

# Food addiction as a proxy for eating disorder and obesity severity, trauma history, PTSD symptoms, and comorbidity

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## Abstract

**Purpose** Food addiction (FA) is a newly defined yet still controversial condition that has important etiological, developmental, treatment, prevention, and social policy implications. In this review, the case is made that FA (or high scores on the Yale Food Addiction Scale) may be used as a proxy measure for a matrix of interrelated clinical features, including greater eating disorder severity, greater obesity severity, more severe trauma histories, greater symptoms of posttraumatic stress disorder (PTSD), greater psychiatric comorbidity, as well as greater medical morbidity and mortality.

**Methods** A Medline search was undertaken using the following terms: food addiction cross-referenced with eating disorders (anorexia nervosa, bulimia nervosa, binge eating disorder, and binge eating), obesity, trauma, posttraumatic stress disorder, and comorbidity.

**Results** The thesis is that the identification and acknowledgment of the concept of FA, when integrated into an overall, trauma-focused and transdiagnostic treatment approach, are supported and can be useful in understanding clinically the “big picture.”

**Conclusions** Food addiction (FA) may be used as a proxy for (1) bulimic eating disorder severity, (2) complex trauma histories, (3) severity of PTSD and PTSD symptoms, (4) intensity of psychiatric comorbidity, (5) severity of obesity,

as well as (6) their combination. Implications for developing treatment strategies are discussed. The case for a comprehensive management that requires careful attention to medical and psychiatric assessment and integrated care that incorporates trauma-focused treatment is made.

**Keywords** Binge eating disorder · Bulimia nervosa · Comorbidity · Food addiction · Posttraumatic stress disorder · Severity

## Food addiction as a concept

The term “food addiction” (FA) was originally coined in 1956 by Randolph, who associated it with addictive drinking [59]. However, the phenomenon went relatively unexplored for many years until the last decade when serious scientific interest progressively mushroomed (see Fig. 1). Parallel to this scientific inquiry, FA has increasingly become a useful and defensible clinical entity with marked implications for policy, practice, and research [30, 42, 61]. Highly palatable foods are postulated to act via similar mechanisms as both illicit and licit drugs of abuse in the brain [2–4, 6, 27–29, 33–35, 38, 41, 43, 45]. Much of the work in humans has been facilitated by the development of the Yale Food Addiction Scale (YFAS) by Gearhardt and associates [28, 31, 58]. The YFAS has shown good test–retest reliability and validity, and now, there is a YFAS for children [31], as well as the YFAS-2, which is based on DSM-5 criteria for substance use disorder [52].

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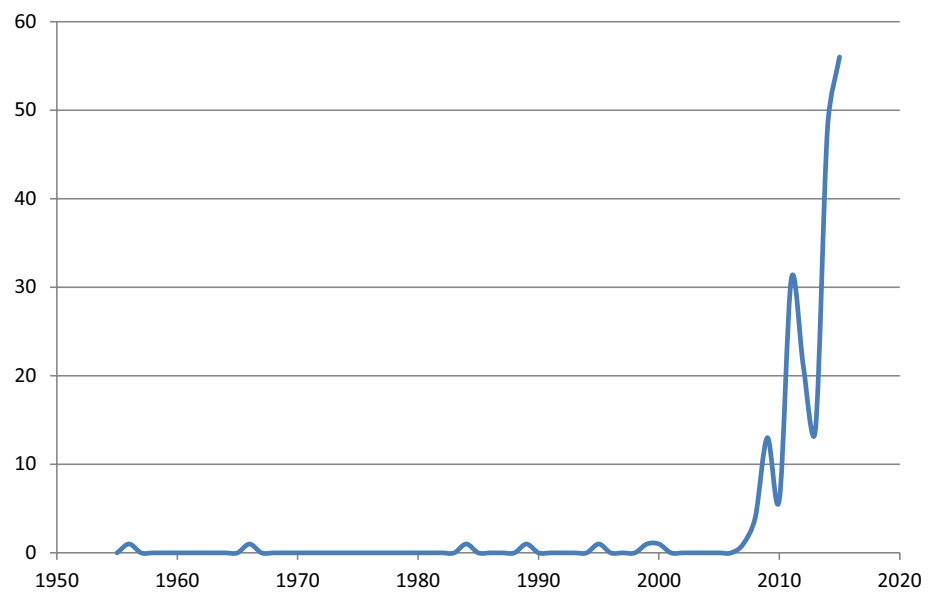
This article is part of the topical collection on Food addiction.

