

Published in final edited form as:

Appetite. 2013 August ; 67: 22–24. doi:10.1016/j.appet.2013.03.008.

Exploration of “Food Addiction” in Overweight and Obese Treatment-Seeking Adults

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Abstract

There is growing interest in conceptualizing obesity as a “food addiction.” The current study investigated the prevalence and correlates of “food addiction” (FA), as defined by the Yale Food Addiction Scale (YFAS) in 178 (133 F, 45M) persons seeking weight loss treatment. Participants had a mean age of 51.2±11.7 years and a body mass index of 36.1±4.8 kg/m². Fifteen percent of individuals met the YFAS proposed diagnostic criteria for FA. Those who met criteria for FA reported significantly greater depressive symptomatology. There were no differences in BMI, age, race, or gender between participants with and without FA. Among those not meeting criteria, 35% reported 3 or more symptoms in the absence of self-reported clinical distress or impairment. YFAS symptom count was also significantly correlated with depressive symptoms. These findings suggest that 15% of adults presenting for weight loss treatment meet YFAS criteria for FA. The clinical significance of this classification is unknown and needs to be validated in prospective studies.

Keywords

food addiction; obesity; depressive symptomatology

“Food addiction” (FA) is a phrase increasingly used by the public (1) but continues to garner debate in the scientific literature (2, 3). FA refers to a behavioral phenotype of food consumption that mirrors the clinical criteria for substance dependence (4). There is some preliminary evidence for the addictive potential of food, including similarities between the effects of palatable foods and drugs of abuse on the dopamine and opiate systems (5), and decreased dopamine (D2) receptor availability in obese individuals which parallels D2 findings in drug addicted individuals (6,7). The clinical significance of these associative data

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Disclosure

GDF serves on the Scientific Advisory Boards for Con Agra Foods, Tate and Lyle, Nutrisystem and United Health Group. Other authors have no conflicts of interest to disclose.

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is unknown given the difficulties of operationalizing criteria for tolerance, withdrawal and functional impairment in regards to eating behavior (4).

The measurement of FA was aided by the development of the *Yale Food Addiction Scale* (YFAS; 4). YFAS authors adapted established criteria for Substance Dependence (DSM-IV-TR; 8) to develop potential clinical criteria for FA. The YFAS provides two scoring alternatives: 1) a dimensional measure of symptoms of FA and 2) a categorical “diagnostic” threshold that is met when an individual endorses three or more symptoms *and* “clinically significant” distress or impairment. The YFAS was validated in undergraduate populations (4) and correlated with neural activation of reward circuitry (9). More recently, several studies have examined the YFAS in select subgroups of obese patients, such as those with binge eating disorder (BED) (10, 11) or those undergoing bariatric surgery (12). Among these samples, 40–60% of patients met criteria for FA.

To our knowledge, no studies of the YFAS have been conducted among samples of obese adults seeking weight-loss treatment who were not selected for surgical treatment or the presence of BED. Such data are needed to better understand the construct of FA among less specialized samples of individuals seeking weight-loss treatment. The purpose of the current study was to examine the prevalence of YFAS FA in a large, weight-loss treatment seeking sample utilizing both the “diagnostic” threshold and the dimensional symptom count. In addition, we examined the relationship of the YFAS with body mass index (BMI) and depressive symptomatology.

Method

Participants

Participants were 178 (133 F) adults seeking weight loss treatment. Most (92.1%) were obese, and all were, at least, overweight with a mean BMI of 36.1 kg/m². Most were female (74.7%) and African American (69.1%). Sample characteristics are described in Table 1. Participants were enrolled in two weight-loss studies at an obesity research center. Treatments were delivered in group format and focused on behavioral strategies for weight loss including self-monitoring, portion control, physical activity, slow/mindful eating, and precipitants of eating, with varying degrees of emphasis on each facet of the treatment. Participants were provided free treatment and were compensated 25–50 dollars for completing these baseline assessments. Exclusion criteria included a current diagnosis of substance abuse or dependence, a serious medical condition, BED, and severe depressive symptoms. All studies were approved by Temple University Institutional Review Board, and all participants provided written consent prior to the initial screening visit. All assessments were obtained as part of a larger baseline assessment before any treatment was administered.

