

Commentary on: Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research

On functional and compulsive aspects of reinforcement pathologies

DAMIEN BREVERS^{1,2*} and XAVIER NOEL²

¹Brain and Creativity Institute, Department of Psychology, University of Southern California, Los Angeles, CA, USA

²Laboratoire de psychologie médicale et d'addictologie, Faculty of Medicine, Brugmann-campus, Université Libre de Bruxelles (ULB), Brussels, Belgium

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Background: This paper is a commentary to a debate article entitled: “Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research”, by Billieux et al. (2015). **Methods and aim:** This brief response focused on the necessity to better characterize psychological and related neurocognitive determinants of persistent deleterious actions associated or not with substance utilization. **Results:** A majority of addicted people could be driven by psychological functional reasons to keep using drugs, gambling or buying despite the growing number of related negative consequences. In addition, a non-negligible proportion of them would need assistance to restore profound disturbances in basic learning processes involved in compulsive actions. **Conclusions:** The distinction between psychological functionality and compulsive aspects of addictive behaviors should represent a big step towards more efficient treatments.

Keywords: substance addiction, behavioral addictions, DSM, compulsion, inflexibility, comorbidity

In their debate paper, Billieux, Schimmenti, Khazaal, Maurage & Heeren (2015) presented an interesting thought-provoking analysis of the contemporary tendency to inherently identify the excessive enactment of incentive activities (e.g. sex, shopping, social-network, work, exercise, gambling) as medical/psychiatric entities, that is, “behavioral addictions”. According to the authors, “the behavioral addiction research field is invaded by an increasing number of studies that creates new psychiatric disorders by endorsing concepts and models that were based on decades of research and were validated for other disorders” (Billieux et al., 2015, p. 8). We agree with this criticism and suggest that as a result, such approach might override the determinants of the *psychological homeostasis* and/or *compulsive* aspects attached to the excessive enactment of specific behavioral patterns. Indeed, problematic involvement in behaviors depends on a constellation of factors that are unique to the specific conduct (Blaszczynski & Nower, 2002). For instance, excessive use to online games could result from the need to experience reward (positive reinforcement such as a desire of game achievement) or to cope with negative psychological states (negative reinforcement such as an avoidance strategy to face negative life events or social anxiety). In other terms, long before becoming a problem (because of unambiguous related deleterious consequences), addictive behaviors were a solution. Differently, compulsive behaviors engage action control for which past utilities are divorced from the outcomes that they predict (for a review of the distinction between goals and habits in the brain, see Dolan & Dayan, 2013). In this context, the disease conceptualization of addictive behaviors associated with an overreliance on confirmatory and atheoretical quantitative studies could limit our understanding of these problematic behaviors and could

lead to standardized interventions that are likely to be inaccurate and poorly efficient.

ABOUT THE RISK OF OVERPATHOLOGIZING EVERYDAY LIFE REINFORCEMENT ACTIVITIES

In support of the *over-pathologizing* hypothesis of excessive involvement in behaviors, such as excessive exercising, sexual behavior, shopping, online chatting, video gaming, are works demonstrating that those behaviors are fairly transient for most people (Konkolý Thege, Woodin, Hodgins & Williams, 2015). This lack of robustness of the abnormal conduct supports the view that excessive behaviors are often context-dependent which, in turn, reinforce the relevance of a functional – process-based – approach of behavioral addictions. However, ample evidence showed that a majority of individuals with substance dependence overcame life-time ICD-10 or DSM-IV dependence without any form of professional help, a phenomenon called *self-change* or *natural recovery* (for a review, see Klingemann, Sobell & Sobell, 2010). Hence, by being “the rule rather than the exception” in both substance and non-substance addictions, natural recovery challenged a classic “disease model” of excessive behaviors viewing addiction as an irreversible and inexorably progressive process due to some inborn charac-

