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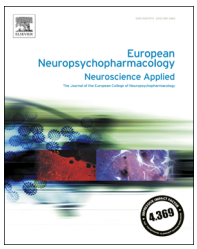

Behavioural addiction—A rising tide?

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Abstract
The term ‘addiction’ was traditionally used in relation to centrally active substances, such as cocaine, alcohol, or nicotine. Addiction is not a unitary construct but rather incorporates a number of features, such as repetitive engagement in behaviours that are rewarding (at least initially), loss of control (spiralling engagement over time), persistence despite untoward functional consequences, and physical dependence (evidenced by withdrawal symptoms when intake of the substance diminishes). It has been suggested that certain psychiatric disorders characterized by maladaptive, repetitive behaviours share parallels with substance addiction and therefore represent ‘behavioural addictions’. This perspective has influenced the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), which now has a category ‘Substance Related and Addictive Disorders’, including gambling disorder. Could other disorders characterised by repetitive behaviours, besides gambling disorder, also be considered ‘addictions’? Potential examples include kleptomania, compulsive sexual behaviour, ‘Internet addiction’, trichotillomania (hair pulling disorder), and skin-picking disorder. This paper seeks to define what is meant by ‘behavioural addiction’, and critically considers the evidence for and against this conceptualisation in respect of the above conditions, from perspectives of

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aetiology, phenomenology, co-morbidity, neurobiology, and treatment. Research in this area has important implications for future diagnostic classification systems, neurobiological models, and novel treatment directions.

1. Introduction

The term 'addiction' was traditionally used in relation to specific psychoactive substances, such as cocaine, alcohol, or nicotine. Substances with addictive properties exert to some extent common effects on the brain's reward pathways, notably the ventral striatum, implicating the dopaminergic and opioid systems (Everitt and Robbins, 2005, 2013; Dalley et al., 2007). Core aspects of addiction, according to the Diagnostic and Statistical Manual Version 5 (DSM-5) (American Psychiatric Association, 2013), include impaired control (e.g. craving increasingly large quantities, unsuccessful attempts to reduce intake), impairment (e.g. narrowing of interests, neglect of other areas of life), risky use (persisting intake despite awareness of damaging psychological or physiological effects), and pharmacological criteria (tolerance, withdrawal).

Certain psychiatric syndromes characterised by repetitive habits share considerable phenomenological parallels with substance addiction, and have thus been argued to represent candidate 'behavioural addictions' (Goodman, 1993; Potenza, 2001; Grant et al., 2006a; Petry et al., 2013, 2014). Studying behavioural addictions, such as gambling disorder, could serve as a model to investigate the underlying neural mechanisms related to addictive behaviours without the confounding influences of drugs of abuse. While different accounts of behavioural addictions have included different disorders, for the purposes of this paper we focus on gambling disorder, kleptomania (compulsive stealing), internet addiction, trichotillomania (hair pulling disorder), and excoriation disorder (skin-picking disorder). Far from being rare disorders only of theoretical interest, these conditions are relatively common, with lifetime prevalence rates for each estimated at 0.5–3% (Christenson et al., 1991b; Bohne et al., 2002; Odlaug and Grant, 2010; Odlaug et al., 2013). Collectively, these conditions subtend a considerable burden of suffering to affected individuals and their families (Grant et al., 2013c).

The behavioural addiction model is tempting at face value: individuals with pathological types of various behaviours (gambling, excess grooming, stealing, setting fires, excess use of the internet) do share remarkable phenomenological parallels to people with addictive substances – including impaired control, functional impairment, and persisting engagement in the behaviour despite negative consequences. Do these behavioural addictions also share parallels in terms of the DSM-5 physiological criteria, namely tolerance, and withdrawal? Evidence arguably abounds for gambling disorder involving these features, hence its inclusion in the new DSM-5 category of 'Substance-Related and Addictive Disorders' (American Psychiatric Association, 2013). In contrast, trichotillomania (hair-pulling disorder) and skin-picking disorder are now classified within 'Obsessive-Compulsive and Related Disorders', while kleptomania is classified within 'Disruptive, Impulse-Control, and Conduct Disorders'. DSM-5 does not include 'Internet addiction' in its main section but rather lists 'internet gaming disorder' as a condition requiring further study, acknowledging that this entity is also referred to variably as internet addiction, internet use disorder, or gaming addiction.

Psychiatric classification systems have traditionally relied on expert consensus, focusing mainly on the overt symptoms (phenomenology) and comorbid overlap between disorders, albeit DSM-5 made some efforts to focus also on other validators. However, recent initiatives such as the National Institute of Mental Health's Research Domain Criteria (RDoC) and European Commission's ROAMER initiative emphasise the importance of expanding upon the traditional perspective, to incorporate additional intermediate neurobiological markers (Insel et al., 2010; Cuthbert and Insel, 2013). As noted above, putative behavioural addictions are disparately classified in DSM-5, with only gambling disorder being recognized as a type of 'addiction'. Thus, it is timely to review the evidence supporting the conceptualization of the above disorders as behavioural addictions from a translational perspective. This paper focuses on cross-cutting issues between these disorders with an emphasis on comorbidity, neurobiology, and treatment. By drawing together these strands of evidence, we highlight the strengths and weaknesses of this model, future research directions, and important treatment implications.

2. Comorbidity

Substance use disorders (SUDs) and the candidate behavioural addictions (i.e. gambling disorder, Internet addiction, trichotillomania and skin-picking disorder), and kleptomania resemble each other in many aspects, including comorbidity patterns. This section focuses on existing data on the construct of behavioural addiction from the perspective of comorbidity. Specifically, the focus will be on comorbidity in SUDs, in behavioural addictions, and comorbidity between SUDs and these behavioural addictions.

There are extensive data attesting to the strong association of SUDs with a broad range of psychiatric disorders including major depressive disorder (MDD), bipolar disorder, anxiety and related disorders such as social anxiety disorder (SAD) and posttraumatic stress disorder (PTSD), and conduct disorder/antisocial personality traits (e.g. Merikangas et al., 1998). Attention deficit / hyperactivity disorder (ADHD) is also commonly reported by individuals with SUD (Szobot et al., 2007), and some studies have indicated that the link between SUDs and ADHD is usually through conduct disorder or antisocial personality disorder (Disney et al., 1999; Elkins et al., 2007; Serra-Pinheiro et al., 2013).

Clinical and epidemiological research suggests that, similarly, behavioural addictions are also associated with a range of psychiatric disorders. Most prevalent seems to be mood disorders including bipolar disorder, anxiety disorders, ADHD