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## ORIGINAL

## Comorbidity of Pathological Gambling: clinical variables, personality and response to treatment

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### KEYWORDS

Pathological gambling;  
Comorbidity;  
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Psychopathology;  
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### Abstract

**Introduction:** Pathological gambling shows high comorbidity rates, especially with substance use disorders, although affective, anxiety and other impulse control disorders, as well as personality disorders, are also frequently associated.

**Objectives:** To explore comorbidity in pathological gambling with other mental disorders in a consecutive sample of patients attending a unit specialized in pathological gambling, and specifically the relationship between substance-related disorders, on the one hand, and personality and clinical variables in pathological gamblers, on the other.

**Method:** A total of 498 patients with a DSM-IV-TR diagnosis of Pathological Gambling (11.8% women) were assessed with a semi-structured clinical interview and several clinical and personality scales.

**Results:** Higher comorbidity with affective disorders was found in women (30.5%), while higher comorbidity with substance-related disorders was found in men (11.2%). A positive association was also detected between a history of psychiatric disorders and current comorbidity with substance-use disorders, as well as between alcohol abuse and age. Finally, some personality traits such as low reward dependence (OR = 0.964) and high impulsivity (OR = 1.02) predicted other substance abuse (not alcohol). High self-transcendence scores predicted both alcohol and other substance abuse (OR = 1.06).

**Conclusions:** Our results suggest a high prevalence of comorbid disorders in pathologic gambling, mainly with affective and substance-related disorders. The results of the present

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study, conducted in a broad sample of consecutively admitted pathologic gamblers, may contribute to understanding of this complex disorder and treatment improvement.

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## PALABRAS CLAVE

Juego patológico;  
Comorbilidad;  
Abuso de sustancias;  
Psicopatología;  
Personalidad

## Comorbilidad del juego patológico: variables clínicas, personalidad y respuesta al tratamiento

### Resumen

**Introducción:** El juego patológico es un trastorno que presenta elevadas tasas de comorbilidad, especialmente con los trastornos por abuso o dependencia de sustancias, aunque también con los trastornos del estado de ánimo, de ansiedad, otros trastornos del control de los impulsos, así como con trastornos de personalidad.

**Objetivos:** Analizar la comorbilidad del juego patológico con otros trastornos mentales en una muestra consecutiva de sujetos que consultaban en una unidad especializada de juego patológico, y específicamente la relación existente entre trastornos relacionados con sustancias con las variables de personalidad y clínica de los juegos patológicos.

**Método:** Se evaluó a 498 pacientes (el 88,2% varones), diagnosticados de trastorno por juego patológico según DSM-IV-TR, mediante entrevista clínica semiestructurada y diversas escalas clínicas y de personalidad.

**Resultados:** Se obtuvo una mayor prevalencia de trastornos del estado de ánimo en las mujeres (30,5%), y de abuso y/o dependencia de sustancias, en los varones (11,2%). Asimismo, se encontró una asociación positiva entre antecedentes psiquiátricos y abuso de alcohol y otras sustancias, y entre abuso de alcohol y edad. Finalmente, determinados rasgos de personalidad, como la baja dependencia a la recompensa (odds ratio [OR] = 0,964) y elevada impulsividad (OR = 1,02), predecían el abuso y/o dependencia de tóxicos, mientras elevadas puntuaciones en autotranscendencia predecían tanto el abuso de alcohol como de otras sustancias (OR = 1,06).

**Conclusiones:** Los resultados confirman que el juego patológico se presenta de forma comórbida con otros trastornos, especialmente del estado de ánimo y relacionados con sustancias. Los resultados de este estudio, realizado con una amplia muestra de sujetos diagnosticados de juego patológico, que solicitan tratamiento por su problema, pueden contribuir al conocimiento de esta compleja problemática y una mejora de su tratamiento.

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## Introduction

Pathological gambling (PG) is a health problem which has serious consequences for the people it affects and their families. It is a highly disabling, progressive and chronic disorder that has a damaging effect on every area of an individual's life.

PG is classified as an impulse control disorder and its clinical manifestations are characterized by a series of cognitive, behavioural and physiological symptoms. Problematic or pathological gambling behaviour is a phenomenon which exists in all countries. Various studies show that 70-90% of the adult and adolescent population has gambled at least once.<sup>1-3</sup> Current epidemiological studies reveal PG rates of 1-2% in the general population<sup>4,5</sup>

and the prevalence of this disorder ranges from 0.1 to 5.1% throughout life.<sup>6-8</sup>

The analysis of the comorbidity of PG with other disorders is one of the most relevant aspects to address if we are to advance our knowledge of its aetiology. This phenomenon could identify some common link between PG and other disorders, in other words one might be the cause of the other and, as such, they might share a series of mutual vulnerability factors or perhaps the two disorders might not be independent phenomena but different phenotypes of the same disease.

