFAS07 + mYFAS08 + mYFAS09 + mYFAS10 + mYFAS11 + mYFAS12 + mYFAS13.

Execute.

**Compute diagnostic score separated by severity level*

Compute mYFASdiagnosis = 0.

If (mYFASsymptoms >= 2 & mYFASimpairment >= 1) mYFASdiagnosis = 1.

If (mYFASsymptoms >= 4 & mYFASimpairment >= 1) mYFASdiagnosis = 2.

If (mYFASsymptoms >= 6 & mYFASimpairment >= 1) mYFASdiagnosis = 3.

Execute.

Value labels mYFASdiagnosis 0 “no food addiction” 1 “mild food addiction” 2 “moderate food addiction” 3 “severe food addiction.”

Execute.

**Compute diagnostic score without differentiating between severity levels.*

Compute mYFASdiagnosis_dichotomous = 0.

If (mYFASsymptoms >= 2 & mYFASimpairment >= 1) mYFASdiagnosis = 1.

Execute.

Value labels mYFASdiagnosis_dichotomous 0 “no food addiction” 1 “food addiction.”

Execute.

**Make your variables look nicer*

Alter type

mYFAS01 mYFAS02 mYFAS03 mYFAS04 mYFAS05
mYFAS06 mYFAS07 mYFAS08 mYFAS09 mYFAS10
mYFAS11 mYFAS12 mYFAS13 mYFASimpairment
m Y F A S s y m p t o m s m Y F A S d i a g n o s i s
mYFASdiagnosis_dichotomous (F8.0).

Execute.

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