Is gambling disorder associated with impulsivity traits measured by the UPPS-P and is this association moderated by sex and age?


Abstract

Objectives: Impulsivity is a construct that is strongly associated with Gambling Disorder (GD). The main objectives in the present study are: 1) to explore the role of sex and age on impulsivity levels in GD patients; 2) to identify the relationship of the different impulsivity facets with comorbid psychopathology and other personality traits in GD patients; and (3) to assess whether impulsivity is a predictor for the severity of GD.

Method: The final sample consisted of 406 consecutive participants. All of them were seeking treatment for GD (88.4% male and 11.6% female) and completed the South Oaks Gambling Screen (SOGS), the UPPS-P Impulsive Behavior Scale, the Symptom Checklist (SCL-90-R), the Temperament and Character Inventory-R (TCI-R) as well as other clinical and psychopathological measures.

Results: Results show a negative linear trend between age and lower sensation seeking levels as well as lack of premeditation (the higher the age the lower the UPPS-P scores), and a positive linear trend between age and positive urgency (UR) (the higher the age the higher the UPPS-P score). However, no sex differences were found for the assessed impulsivity dimensions. Lack of perseverance was positively associated with obsessive-compulsive symptoms and harm avoidance trait, and negatively related to persistence and self-directedness traits. Positive UR and negative UR were positively correlated with general psychopathology and the total number of DSM-IV criteria, and negatively associated to the following personality traits: self-directedness and cooperativeness. Finally, only the sensation seeking and negative UR of the UPPS-P showed predictive capacity on the severity of the disorder (the higher the impulsivity scores the higher the illness severity).

Conclusions: These findings highlight the association between impulsivity traits (measured by the UPPS-P) and GD in a large and consecutively recruited clinical sample with GD, taking into account the variables sex and age.

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Abbreviations: GD, Gambling Disorder; DSM, Diagnostic and Statistical Manual of Mental Disorders; SOGS, South Oaks Gambling Screen; SCL-90-R, Symptom Check List- 90-Revised; GSI, Global Severity Index; PST, Positive Symptom Total; PSDI, Index Positive Symptom Distress; TCI-R, Temperament and Character Inventory-Revised; UPPS-P, UPSS-P Impulsive Behavior Scale; UR, Urgency; ANOVA, Analysis of Variance.

Conflict of interest declaration: All authors declare that they have no conflicts of interest.

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1. Introduction

Pathological gambling (PG), previously classified as an “impulse control disorder not elsewhere classified”, has been renamed as Gambling Disorder (GD) and reclassified as a “substance-related and addictive disorder” in the fifth edition of the Diagnostic and Statistical Manual (DSM-5) [1]. The basis of this change lies on the growing scientific evidence from neuroscience, genetics and experimental psychology studies that reveal that GD and substance use disorder share some common substantial elements, such as impulsivity [2,3]. Accordingly, the strong association between impulsivity and problematic gambling behavior has been widely studied and repeatedly reported as significant [4]. Furthermore impulsivity has been described as a risk factor for GD [5–7].

Impulsivity is a complex construct with multi-dimensional characteristics and its definition has been difficult to ascertain [8,9]. At present, there are different theoretical and conceptual models of impulsivity. Among them, the Whiteside & Lynam [10] Five Factor Model of personality is of particular interest because it improved the assessment of impulsivity through the widely known UPPS Impulsive Behavior Scale. Originally, the UPPS was created and validated by Whiteside & Lynam [10] with 4 different sub-scales: Urgency (UR), Lack of Premeditation, Lack of Premeditation and Sensation Seeking. Later, the UR dimension (emotion-based disposition to engage in rash actions) was divided into two different personality traits: positive UR and negative UR [11]. Positive UR refers to the tendency to engage in impulsive actions in response to extreme positive emotions. Therefore impulsivity is associated with positive emotions and immediate positive reinforcement [12,13]. Negative UR refers to impulsive actions due to the experience of negative emotional states, such as depression, boredom and stress. In this case, impulsivity is associated with negative emotions and negative reinforcement (avoidance behavior or relief seeking) [14–17]. The UPPS-P Impulsive Behavior Scale assesses the five described personality dimensions for impulsive behaviors [18] observed in different addictive disorders or impulsive related disorders such as: eating disorders [19], substance use disorders [20], non-suicidal self-injury [21], among others. In fact, the UPPS-P has been proven as one of the most valid and appropriate impulsivity measures.

