



Monetary delay discounting in gambling and cocaine dependence with personality comorbidities



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ABSTRACT

Background: Cocaine addiction and pathological gambling are commonly associated with steeper (impulsive) discounting of delayed rewards, which promotes ongoing drug and gambling behaviors. However, it is yet unclear whether impulsive delay discounting is a stable trait in cocaine and gambling disorders during abstinence, and whether it is significantly impacted by dysfunctional personality beliefs.

Methods: The aim of this study was to compare the delay discounting rates of four groups: 47 cocaine users with comorbid personality disorders, 41 cocaine users without psychiatric comorbidities, 28 pathological gamblers without psychiatric comorbidities, and 36 healthy comparison individuals. We also examined the association between dysfunctional personality beliefs and delay discounting rates. Participants completed the Kirby Delay Discounting Questionnaire and the Beck Personality Belief Questionnaire as part of a larger battery.

Results: We used non-parametric tests to compare discounting rates between the groups, and bivariate correlation analyses to examine the association between beliefs and discounting rates within each of the groups. We found that discounting rates were significantly higher in individuals with disordered gambling compared to controls. Specifically in cocaine users with Cluster B personality disorders, higher discounting rates were associated with the intensity of “dependent” dysfunctional beliefs (e.g., “I am needy and weak”).

Conclusion: We conclude that impulsive delay discounting is increased in gambling relative to controls and linked to personality beliefs in cocaine users with Cluster B personality disorders.

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1. Introduction

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) groups substance use and gambling disorders within the substance-related and addictive disorder category (American Psychiatric Association, 2013). The re-labeling of gambling (previously within the impulse control disorder category) as a behavioral addiction has built on empirical evidence showing that (i) substance use and gambling disorders have overlapping impulsivity features (Robbins, Curran, & de Wit, 2012; Verdejo-García, Lawrence, & Clark, 2008), and (ii) impulsivity is essential to characterize core aspects of addictive disorders, such as hypersensitivity to immediate

rewards and subsequent neglect of long-term negative consequences (Bechara, 2005).

These aspects have been elegantly modeled by delay discounting monetary choice questionnaires (e.g., “Would you prefer \$15 today or \$35 in 13 days?”), which index the reduction in the current value of a future reward as the delay to that reward increases (Kirby, Petry, & Bickel, 1999). Steeper delay discounting, reflective of higher impulsivity, has been consistently demonstrated in gambling populations compared to healthy controls (Brevers et al., 2012; Dixon, Marley, & Jacobs, 2003; Petry, 2001). However, few studies have contrasted delay discounting rates in gambling vs. other addictive disorders (Albein-Urios, Martínez-González, Lozano, Clark, & Verdejo-García, 2012). In the case of substance using populations, studies have demonstrated steeper delay discounting in cocaine users compared to heroin and alcohol users (Bornoalova, Daughters, Hernandez, Richards, & Lejuez, 2005; Kirby & Petry, 2004). Moreover, at difference with other substance using populations, steeper discounting rates are stable in cocaine users during drug abstinence (Kirby & Petry, 2004); hence, cocaine use related

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delay discounting impulsivity cannot be exclusively attributed to the pharmacological effects of the drug.

Collectively, the available evidence supports the notion that steeper delay discounting is a shared behavioral marker of cocaine use and gambling disorders (Bickel, Koffarnus, Moody, & Wilson, 2014). Notwithstanding this overlap, there is ongoing interest in contrasting delay discounting impulsivity between different addictive groups, mainly because a more precise understanding of how this marker relates to specific characteristics of each addiction may ultimately facilitate treatment development (Leeman & Potenza, 2012). For example, in the case of gambling, there is direct convergence of the task reinforcer (money) and the addictive cue (Limbrick-Oldfield, Clark, & van Holst, 2013). This convergence may render individuals with gambling disorder more sensitive to the appeal of immediate monetary choices. Conversely, in the case of cocaine users, delay discounting choices seem to be more influenced by stable characteristics than by specific addictive cues or drug effects (Bornovalova et al., 2005). In fitting with this notion, previous studies have demonstrated that substance using groups (including cocaine users) with comorbid personality disorders (i.e., antisocial, borderline) have steeper discounting rates than comparison groups without dual diagnoses (Coffey, Schumacher, Baschnagel, Hawk, & Holloman, 2011; Petry, 2002). Furthermore, dysfunctional beliefs associated with personality disorders (e.g., “I am needy and weak”) may boost the value of immediate rewards via utility-maximizing or negative reinforcement mechanisms (Callan, Shead, & Olson, 2011; McGuire & Kable, 2013).

The main aim of this study was to compare monetary delay discounting rates between a healthy control group and three groups of individuals with addictive disorders: a group of individuals with gambling disorders, a group of individuals with cocaine use and personality disorders (diagnoses pertaining to Cluster B and Cluster C), and a group of individuals with cocaine use disorder (without other comorbidities). We also examined the association between a continuous measure of dysfunctional personality beliefs and delay discounting rates within each group. We predicted that (i) delay discounting rates would be steeper in individuals with gambling disorders and in individuals with cocaine use and personality disorders compared to controls and cocaine users without personality comorbidities, and (ii) higher degree of dysfunctional beliefs, especially those associated with perceived need

(e.g., borderline or dependent personality beliefs), would be positively correlated with discounting rates.