## Pathological Gambling and Substance Abuse

A review of the literature on comorbidity shows that disorders as a result of the abuse or dependence on alcohol

and other substances are some of the conditions which are most commonly associated with PG,<sup>9-12</sup> with rates ranging from 21 to 65% both in clinical samples and samples taken from the general population.<sup>13-17</sup>

Some studies emphasize that the incidence of PG is 8 to 10 times greater in individuals with problems of abuse or dependence on alcohol, in comparison with the general population.<sup>18</sup> Others indicate that from 9 to 30% of consumers of toxic substances presented concomitant gambling problems.<sup>19-23</sup> In addition, confirming these findings, Petry et al<sup>24</sup> asserted that PG showed high levels of comorbidity with other mental disorders, especially alcohol abuse and mood disorders. A recent study by Adamson et al,<sup>25</sup> involving a sample of 105 subjects with dependence on toxic substances, found that 74% had other psychiatric disorders, including PG.

### **Pathological Gambling and Other Comorbid Axis I Disorders**

Studies on the comorbidity of PG with other disorders indicate that there are high rates of mood disorders (major depressive disorder, dysthymia, mania and hypomania), ranging from 33 to 76% anxiety disorders (9-40%), other impulse control disorders (35-43%) and attention deficit disorder with hyperactivity (20%).<sup>26</sup> Studies conducted on special populations, such as elderly people with gambling problems, also reveal high rates of psychiatric comorbidity, which include depressive, anxiety and alcohol abuse disorders.<sup>27</sup>

### **Pathological Gambling and Other Comorbid Axis II Disorders**

In the case of personality disorders, Black et al<sup>28</sup> observed that 87% of a sample of 30 compulsive gamblers had, at the very least, a concomitant personality disorder. They reported obsessive-compulsive personality disorder to be the most common of these, followed by avoidant, schizotypal and paranoid personality disorder. Various studies show a link between PG and *cluster B* personality disorders and observe a greater prevalence of traits such as impulsiveness and sensation-seeking in PG subjects in comparison with controls.<sup>29,30</sup> With respect to how it is related to antisocial personality disorder (ASPD), a number of authors<sup>31-34</sup> have demonstrated a link and its incidence ranges from 15 to 40%. As far as other personality disorders are concerned, levels are no higher than in the general population.<sup>26</sup> In other studies rates range from 15 to 65%.<sup>16,24,35-37</sup> However, conflictive personality traits, which are not clinically severe enough to warrant an axis II diagnosis, are much more common.<sup>38</sup>

### **Pathological Gambling, Sex and Comorbidity**

Fewer results are available in relation to sex and comorbidity. Most studies on its prevalence demonstrate that males are particularly affected by PG.<sup>17,39,40</sup> The literature also indicates that men and women gamble for different reasons. In the case of men, the behaviour usually begins

in youth and, generally a liking of risk, new sensations, the possibility of winning money, etc. are involved,<sup>10,41</sup> while, in the case of women, its onset is usually later (in adulthood) and as a result of negative emotional states.<sup>42</sup> These profiles, according to Petry et al,<sup>24</sup> can be extended to the differential characteristics of comorbidity between the sexes. For example, in their study based on the results of the National Epidemiologic Survey on Alcohol and Related Conditions, they observed that some disorders (such as emotional disorders or substance abuse) are closely related to sex. In a study involving 143 males and 143 females, who consecutively sought medical advice for a pathological gambling problem, it was found that, although the onset of the disorder occurred 7 years later in women, the severity was similar for both sexes. Females, however, presented greater general psychopathology, as well as significantly higher scores for harm avoidance and lower scores for self-determination than the male group. No association was detected between sex variables and the severity of the disorder.<sup>43</sup>

### **Objectives of the Present Study:**

1. To describe the clinical characteristics and comorbidity with DSM-IV Axes I and II disorders of a sample of pathological gamblers receiving professional treatment.
2. To identify the concurrent comorbidity between PG and substance abuse (nicotine, alcohol and other toxic substances) in the total sample and in subgroups of the sample (classified according to sex, age, the type of gambling problem and how many years the patients have had PG).
3. To verify the concurrent comorbidity between PG and other DSM-IV Axes I and II mental disorders in the total sample and in subgroups of the sample (classified according to sex, age, type of gambling problem and how many years the patients have had PG).
4. To evaluate the relationship between personality traits and alcohol and toxic substances abuse in males diagnosed with PG.
5. To see whether the consumption of alcohol and toxic substances predicts the clinical status of males diagnosed with PG (psychopathology and severity of the PG disorder).

## **Method**

### **Trial Subjects**

The sample consisted of 498 subjects diagnosed with PG, in accordance with DSM-IV-TR criteria,<sup>44</sup> who had consecutively visited the Pathological Gambling Unit of the Bellvitge University Hospital (HUB) in Barcelona. All of them had requested specific treatment for their gambling problem between January 2003 and August 2006.

### **Procedure**

At the time of their visit all the subjects were assessed by specialists (psychiatrists and psychologists) in this

disorder by means of a semi-structured interview, which concentrated on different aspects related to gambling problems and the clinical state of the patient, based on DSM-IV-TR<sup>44</sup> diagnostic criteria (including comorbid disorders, except disorders due to substance abuse and axis II personality disorders. The latter were explored using specific instruments, which are described in the instrument section). Afterwards, on an individual basis, the patients completed the rest of the scales and questionnaires described in this study.