During the last decade several studies have concluded that UR is a key component of risky behaviors [22,23] and among them problematic gambling behavior is highlighted [15,24]. For instance, Whiteside et al. [25] studied a sample of patients with GD, borderline personality disorder, alcohol abusers and healthy controls; according to their results UR was both a predictor of GD as well as the most constant factor across all the dimensions (low premeditation, low perseverance and sensation seeking). Additionally, in a cross-sectional study conducted by Cyders & Smith [26], higher scores in positive UR among university students predicted increased risk of long term gambling behaviors. Negative UR on the other hand, has been linked to the urge to consume tobacco [22] as well as to binge-eating/purging symptoms in eating disorders [19,27].

Three studies have been conducted with UPPS-P so far and GD in clinical samples [24,28,29]. Billieux et al. [28] described how GD individuals presented higher UR and lack of premeditation when compared to control individuals. Furthermore, Michalczuk et al. [24] reported that UR dimensions (i.e.: negative and positive UR) were strongly associated with gambling behaviors. Besides, differences were also found between GD participants and controls in all the other impulsivity dimensions with the exception of sensation seeking.

Thus, UR appears to be the impulsivity dimension most highly associated with emotion regulation in GD, with gambling behavior being a maladaptive mechanism for regulating positive (e.g.: euphoria, empowerment) and negative emotions (e.g.: stress, boredom or sadness) [30–32]. Finally, Grall-Bronnec et al. [29] reported a positive association between UR and GD severity as well as a strong association between impulsivity and psychopathology (e.g.: mood disorders, risk of suicide, alcohol use disorder and ADHD).

In spite of impulsivity being a well studied construct in GD samples with and without the UPPS-P measure [24,28,29], to our knowledge no previous studies have been conducted so far exploring impulsivity in a consecutively recruited and large GD clinical sample.

The main goal of the present study was threefold: 1) to explore the role of sex and age on impulsivity in GD patients; 2) to identify the relationship of the different impulsivity facets with comorbid psychopathology and other personality traits in GD patients and 3) to assess whether impulsivity is a predictor for the severity of GD.

2. Methods

2.1. Sample

Sample consisted of 406 GD individuals (359 male, 88.4%) with a mean age of 41.2 years old (SD = 13.0). All of them were outpatient consecutive referrals for the assessment and treatment of GD at a Gambling Disorder Unit in the Psychiatry Department of the University Hospital of Bellvitge, in Barcelona (Spain). Sample recruitment was conducted from March 2012 to November 2013. Many participants had primary (50.5%) or secondary (38.5%) education and 53.3% were unemployed. Civil status was distributed as follows: 48.4% married, 16.6% divorced and 35.0% single. All participants were diagnosed with the Diagnostic Questionnaire for Gambling Disorder according to DSM-IV criteria [33]. Diagnoses were made by expert psychologists and psychiatrists, who have more than 15 years of clinical experience in the GD field.

2.2. Measures

*South Oaks Gambling Screen (SOGS)* [34] on its Spanish validation [35]. This screening self-report questionnaire
The statistical analysis was carried out with Stata13 for windows. The contribution of patients’ age and sex on the UPPS-impulsivity raw scores was analyzed with multiple regressions in two steps-blocks: first block included sex and age and second block added the interaction parameter sex by age. For significant interaction-terms \( p \leq .05 \), the interaction parameter was retained into the model and single-effects were estimated. For non-significant interaction-terms \( p > .05 \), the moderator parameter was excluded and the first block with the main effects was estimated and interpreted.

The associations between UPPS-impulsivity scores and clinical symptoms, TCI-R personality traits and features of GD were calculated by means of partial correlation coefficients adjusted by the covariates sex and age. Due to the large effect size and the correspondent high statistical power, non-relevant coefficients tended to achieve statistical significance. So, only values with good effect size \(| r | > .30 \) were interpreted as relevant.