* Corresponding author: Damien Brevers, PhD; Brain and Creativity Institute, University of Southern California, 3620A McClintock Avenue, 90089-2921, Los Angeles, CA, USA; E-mails: dbrevers@ulb.ac.be; brevers@usc.edu

teristics in certain people (Blomqvist, 2007). Noteworthy, proportions of self-recovery observed in behavioral addiction seem to be higher than those highlighted in substance addiction (Konkolý Thege, Woodin et al., 2015). Nevertheless, while such difference in self-recovery frequency could be a marker of a greater addiction liability for substance abuse (see also Koski-Jännes, Hirschovits & Pennonen, 2012; Konkolý Thege, Colman et al., 2015), it does not necessarily preclude that behavioral addictions could be underlined by comparable psychological homeostatic constraints (i.e., functional addiction) and even possible *compulsive* engagements (i.e., compulsive addiction) than those observed in addictive disorders already listed in the DSM-5 (Grant & Chamberlain, 2013; Yau & Potenza, 2015).

FROM FUNCTIONAL AND COMPULSIVE ASPECTS OF ADDICTIVE BEHAVIORS

Compulsion refers to the idea that a given behavior persists because of its enduring incentive properties despite of changes in action values (negative or punishing outcomes; el-Guebaly, Mudry, Zohar, Tavares & Potenza, 2012; Everitt & Robbins, 2005; Graybiel, 2008). Put differently, the persistence of actions could involve from action-outcome (or goal-directed) behaviors, including a valuation stage optimizing its utility (e.g. coping with negative psychological states, see for instance the self-medication hypothesis of addiction, Khantzian, 1985), to automatic and inflexible stimulus-response sequences, not including a valuation stage, thus representing a key mechanism underlying the development of compulsive (e.g.) drug seek and high vulnerability to relapse; (Belin, Jonkman, Dickinson, Robbins & Everitt, 2009). Hence, the key question here is whether excessive involvement in behavioral routines – targeted by the label “behavioral addiction” – becomes so deeply ingrained that it could resist *functional* contextual changes (i.e. compulsion).

Despite of a growing number of similarities (shared biological, psychological, social vulnerabilities for instance) found between substance and non-substance use disorders (e.g. excessive gambling; for a review, see el-Guebaly et al., 2012; Leeman & Potenza, 2012), we believe that a clear response to this question has not been provided yet. This could be due to the challenging task of operationalizing and measuring the concept of *compulsion* in humans (Everitt & Robbins, 2005; Sjoerds et al., 2013; Voon et al., 2015). For instance, in rodents, compulsive behavior was operationalized as a resistance to the degradation of the reinforcer, that is, 15–20% of rats self-administering cocaine for several weeks kept pressing the lever despite that cocaine delivery was replaced with electric shocks (Deroche-Gamonet, Belin & Piazza, 2004). Interestingly, this behavior inflexibility has been associated with a persistent impairment in synaptic plasticity in the nucleus accumbens (Kasanez et al., 2010) and hypoactive prefrontal cortex neurons (Chen et al., 2013). Importantly, this compulsive state is associated with both increased impulsivity and novelty seeking (Belin, Mar, Dalley, Robbins & Everitt, 2008).

Based on these important findings, one could expect that individuals with compulsive addiction exhibit a massive dysexecutive syndrome including poor response inhi-

bition. In fact, approximately one in two pathological gamblers has response inhibition deficits as measured by a stop signal task (Billieux et al., 2012) and this proportion could be similar in substance use disorders (for alcohol dependence, see Ihara, Berrios & London, 2000). Thus, possible involved mechanisms might differ greatly from two persons sharing pivotal DSM criteria of addiction disorders (e.g. diminished ability to resist an impulse to enact the [problem behavior] despite serious or adverse consequences of the [problem behavior]; American Psychiatric Association, 2013). In absence of unambiguous neurocognitive impairments affecting basic learning processes (for a discussion, see Noël, Brevers & Bechara, 2013a, 2013b), addictive behaviors remain best explained by psychological theories (e.g. the self-medication hypothesis; Khantzian, 1985). In other words, although damaging, addictive behaviors may still possess some protective aspects (addiction as a coping strategy). Because diagnoses in the field of addiction are still very descriptive (craving, tolerance, dependence, etc.) as opposed to biology-based, any conclusion regarding the nature of so-called *behavioral addictions* remains tentative.