## Instruments

Various clinical and psychopathological measures were evaluated, such as: the Structured Clinical Interview for DSM IV Axis I Disorders. Module E: Disorders as a result of substance abuse (SCID-I)<sup>45</sup> and the Structured Clinical Interview for DSM IV Axis II Personality Disorders (SCID-II);<sup>46</sup> The Symptom Check List —90 items—Revised (SCL-90-R),<sup>47,48</sup> Eysenck Impulsiveness Scale (I7),<sup>49</sup> Temperament and Character Inventory-Revised (TCI-R)<sup>50,51</sup>, South Oaks Gambling Screen (SOGS)<sup>52,53</sup> and Stinchfield's DSM-IV Diagnostic Questionnaire for pathological gambling.<sup>54,55</sup>

Additional information was collected by means of a semi-structured interview related to demographic, clinical and psychopathological, social/family and gambling behaviour variables presented in other publications.<sup>41,56,57</sup>

## Statistical Analysis

The statistical analysis was conducted using the SPSS 15.0.1 for Windows software programme. First of all, the prevalences of the main clinical characteristics and comorbidities in the population from which the sample was taken were estimated and classified according to the sex of the patients, their age, the type of game they played and how long they had had the disorder. The statistical comparison of these epidemiological indexes was performed by means of the *odds ratio* (OR) values obtained using binary logistic regression models, whose goodness-of-fit was evaluated by the usual Hosmer-Lemeshow test.

Then comparison of mean tests were used (T-test groups procedure) to compare the average scores for psychopathology (SCL-90-R) and the severity of pathological gambling (SOGS and DSM total symptom scales) amongst subjects who reported alcohol abuse and subjects who did not.

Finally, the capacity of scores on TCI-R and I7 personality questionnaires to predict levels of substance abuse (alcohol, drugs or both) was evaluated by means of multinomial regressions adjusted in accordance with the age of patients (NOMREG procedure). Due to the small sample size for women with PG and the fact that they were clinically less representative, these analyses were performed on the male cohort. These models constitute an extension of the logistic regression for multi-level responses. The global predictive capacity was evaluated using Nagelkerke's  $R^2$  coefficient and goodness-of-fit was based on the usual  $\chi^2$  tests and the likelihood ratio.

## Results

### Clinical Characteristics of the Sample

Table 1 shows the distribution of the main clinical characteristics of the patients in the study, classified according to their sex. The average age was 41.5 years in the total sample (49.6 years for females and 40.5 for males) and the average length of time the patients had had PG was 6.3 years (7.2 years for females and 6.2 for males). 2.2% of the patients met the DSM-IV criteria for *cluster A* personality disorders, 6.5% for *cluster B* personality disorders, 3.7% for *cluster C* personality disorders and 1.4% for mixed personality disorders. With respect to previous psychiatric history, the most prevalent disorders throughout the life span were emotional disorders (27.1% in females and 8.9% in males), anxiety disorders (22% in females and 10.8% in males) and substance abuse-dependence (6.7% in females and 16.5% in males). With respect to concurrent comorbidity, at the time of consultation: 30.5% of the females and 9.6% of the males had an emotional disorder, 13.5% of the females and 9.4% of the males met the criteria for some type of anxiety disorder and 6.7% of the females had problems of substance abuse-dependence compared to 11.2% of the males.

### Concurrent Comorbidity in the Total Patient Sample

Table 2 shows the concurrent comorbidity of substance abuse (nicotine, alcohol and other toxic substances) with the sex and age of the patients, their type of gambling problem and the length of time they have had the disorder. This data indicates that sex and type of gambling do not correlate significantly with the use of substances (in these cases, the OR values which were obtained are not statistically significant). However, there is a positive correlation between patient age and the probability of alcohol abuse (the older the patients, the higher the proportion of subjects with problems of alcohol abuse) and a negative correlation between age and the probability of tobacco consumption (the younger the patients, the more likely they were to be smokers). In comparison with younger patients ( $\leq 30$  years), older patients (age  $> 50$  years) also demonstrated less probability of abusing other toxic substances (OR = 0.059). With respect to how long patients had had the disorder, after making an adjustment for age, patients who had not had the disorder very long (0-2 years) smoked less than patients who had suffered from the disorder for 2-5 years (OR = 1.93), 5-10 years (OR = 2.46) or over 10 years (OR = 2.03).