Clinical Measures

Yale Food Addiction Scale (YFAS)—The 25-item YFAS (4) examined symptoms of FA following the substance dependence criteria of the DSM-IV-TR (8). We modified this scale with permission from the original scale developers to examine symptom presentation over the past month rather than the past year in order to obtain a more proximal estimate of symptoms and allow for potential follow-up assessments that would occur over periods less than 1 year. A “diagnosis” was given if the participant endorsed experiencing three or more of the seven symptoms *and* at least one of two questions impairment or distress over the past month (i.e., “clinical significance”). A continuous score representing the total number of symptoms endorsed was also calculated. The YFAS was shown to have convergent validity with measures of eating pathology (i.e. binge and emotional eating, food cravings),

divergent validity and adequate internal consistency (4, 10–13). For the current sample, the Cronbach's alpha coefficient of all items was .76.

Beck Depression Inventory, 2nd edition (BDI-II)—The BDI-II (14), a 21-item scale with item responses ranging from 0–3, assessed depressive symptomatology. Severity of scores is as follows: 0–13, minimal; 14–19, mild; 20–28, moderate; 29, severe. This scale has demonstrated good reliability, validity and clinical utility (14).

Body Mass Index (BMI)—BMI (weight in kg/ height in m²) was calculated using weight obtained in indoor clothing with no shoes on a calibrated, digital scale. Height was measured using a wall mounted stadiometer while participants wore no shoes.

Procedures

Statistical analyses were performed with SPSS version 19.0 for Windows (SPSS: Chicago, an IBM Company). Chi-square and Fischer exact tests were conducted to examine group differences between participants who met criteria for FA and participants who did not meet criteria by gender and race. T-tests, Mann-Whitney or Kruskal-Wallis tests examined between group differences in BDI scores and BMI by demographic variables and FA diagnosis. Spearman's correlation coefficients examined the relationship of overall FA symptom count with BDI scores and BMI.

Results

In total, 15.2% of individuals met the YFAS criteria for FA. There were no differences in gender, race, age, or BMI between participants who met criteria for FA and individuals who did not meet criteria (non-FA). Participants who met criteria for a “diagnosis” of FA had significantly higher BDI-II scores [see Table 1]. The mean BDI-II of individuals with FA fell in the “mild” range whereas the mean of non-FA participants fell in the “minimal” range.

The average number of symptoms of FA in the full sample was 2.57 (SD = 1.67), and 80 participants (45%) endorsed at least three symptoms. The three most frequently endorsed symptoms in the overall sample were: inability to cut down or stop eating (96.1%), continued use despite consequences (44.4%) and tolerance (36%, defined as a marked increase in amount or marked decrease in effect). Symptom count differed significantly by gender ($p=.002$) and race ($p=.04$). Women (median= 3.0 symptoms) and African Americans (median= 3.0 symptoms) endorsed significantly more symptoms than males (median= 2.0 symptoms) or participants of other races (median=2.0 symptoms). Symptom count inversely correlated with age ($r_s=-.284, p<.001$). Similar to the categorical results, there was no relationship between YFAS symptom count and BMI, but a higher YFAS symptom count was associated with higher BDI-II scores ($r_s=.48, p<.001$). Among individuals who did not meet “diagnostic” criteria for FA, 35% endorsed three or more symptoms but did not report distress or impairment.

Discussion

The present study used the YFAS to investigate FA in overweight and obese adults seeking weight-loss treatment. Over 15% of the sample met “diagnostic” criteria for FA within the past month. This prevalence rate is comparable to rates in healthy weight college students (11.4%) (4), but lower than rates in BED (56.8%) (10), bariatric surgery (41.7%) (12) and non-treatment seeking obese populations (25.0%) (11). Rates of FA in our sample may have differed from non-treatment seeking obese individuals because we excluded individuals with BED and severe depressive symptoms, which were previously found to be related to higher

rates of FA (11). Additionally, all of these studies evaluated prevalence rates of FA within the past year while we evaluated the past month (4, 10–12) which could have led to a lower estimated prevalence.

