Impulsivity profiles in pathological slot machine gamblers

Núria Aragay [a,b,*], Maite Barrios [c,d], Isabel Ramirez-Gendrau [a,b], Anna Garcia-Caballero [a,b], Gemma Garrido [b], Irene Ramos-Grille [b], Yésika Galindo [b], Jonatan Martin-Dombrowski [b], Vicenç Vallès [b]

[a] Pathological Gambling Unit, Consorci Sanitari de Terrassa, Barcelona, (Spain)
[b] Department of Mental Health, Consorci Sanitari de Terrassa, Barcelona, (Spain)
[c] Quantitative Psychology Unit, Faculty of Psychology, University of Barcelona, Barcelona, Spain
[d] Institute of Neurosciences (Neuro UB), University of Barcelona, Barcelona, Spain

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ABSTRACT

Introduction: In gambling disorder (GD), impulsivity has been related with severity, treatment outcome and a greater dropout rate. The aim of the study is to obtain an empirical classification of GD patients based on their impulsivity and compare the resulting groups in terms of sociodemographic, clinical and gambling behavior variables.

Methods: 126 patients with slot machine GD attending the Pathological Gambling Unit between 2013 and 2016 were included. The *UPPS-P Impulsive Behavior Scale* was used to assess impulsivity, and the severity of past-year gambling behavior was established with the *Screen for Gambling problems questionnaire* (NODS). Depression and anxiety symptoms and executive function were also assessed. A two-step cluster analysis was carried out to determine impulsivity profiles.

Results: According to the UPPS-P data, two clusters were generated. Cluster 1 showed the highest scores on all the UPPS-P subscales, whereas patients from cluster 2 exhibited only high scores on two UPPS-P subscales: *Negative Urgency* and *Lack of premeditation*. Additionally, patients on cluster 1 were younger and showed significantly higher scores on the *Beck Depression Inventory* and on the *State-Trait Anxiety Inventory* questionnaires, worse emotional regulation and executive functioning, and reported more psychiatric comorbidity compared to patients in cluster 2. With regard to gambling behavior, cluster 1 patients had significantly higher NODS scores and a higher percentage presented active gambling behavior at treatment start than in cluster 2.

Conclusions: We found two impulsivity subtypes of slot machine gamblers. Patients with high impulsivity showed more severe gambling behavior, more clinical psychopathology and worse emotional regulation and executive functioning than those with lower levels of impulsivity. These two different clinical profiles may require different therapeutic approaches.

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1. Introduction

Gambling Disorder (GD) is characterized by persistent and recurrent maladaptive behavior that disrupts personal, family or vocational pursuits and is classified in the DSM-5 as an Addictive Disorder, due to similarities in etiological, biological, clinical terms and treatment outcomes with Substance-Related Disorders [1]. Indeed, high impulsivity is considered as an indicator of vulnerability for both disorders [2,3]. In a recent review, Grant and Chamberlain [4] concluded that there were similarities between substance abuse and GD on the cognitive and neurological components of impulsivity. In a prospective community-based study of 958 births analyzing the association between impulsivity at age 7 and the development of GD in adulthood, Shenassa et al. [5] found that

children with impulsive behavior were three times more likely to develop GD in adulthood than non-impulsive children.

Impulsivity has been associated with various psychopathological disorders such as addiction, compulsive buying, problem gambling, attention deficit and hyperactivity disorders, eating disorders, aggressiveness, antisocial conduct, limit and antisocial personality disorders or risky sexual behaviors [6]. Although impulsivity has been widely used in mental health, its definition remains controversial [7,8]. It is a complex and multi-dimensional concept composed of different dimensions (i.e., cognitive, emotional and behavioral), which result in individual differences in its distribution and its degree of severity [8,9]. More than a criterion for a specific diagnosis, impulsivity could be considered a trans-diagnostic trait [10].

High impulsivity has also been associated with GD [2,11–15]. Whiteside and Lynam [15] described a multi-dimensional model of impulsivity and confirmed its heterogeneity. The four-factor model of impulsivity they developed was named the "Urgency-Premeditation-

Perseverance-Sensation seeking model" (UPPS model). *Negative urgency* was defined as the tendency to act rashly as a result of intense negative affect; *Lack of premeditation* refers to the tendency to act without considering the potential consequences, without planning or adequate consideration of potential outcomes prior to action; *Lack of perseverance* as the inability to maintain involvement or persist in long, boring or difficult tasks; and *Sensation seeking*, defined as the tendency to enjoy and pursue exciting activities and openness to trying new experiences. Later, a fifth facet named, *Positive urgency*, defined as the tendency to act rashly or maladaptively in response to positive mood states, was added by Cyders et al. to create the UPPS-P model [2].

These five dimensions of the UPPS-P model have been empirically associated with different parameters of addictive behavior. *Negative urgency* has been associated with tobacco craving, severity of stimulant addiction, pathological gambling, compulsive purchases, as well as Internet abuse and risky sexual behavior. *Lack of perseverance* and *lack of premeditation* have both been linked with problematic use of substances (e.g., alcohol, cocaine and amphetamines). *Sensation seeking* has been associated with the frequency of drug use, alcohol consumption and pathological gambling. Finally, *Positive urgency* has been linked to the recreational use of alcohol and drugs and risky sexual behavior [7,16].

