Addictive Behaviors 39 (2014) 1670–1675

Contents lists available at ScienceDirect

Addictive Behaviors

Rash Impulsiveness and Reward Sensitivity as predictors of treatment outcome in male substance dependent patients

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HIGHLIGHTS

- We study the predictive value of a model of impulsivity for treatment outcome in substance dependency.
- Rash Impulsiveness and Reward Sensitivity are assessed using behavioral and self-report measures.
- Behavioral Reward Sensitivity and self-reported Rash Impulsiveness are predictors of treatment drop-out.
- Relapse into substance use is not predicted by the two-factor model of impulsivity.

ARTICLE INFO

Available online 29 April 2014

Keywords:
Reward Sensitivity
Rash Impulsiveness
Substance dependence
BAS
Two-factor model
Treatment outcome

ABSTRACT

Recent theories hypothesize that the impulsivity observed in addictive behaviors is a two-factor construct, consisting of Rash Impulsiveness and Reward Sensitivity. There is some evidence for this distinction, but it is unknown what the clinical relevance of this distinction is. The present study examines the predictive value of the two-factor model regarding drop-out from treatment and relapse into substance use in a clinical population of male substance dependent patients. Both behavioral and self-report measures of Rash Impulsiveness and Reward Sensitivity were measured during treatment while substance use relapse was measured after 90 days. Results indicate that treatment drop-out could be predicted by a behavioral index of Reward Sensitivity (Card Playing Task); self-reported Rash Impulsiveness only approached significance as predictor drop-out. In contrast, relapse could not be predicted in the present study. These findings might have implications for the early identification and treatment of patients at risk of treatment drop-out.

1. Introduction

Treatment drop-out and relapse are significant problems in the treatment of substance dependent patients. The prediction of treatment outcome, both treatment drop-out and relapse, is important in order to identify risk groups at the start of the treatment. Currently, most predictor studies examine demographic and substance use variables. Overall, substance use variables, such as severity of substance use, appear indeed to be a robust predictor of treatment outcome (see also Adamson, Sellman, & Frampton, 2009). There are some indications that personality traits predict treatment outcome, although the number of studies is quite limited and most studies are based on self-report. Identification of personality traits that are associated with higher treatment drop-out and relapse would make it possible to identify those patients with higher risk and could guide treatment plans of individual patients (Dawe, Gullo, & Loxton, 2004; Miller, 1991).

Impulsivity is a personality trait that is particularly relevant for addictive behaviors (see for example: Le Bon et al., 2004; Miller, 1991). According to some recent theories (Dawe & Loxton, 2004, Dawe et al., 2004), impulsivity consists of two components: Rash Impulsiveness and Reward Sensitivity. This two-factor model explains the paradox that can be observed in substance use disorder patients: the absence of impulse control and a simultaneous 'great amount of planning and effort which goes into obtaining the substance' (Evenden, 1999). Rash Impulsiveness stands for 'a tendency to act rashly and without consideration of consequences' (p. 345, Dawe & Loxton, 2004). The other factor, Reward Sensitivity, is a deliberate drive towards rewards. Dawe and colleagues theorize that both factors

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http://dx.doi.org/10.1016/j.addbeh.2014.02.020
0306-4603/

play a distinctive role in the origin and continuation of substance use disorders. Support for this two-factor model comes from studies using factor analyses on data obtained from general population (Dawe & Loxton, 2004; Franken & Muris, 2006; Quilty & Oakman, 2004; Zelenski & Larsen, 1999). Recently, evidence for the existence of these two factors of impulsivity has been found in a clinical sample of substance dependent inpatients (Boog, Goudriaan, van de Wetering, Deuss, & Franken, 2013).

Three studies are showing that Novelty Seeking predicts treatment attrition in substance dependent patients (Helmus, Downey, Arfken, Henderson, & Schuster, 2001; Kravitz, Fawcett, McGuire, Kravitz, & Whitney, 1999; Roll, Saules, Chudzynski, & Sodano, 2004). However, one study does not find a relationship between Novelty Seeking and drop-out (Zoccali et al., 2007). Other studies use other measures of impulsivity such as Barratt's Impulsiveness Scale (Moeller et al., 2001) or the Sensation Seeking Scale (Patkar et al., 2004). These studies found similar results: impulsivity is associated with drop-out and poorer treatment outcome. The studies mentioned above indicate that facets of impulsivity can be predictors of treatment outcome. However, research into the predictive value of the two-factor model of impulsivity for addiction treatment outcome has not been done yet. In addition, behavioral measures of impulsivity are scarce in treatment prediction studies.

In behavioral terms, Rash Impulsiveness is referred to as disinhibition. According to Logan, Cowan, and Davis (1984), disinhibition involves the inhibition of a pre-potent response. In a study of Passetti and colleagues in opiate dependence (Passetti, Clark, Mehta, Joyce, & King, 2008) behavioral measures of disinhibition did not predict treatment outcome. Further, in a tobacco smoking cessation program (Krishnan-Sarin et al., 2007), participants who failed to achieve abstinence had worse performances on the Continuous Performance Task, a behavioral task measuring impulsivity.