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**Fig. 1** Number of “food addiction” citations in PUBMED by year (1950–2015)



### Thesis of this review

The purpose of this theoretical and integrative review is to explore the premise that FA, as evidenced by high scores on the YFAS, may be used as a proxy measure or marker for greater eating disorder severity, greater obesity severity, more severe trauma histories, greater symptoms of posttraumatic stress disorder (PTSD), greater psychiatric comorbidity, as well as greater medical morbidity and mortality. The existing literature through August 2016 was reviewed by the author using a Medline search with the following terms: food addiction cross-referenced with eating disorders (anorexia nervosa, bulimia nervosa, binge eating disorder, and binge eating), obesity, trauma, posttraumatic stress disorder, and comorbidity. The author asserts that the identification and acknowledgment of the concept of FA, when integrated into an overall, trauma-focused treatment approach, can be useful in understanding a more integrated and comprehensive clinical picture. This perspective may also help to bridge the conceptual gaps between eating disorders, weight disorders, addictions, and other related psychiatric and medical comorbidities.

### Food addiction as a proxy for eating disorder and obesity severity

Gearhardt and colleagues were the first to demonstrate high rates of FA in individuals with binge eating disorder (BED) [32, 33; Gearhardt, White, et al., 2011]. In one study of 81 obese, treatment-seeking patients with BED, 57% met criteria for FA. This subgroup of BED individuals had significantly higher levels of eating disorder psychopathology,

as well as higher measures of depression, negative affect, and emotional dysregulation, and lower measures of self-esteem. Taken together, the BED-FA group was a “more disturbed variant” of BED [33]. In a similar study of a racially diverse group of 96 patients with BED, 41.5% of them met FA criteria. Again, the BED-FA group had significantly higher rates of ED psychopathology, negative affect, emotional dysregulation, and low self-esteem [31]. In addition, higher YFAS scores were significant predictors of binge eating (BE) frequency above and beyond other measures, and were also associated with an earlier age of first being overweight and dieting onset.

The FA construct has also been studied in other eating disorders besides BED. In a study of 26 women with current bulimia nervosa (BN), 20 women with remitted BN, and a matched control group of 63 women, 100% of those with active BN met FA criteria, while 30% of the remitted group and none of the controls met FA [53]. The authors concluded that eating behavior within the context of BN can be described as addiction-like and that FA most likely improves when BN symptoms remit, although prospective, long-term studies are needed to clearly demonstrate this.

In a study of 125 patients with a variety of DSM-5 defined EDs versus 82 healthy controls, the Spanish version of the YFAS (YFAS-S) showed good discriminative capacity to distinguish between ED and controls and a good sensitivity to screen for specific ED subtypes [36]. The highest prevalence of FA was found in bingeing ED-subtype patient groups, i.e., AN binge-purge subtype (85.7%), BN (81.5%), and BED (76.9%), while the lowest prevalence was found in the AN restrictive subtype (50%). Again, YFAS-S scores were related to more severe eating pathology, higher levels of negative affect and depression,

higher general psychopathology, and greater BMI. In summary, higher YFAS-S scores are associated with bingeing ED-subtype patients and with more eating severity and psychopathology. In addition, the FA construct was able to differentiate between ED and controls, although the authors called for further research on this topic.

Imperatori and colleagues studied 112 patients seeking weight loss treatment and found that 33.9% of these individuals met criteria for FA [39]. Severity of FA was strongly associated with BE. The combination of FA and BE was moderately associated with psychopathology.

### Food addiction as a proxy for trauma and posttraumatic stress disorder (PTSD)

It has been well-established previously that bulimic behaviors (BE and purging) and especially eating disorders with bulimic features are highly associated with prior traumatic events and resultant posttraumatic stress disorder (PTSD) and partial PTSD [9, 10, 13–15, 17, 22, 55, 62]. Similarly, obesity has also been linked to prior victimization and PTSD [16]. It has been hypothesized that overindulgence in hedonic foods and drinks may, therefore, become a legal, inexpensive, and readily available method similar to indulging in other addictive substances or behaviors that traumatized persons use to anaesthetize themselves from unpleasant feelings and memories and to diminish emotional arousal [9–14, 17].

In substantiation of this model, Hirth and colleagues studied over 3000 adult women who were patients at five public health clinics in respect to (1) their sugary soda and fast-food consumption, (2) their eating disordered behaviors (e.g., dieting, BE, purging), and (3) their PTSD symptoms. The researchers discovered a statistically significant relationship between symptoms of PTSD and (1) their frequency of sugary soda and fast-food intake and (2) their ED symptoms, including severe dieting, purging, and compulsive exercising, but not with BMI [37]. This research paper is distinctive, because it established for the first time a relationship between PTSD symptoms (and thus trauma history) and eating highly palatable foods known to be relatively unhealthy and associated with the concept of FA, i.e., foods with high concentrations of processed sugars and saturated fats, as well as salt and often caffeine.