Table 3 shows the concurrent comorbidity between psychopathology (psychiatric history and current axes I and II disorders) and sex, age, type of gambling and the length of time patients have had the disorder. In this case, the age group in which the patient is included is not related to the probability of presenting previous or current psychopathology. On the other hand, if patients are male they have a lower risk of having other psychopathologies both in the past and in the present (OR = 0.44 for previous psychiatric history, OR = 0.38 for axis I diseases and

**Table 1** Clinical Characteristics of the Sample

	Current Psychopathologies			History of Psychiatric Problems		
	Females (n = 59)	Males (n = 439)	Total (n = 498)	Females (n = 59)	Males (n = 439)	Total (n = 498)
Mood Disorders	30.51	9.64	12.12	27.12	8.98	11.15
Anxiety Disorders	13.56	9.44	10.10	22.03	10.83	12.17
Disorders related to Substance Abuse (%)	6.78	11.24	10.71	6.78	16.55	15.38
Schizophrenia and Other Psychotic Disorders (%)	3.39	4.36	4.24	5.08	4.84	4.87
Eating Disorders (%)	3.39	0	0.40	3.39	0.23	0.61
Impulse Control Disorders (%)	0	1.15	1.01	1.69	1.38	1.42
Other (%)	3.39	1.84	2.02	13.55	6.44	7.30
Personality Disorders						
Cluster A (%)	0	2.54	2.24			
Cluster B (%)	17.24	5.08	6.52			
Cluster C (%)	3.45	3.70	3.67			
Mixed (%)	5.17	0.92	1.43			
Length of time patient has had Problem Gambling disorder						
Current age, mean $\pm$ SD	49.6 $\pm$ 11.7	40.5 $\pm$ 12.9	41.5 $\pm$ 13.1			
Duration, mean $\pm$ SD	7.2 $\pm$ 7	6.2 $\pm$ 6.5	6.3 $\pm$ 6.5			

SD: standard deviation.

OR = 0.40 for axis II diseases). After adjusting for sex, there were no differences between the predominant gambling problem and the likelihood of presenting comorbidity. Neither was there any correlation with the length of time the gambling problem had persisted, after adjusting for age.

Table 4 shows the comorbidity between the use of substances and psychopathology in the strata defined by sex, age, type of gambling and the length of time the problem had persisted. A history of psychiatric problems is statistically linked to toxic substances abuse in patients who are male (OR = 1.98), middle-aged (OR = 2.77) and slot-machine gamblers (OR = 2.79). The presence of axis I disorders is associated with alcohol abuse in males (OR = 1.69) who are slot machine gamblers (OR = 1.91) and have had the disorder for 2 to 5 years (OR = 3.28) or from 5 to 10 years (OR = 2.69). Comorbidity is also seen between axis I disorders and other toxic substances abuse in males (OR = 2.55) on an individual basis (OR = 3.49). The presence of axis II disorders is associated with alcohol abuse in younger patients (OR = 6.11), in whom the disorder has persisted for 2 to 5 years (OR = 5.88), and it is associated with other toxic substances abuse in patients who have had the disorder for 2 to 5 years (OR = 4.90).

### Relationship between Personality Type and Substance Abuse in Male Pathological Gamblers

Table 5 shows the capacity of the scores obtained by males in the TCI and I7 personality questionnaires to predict the probability of alcohol and/or drug abuse. These results indicate that subjects who present alcohol abuse alone obtain analogous scores for personality traits to patients who do not abuse any of these substances. On the other hand, low scores on the TCI-R dependence on reward subscale and high scores on the I7 impulsiveness scale differentiate patients who abuse toxic substances from non-abusers. Finally, high scores on the TCI-R self-transcendence scale increase the probability that patients will abuse both alcohol and other toxic substances. The adjustment of the models was adequate ( $\chi^2$ ,  $p > 0.05$ ) and the general predictive capacity was low ( $R^2 < 0.15$ ).

### Clinical Differences in Male Pathological Gamblers depending on whether they exhibit Problems of Substance Abuse

Table 6 shows the clinical status of males on the SOGS and SCL-90-R scales, depending on whether or not they abuse

**Table 2** Prevalences and Concurrent Comorbidity between Pathological Gambling and Substance Use-abuse

	Females (n = 59)	Males (n = 439)	Males compared to Females, OR (CI 95%)				
Nicotine	64.4%	75.9%	1.74 (0.976-3.09)				
Alcohol	11.9%	18.9%	1.73 (0.759-3.95)				
Toxic Substances	5.1%	8.9%	1.82 (0.544-6.09)				
Age <sup>a</sup>	Young (n = 111)	Middle-aged (n = 259)	Older Patients (n = 128)	Middle-aged compared to young patients, OR (CI 95%)		Older Patients compared to young patients, OR (CI 95%)	
Nicotine	88.3%	73.4%	64.8%	0.365b (0.192-0.693)		0.245b (0.124-0.484)	
Alcohol	9.9%	20.1%	21.1%	2.28b (1.14-4.57)		2.43b (1.14-5.16)	
Toxic Substances	11.7%	10.8%	0.8%	0.914 (0.454-1.84)		0.059b (0.008-0.462)	
Gambling	Slot machines (n = 431)	Bingo (n = 22)	Other (n = 26)	Bingo compared to slot machines, OR (CI 95%)		Other types of gambling compared to slot machines, OR (CI 95%)	
Nicotine	77.5%	63.6%	61.5%	0.508 (0.207-1.25)		0.465 (0.204-1.06)	
Alcohol	18.1%	18.2%	26.9%	1.01 (0.331-3.05)		1.67 (0.667-4.10)	
Toxic Substances	8.6%	0	11.5%	—		1.39 (0.398-4.85)	
Duration <sup>c</sup> (years)	0-2 (n = 169)	2-5 (n = 117)	5-10 (n = 125)	> 10 (n = 76)	2-5 compared to 0-2, OR (CI 95%)	5-10 compared to 0-2, OR (CI 95%)	> 10 compared to 0-2, OR (CI 95%)
Nicotine	68.6%	77.8%	80.8%	73.7%	1.93 (1.10-3.39) <sup>b</sup>	2.46 (1.38-4.38) <sup>b</sup>	2.03 (1.05-3.92) <sup>b</sup>
Alcohol	17.2%	12.8%	24%	17.1%	0.661 (0.335-1.36)	0.823 (0.389-1.74)	1.02 (1-1.64)
Toxic Substances	10.1%	7.7%	8.8%	5.3%	0.877 (0.372-2.07)	1.08 (0.489-2.45)	0.758 (0.238-2.42)

