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Review

Food and drug addictions: Similarities and differences

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ABSTRACT

This review examines the merits of 'food addiction' as an explanation of excessive eating (i.e., eating in excess of what is required to maintain a healthy body weight). It describes various apparent similarities in appetites for foods and drugs. For example, conditioned environmental cues can arouse food and drug-seeking behaviour, 'craving' is an experience reported to precede eating and drug taking, 'bingeing' is associated with both eating and drug use, and conditioned and unconditioned tolerance occurs to food and drug ingestion. This is to be expected, as addictive drugs tap into the same processes and systems that evolved to motivate and control adaptive behaviours, including eating. The evidence, however, shows that drugs of abuse have more potent effects than foods, particularly in respect of their neuroadaptive effects that make them 'wanted.' While binge eating has been conceptualised as form of addictive behaviour, it is not a major cause of excessive eating, because binge eating has a far lower prevalence than obesity. Rather, it is proposed that obesity results from recurrent overconsumption of energy dense foods. Such foods are, relatedly, both attractive and (calorie for calorie) weakly satiating. Limiting their availability could partially decrease excessive eating and consequently decrease obesity. Arguably, persuading policy makers that these foods are addictive could support such action. However, blaming excessive eating on food addiction could be counterproductive, because it risks trivialising serious addictions, and because the attribution of excessive eating to food addiction implies an inability to control one's eating. Therefore, attributing everyday excessive eating to food addiction may neither explain nor significantly help reduce this problem.

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1. Introduction

The scientific use of the term addiction in reference to food (chocolate) has been traced back to 1890, followed by sporadic interest in the topic dating from the 1950s, and a burgeoning of publications in the area much more recently (Meule, 2015). This recent research comprises behavioural and physiological studies in humans, and the development of animal models of 'food addiction' which draw on extensive findings from animal models of drug addiction. A great part of the importance of addiction, of course, lies in the harm done to people with addictions, to their families and to others who are indirectly affected, plus the burden placed on healthcare providers and civil and government authorities. The individual and economic costs of overweight and obesity, with their associated conditions such as type 2 diabetes, cardiovascular disease and osteoarthritis, are also enormous, requiring 'urgent global action' (Ng et al., 2014). Linking these problems is the possibility that excessive eating (defined as food intake in excess of that required to maintain a healthy body weight) might be understood, at least in part, as food addiction. The purpose of this review is to assess the extent to which there are commonalities between the consumption of foods and consumption of addictive drugs such as alcohol, opioids, stimulants and tobacco, and whether this comparison could be helpful in combating excessive eating.

2. What is addiction?

This question is of course fundamental to deciding whether or not a particular behaviour, such as eating chocolate or smoking a cigarette, qualifies as an addiction. If, for example, very strict criteria were applied then perhaps it would be concluded that food addiction was rare or non-existent.

In medicine criteria for addiction are set out in, for example, the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) (American Psychiatric Association, 2013) and the International Statistical Classification of Diseases and Related Health Problems (World Health Organization, 1992). These two manuals are largely in agreement in listing key criteria defining addiction as the presence of at least two or three of the following: difficulties in controlling substance use; a strong desire or craving for the substance; tolerance such that increased doses of the substance are required to achieve intoxication or the desired effects; adverse effects of acute withdrawal from the substance; neglect of alternative interests, and social, family and occupational activities; unsuccessful attempts to quit use; and continued use despite knowledge of physical or psychological harm caused by the substance. Actually, both manuals avoid using the term addiction, instead preferring 'Substance Use Disorders' and 'substance use dependence,' respectively. Others restrict addiction to 'the extreme or psychopathological state where control over drug use is lost,' and distinguish this from dependence which they say 'refers to the state of needing a drug to function within normal limits' and which 'is often associated with tolerance and withdrawal, and with addiction' (Altman et al., 1996, p 287).

Complementary to expert views, dictionary definitions provide very good evidence of how words are used in everyday life. The main dictionary definition of addiction can be summarised as 'being physically and/or mentally dependent on a particular substance or activity,' with dependence in this context defined as 'being unable to do without something.' Associated with these definitions are the concepts of 'compulsion' and 'obsession', or more mildly a 'fondness' or 'passion' for something. The latter might apply to a hobbyist or, for example, someone who says they are 'addicted to watching soap operas,' communicating their affection for certain TV drama serials, but perhaps also hinting that they feel they spend proportionally too much of their time on this activity. Similarly, a person claiming to be a 'chocoholic' is probably ambivalent about what they perceive to be their excessive consumption of chocolate (Rogers and Smit, 2000). However, there can be little doubt that these examples denote less serious difficulties resulting from 'addiction' than those faced by a person with a serious gambling problem or a person with Alcohol Use Disorder as defined in DSM-5.

This points to the necessity of considering the relative risk of addiction associated with exposure to different substances and activities, rather than categorising the substance as either addictive or non-addictive. For example, most consumers of alcohol do not become addicted, but some do. Although drinking coffee poses an even lower risk of addiction, a very small proportion of caffeine consumers probably do meet stringent criteria for substance dependence (addiction) (Strain et al., 1994). Note, however, that based on Altman et al.'s (1996) definition of dependence (above), a very large majority of the world's caffeine consumers are dependent on caffeine (Rogers et al., 2013). In relation to foods, a key determinant of reward value appears to be energy density (calories per unit weight, Section 4.3), yet there is even a well-documented case of carrot addiction (Kaplan, 1996). So, depending on individual vulnerabilities and circumstances, a very large range of substances and activities must be considered as potentially addictive.

Above, addiction is defined primarily on the basis of behaviour towards substances and activities, together with reports of associated cognitions, emotions and other experiences. These behavioural tendencies and experiences will be represented in the brain but, more than that, drug use modifies brain chemistry in ways that perpetuate and potentially escalate consumption (Robinson and Berridge, 1993; Altman et al., 1996; American Psychiatric Association, 2013). In particular, drug-induced neural changes in cortical and basal ganglia structures, involving for example dopaminergic, GABAergic and opioid peptidergic neurocircuitry, are thought to be critical in the development of drug addiction (Everitt and Robbins, 2005; Koob and Volkow, 2016). These changes characterise the transition from occasional, voluntary drug use to habitual use, compulsion and chronic addiction and, together with heightened stress, underlie what is described as the three-stage recurring cycle of addiction, namely 'binge/intoxication,' 'withdrawal/negative affect' and 'preoccupation/anticipation (craving)' (Koob and Volkow, 2016). This is significant because much of the literature on food addiction considers food addiction to be similar to drug addiction

Table 1
Some possible similarities in characteristics of appetites for foods and drugs.

Foods	Drugs	Section(s)
External cue control of desire to eat, including specific appetites	Cues associated with drug-taking increase desire for drug taking and acquire 'incentive salience'	3.1, 3.8
Appetite comes with eating	Priming	3.2
Disinhibition of dietary restraint	Abstinence violation effect	3.3
Food craving	Drug craving	3.4
Tolerance to the physiologically disruptive effects of food ingestion, 'satiety tolerance,' etc.	Drug tolerance	3.5
Adverse effects of acute food withdrawal	Adverse effects of drug withdrawal	3.6
Bingeing on foods	Bingeing on drugs	3.7, 3.6, 4.1, 4.2
Liking and wanting for foods	Liking and wanting for drugs	3.8, 3.9, 4.3
Reward deficiency in obesity	Reward deficiency resulting from exposure to drugs	3.9