Studies by Mason and her colleagues have further established the important links between trauma exposure, PTSD and FA. In one study of 57,321 adult participants in the National Nurses' Health Study II (NNHSII), lifetime histories of childhood physical and sexual abuse in 2001 and current diagnosis of FA in 2009 were obtained [47]. Eighty percent of those with childhood maltreatment histories met criteria for FA. In fact, severe physical and sexual abuse

histories were associated with approximately 90% increases in risk of FA. The relative risk (RR) of FA for those with histories of physical abuse was 1.92 (95% CI 1.76–2.09) and for those with histories of sexual abuse it was 1.87 (95% CI 1.69–2.05). The RR for combined severe physical abuse and sexual abuse was 2.40 (95% CI 2.16–2.67). The authors noted the strong relationship between histories of childhood physical and sexual abuse and FA in this population of women registered nurses. It is important to note that other forms of childhood trauma, e.g., emotional abuse, emotional neglect, physical neglect, accidents, disasters, etc., were not reported in this study, nor were symptoms or diagnoses of PTSD reported.

However, in another study by Mason and co-investigators using the NNHSII, 49,408 participants completed a modified version of the YFAS as well as measures of lifetime trauma exposure and PTSD symptoms [48]. Approximately 80% of the study sample reported some type of trauma exposure, and 66% of those who were trauma-exposed reported at least one lifetime PTSD symptom. Eight percent of the entire cohort met FA criteria, and the prevalence of FA increased with the number of lifetime PTSD symptoms endorsed. The women with the greatest number of PTSD symptoms (6–7 symptoms) had more than twice the prevalence of FA as women with neither trauma histories nor PTSD symptoms. Symptoms of PTSD were more strongly related to FA when symptom onset occurred at a younger age. The PTSD–FA link did not differ significantly by type of trauma. The authors noted that approaches to reduce obesity associated with PTSD may require psychological and behavioral interventions that address dependence on food and/or use of food to cope with distress.

### Food addiction as a proxy for trauma and obesity

The links between obesity and childhood maltreatment and/or PTSD are well-recognized [1, 24, 25, 46, 49]. In a recent study using results from the National Women's Study, Brewerton and coworkers showed strong associations between extreme obesity (BMI  $\geq$  40) and histories of rape, childhood sexual abuse, any childhood maltreatment, as well as current and lifetime PTSD [15]. In addition, those with extreme obesity were more likely to engage in BE and purging behaviors and to meet criteria for BN, any bulimic disorder (BN or BED), and major depressive disorder.

Other recent studies report important links between trauma histories, FA, and obesity. In the study noted above by Mason and colleagues using the NNHSII, FA was not only strongly associated with childhood abuse but with significantly higher weights as well, i.e., six units of BMI higher than women without FA [47].

In a report involving 301 overweight and obese women seeking weight loss treatment, self-report measures of childhood trauma histories, BE, and FA were obtained [40]. The authors found that the severity of childhood trauma was moderately and independently associated with severity of both FA and BE, even after controlling for potential confounders. However, the co-occurrence of FA and BE was associated with higher BMI and more severe anxiety and depressive symptoms. In another study by Imperatori and colleagues in 112 men and women seeking weight loss interventions, the authors found that 33.9% of these individuals met criteria for FA [39]. The severity of FA was strongly associated with BE, and the combination of FA and BE was moderately associated with psychopathology.

### Food addiction as a proxy for psychiatric comorbidity

As noted above, the links between FA, trauma exposure, and obesity extend to PTSD and its symptoms. The presence of PTSD is highly predictive of increased psychiatric comorbidity [8–10, 13].

In a group of trauma-exposed female ( $n=55$ ) and male ( $n=642$ ) veterans, the links between FA and PTSD were examined [56]. PTSD was found to be significantly and positively associated with ED symptoms, FA, expressive suppression of emotions, and cognitive reappraisal in the full sample and with all constructs except cognitive reappraisal in the male subsample. Expressive suppression of emotions was significantly associated with ED symptoms and mediated the PTSD—ED link. These results highlight the importance of investigating PTSD as a risk factor for FA and ED symptoms and the potential mediating role of emotion regulation in the development of PTSD, EDs, and all related disorders to identify targets for treatments.

As noted above in the studies by Imperatori and coworkers, the combination of FA and BE was associated with general psychopathology, particularly greater levels of anxiety and depression [39, 40].