CI: confidence interval; OR: *odds ratio*.<sup>a</sup>Age: Young (up to 30 years); Middle-aged (30-50 years); Older Patients (over 50 years).<sup>b</sup>OR significant ( $p \leq 0.05$ ).<sup>c</sup>Values adjusted for age.

alcohol and other toxic substances. The data indicates that alcohol abuse alone is a statistical predictor of the degree of severity of pathological gambling: consumers of alcohol obtain a statistically higher average score on the SOGS scale ( $p = 0.015$ ). Alternatively, other drugs abuse increases all the average scores for psychopathology, except on the SCL-90-R somatisation and obsessive-compulsive subscales.

## Discussion

The aim of this study was to look at the comorbidity between PG and other disorders in a group of subjects who had consecutively requested treatment for their gambling problem. Similarly, it was our intention to study the relationship between alcohol and toxic substances abuse and personality, psychopathology and the severity of the pathological gambling disorder.

## Clinical Characteristics of the Sample

Coinciding with other research studies, an association was observed between pathological gambling and emotional and anxiety disorders in the case of females, and substance abuse or dependence in males; these are the most prevalent disorders in the study sample.<sup>58,59</sup> However, this concordance was only partial, given that when we compared our results with those of other studies, we obtained considerably lower rates. Similarly, where axis II disorders are concerned, the most prevalent of these in our study were *cluster B* disorders, a finding which also coincides with the literature,<sup>28,29</sup> although our rates were again distinctly lower. Nevertheless, the results we obtained were higher than those observed in the general population, irrespective of sex, in both axis I<sup>60</sup> and axis II disorders.<sup>61</sup> These discrepancies may be due to various factors, such as the origin of the samples; while

**Table 3** Prevalences and Comorbidity between Pathological Gambling and Psychopathology

	Females (n = 59)	Males (n = 437)	Males compared to Females, OR (CI 95%)				
History of Psychiatric Problems	62.7%	42.4%	0.438 <sup>a</sup> (0.250-0.768)				
Axis I Disorders	59.3%	35.7%	0.381 <sup>a</sup> (0.219-0.663)				
Axis II Disorders	25.4%	11.9%	0.396 <sup>a</sup> (0.206-0.762)				
Age <sup>b</sup>	Young (n = 111)	Middle-aged (n = 259)	Older Patients (n = 128)	Middle-aged compared to young patients, OR (CI 95%)		Older Patients compared to young patients, OR (CI 95%)	
History of Psychiatric Problems	43.2%	44.5%	46.9%	1.05 (0.672-1.65)		1.16 (0.694-1.93)	
Axis I Disorders	39.1%	38.2%	38.6%	0.964 (0.610-1.52)		0.979 (0.580-1.65)	
Axis II Disorders	15.3%	14.3%	10.2%	0.926 (0.497-1.73)		0.631 (0.291-1.37)	
Gambling <sup>c</sup>	Slot machines (n = 431)	Bingo (n = 22)	Other (n = 26)	Bingo compared to slot machines, OR (CI 95%)		Other types of gambling compared to slot machines, OR (CI 95%)	
History of Psychiatric Problems	44.9%	42.9%	38.5%	0.532 (0.197-1.44)		0.768 (0.339-1.74)	
Axis I Disorders	37.2%	59.1%	32%	1.47 (0.564-3.81)		0.792 (0.332-1.89)	
Axis II Disorders	12.1%	19%	20%	0.819 (0.235-2.85)		1.85 (0.658-5.22)	
Duration <sup>d</sup> (years)	0-2 (n = 168)	2-5 (n = 117)	5-10 (n = 125)	> 10 (n = 76)	2-5 compared to 0-2, OR (CI 95%)	5-10 compared to 0-2, OR (CI 95%)	> 10 compared to 0-2, OR (CI 95%)
History of Psychiatric Problems	39.3%	43.1%	48.8%	53.3%	1.17 (0.722-1.90)	1.47 (0.918-2.37)	1.77 (1-3.12)
Axis I Disorders	37.5%	35%	41.6%	42.1%	0.897 (0.547-1.47)	1.18 (0.734-1.91)	1.21 (0.680-2.14)
Axis II Disorders	11.3%	11.1%	16%	18.4%	1.05 (0.492-2.22)	1.63 (0.822-3.24)	2.11 (0.966-4.63)

