Typologies of young pathological gamblers based on sociodemographic and clinical characteristics

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Abstract

Objective: The aim of this study is to explore empirical clusters within the population of young Spanish individuals attending outpatient pathological gambling treatment.
Method: The South Oaks Gambling Screen (SOGS), the Symptom Checklist (SCL-90-R), the Temperament and Character Inventory-R (TCI-R) and other clinical and psychopathological measures were administered to 154 patients (between 17 and 25 years old). The two-step cluster analysis explored the presence of empirical heterogeneous groups based on clinical and socio-demographic characteristics.
Results: Three clusters of young pathological gambling patients emerged. Type I showed less psychopathology and more functional personality traits. Type II showed a profile characterized by major emotional distress, shame, immaturity, hostility and negative feelings. Type III showed the most severe psychopathological profile and most psychopathological disturbances and schizotypal traits.
Conclusions: These results suggest that three distinct endophenotypes exist, and that environmental factors have a stronger influence in the first, while in the second and third, individual factors related to deficits of emotional regulation stand out.
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1. Introduction

Pathological gambling (PG) is defined by uncontrollable gambling behavior that results in severe negative effects on the patient's occupation, relationships, psychological health and other relevant areas of life [1]. Moreover, although people suffering from this disorder recognize that gambling is the reason of severe impairments in the family and on a community level (many patients indicate that gambling was the reason they lost significant relationships and jobs), they cannot resist the impulse to gamble.

According to Chiu & Storm [2], youth are overly sensitive to norms that contribute to the maintenance of high-risk behaviors such as gambling. Further studies consistently report that youth problem gambling is associated with other psychosocial problems, such as depression, substance abuse, and delinquency [3,4]. The first exposure to gambling usually happens early in life, in the form of electronic and/or internet gambling, lotteries, slot-machines, card games, casinos, and many other types of games [5]. This early exposure represents one of the critical risk factors for the onset of PG. Furthermore, the main steps or actions that form

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the addictive behavior are located in the same social atmosphere, involving gambling as well as the excitement of risk-taking (strong characteristic of youth).

It is crucial to identify PG behaviors while still in their earliest manifestations, since the persistence to gamble involves the accumulation of negative social and psychopathological consequences, such as unemployment, debts, disrupted family relationships, and search for money by illegal means, substance abuse and affective–anxiety disorders [6].

Even though there is strong evidence about the heterogeneity of PG and the existence of different subgroups based on socio demographic and clinical characteristics among adults [7–11], few studies have attempted to identify clusters of young pathological gamblers. An exception is the recent work published by Gupta et al. [12], which was conducted with students of English-speaking schools in Quebec and Ontario. This study explores the "Pathways Model" proposed by Blaszczynski & Nower [8], in a sample of 109 adolescents that meet the criteria for problem gambling. The results suggest that, in addition to the three subtypes described in the "Pathways Model" (behaviorally conditioned, emotionally vulnerable and antisocial impulsive problem gamblers) there are two more subtypes, one characterized by depressive symptoms and the other by externalizing and internalizing symptoms. Furthermore, Goldstein et al. [13] examined subgroups of gamblers among adolescent emergency patients, finding two groups with few or many consequences of gambling. The group with many consequences also exhibited substance abuse, delinquency and violence, and resembled Pathway 3 in the model by Blaszczynski & Nower [8].

The aim of this study is to explore empirical clusters in a sample of Spanish young people (17–25 years old) attending outpatient PG treatment. Based on empirical evidence, we hypothesized that it would be possible to identify clinically relevant subgroups of young PG patients, based on psychopathology and personality traits. We expected to identify one subgroup characterized by low psychopathology and non-dysfunctional personality traits, a second with moderate psychopathology and melancholic personality traits (following character types described by Cloninger et al. [14] and a third formed by a subgroup of patients with severe psychopathology and disorganized or schizotypal personality configuration (as defined by Cloninger et al. [14].

2. Method

2.1. Participants

The sample included 154 pathological gambling patients, 17–25 years old, who presented for assessment and outpatient treatment at the Pathological Gambling Unit in the Psychiatric Department of Bellvitge University Hospital (HUB) in Barcelona. All participants were diagnosed by experienced psychologists and psychiatrists in PG, using the Diagnostic Questionnaire for Pathological Gambling according to DSM-IV criteria [15].

The first column of Table 1 shows the socio demographic and clinical characteristics of the sample. The mean age was 22.4 years old ($SD = 2.2$), 94.2% were male and 61.3% of them were employed at the intake. More than half of the sample had achieved no more than primary educational level and only 11.3% were married or lived with a partner.

2.2. Measures

South Oaks Gambling Screen (SOGS) [16], Spanish validation by Echeburúa et al. [17]. This is a 20-item screening questionnaire that identifies probable pathological gambling. The Spanish validation of this questionnaire

Table 1
Differences between clusters regarding socio demographic and socio-economic characteristics and clinical measures.