### Food addiction as a proxy for medical morbidity and mortality

Obesity has long been identified as a risk factor for many medical conditions and causes of death. However, it is only since the advent of the adverse childhood experiences (ACE) research studies that childhood adversity has been identified as a risk factor for all the major causes of death [1, 18, 24, 26]. Since the advent of these initial studies, other researchers have replicated these findings and have searched for potential mechanisms. These studies have

incorporated findings from studies of stress in animals and PTSD in humans, which have identified major changes in various biological systems, including the central and autonomic nervous systems, the cardiovascular system, as well as endocrine and immunological systems [5, 7, 19–21, 51, 54, 57, 60]. Other investigators have found evidence of telomere shortening as a result of severe stress, which may be a marker for increased aging and early death [23, 50]. An extensive discussion of this topic is beyond the scope of this article. However, suffice it to say that obesity, severe bulimic disorders, childhood trauma, PTSD, and major depression have all been linked to significant morbidity and increased mortality. This places even more responsibility on the clinician to implement comprehensive psychiatric and medical evaluations, to identify any and all treatable medical conditions and to institute prophylactic measures against further health decline.

### Implications for treatment

Gearhardt and colleagues have outlined some of the inherent conflicts between traditional conceptualizations of eating disorders treatment and substance use treatment, including food addiction [34]. One of the cornerstones within the eating disorders treatment community is that there are “no bad foods.” Unless there is a medically documented food allergy or intolerance, e.g., gluten, peanuts, etc., then all foods should be eaten in moderation and in balance with each other. This has been an especially important concept when treating anorexia nervosa, an illness characterized by irrational fears about gaining weight and hence eating certain foods that are perceived to be “fattening” or “bad.”

In contrast, the addiction treatment community is comfortable with the concept of elimination of and abstinence from particular substances, including specific foods that are addicting. A classic example of this philosophy in Overeaters Anonymous (OA), which was founded in 1960 in Los Angeles under the premise that individuals struggling with compulsive overeating, BE, overweight, and/or obesity, are addicted to processed foods, including white sugar and white flour. More recently, the substance abuse treatment community has embraced a middle ground, i.e., the concept of harm avoidance, as opposed to an all-or-nothing stance, where there is no room for error [44].

Although evidence-based, integrated treatment approaches for FA remain to be determined in randomized, controlled trials, there is some clarity about what the concept of FA does not imply for treatment. It does not mean that a 12-step program is the only treatment or is the treatment of choice for FA. Some professionals mistakenly think that the only effective treatment for any type of addiction is a 12-step approach. It does not mean that the Overeaters

Anonymous (OA) doctrine of eliminating white flour and sugar is valid. This has never been studied scientifically; there are only anecdotes for and against this strategy. It also does not mean that total abstinence from the addictive substance or behavior is necessary for improvement.

On the contrary, FA may mean that treatments used for substance-related disorders may be indicated. Although this requires further investigation, using already established, evidence-based approaches for addictions in the treatment of FA may be a good place to start. Such approaches include cognitive behavioral therapy (CBT), dialectical behavior therapy (DBT), motivational interviewing (MI) and motivational enhancement therapy (MET), mindfulness-based therapies (MBT), family therapies, and pharmacotherapies. Twelve-step facilitation, which has been effective for alcohol and cocaine dependence, may be effective for certain individuals with FA. Abstinence from or reduction of addictive substances (e.g., highly palatable foods) and behaviors (e.g., BE) may be necessary, although a harm reduction (HR) strategy, similar to what has evolved for alcohol and drugs (both illicit and licit), may be especially useful given how ubiquitous processed foods have become. The HR approach was developed in response to the excesses of a “zero tolerance approach” and to more effectively meet the needs of patients struggling with chronic conditions. HR emphasizes practical rather than idealized goals and is grounded in the ever evolving public health and advocacy movements. HR has been proven to be effective and has gained increasing official acceptance [44]. For example, it is now the basis of Canada’s Drug Strategy. A principle feature of HR is acceptance of the fact that some drug users for multiple reasons cannot be expected to cease their drug use at the present time.

## Summary

In this overview of the emerging literature on FA and its relationship to eating and related disorders, the case has been made that FA may be used as a proxy for (1) bulimic eating disorder severity, (2) complex trauma histories, (3) severity of PTSD and PTSD symptoms, (4) intensity of psychiatric comorbidity, (5) severity of obesity, as well as (6) their combination. In addition, the implications for treatment have been discussed, and the case for a comprehensive management that requires careful attention to medical and psychiatric assessment and integrated care that incorporates trauma-focused treatment is made.

## Compliance with ethical standards

**Conflict of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Research involving human participants and/or animals** This article does not contain any studies with human participants or animals performed by any of the authors.

**Informed consent** No new results are being reported in this paper, so informed consent is not applicable.

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