The predictive validity of impulsivity facets on the severity of the GD (SOGS-total and DSM4-total score) was explored with multiple regression models in two blocks-steps: the first block-step included the covariates sex and age and the second block-step added the UPPS-P facet scale raw scores. In this modeling, for non-significant interaction-terms \( p > .05 \), the moderator parameter was excluded and the first block with the main effects was estimated and interpreted. For significant interaction-terms \( p \leq .05 \), the interaction parameter was retained into the model and single-effects were estimated.

### 3. Results

#### 3.1. Impulsivity levels in GD patients

Table 1 shows the distribution of the UPPS-impulsivity scores for the sample. No statistical differences emerged based on participants’ sex. Based on the groups of age, a negative linear trend was obtained for the lack of premeditation and sensation seeking scores (the higher the age the lower the impulsivity level) and a positive linear trend was obtained for the positive UR score (means tended to increase in this scale according to the patients’ age) (Fig. 1).

Table 2 shows the results of the multiple regression models valuing the specific contribution of sex and age (measured in years) on the UPPS-impulsivity scores. No interaction sex-by-age parameter achieved significant result, indicating that the potential effect of age and sex was independent. So the main effects obtained in the first block of regressions were interpreted. Entered simultaneously, sex did not contribute on the impulsivity values but age was a significant predictor of lack of premeditation and sensation...
offered lower scores in these two impulsivity scales).

3.2. Association between impulsivity levels and clinical variables

Table 3 shows the results of the partial correlations adjusted by sex and age, measuring the association between UPPS-impulsivity scores and psychopathological variables related to GD. Lack of premeditation was positively correlated with novelty seeking personality trait. Lack of perseverance obtained positive correlation with obsessive–compulsive symptom levels and harm avoidance trait, and negative correlation with persistence and self-directedness traits. Positive UR positively correlated with psychopathological levels of obsessive–compulsive, paranoid ideation, psychotic ideation, GSI index and PST index, positively correlated with self-transcendence trait and it was negatively associated to self-directedness and cooperativeness. Negative UR levels were positively correlated with all the SCL-90 scales, harm avoidance trait and the total number of DSM-IV criteria, and it was negatively related with the personality traits self-directedness and cooperativeness.

Table 4 shows the results of the multiple regressions, adjusted by participants’ sex and age, measuring the contribution of the UPPS-P impulsivity scores on the GD severity (SOGS-total score and the total number of DSM-IV criteria for GD). The specific contribution of the UPPS scores on the SOGS-total score was $\Delta R^2 = .12$, but only the sensation seeking scale was a significant predictor in the final model (the higher the sensation seeking the higher the SOGS-total). The contribution of UPPS-P scores on the total number of DSM-IV criteria for GD was $\Delta R^2 = .14$, and for this outcome the only significant impulsivity scale was negative UR (positive association: the higher the negative UR score the higher the number of DSM-IV criteria).

4. Discussion

The present study widens the previous knowledge of the association between GD and impulsivity (measured by means of the UPPS-P). Specifically, it reports no sex differences in impulsivity among individuals suffering from GD and provides significant information about the role that psychopathology and personality traits play in impulsivity among the studied sample. Accordingly, several studies report that impulsivity as a trait is a risk factor for both the onset and maintenance of the problematic gambling behavior [42–45]. Additionally, previous studies have also found that high impulsivity is associated with GD regardless of sex [7,42,46,47]. Thus, the results of these studies convey the important role of impulsivity in problematic gambling behaviors in both men and women.

Moreover, our results displayed a positive association between age, sensation seeking, as well as lack of premeditation and positive UR in the UPPS-P, being the first one the impulsivity facet which is most influenced by age. Thus, results show that the older the individual the lower the sensation seeking and the lack of premeditation and the higher the positive UR. Previous studies have also reported a link among these variables [47–51]. It is important to mention that individuals with high lack of premeditation levels tend to ignore the advantages and disadvantages of a situation and present more impulsive behaviors despite the consequences. In this line, studies implementing delay discounting tasks report that low premeditation is associated with certain cognitive mechanisms. Specifically, GD individuals present more choices based on short-term criteria [52–55] and their choices are more oriented...
Table 3
Partial correlation, adjusted by sex and age, for impulsivity and GD outcomes.

