



# Child Abuse and Addiction in Obesity



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## Abstract

In this mini-review the contribution of adverse child effects (ACEs) to obesity and food addiction (FA) is discussed. The concept of FA, its underlying mechanisms and the varying prevalences of FA are reviewed. Its relationship to eating disorders as binge eating, bulimia and substance use disorder is seen from the viewpoint of emotional abuse(EA), emotional neglect(EN) and intimate partner violence (IPV) in childhood. Finally, the therapeutic implications of FA and eating disorders are considered, with an emphasis of various forms of cognitive behavior therapy (CBT) and evolving mHealth CBT.

**Abbreviations:** ACEs: Adverse Child Effects; FA: Food Addiction; EA: Emotional Abuse; EN: Emotional Neglect; IPV: Intimate Partner Violence; CBT: Cognitive Behavior Therapy; ACEs: Adverse Childhood Experiences; PTSD: Post Traumatic Stress Disorder; YFAS: Yale Food Addiction Scale; BMI: Body Mass Index; PR: Prevalence Ratio; SUD: Substance Use Disorder; BED: Binge Eating Disorder; BN: Bulimia Nervosa; IPV : Intimate Partner Violence; CBT: Cognitive Behavioral Therapy; BWLT: Behaviour weight loss treatment; BWL: Behavioral Weight Loss; ACT: Acceptance and Commitment Therapy

## Introduction

Child abuse is associated with being obese as an adult. There is a clear positive dose-response relationship between all 4 types of abuse, including physical, emotional, sexual and general abuse. Hemmingsson et al. [1] concluded from an extensive review of 23 cohort studies (4 prospective, 19 retrospective.), with n=112.708 participants, that adverse childhood experiences (ACEs) play a major role in obesity development, potentially by inducing mental and emotional perturbations, maladaptive coping responses, stress, inflammation and metabolic disturbances.

The CDC-Kaiser Permanente Adverse Childhood Experiences (ACE) Study is one of the largest, on-going, investigations in childhood abuse and neglect and later-life health and well-being. The original study started in 1995 at the Kaiser Permanente in San Diego, California, by Felitti et al. [2] who examined the ACE categories of childhood physical, sexual, and emotional abuse, childhood physical and emotional neglect, witnessing domestic violence as a child and living with a substance abusing, mentally ill, or incarcerated household member as a child. In this study 60 plus percent of respondents (n=17.000) had at least one ACE, 12,6 percent had four or more. Things were going wrong from 4 or more ACEs. As the number of ACEs increases the risk for outcomes, such as heart disease, depression, cancer, smoking, substance use, decreased parenting capability, and obesity increases. The calculated risk of obesity is 34% higher among adults, who were abused as children, than among adults, who were not. Split into categories, physical abuse during childhood increased the risk of

obesity in adulthood by 28% emotional abuse by 36%, sexual abuse by 31% and general abuse by 45% [2]. Probably such stressful experiences increase the risk through emotional factors, which can trigger maladaptive coping responses. The mechanisms involved are increased stress, negative mental and emotional patterns, and poor mental health. These factors impact negatively on appetite regulation, metabolism, eating behavior, sleep, inflammation and cognitive function, which in turn pave the way for obesity [3]. Not everyone, who is subjected to abuse will be obese, and not all obese individuals have been abused. The cause of obesity is multifactorial, such as physical, psychological and social health problems and metabolic, neurohumoral and genetic factors [4]. Anyway obesity is more than "overfeeding and lack of control".

However, some similarities with alcohol and substance abuse were observed. Animal studies suggest, that stress-related consumption of palatable food can become addiction-like in nature [5-7]. A cross sectional study by Hirth et al. [8] found PTSD ( Post Traumatic Stress Disorder) to be associated with increased consumption of fast food and soda in young women. These findings are suggestive of the use of food as self-medication. They are consistent with animal models, indicating that stress may provoke increased consumption of high-fat/high-sugar food, leading to weight gain [9-12]. These studies, animal and clinical have led to public health interest in the potential role of food addiction in the obesity epidemic [13]. Childhood abuse is strongly associated with adult reports of food addiction [14]. In this mini-review the concept

of food addiction, the underlying mechanisms, its relation with child abuse and substance abuse and the therapeutic implications, will be discussed.