2. Methods

2.1. Participants

The sample partially overlaps with the one described in previous studies of the COPERNICO project (e.g., Albein-Urios et al., 2013; Albein-Urios, Martinez-Gonzalez, Lozano, & Verdejo-García, 2013; Albein-Urios et al., 2012) but here we report for the first time the results from the monetary choice delay discounting measure in the whole sample. The sample consisted of 47 individuals with cocaine dependence and comorbid personality disorders (15 borderline, 11 histrionic, 5 antisocial, 1 narcissistic, 10 avoidant and 5 obsessive-compulsive diagnoses), 41 individuals with cocaine dependence without current psychiatric comorbidities, 28 individuals with pathological gambling without current psychiatric comorbidities, and 36 healthy comparison participants. The socio-demographic characteristics and drug use and gambling patterns (as determined by the Interview for Research on Addictive Behavior [IRAB]; Verdejo-García, López-Torrecillas, Aguilar de Arcos, & Pérez-García, 2005) are displayed in Table 1. The four groups had similar distributions for relevant demographic variables. Age ranges were as follows: controls 22 to 48 years old, gamblers 19 to 52 years old, cocaine users without comorbidities 20 to 46 years old, and cocaine users with personality comorbidities 19 to 52 years old. IQ distributions fell within the normal range for all groups.

Cocaine users and gamblers were recruited through consecutive admissions into two public clinics specialized in substance use and gambling disorders respectively; provided that they met the eligibility criteria. Cocaine users were recruited at the clinic “Centro Provincial de Drogodependencias” in Granada (Spain), which provides behavioral treatment for substance use disorders in an outpatient setting. Gambling participants were recruited at the clinic “AGRAJER” in Granada (Spain), which provides behavioral and self-help based interventions for gambling in an outpatient setting. In this study, the inclusion criteria for cocaine users and gamblers were: (i) age range between 18 and 55 years old; (ii) IQ levels ≥ 70 — as measured by the Kaufman Brief Intelligence Test (K-BIT; Kaufman and Kaufman, 1990); (iii) meeting

Table 1
Descriptive scores for socio-demographic and substance/gambling use patterns in the study groups.

	Cocaine use comorbid PD		Cocaine use non-comorbid		Gambling		Controls		Statistic	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	p
<i>Demographic variables</i>										
Age	34.04	6.93	31.54	6.57	35.75	8.73	31.30	5.36	3.23	0.02 ⁺
Years of education	10.38	2.11	10.24	1.74	10.11	2.32	10.61	1.84	0.39	0.76
IQ	96.52	10.04	95.26	8.23	97.18	11.20	102.56	7.84	4.40	0.01 [*]
<i>Patterns of use</i>										
Cocaine use age of onset	22.26	6.03	21.04	6.15	–	–	–	–	1.06	0.35
Cocaine monthly use (g)	13.33	18.40	15.45	21.34	–	–	–	–	0.93	0.40
Cocaine duration of use (mo.)	56.70	44.42	51.96	50.23	–	–	–	–	0.94	0.39
Cocaine abstinence (mo.)	3.53	6.41	2.41	3.96	–	–	–	–	0.91	0.34
Gambling age of onset	–	–	–	–	22.93	7.80	–	–	–	–
Gambling monthly hours	–	–	–	–	42.04	45.22	–	–	–	–
Gambling duration (mo.)	–	–	–	–	36.48	36.66	–	–	–	–
Gambling abstinence (mo.)	–	–	–	–	6.97	5.80	–	–	–	–
Alcohol use age of onset	18.66	4.04	17.46	4.30	17.60	2.60	18.48	4.36	0.65	0.59
Alcohol monthly use (S.U.)	41.63	49.73	35.94	54.34	14.07	15.40	9.61	8.72	3.45	0.02 ⁺
Alcohol duration of use (mo.)	86.81	69.13	85.94	76.36	85.29	67.77	83.85	51.63	0.01	0.99
Tobacco use age of onset	18.41	6.50	16.46	3.53	18.07	4.73	18.91	5.22	0.93	0.43
Tobacco monthly use (cig.)	439.97	255.46	576.79	312.15	617.14	226.25	273.63	193.41	4.93	0.003 [/]
Tobacco duration of use (mo.)	142.85	163.68	102.04	98.96	161.14	88.15	97.36	111.57	1.04	0.38

Note. PD, personality disorders; SD, standard deviation; g, grams; mo., months; S.U., standard units; cig., cigarettes. Superscripts indicate Scheffe post hoc tests: ⁺No differences at post hoc tests. ^{*}Significant differences between cocaine use (with and without comorbidities) vs. controls. [/]Significant differences between gamblers and cocaine users without comorbidities vs. controls.

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