In GD, although some studies have established impulsivity as a predictor of GD severity, treatment outcomes and dropouts, they did not consider its multi-dimension nature [9,17–20]. Some studies using the UPPS-P Impulsive Behavior Scale have found that pathological gamblers showed high impulsivity with a larger effect for both *Positive and Negative urgency* [21–23]. Considering the relationship between impulsivity and GD, a better understanding of the implications of impulsivity for the treatment and prevention of GD is essential. However, it is worth mentioning that gambling is not a single homogeneous activity, and although the chance of winning something of greater value than the amount invested is a common feature of the various forms of gambling activities, different types of gambling present different attributes [24]. Since lotteries, bingo, sport betting, or slot machines offer diverse experiences to gamblers, the motives for participating in particular forms of gambling probably vary from person to person [25]. Indeed, several studies have pointed out that certain forms of gambling are more likely to develop into problem behavior (e.g., slot machines, casino games, online gambling) than others (e.g., weekly lotteries, instant lottery tickets) [24,26–28]. Moreover, of all types of gambling, slot machines are the most addictive; in Spain they cause more gambling problems than any other type and require more specialized psychological treatment [29]. Therefore, including different types of gamblers in one study may introduce excessive variance, whereas focusing on one specific type of gambling may obtain more homogeneous results and a rapid understanding of its distinguishing features. Consequently, the main objective of the present study is to obtain an empirical classification of slot machine gamblers with GD based on their impulsivity. We also aimed to compare the resulting groups in terms of sociodemographic and clinical variables and gambling behavior.

2. Methods

2.1. Participants

The study population was derived from a prospective single-center registry of consecutive outpatients attended at a Pathological Gambling Unit between 2013 and 2016. Patients older than 18 years, diagnosed with GD and having problems only with slot machines were included. Patients with any other behavioral addiction (i.e., compulsive buying, internet addiction, sex addiction) or with addiction to other types of gambling were excluded. Illiterate subjects, those with difficulties in understanding the questionnaires, dementia, mental retardation or psychiatric comorbidity in the acute state were also excluded. GD was defined according to the Diagnostic and Statistical Manual of Mental Disorders (DSM) [1]. During the study period, 340 patients with GD

were attended at the Pathological Gambling Unit. Of these patients, 221 (65%) had problems with slot machines. Since 95 patients did not meet the inclusion criteria, the final sample consisted of 126 patients. Mean age was 41.9 (SD = 10.5) years and 118 (94%) were men. Seventy-five (59%) had a stable partner, 74 (58%) were in employment and 76 (60%) had secondary education or higher.

2.2. Instruments

Participants provided sociodemographic information (i.e., gender, age, employment, marital status and educational level) and information on their gambling history (i.e., age at initiation, frequency of gambling, money invested in gambling per week) via a semi-structured interview.

To assess impulsivity profiles, the Spanish version of the UPPS-P Impulsive Behavior Scale was used. This 59-item self-report scale is based on the five-factor model of the UPPS which measures impulsivity as a personality trait [30]; the five factors are *Negative Urgency*, *Lack of Premeditation*, *Lack of Perseverance*, *Sensation seeking*, and *Positive Urgency*. Each item is rated on a 4-point scale, ranging from 1 (strongly agree) to 4 (strongly disagree). The internal consistency coefficients for the Spanish version of each scale range from 0.79 to 0.93 [31].

The severity of past-year gambling behavior was established with the Spanish version of the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS) [32]. This questionnaire is based on DSM-IV criteria and contains 17 past-year items. Scores range from 0 to 10 and establish four levels of severity, categorized as: no gambling behavior (NODS: 0), risk gambling (NODS: 1–2), problem gambling (NODS: 3–4) and GD (NODS: ≥5). The instrument shows adequate reliability (Cronbach α = 0.79) and correlate highly with other measures to identify gambling problems [33,34].

Psychiatric comorbidity was assessed according to the DSM-5 and was defined globally including affective disorders, anxiety disorders and substance abuse disorders [1]. The Beck Depression Inventory (BDI) [35] and the State-trait Anxiety Inventory (STAI) [36] were administered in order to assess depression and anxiety symptoms, respectively. The Behaviour Rating Inventory of Executive Function – Adult Version (BRIEF-A) [37], a self-report questionnaire composed of nine subscales and three composite scores, was used to assess executive functioning. The Behavioral Regulations Index (BRI) consists of the inhibit, shift, self-monitor and emotional-control subscales. The Metacognition Index (MI) comprises the initiate, plan/organize, working memory, organization of materials, and task-monitor subscales. Finally, the BRI and MI can be combined to produce the overall global executive composite (GEC) score [37,38].

2.3. Procedures

This study was carried out in accordance with the latest version of the Declaration of Helsinki (WMA, 2008). The Research Ethics Committee of our hospital approved the study. After signing an informed consent document, all participants completed a semi-structured interview before beginning treatment and attended a therapeutic program aimed at achieving abstinence from gambling.

We recorded sociodemographic information, clinical data (i.e., use/abuse of illegal substances, psychiatric comorbidities and family mental health history) and information about gambling behavior in the first visit. The self-reported scales mentioned above were also administered.

2.4. Statistical analysis

In order to identify impulsivity profiles, a two-step cluster analysis was carried out to automatically determine the optimal number of clusters. The log-likelihood method was used to determine inter-subject distance, and the Schwarz Bayesian criterion was selected as the clustering criterion.