## Food Addiction

The term addiction is applied to excessive ingestion of substances, leading to physical dependence, characterized by tolerance and withdrawal symptoms. Compulsive engagement in behaviors, such as gambling, sex and eating, was not considered a true addiction, because the drive to engage in these behaviors, was considered purely psychological. The conceptual model of substance addictions has begun to change, with an increasing emphasis of the behavior of substance use, rather than the chemical properties themselves [15]. Despite the proposed association of addictive-like eating with obesity, it is highly unlikely, that all obese individuals are addicted to food. Also a normal body weight does not equate to a healthy relation with food [16]. To operationalize the addiction-like eating behavior, the Yale Food Addiction Scale (YFAS), translates the substance-diagnostic criteria in a psychometric tool to apply to the consumption of highly palatable foods [17,18]. Elevated scores on the YFAS have been linked to more frequent binge-eating episodes, [19-21]. Elevated impulsivity [20], increased depression, [22], higher rates of craving [23], reduced weight loss in response to treatment [17], and an elevated weight regain after bariatric surgery [24]. In addition, addictive eating in both lean and obese people is related to neural activation patterns, observed in other addictive disorders [25].

The prevalence of food addiction (FA) was examined in 2 cohorts of the Nurse Health-2 study (n=134,175 women). Overall 5,8% of the women surveyed, met the criteria for food addiction by YFAS. The prevalence of FA was 8,4% in the younger cohort of women, aged 45-64 years, and 2,7% in the older cohort of women aged 62-88 years. Body mass index (BMI) greater than 35 (normal 18,5-22,9) was associated with FA with a prevalence ratio (PR) of 15,83 (95% CI;12,58,19,91) in the younger cohort of women and a PR of 18,41 (95% CI;11,63-29,14) in the older cohort of women. FA prevalence was 2 fold higher in women, who reported depression [16]. Prevalence of FA was 25% in a study of Davis et al. [26] of obese participants. Those who received a food addiction diagnosis, did not differ from non-food addicted participants. The prevalence of FA is increased in obese individuals, and even more so in patients with binge-eating disorder. However the prevalence of FA is not sufficient to account for the obesity epidemic. Conversely, a high prevalence of FA can also be found in under-normal and overweight individuals [27]. Hardy et al. [28] found in a cross-sectional study of patients at risk for PTSD, that women with a substance use disorder (SUD) or FA have similar PTSD and depression symptoms profiles and exhibited more problems with emotional dysregulation, as compared to women with no addictions.

The validity of the clinical assessment of FA as a clinical research tool has not been established yet, despite numerous reports. The assessment of FA largely depends on self-identification, using BMI as a proxy, or administered non-validated questionnaire tools. This

leads to variations in reports of FA prevalence. In a meta-analysis of 25 eligible studies (n=196.211, predominantly female), the weighted mean prevalence of YFAS food addiction diagnosis was 19,9%. FA was found to be higher in adults aged >35 years, females and overweight participants [29]. There are few studies that evaluate the neural correlates of food in the subgroup of FA obese and the non-FA obese. Non-invasive long-term neuromodulation studies have not been performed. Thus even if results look promising, they still have to be considered preliminary [30].

## Binge-Eating

Patients suffering from Binge Eating Disorder (BED) shows an eating pattern, that is characterized by recurrent episodes, during which they ingest large amounts of food in a discrete period of time. These patients experience a subjective loss of control over their eating behavior. As BED patients do not regularly compensate for caloric intake, many patients are overweight and obese [31,32]. It is believed, that BED might represent a phenotype, within the obesity spectrum, that is characterized by increased impulsivity [33-35].

Giel et al. [36] showed in a review of the literature, that rash-spontaneous behavior ("no matter the consequences") to food is increased in BED, while food-specific reward sensitivity is also increased in obese individuals without BED. However, food addiction (FA) has a high overlap with BED and obesity [37] and is positively related to increased reward sensitivity and inhibitory control [38-42]. Further research should disentangle the concepts and mechanisms of BED, obesity and food addiction.

