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Review

"Eating addiction", rather than "food addiction", better captures addictive-like eating behavior

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ABSTRACT

"Food addiction" has become a focus of interest for researchers attempting to explain certain processes and/or behaviors that may contribute to the development of obesity. Although the scientific discussion on "food addiction" is in its nascent stage, it has potentially important implications for treatment and prevention strategies. As such, it is important to critically reflect on the appropriateness of the term "food addiction", which combines the concepts of "substance-based" and behavioral addiction. The currently available evidence for a substance-based food addiction is poor, partly because systematic clinical and translational studies are still at an early stage. We do however view both animal and existing human data as consistent with the existence of addictive eating *behavior*. Accordingly, we stress that similar to other behaviors eating can become an addiction in thus predisposed individuals under specific environmental circumstances. Here, we introduce current diagnostic and neurobiological concepts of substance-related and non-substance-related addictive disorders, and highlight the similarities and dissimilarities between addiction and overeating. We conclude that "food addiction" is a misnomer because of the ambiguous connotation of a substance-related phenomenon. We instead propose the term "eating addiction" to underscore the behavioral addiction to eating; future research should attempt to define the diagnostic criteria for an eating addiction, for which DSM-5 now offers an umbrella via the introduction on *Non-Substance-Related Disorders* within the category *Substance-Related and Addictive Disorders*.

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Contents

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1. Introduction

Almost 60 years ago, Randolph first defined "food addiction" as "[. . .] a specific adaptation to one or more regularly consumed foods to which a person is highly sensitive, produces a common pattern of symptoms descriptively similar to those of other addictive processes"; addictive-like consumption of corn, wheat, coffee, milk, eggs, and potatoes was reported (Randolph, 1956). With the increase in the worldwide prevalence of obesity over the past decades (Finucane et al., 2011; Ogden et al., 2012) the concept of "food addiction" has recently become popular both among researchers and the lay public as a possible way to understand the impact of psychological factors on weight gain (Brownell and Gold, 2013). This concept forms an etiological framework that is centered between chemical or "substance based" and behavioral addictions.

The rise in prevalence rates of obesity in many countries cannot be attributed to genetic factors alone; instead, environmental changes, which interact with our biological make-up, appear to underlie the obesity pandemic. A large proportion of different populations overeat to an extent that threatens physical and mental well-being, and both somatic and psychiatric disorders are associated with obesity. "Food addiction" offers a superficially attractive explanation, and potentially an excuse, for this unhealthy behavior at an individual level. The modern "obesogenic" environment is characterized by the ubiquitous availability of palatable, energy-dense and inexpensive foods, reflecting ongoing efforts of the globalized food industry to increase production and boost sales. As such, the food and beverage industry is perceived as having a powerful role in promoting poor nutrition policies (Davis, 2013). "Food addiction" places blame on the food industry for the production of "addictive foods" and by so doing indicates that obesity prevention strategies should seek to curtail the influence of this industry on eating behavior.

The behavioral, clinical and neurobiological similarities and dissimilarities between addiction and overeating are highlighted in this review. We point out that current evidence in humans suggests that "eating addiction" rather than "food addiction" more precisely circumscribes addictive-like food intake in affected individuals.

2. Definition, classification, and neurobiology of addiction

2.1. Definition of addiction and classification of substance-related and addictive disorders

An overarching scientific delineation of the concept of addiction has proven elusive: "Ideally, we would like to discover the necessary and sufficient conditions for someone to have an addiction, and to do so in such a way as to provide real illumination about the sort of phenomena we have in mind when thinking about addiction" (Sussman and Sussman, 2011). Clinicians and researchers understand addiction in several different ways. Drug addiction has been defined as a chronically relapsing disorder characterized by (1) compulsion to seek and take the drug, (2) loss of control in limiting drug intake, and (3) emergence of a negative emotional state (e.g., dysphoria, anxiety and irritability) reflecting a motivational withdrawal syndrome when access to the drug is prevented; Koob (2013) refers to the term 'reward deficit disorder' for alcoholism and other drug addictions, which are based on multiple motivational mechanisms and progress from impulsivity (positive reinforcement) to compulsivity (negative reinforcement). Compulsive drug seeking can be derived from multiple neuroadaptations. Koob stresses that a key component of addiction is based on the construct of negative reinforcement defined as drug taking that alleviates a negative emotional state. This state is hypothesized to result from the dysregulation of specific neurochemical elements involved in reward and stress within the basal forebrain structures (Koob, 2013).

Sussman and Sussman (2011) identified five elements of addiction that recur in the scientific literature: (1) engagement in the behavior to achieve appetitive effects; (2) preoccupation with the behavior; (3) temporary satiation; (4) loss of control; and (5) suffering negative consequences. They point out the major limitations of conceptualizing addiction via these definitional elements. In particular, there are difficulties in measuring these elements, which might not be independent, but rather related and operative in complex feedback loops. It is also unclear to what quantitative extent 'engagement' must be present before it can be labeled as addictive behavior. Finally, what is perceived as an addiction might be context-dependent.

Until recently, the medically established forms of addiction (APA, 2000) pertained to substance-related disorders only: "Addiction is defined as a chronic, relapsing brain disease that is characterized by compulsive drug seeking and use, despite harmful consequences" (National Institute on Drug Abuse, 2013). Substance-related disorders, which represent a major global public health problem (Whiteford et al., 2013), are classified within the context of mental disorders in the widely used Tenth Edition of the International Classification of Diseases (ICD-10) and the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013).

The now outdated DSM-IV TR (APA, 2000) avoided the diagnostic use of the term addiction and instead referred to the category "*Substance-Related Disorders*", subdivided into *Substance Use Disorders* and *Substance Induced Disorders* (Table 1). Within *Substance Use Disorders*, *Substance Dependence* referred to "a cluster of cognitive, behavioral, and physiological symptoms". If diagnostic criteria for *Substance Dependence* were not met, but a "maladaptive pattern of substance use manifested by recurrent and significant adverse consequences related to the repeated use of substances" applied, *Substance Abuse* was diagnosed.

After extensive discussions of the definition of the term "addiction", the DSM-5 Substance Use Disorders Workgroup re-titled the previous category as "*Substance-Related and Addictive Disorders*" (APA, 2013; Table 1), which was subdivided into "*Substance-Related Disorders*" and "*Non-Substance-Related Disorders*". Importantly, within the context of *Substance-Related Disorders*, 'addiction' is

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