CI: confidence interval; OR: *odds ratio*.<sup>a</sup>OR significant ( $p \leq 0.05$ ).<sup>b</sup>Age young (up to 30 years); middle-aged (30-50 years); Older Patients (over 50 years).<sup>c</sup>Values adjusted for sex.<sup>d</sup>Values adjusted for age.

some studies include subjects who are selected through newspaper advertisements or other media sources, which inform potential candidates that a research study on PG is being carried out,<sup>29,62</sup> others are conducted using special samples, as in the study by Kruegelbach et al,<sup>33</sup> in which the participants were American army veterans, who had been admitted to treatment units. Other causes might be due to the methodology and evaluation instruments which were used. In some cases the diagnosis was confirmed after the application, by trained and experienced doctors, of standardized instruments,<sup>63</sup> while in others the results were obtained using self-assessment measures, even allowing the results to be sent by post.<sup>64</sup> It is a known fact that self-

assessment measures produce significantly higher rates if they are compared to rates based on interviews conducted by specialists. Similarly, according to Pérez Urdániz,<sup>65</sup> aspects such as conceptual difficulties, the validity and stability of diagnosis (especially in the case of personality disorders), etc., facilitate the introduction of biases which would explain the huge discrepancies which exist between studies.

### Stratified Comorbidity in the Total Patient Sample

The results obtained in this study demonstrated a positive correlation between a history of psychiatric



**Table 4** Comorbidity (OR) between the Use of Substances and Psychopathology classified according to Sex, Age, Type of Gambling and Duration

History of Psychiatric Problems	Sex				Axis I Disorders		Axis II Disorders					
	Females (n = 59)		Males (n = 437)		Females (n = 59)	Males (n = 437)	Females (n = 59)		Males (n = 437)			
Nicotine	2.70	1.20	1.15	1.28	1.14	1.19	1,14	1,19				
Alcohol	0.768	1.08	4.76	1.69 <sup>a</sup>	1.20	1.89	1,20	1,89				
Toxic Substances	—	1.98 <sup>a</sup>	0.324	2.55 <sup>a</sup>	6.62	1.10	6,62	1,10				
History of Psychiatric Problems	Age <sup>b</sup> (years)			Axis I Disorders			Axis II Disorders					
	Young (n = 111)	Middle-aged (n = 259)	Older patients (n = 128)	Young (n = 111)	Media (n = 259)	Older-patients (n = 128)	Young (n = 111)	Middle-aged (n = 259)	Older patients (n = 128)			
Nicotine	1.83	1.20	1.34	0.506	1.22	1.56	0.344	4.72 <sup>a</sup>	0.197 <sup>a</sup>			
Alcohol	1.11	1.03	0.883	2.01	1.84	1.36	6.11 <sup>a</sup>	1.58	0.647			
Toxic Substances	1.14	2.77 <sup>a</sup>	—	1.98	2.02	—	1.01	1.35	—			
	Gambling			Axis I Disorders			Axis II Disorders					
	Slot Machines (n = 431)	Bingo (n = 22)	Other (n = 26)	Slot Machines (n = 431)	Bingo (n = 22)	Otros (n = 26)	Slot machines (n = 431)	Bingo (n = 22)	Other (n = 26)			
Nicotine	1.35	2.50	0.455	1.52	0.800	0.417	1.45	1.64	0.286			
Alcohol	1.10	0.375	1.29	1.91 <sup>a</sup>	0.167	1.95	1.61	1.56	2			
Toxic Substances	2.79 <sup>a</sup>	0.750	—	2.71 <sup>a</sup>	1.44	1.07	1.46	—	—			
	Duration (years)			Axis I Disorders			Axis II Disorders					
	0-2 (n = 168)	2-5 (n = 117)	5-10 (n = 125)	> 10 (n = 76)	0-2 (n = 168)	2-5 (n = 117)	5-10 (n = 125)	> 10 (n = 76)	0-2 (n = 168)	2-5 (n = 117)	5-10 (n = 125)	> 10 (n = 76)
Nicotine	1.18	2.48	0.766	0.691	1.11	1.02	1.24	1.13	0.968	3.80	1.42	0.574
Alcohol	0.933	0.622	1.81	0.571	0.854	3.28 <sup>a</sup>	2.69 <sup>a</sup>	1.22	1.32	5.88 <sup>a</sup>	2.52	—
Toxic Substances	1.86	2.33	1.29	—	3.49 <sup>a</sup>	0.505	1.19	—	0.462	4.90 <sup>a</sup>	1.19	1.51

Odds ratio (OR) obtained by binary logistic regression.

<sup>a</sup>OR significant ( $p \leq 0.05$ ).