To date research has focused on the role of child physical and sexual abuse in eating-related pathology. Less attention has been given to the role of emotional abuse (EA), emotional neglect (EN) and intimate partner violence (IPV) [43]. Caslimi et al. [44] found a significant and positive association between childhood EA and bulimia nervosa (BN) and BED, calling into question the disproportionate focus on physical and sexual abuse as risk factors. With respect to anorexia nervosa these authors found no significant association between anorexia nervosa and childhood exposure to EA [44]. EN may have a specific relationship to different forms of eating-disorder pathology, which are distinct from the impacts of EA. Emotional neglect may be more strongly associated with bingeing behaviors and EA more strongly associated with binge-purge cycles [45].

Generally, a large proportion of adults with eating disorders report EA, EN, or child exposure to IPV, but there is a paucity of high-quality evidence about these relationships. The prevalence of IPV in relation to childhood exposure is not known. Prevalences of EA and EN range from 21% to 66% respectively. Samples included predominantly white women and the methodological quality of the available literature is generally low [43].

## Obesity and Comorbid Drug Abuse

Risk behaviors as poor diet, physical inactivity, alcohol and tobacco use are believed to be associated with higher body mass

index (BMI), trajecting across lifespan [46]. Binge drinking and alcohol, tobacco and marijuana use were positively associated with BMI [47]. Despite the high prevalence of illicit drug use (eg, narcotics, amphetamines, opiates and other prescription drugs) in the U.S. data about the associations between these drugs and BMI are scant. Blackstone et al. [48] examined data from the 2009-2010 Health Behavior in School-Aged Children study (n=10,295 students; Grades 6-10). There were 51,4% male and 48,6% female participants; 18,3% were at risk of being overweight, according to adjusted BMI and 13,8% were overweight. The percentage of students consuming alcohol in the past 30 days was 25,1%. Illicit drug use in the past 12 months was 14,8% of the 1907 10th graders asked, and the percentages of students, who had smoked tobacco or marijuana at least once in their lifetime were 15,9% and 14,3% respectively. The positive relationship between the use of illicit drug use and BMI proved to be largely due to smoking. When adjusted for smoking this relationship was not significant, anymore.

The research on the relationship between obesity and substance use is most remarkable for its inconsistency. Both positive, negative and no associations have been reported in the literature. Meule, stated that in most studies the specific type of the substance misuse is not defined. Instead of focusing on BMI, it may be more promising to examine the specific kind of eating behavior in relation to substance use. Also, it may be more appropriate to direct research on the relationship between eating disorders and eating topography, than on coprevalence data [49].

A recent PhD thesis by Courtney CL [50] studied a high-risk forensic in-patient population (n=190) and found no associations between ACEs scores and health risk behaviors. The lack of significance in these relationships, suggests that ACEs are less singularly predictors of chronic illness, within this population.

### Therapeutic Implications

Most weight loss research focuses on weight, as the primary outcome and less of the effects of weight loss interventions on physiological, psychological and eating disorders, from these interventions. Peckmezian et al. [51] reviewed 134 studies, that met all these criteria. Lifestyle interventions had the strongest evidence base as a first line approach, with escalation to pharmacotherapy and bariatric surgery in more severe or complicated cases. Quality of life was the most common psychological outcome measure and improved in all cases, where it was assessed, across all intervention types. Behavioral, psychological and lifestyle interventions for weight loss led to improvements in cognitive restraint, control over eating and binge eating, while bariatric surgery led to improvements in eating behavior and body image, that were not sustained over the long term.

Untreated ACEs are supposed to make the treatment of obesity and addictions difficult [2]. Until now, there are no prospective, randomized, controlled trials to support this hypothesis. However, most evidence-based obesity treatment programs integrate

different interventions; dietetic, nutritional, physical, behavioral, pharmacological and surgical ones. Such treatment programs are implemented mostly with a team of; endocrinologists, nutritionists, dietitians, physiotherapists, psychologists, psychiatrists and surgeons. Cognitive behavioral therapy (CBT) is traditionally recognized as the best treatment for BED and the most preferred intervention for obesity and could be considered as the first-line treatment among psychological treatments [52]. However, it does not result necessarily in a long term, prolonged and sustained weight loss [53]. Anyway, CBT has the possibility to bring the ACEs at the surface [54,55]. Traditional medication protocols and psychological treatments have short term efficacy in comparison with placebo [56,57].