<table>
<thead>
<tr>
<th></th>
<th>Lack premeditation</th>
<th>Lack perseveration</th>
<th>Sensation seeking</th>
<th>Positive UR</th>
<th>Negative UR</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCL-90: Somatization</td>
<td>.106</td>
<td>.147</td>
<td>−.049</td>
<td>.261</td>
<td>.348</td>
</tr>
<tr>
<td>SCL-90: Obsessive/compulsive</td>
<td>.162</td>
<td>.407</td>
<td>.011</td>
<td>.300</td>
<td>.368</td>
</tr>
<tr>
<td>SCL-90: Interpersonal sensitivity</td>
<td>.110</td>
<td>.277</td>
<td>−.061</td>
<td>.295</td>
<td>.399</td>
</tr>
<tr>
<td>SCL-90: Depressive</td>
<td>.159</td>
<td>.287</td>
<td>−.002</td>
<td>.240</td>
<td>.363</td>
</tr>
<tr>
<td>SCL-90: Anxiety</td>
<td>.119</td>
<td>.248</td>
<td>−.097</td>
<td>.295</td>
<td>.393</td>
</tr>
<tr>
<td>SCL-90: Hostility</td>
<td>.125</td>
<td>.182</td>
<td>.005</td>
<td>.246</td>
<td>.312</td>
</tr>
<tr>
<td>SCL-90: Phobic anxiety</td>
<td>.099</td>
<td>.258</td>
<td>−.099</td>
<td>.274</td>
<td>.312</td>
</tr>
<tr>
<td>SCL-90: Paranoid Ideation</td>
<td>.057</td>
<td>.140</td>
<td>.087</td>
<td>.347</td>
<td>.380</td>
</tr>
<tr>
<td>SCL-90: GSI score</td>
<td>.135</td>
<td>.280</td>
<td>−.040</td>
<td>.314</td>
<td>.412</td>
</tr>
<tr>
<td>SCL-90: PST score</td>
<td>.113</td>
<td>.241</td>
<td>.034</td>
<td>.343</td>
<td>.456</td>
</tr>
<tr>
<td>SCL-90: PSDI score</td>
<td>.148</td>
<td>.261</td>
<td>−.067</td>
<td>.243</td>
<td>.338</td>
</tr>
<tr>
<td>TCI-R: Novelty seeking</td>
<td><strong>.506</strong></td>
<td>.229</td>
<td>.160</td>
<td>.236</td>
<td>.259</td>
</tr>
<tr>
<td>TCI-R: Harm avoidance</td>
<td>.015</td>
<td><strong>.372</strong></td>
<td>−.216</td>
<td>.251</td>
<td><strong>.312</strong></td>
</tr>
<tr>
<td>TCI-R: Reward dependence</td>
<td>−.145</td>
<td>−.201</td>
<td>.145</td>
<td>−.050</td>
<td>−.105</td>
</tr>
<tr>
<td>TCI-R: Persistence</td>
<td>−.247</td>
<td><strong>.483</strong></td>
<td>.271</td>
<td>.130</td>
<td>.115</td>
</tr>
<tr>
<td>TCI-R: Self-directedness</td>
<td>−.262</td>
<td>−.392</td>
<td>−.079</td>
<td>−.457</td>
<td>−.503</td>
</tr>
<tr>
<td>TCI-R: Cooperativeness</td>
<td>−.090</td>
<td>−.255</td>
<td>−.071</td>
<td>−.330</td>
<td>−.313</td>
</tr>
<tr>
<td>TCI-R: Self-Transcendence</td>
<td>−.164</td>
<td>−.132</td>
<td>.239</td>
<td>.318</td>
<td>.252</td>
</tr>
<tr>
<td>SOGS: total score</td>
<td>.118</td>
<td>.133</td>
<td>.149</td>
<td>.270</td>
<td>.248</td>
</tr>
<tr>
<td>DSM-IV: total criteria</td>
<td>.044</td>
<td>.110</td>
<td>.050</td>
<td>.286</td>
<td>.322</td>
</tr>
<tr>
<td>Use of tobacco</td>
<td>.008</td>
<td>.191</td>
<td>−.027</td>
<td>.087</td>
<td>.166</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>.016</td>
<td>−.007</td>
<td>.087</td>
<td>.217</td>
<td>.185</td>
</tr>
<tr>
<td>Substances use</td>
<td>−.025</td>
<td>.031</td>
<td>.004</td>
<td>−.027</td>
<td>−.008</td>
</tr>
<tr>
<td>Maximum bets (euros)</td>
<td>.001</td>
<td>−.017</td>
<td>.000</td>
<td>−.083</td>
<td>−.087</td>
</tr>
<tr>
<td>Mean bets (euros)</td>
<td>.126</td>
<td>.025</td>
<td>.064</td>
<td>.076</td>
<td>.064</td>
</tr>
<tr>
<td>Cumulate debts (euros)</td>
<td>.045</td>
<td>.059</td>
<td>−.068</td>
<td>.039</td>
<td>−.034</td>
</tr>
</tbody>
</table>