<sup>b</sup>Age: young (up to 30 years); middle-aged (30-50 years); older patients (over 50 years).

problems, current comorbidity and alcohol and toxic substances abuse, which coincides with the literature. In a retrospective analysis of interviews performed on over 9,000 subjects Kessler et al<sup>63</sup> concluded that the existence of other psychiatric disorders acted as a prediction and maintenance factor for PG. In addition, our study identified a positive association between alcohol abuse and age. In other words, the consumption of alcohol increases with age, which is the opposite to what happens in the case of drugs. These results partially coincide with the literature,

given that most studies detect a positive correlation between the consumption of alcohol and other substances and adolescence/youth in pathological gamblers.<sup>1,66,67</sup>

With respect to sex, our results indicate that being female confers a greater risk of a history of psychiatric disease. However, in males, a history of psychiatric disease is associated with the consumption of toxic substances. Some investigators have found no differences in terms of sex and psychiatric comorbidity,<sup>68</sup> but others indicate that females have a higher risk of presenting other psychiatric



**Table 5** Capacity to Predict the Personality of Males (n = 439) Diagnosed as Pathological Gamblers in Relation to Substance Abuse

TCI-R (R <sup>2</sup> = 0.13)	Means adjusted for age				Multinomial Regression Adjusted for Age		
	NoAb (n = 328)	Alch (n = 72)	Drugs (n = 28)	Alc+Dr (n = 11)	Alcohol alone, OR (CI 95%)	Drugs alone, OR (CI 95%)	Alcohol and drugs, OR (CI 95%)
Novelty-seeking	109.1	108.8	114.3	117.9	0.992 (0.969-1.01)	1.02 (0.989-1.06)	1.04 (0.985-1.09)
Harm Avoidance	98.1	99.6	102.5	93.6	0.999 (0.977-1.02)	1.01 (0.976-1.04)	0.981 (0.933-1.03)
Dependence on Reward	101.5	101	96	96	1.01 (0.987-1.03)	0.964* (0.930-0.999)	0.952 (0.896-1.01)
Persistence	111.6	109.9	108.7	114	0.997 (0.980-1.01)	0.998 (0.975-1.02)	0.991 (0.954-1.03)
Self determination	129.3	125.5	117.3	122.2	0.996 (0.975-1.02)	0.979 (0.949-1.01)	1 (0.956-1.05)
Cooperation	135.8	131.6	132.4	130.2	0.985 (0.963-1.01)	1.03 (0.994-1.06)	1.01 (0.959-1.06)
Self transcendence	64.5	64.8	70.3	75.3	1 (0.978-1.02)	1.03 (0.994-1.07)	1.06* (1.01-1.12)
I7 (R <sup>2</sup> = 0.08)							
Impulsiveness	44.1	46.8	53.8	56.2	1.01 (0.992-1.02)	1.02* (1-1.05)	1.03 (0.994-1.07)
Adventurousness	42.6	41.8	42.7	48.7	0.997 (0.985-1.01)	0.995 (0.977-1.01)	1 (0.976-1.03)
Empathy	70.6	72.4	72.1	66.2	1.01 (0.988-1.03)	1 (0.977-1.03)	0.984 (0.951-1.02)

Alc+Dr: alcohol and other drugs abuse; Alch: alcohol abuse; Drugs: other drugs abuse; NoAb: Non-abusers.

\*OR significant ( $p \leq 0.05$ ).

Reference Category in Multinomials: no consumption of alcohol or drugs.

disorders, as well as pathological gambling, for example emotional disorders,<sup>69-71</sup> generalized anxiety, dependence on alcohol and drug use and abuse.<sup>24</sup> In contrast, other authors have identified a link between the use of alcohol, tobacco and drugs, especially in males.<sup>58,59</sup>

### Relationship between Personality Type and Substance Abuse in Male Compulsive Gamblers

With respect to factors which predict abuse and/or dependence on alcohol and drugs in cases of PG, the results obtained in this study show the implication of personality variables in this association. Limited dependence on reward (little empathy and concern for the problems of others, independence, non-conformism, etc.) and high levels of impulsiveness predicted substance abuse and/or dependence. However, high scores for self transcendence or spirituality were predictors of both abuse and/or dependence on alcohol and drugs. In general psychiatric populations some personality traits, such as sensation-seeking and impulsiveness, as well as certain personality disorders (antisocial and borderline personality disorder), have been consistently associated with vulnerability to disorders as a result of substance abuse and dependence.<sup>72</sup> However, although the concept of the "addictive personality" has been proposed, so far there is no solid empirical evidence to prove its existence.<sup>73</sup> On the other hand, there is data to support the view that compulsive gamblers who abuse substances show a greater tendency towards sensation seeking, impulsiveness, a liking for and lack of concern about risk, as well as poor empathy and cooperation skills, and a lack of ability to plan and establish aims and goals.<sup>74</sup>

### Clinical Differences in Male Pathological Gamblers depending on whether they exhibit Problems of Substance Abuse

Finally, in agreement with the literature, the results of this study show that the abuse and/or dependence on alcohol was a factor which predicted the severity of PG.<sup>75-77</sup> Likewise, the abuse of other substances increased the risk of presenting concomitant psychopathology. This result also agrees with previous studies which coincide in their emphasis on the high comorbidity between substance abuse and other psychiatric disorders in subjects with a diagnosis of pathological gambling.<sup>78,79</sup>