Is CBT clinically effective only in obesity with BED ? [52]. Epidemiological studies showed BED being the most common eating disorder [58,59]. There is a strong association between BED and obesity, even if obesity is not a criterion of BED. Furthermore, there are important differences, between obese binge eaters and obese non-binge eaters [60,61]. To complicate matters further emotional neglect (EN) is strongly associated with bingeing behaviors and emotional abuse (EA) with binge-purging cycles, as depicted above [45]. CBT can reduce binge eating episodes significantly, promote days without bingeing, manage eating and reduce shape and weight concerns, without directly affecting body weight [62]. Follow-up studies to monitor the long-term results are requested, but not available [61-65].

CBT has strongly developed in the management of obesity and eating disorders. Various modifications are offered now. These include "enhanced" treatment (CBT-E), directing exclusively at the psychopathology of eating disorders and a more complex form (CBT-Eb), that also addresses problems as mood intolerance, clinical perfectionism, low self-esteem and interpersonal difficulties [66]. Behavior weight loss treatment (BWL) or behavioral weight loss (BWL) consider diet, exercise and behavior therapy. Behavior modification strategies include self-monitoring, goal-setting, shaping, reinforcement and stimulus. Their additional value over conventional CBT is not proven yet and data about cost-effectiveness are lacking [67-69]. CBT is also combined with the acceptance and commitment therapy (ACT), which may have a mindfulness component, too [70-72]. Mindfulness enhancements to a diet-exercise program did not show substantial weight loss in a study by Daubenmier et al. (n=194) [73]. CBT treatments for obesity are also delivered by mHealth applications in remote settings. These applications have received positive results [74-76]. But even if evidence is growing in mHealth for obesity, organizational, technological, economical and philosophical barriers are still present [77]. Unfortunately all these studies have in common again, that they are primarily directed on BMI, and not on the relationship between ACEs and eating behavior or eating topography. As Adrian Meule [23] says "it is still a true can of worms" [49]. An extensive discussion about the role of pharmacology and bariatric surgery in obesity treatments, is beyond the scope of this mini-review.

## Conclusion

Child abuse shows a clear positive dose-response relationship with the number of adverse child events (ACEs). The calculated risk of obesity is 34% higher among adults, who were abused as a child. While there is a disproportionate attention for physical and sexual abuse, factors as emotional abuse (EA), emotional neglect (EN) and intimate partner violence (IPV) have a more deleterious effect on obesity and eating disorders. EA is significantly associated with bulimia nervosa (BN) and binge eating disorder (BED). EN is more strongly associated with bingeing behaviors and EA more strongly with binge-purge cycles. The positive relationship between the illicit use of drugs and body mass index (BMI) proved to be largely due to smoking. The research on the relationship between obesity and substance use is most remarkable for its inconsistency. Both positive, negative and no associations have been reported in the literature. Most weight loss research focuses on weight as primary outcome and less on the effects on physiological, psychological and eating disorders from interventions. Lifestyle interventions have the strongest evidence base as a first line approach, with escalation to pharmacotherapy and bariatric surgery in severe cases. Quality of life improved in all cases, across all intervention types. Untreated ACEs are supposed to make the treatment of obesity and addictions difficult. There are still no prospective, controlled, randomized trials available, that support this hypothesis. Combined with lifestyle interventions, exercise, CBT has a positive short term effect compared to placebo. Reliable long-term results of CBT (3 years or more) are lacking. CBT has developed various forms in the treatment of obesity, that have to prove their value over conventional CBT, yet. This is also the case for mHealth CBT. Generally, the research in obesity has many flaws and is methodologically of low quality, relying on predominantly white women, self identification, using BMI as a proxy for food addiction.

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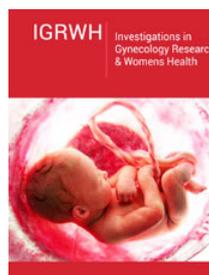
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