Recent studies highlighted that cues associated with social network, cybersex, or buying addictions activate cognitive processes (e.g. automatic approach tendencies, craving, cue reactivity; Brand et al., 2011; Hormes, Kearns & Timko, 2014; Laier, Schulte & Brand, 2013; Snagowski & Brand, 2015) and the brain reward system (Georgiadis & Kringelbach, 2012; Raab, Elger, Neuner & Weber, 2011; Turel, He, Xue, Xiao & Bechara, 2014) in much the same way that a drug does. Nevertheless, while these studies deliver insightful information on automatic-incentive approach tendencies toward addiction-related cues, they did not focus on the inflexible stimulus-response aspect of compulsive behaviors. One possible direction would be to examine flexibility capacity, using both addiction and non-addiction related paradigms, in individuals scoring low or high scores on a (specific) behavioral addiction scale. For instance, Boog et al. (2014) showed that problem gamblers exhibit cognitive inflexibility during monetary-reward decision-making, but not during a task assessing cognitive flexibility without monetary reward. Lack of flexible decision and action has also been evidenced in a recent study examining the impact of proactive motor response on monetary risk-taking in low and high problem gamblers (Stevens et al., 2015). In this study, occasionally stopping a response decreased monetary risk-taking in low-problem gamblers but not in high-problem gamblers, which indicates that gambling disorder is associated with a high degree of inflexibility toward the action of gambling. Thus, the examination of inflexibility toward addiction-related behaviors should shed some light on whether “out of the norms” deviations in our daily life incentive habits could evolve into persistent “out of sync” schema of actions.

Additional descriptive and epidemiological studies are also needed in order to enhance our understanding of the phenomenology of behavioral addiction. For instance, gambling runs along with other addictions in the same families (Yau & Potenza, 2015). Retrospective (Hodgins & el-Guebaly, 2000, 2004) and prospective (Hodgins & el-Guebaly, 2004; for ongoing studies with a validated protocol, see Kushnir, Cunningham & Hodgins, 2013) studies on gambling disorder have provided insightful information on

processes responsible for driving and maintaining problem gambling, but also on factors promoting changes and recovery from gambling disorder (e.g. types of “willpower” and goal commitment strategies, reports on the psychological benefit of maintaining the state of change, moderation versus abstinence). These studies should also bring information on the ease with which behavioural routines bounce back after extinction (i.e. relapse rate, precipitants to relapse). Besides, further research is needed in order to further examine whether behavioral and substance-related conducts represent distinct addictions or whether they are different expressions of a core addiction syndrome (e.g. Blanco et al., 2015). Indeed, current scientific and empirical evidence on whether behavioral addiction could occur without comorbid addiction disorder (e.g. compulsive buying without binge eating or substance abuse; Müller, Mitchell & de Zwaan, 2015) or shared common developmental pathways (e.g. shared biological, personality and neurocognitive markers of impulsivity; Yau & Potenza, 2015) remains insufficient.

To sum up, this brief response to Billieux et al.’s paper focused on the necessity to better characterize psychological and related neurocognitive determinants of persistent deleterious actions associated or not with substance use. The distinction between psychological functionality and compulsion should represent a big step towards the clarification of core addictive action determinants (e.g. model-based versus model-free systems; Daw, Niv & Dayan, 2005). Coherently, whether a majority of addicted people could be driven by psychological functional reasons to keep using drug, gambling or buying despite the growing number of related negative consequences, a non-negligible proportion of them would need assistance to restore profound disturbances in basic learning processes (e.g. overreliance of their habit system; Sjoerds et al., 2013; Voon et al., 2015).

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