### Conclusions

Our results confirm that pathological gambling is comorbid with other disorders, especially mood disorders and disorders related to substance abuse. An association is also demonstrated between a history of psychiatric problems and disorders related to substance abuse, and between alcohol abuse and age. Certain personality traits predict the abuse of alcohol and other substances. In short, the comorbidity of pathological gambling with other disorders is probably one of the most relevant issues in the study of the aetiopathogenesis of this disorder. The possibility of identifying factors which are common to and different from other problems may enable the existence of shared biological, family and environmental vulnerabilities to be elucidated. Similarly, the clinical relevance of this type of study is significant, as such research highlights the fact that we need to design specific treatments, in which different

**Table 6** Clinical Differences in Males (n = 439) diagnosed as Pathological Gamblers depending on their Consumption of Alcohol and Drugs

	Alcohol		p	DM	CI 95%	Other drugs		p	DM	CI 95%
	Non-abusers (n = 356)	Abusers (n = 83)				Non-abusers (n = 400)	Abusers (n = 39)			
	Mean ± SD	Mean ± SD				Mean ± SD	Mean ± SD			
SOGS total	10.1 ± 3.16	11 ± 3.02	0.015	0.97	0.19-1.8	10.2 ± 3.11	11.4 ± 3.45	0.033	1.20	0.10-2.3
DSM total	6.95 ± 2.09	7.42 ± 1.92	0.078	0.46	-0.05 to 0.98	7.01 ± 2.08	7.37 ± 1.91	0.325	0.36	-0.36 to 1.1
SCL: somatisation	0.78 ± 0.72	0.79 ± 0.65	0.947	0.01	-0.18 to 0.20	0.77 ± 0.71	0.92 ± 0.71	0.258	0.15	-0.11 to 0.41
SCL: obsessive- compulsive disorder	1.02 ± 0.79	1.10 ± 0.75	0.506	0.07	-0.14 to 0.28	1.01 ± 0.77	1.29 ± 0.87	0.058	0.27	-0.01 to 0.56
SCL: sens. interp.	0.88 ± 0.78	1.01 ± 0.75	0.239	0.12	-0.08 to 0.33	0.87 ± 0.75	1.22 ± 0.97	0.015	0.35	0.07-0.63
SCL: depression	1.31 ± 0.87	1.25 ± 0.88	0.601	-0.06	-0.30 to 0.17	1.27 ± 0.86	1.60 ± 0.96	0.041	0.33	0.01-0.65
SCL: anxiety	0.85 ± 0.76	0.87 ± 0.69	0.826	0.02	-0.18 to 0.22	0.82 ± 0.74	1.15 ± 0.80	0.019	0.32	0.05-0.59
SCL: hostility	0.83 ± 0.83	0.84 ± 0.79	0.895	0.01	-0.21 to 0.24	0.79 ± 0.79	1.21 ± 1.07	0.006	0.42	0.12-0.71
SCL: phobia	0.37 ± 0.56	0.50 ± 0.61	0.088	0.13	-0.02 to 0.28	0.37 ± 0.55	0.64 ± 0.71	0.009	0.27	0.07-0.48
SCL: paranoia	0.77 ± 0.72	0.76 ± 0.75	0.937	-0.01	-0.20 to 0.19	0.74 ± 0.70	1.10 ± 0.94	0.006	0.37	0.10-0.63
SCL: psychosis	0.78 ± 0.71	0.84 ± 0.76	0.600	0.05	-0.14 to 0.24	0.76 ± 0.70	1.16 ± 0.83	0.002	0.40	0.14-0.66
SCL: GSI	0.91 ± 0.66	0.95 ± 0.65	0.646	0.04	-0.14 to 0.22	0.88 ± 0.64	1.21 ± 0.76	0.007	0.33	0.09-0.56
SCL: PST	41.8 ± 21.6	45.5 ± 24	0.209	3.8	-2.1 to 9.7	41.7 ± 21.8	50 ± 24	0.033	8.7	0.73-16.7
SCL: PSDI	1.80 ± 0.58	1.77 ± 0.50	0.757	-0.02	-0.18 to 0.13	1.77 ± 0.56	2.04 ± 0.59	0.010	0.27	0.07-0.47

SD: standard deviation; DM: difference of means; CI: confidence interval.

psychotherapeutic and pharmacological strategies are combined, so that they can be better adapted to the characteristics of individual patients.

## Limitations

Our results need to be considered in the context of a series of limitations. The first of these is the type of sample which was studied, given that it consists of patients who requested treatment at a specialist unit. This is why the results which were obtained are not necessarily representative nor can they be generalized to the general population of pathological or problem gamblers. Secondly, most of the study subjects have a problem with recreational machines giving prizes, which corresponds to a specific patient type and profile that may not be representative of other compulsive gamblers with other gambling problems (bingos, casinos, cards, etc.).

Moreover, in this study additional comparative groups were not used. Finally, we need to emphasize that common standardized instruments were not consistently used to evaluate all the possible comorbid axes I and II disorders. They were only employed to diagnose disorders as a result of substance abuse and personality disorders. In the rest, although diagnostic criteria based on DSM-IV-TR were used, the same assessment procedures were not administered. Nevertheless, if we take into account the large size of the sample which was studied and the fact that some prior studies have used this type of approach, we do not think this diminishes the clinical value of the results of this study.

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## Conflict of Interest

The authors declare that they have no conflicts of interest.

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