Despite excluding individuals with severe depressive symptoms, our findings parallel findings of a previous study suggesting FA diagnoses and higher YFAS symptom counts to be associated with greater depressive symptomatology (11). Both addictive processes and depressive symptoms are hypothesized to involve dopaminergic pathways, which may underlie the apparent co-morbidity of FA and depressive symptoms (11). It is important to note, however, that the mean BDI score of the FA group was in the mild range. Prospective studies are needed to further explore the relationship between FA and depressive symptoms (11).

Approximately 30% of individuals who did not meet diagnostic criteria for FA endorsed at least three symptoms, but did not endorse clinically significant impairment or distress. This is consistent with other research suggesting that 38% of individuals endorse three or more symptoms regardless of meeting clinical FA criteria (9). Reasons for the demonstrated race and gender differences in FA symptoms are unclear. Although we didn't measure subthreshold binge eating, these differences may be due to greater prevalence of subthreshold binge eating in African Americans and women in the sample, which would be consistent with previous reports of higher rates of binge eating in African American women (15,16). Another potential explanation is that there are some gender differences in the tendency to report eating disorder-related symptoms (17). Future studies should continue to examine FA symptoms in heterogeneous populations. Finally, we found higher YFAS symptom scores were not associated with BMI, which supports previous findings that weight is not related to FA diagnosis (11–12). The restricted range of BMI in this study of overweight and obese adults may have contributed to this null finding. Nonetheless, these data suggest that characteristics of FA exist in individuals seeking weight-loss treatment regardless of the level of obesity.

This is the first examination of FA in overweight and obese treatment seekers not selected for binge eating or bariatric surgery (10, 12). Additionally, our sample is larger and more racially diverse than several of the previous studies (10, 12). We used a “diagnostic,” categorical indicator of FA as well as an index of the number of symptoms endorsed by individuals in this sample. A limitation of this study is that we excluded individuals with severe depressive symptoms, BED and serious medical conditions. We also did not examine previous history of eating disorders, eating disorder behaviors, and other characteristics related to disordered eating such as dietary restraint and impulsivity which have previously been associated with food addiction symptomatology (10,11).

Additional studies are needed to evaluate the YFAS in more diverse samples (e.g., other minority populations, individuals with additional medical co-morbidities, across socioeconomic statuses), and to examine the validity and reliability of the YFAS over time, including the YFAS as it was modified for the current study. It is important to better understand the heterogeneity of FA and to explore differences between individuals who meet criteria and individuals who endorse symptoms but do not meet criteria for clinical significance. Similarly, future research should explore the relationship between FA and weight loss and/or attrition during obesity treatment.

Acknowledgments

Preparation of this manuscript was supported in part by grant NIH F32 DK083910.

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Highlights

- In overweight and obese treatment-seeking adults, 15% met criteria for “food addiction” as defined by a questionnaire.
- Individuals who met criteria for “food addiction” reported significantly greater depressive symptomatology.
- Among those who did not meet criteria, greater “food addiction” symptoms were associated with more depressive symptomatology.

Table 1

Demographic Variables and Depressive Symptomatology Among Individuals With and Without Food Addiction

	Total Sample n=178	Participants with Food Addiction n=27(15.2%)	Participants without Food Addiction n=151 (84.8%)	Test statistics
Female, % (n)	74.7 (133)	88.9 (24)	72.2 (109)	Fisher's Exact, $p=.09$
Age, Years (M \pm SD)	51.2 \pm 11.7	47.7 \pm 12.6	51.9 \pm 11.4	$t(176) = 1.72, p=.09$
BMI, kg/m ² (M \pm SD)	36.1 \pm 4.8	36.0 \pm 4.6	36.1 \pm 4.9	$t(176) = .10, p = .92$
Race, % (n)				$\chi^2(2)=1.12, p=.29$
African American	69.1 (123)	77.8 (21)	67.5 (102)	
Non-African American	30.9 (55)	22.2 (6)	32.5 (49)	
BDI-II Total (M \pm SD)	10.3 \pm 8.0	17.1 \pm 6.6	9.2 \pm 7.7	$Z=-4.81, p < .001$

Note: percent values are indicative of relative percentages for the column categories (i.e. 88.9% of people in the Food Addiction group were Females).