Behavioral measures representing Reward Sensitivity require decision-making under conflicting reward and punishment contingencies. Reward Sensitivity is associated with a preference for immediate smaller rewards at the expense of delayed bigger rewards (Goudriaan, Oosterlaan, De Beurs, & Van den Brink, 2008). There is evidence that decision-making under conflicting contingencies is a predictor of treatment outcome and relapse in alcohol addiction (Bowden-Jones, McPhillips, Rogers, Hutton, & Joyce, 2005). In opiate addiction, similar results are found (Passetti et al., 2008, 2011). In their 2008 study, Passetti and colleagues found that performance on tests of decision-making predicted abstinence of illicit drugs at three months in patients taking part in a community based treatment program (poor performance predicting relapse). In a subsequent study (2011) Passetti and colleagues refined their results: they found that this association between poor decision making and relapse only holds for outpatients. Regarding treatment of cocaine dependent individuals, Verdejo-Garciá et al. (2011) did not find evidence that Reward Sensitivity (measured with the Iowa Gambling Task) predicted treatment retention.

Noteworthy, Goudriaan et al. (2008) investigated relapse in abstinent pathological gamblers. These authors found both behavioral measures of Reward Sensitivity (Card Playing Task) and Rash Impulsiveness (Stop Signal Task) to be predictors of relapse in pathological gamblers. However, in a similar study Álvarez-Moya et al. (2011) found conflicting results: behavioral measures of Reward Sensitivity and Rash Impulsiveness did not predict relapse in pathological gambling.

In the present study we addressed the predictive value of the two-factor model of impulsivity in treatment outcome of substance dependent inpatients, using both self-report and behavioral measures of Reward Sensitivity and Rash Impulsiveness. It was hypothesized that higher levels of Rash Impulsiveness and Reward Sensitivity would be predictive of higher rates of treatment drop-out and higher levels of relapse at follow-up. Because of the absence of prior studies on this specific topic, it is not feasible to postulate very specific predictions regarding the nature of the presumed relationships. Therefore, the present study is more explorative regarding the exact relations between these constructs and treatment outcome. This is the first study investigating the predictive value of the two factor model of impulsivity on addiction treatment outcome. Importantly, it is the first study using both behavioral and self-report measures of impulsivity in this context.

2. Method

2.1. Participants

A sample of 58 consecutive included substance dependent inpatients of a large urban mental health care facility (Bouman Mental Health Care, Rotterdam, The Netherlands) volunteered in this study. From four patients no follow-up measures could be obtained. One of these four patients deceased during his stay at the clinic; the other three patients did not respond to repeated attempts to contact them. The mean age of the final sample ($N = 54$) was 42.7 years ($SD = 10.5$). The diagnosis of substance dependence was assessed according to DSM-IV-TR criteria (APA, 2000) by experienced clinicians. The primary substance dependence diagnoses were: alcohol (59.3%), opioid (24.1%), cocaine (14.8%) and cannabis (1.9%). Sixty-nine percent of the sample had a secondary substance dependence diagnosis, 25.9% had a third substance dependence. Only male patients were included, to avoid possible gender effects (Wingerson et al., 1993). Individuals suffering from severe concomitant psychiatric disorders such as schizophrenia, mood disorders, acute psychotic disorders and neuropsychiatric disorders (as assessed by clinicians) were not included. Substance use characteristics are presented in Table 1. The age of first frequent use and the number of days of use in the last 30 days before admission to the clinic are indicated for several substances. The present sample is partly overlapping with the sample used in the psychometrical study of Boog et al. (2013).

2.2. Procedure

All male patients who were consecutively admitted to the detoxification unit were asked to volunteer. One hundred and forty patients were considered for inclusion, of these patients 33 did not meet the inclusion criteria (7 had neuropsychiatric disorders, 20 had other severe concomitant psychiatric disorders (mood, psychosis) and 6 patients had language difficulties), 31 refused participation and 18 left the facility before the first assessment was done. Participants were informed about the procedure and signed an informed consent form. The research plan was approved by the Ethics Commission of the Erasmus Medical Centre.

After detoxification (mean number of days: 24.4; $SD = 13.0$), participants were transferred to the rehabilitation ward. Within a week after their admission to the rehabilitation ward an interview was held, behavioral tests were administered, personality questionnaires were filled out and personal information was acquired. Subjects were followed for 90 days, starting at the date of their admission to the rehabilitation

Table 1
Summary statistics of substance use.

Substance	Age (in years) of first frequent[a] use		Number of days of use in last 30 days	
	N	Mean (S.D.)	N	Mean (S.D.)
Alcohol (<5 units/day)	46	24.6 (10.5)	41	22.3 (10.0)
Heroin	20	31.0 (12.4)	14	20.6 (11.8)
Methadone	17	36.5 (12.2)	16	23.1 (10.6)
Sedatives	18	30.4 (8.1)	9	18.3 (14.1)
Cocaine	27	26.7 (10.0)	26	14.8 (11.2)
Amphetamines	8	20.4 (5.6)	4	1.8 (.5)
Cannabis	29	18.1 (10.1)	22	13.4 (12.5)
>1 substance a day	37	23.1 (11.7)	36	17.9 (12.1)

[a] Frequent: a minimum of three times a week.