Bold: good effect size (|r| > .30).

* Interaction term sex × age.
to highly rewarding activities [56]. Also high positive UR is commonly associated to high-risk and sensation seeking behaviors [57].

Regarding the exploration of the link between impulsivity, comorbid psychopathology and personality in GD individuals, results show a range of significant associations. Specifically, the lack of premeditation was positively associated with novelty seeking personality trait, while the lack of perseverence was associated with high levels of emotional distress and high harm avoidance, as well as low persistence and self-directedness. Overall, while individuals with low premeditation display impaired capability of anticipating and thinking about the consequences of their behaviors, individuals with lack of perseverence have been reported to present lower responsibility perception and a tendency to present non adaptive and risky decision making [57], as well as difficulties in dealing with frustration [58]. Likewise, the results of the present study are in agreement with those that demonstrated that GD patients are more likely to be unaware of the consequences of their actions because they highly need new sensations and they focus on the immediate reward rather than in other long term goals [22,40,42,59,60].

In addition, positive UR and negative UR were both associated with global psychopathology, with negative UR being the impulsivity facet which showed the largest effect size. These results are in concordance with a recent meta-analysis [57] which concludes that this dimension is highly associated with the presence of impulsive behaviors. Also, results support previous studies describing UR as a predictive factor of problematic gambling [16,23,25,28,61–63]. Additionally, in agreement with the results obtained in a previous research conducted with treatment-seekers at-risk and pathological gamblers [29], our data show that GD severity is positively correlated with negative UR. In the same line, other studies also demonstrate that impulsivity is a good predictor for GD severity as well as negative and positive UR. Noteworthy, previous research has also revealed that while high UR and low premeditation are predictors of problematic gambling, sensation seeking could be a predictor of gambling frequency [17,26,40]. Besides, Torres et al. [9] explored the impulsivity role in addiction by comparing a group of GD, a group of cocaine dependents and healthy controls. Results showed that negative UR predicted gambling severity. Similar results were also reported by Michaleckzuk et al. [24], confirming the role of negative UR as a predictor of GD.

The major limitation of this study is its design, which by being cross sectional no causal effects can be obtained. Besides, GD patients were retrieved from a clinical setting and this can be a bias in itself because results could be different if participants came from a non-treatment seeking population. Nonetheless, it is of utmost importance to study different samples and this research raises significant evidence of the associations between GD and impulsivity in clinical settings.

5. Conclusions

This study explores the association between impulsivity and GD and its findings are consistent with previous research
on the field. No sex differences throughout the impulsive dimensions were confirmed. However, the age was negatively associated with impulsivity in patients with GD. Moreover, in our sample, several significant associations were found among impulsivity, personality traits and comorbid psychopathology. While many studies explore the impulsivity by means of UPPS-P in alcohol and other substances as well as other disorders, little research has been conducted so far in GD and, even less, with extensive clinical samples. Notably, in a recent meta-analysis study that explores UPPS and its implications in psychopathology [57], there was only one study conducted with UPPS in GD. According to Berg et al. [57], the limited empirical evidence in GD hinders the possibility to reach firm conclusions of the relationship between UPPS-P impulsivity dimensions and GD. Therefore, this study enhances the understanding of GD and adds to the current knowledge significant evidence of the association between the different dimensions of impulsivity and psychopathology, personality and severity of GD. Future studies exploring GD treatment should consider their impulsivity scores by means of UPPS-P (one of the most reliable impulsivity measures for the here studied population).

References