	Total sample (n = 154)	Cluster 1 (n = 52)	Cluster 2 (n = 44)	Cluster 3 (n = 14)	p
Socio demographic and socio-economic characteristics					
Age (years); *mean (SD)*	22.4 (2.2)	22.6 (2.1)	23.0 (2.3)	22.6 (1.8)	.692
Gender: male; *%*	94.2	100	93.2	100	.374
Employment status (employed); *%*	61.3	73.1	63.6	57.1	.625
Educational level; *% Primary or less*	56.4	48.1	72.7	78.6	.252
Civil status; *% Without partner*	89.0%	94.2	86.0	78.6	.478
Own incomes (euros); *mean (SD)*	704 (603)	907 (579)	751 (524)	771 (841)	.625
Family incomes (euros); *mean (SD)*	2482 (1560)	2613 (1664)	2322 (1643)	3067 (1679)	.625
Smoker (yes); *%*	75.2	74.4	86.5	69.2	.597
Clinical history					
Number of problematic games; *mean (SD)*	1.5 (0.8)	1.33 (0.57)	1.53 (.86)	2.00 (1.15)	.252
Evolution (years); *mean (SD)*	2.8 (2.5)	2.55 (2.04)	3.32 (2.80)	2.54 (2.23)	.597
Age of onset; *mean (SD)*	20.0 (2.6)	20.42 (2.12)	19.76 (2.86)	20.31 (2.27)	.625
Maximum bets (euros); *mean (SD)*	741 (1107)	688 (1394)	659 (798)	1454 (1148)	.374
Mean bets (euros); *mean (SD)*	86 (143)	80 (110)	82 (125)	131 (286)	.646
Cumulate debts (euros); *mean (SD)*	2842 (5723)	3144 (6931)	2635 (5157)	2620 (2721)	.942

p-value including Bonferroni–Finner's correction. SD: standard deviation.

shows high reliability and validity. Test–retest reliability is .98 (p < 0.001) and internal consistency .94 (Cronbach's alpha). Convergent validity with respect to DSM-III-R criteria for pathological gambling (APA, 1987) was estimated .92 (p < 0.001). The total score was used in this study. Additionally, several studies have reported the use and utility of this test as an index of gambling severity [18–20].

Diagnostic questionnaire for Pathological Gambling according to DSM-IV criteria [15]. Spanish adaptation by Jimenez-Murcia et al. [21]. This 19-item questionnaire assesses the DSM-IV diagnostic criteria for PG. Internal consistency ranged between .81 for the general population and .77 for gambling treatment samples. Convergent validity with the SOGS total score was very good: r = .77 for the general population and r = .75 for gambling treatment groups [15].

Symptom Check List-90 items-Revised (SCL-90-R, Spanish version) [22]. We administered the SCL-90-R to evaluate a broad range of psychological problems and symptoms of psychopathology. Containing 90 items, the SCL-90-R is used to measure nine primary symptom dimensions: Somatization, Obsession–Compulsion, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism. In addition, it includes three global indices: a global severity index (GSI), which measures overall psychological distress; a positive symptom distress index (PSDI) to measure the intensity of symptoms; and a positive symptom total (PST), which reports the total self-reported symptoms. The GSI can be used as a summary of the test. This scale has been validated in a Spanish population, obtaining an internal consistency (coefficient alpha) of the items ranging between .81 and .90.

Temperament and Character Inventory-Revised (TCI-R) [23]. This is a 240-item questionnaire. Like the original TCI version [14], this questionnaire is a reliable and valid measure of seven dimensions of personality: four temperament dimensions (harm avoidance, novelty seeking, reward dependence and persistence) and three character dimensions (self-directedness, cooperativeness and self-transcendence). The performance of the Spanish revised version of this questionnaire [24] has been well-documented. The reliability of the different temperament and character dimensions in the Spanish adaptation ranged between .77 and .84 (Cronbach's alpha).

Additional demographic, clinical and socio-familial variables related to gambling were measured using a semi-structured clinical interview, described elsewhere [25,26].

2.3. Procedure

This study was carried out according to the latest version of the Declaration of Helsinki. The Ethics Committee of the Bellvitge University Hospital (Barcelona) approved this study and written informed consent was obtained from all final participants.

The assessment was conducted prospectively at baseline and it involved a single session (with a mean duration of 90 min), during which the above mentioned tests were administered by trained clinical psychologists. In addition to the assessment battery, the patients were explored through a semi-structured face-to-face interview regarding their PG, psychopathological symptoms and personality traits (Jiménez-Murcia et al., 2007). The same interview also assessed sociodemographic data (e.g., education, occupation, marital status) and additional clinical information.

2.4. Statistical analysis

A two-step cluster analysis explored the presence of empirical groups based on the socio demographic and clinical variables (number of problematic games, co-morbidity, SCL-90-R and TCI-R scores, SOGS and DSM Total scores). The two-step method allows discriminating natural groups from a set of variables stabilizing the nearness criterion, with a hierarchical agglomerative clustering whose centres are far apart. Likelihood was the distance measure selected, defining the normal density for continuous variables and the multinomial probability mass function for categorical variables [27]. Average Silhouette Coefficient (a measure of how tightly grouped all the data in the cluster are) measured the goodness-of-fit [28]. This index combines both, cohesion (based on the average distances between all the objects into a cluster) and separation (based on the average distance of any object to all the other objects not contained into the same cluster), and can range between −1 and +1; values over 0 are indicative of inappropriate fit, between 0 and 0.2 are considered poor, between 0.2 and 0.5 fair and indices above 0.5 good.

Next, binary logistic regressions (for categorical criteria) and analysis of variance (ANOVA, for quantitative outcomes) compared the empirical clusters on all the measures of the study. Cohen's d measured the effect size of proportions and mean differences (d-coefficients over 0.50 were considered good). Due to the multiple statistical comparisons, Bonferroni–Finner's correction was applied to avoid bias due to Type-I error.

3. Results

Cluster analysis was carried out with 110 participants (71.4% of sample), who had completed all the measures of the study and were considered valid for the analysis. There were no statistical differences between those included (with complete information) and excluded (due to missing data) into the two-step cluster analysis in the set of variables available. Three clusters emerged, with sample sizes of 52 (47.3%), 44 (40.0%) and 14 (12.7%) (the ratio of sizes comparing the largest to smallest cluster was 3.71). Goodness-of-fit was achieved, with fair average Silhouette Coefficient equal to 0.30.

221   Table 1 shows the sociodemographic composition of
222 clusters, as well as the distribution of clinical variables
223 associated with gambling. No variable differed significantly
224 between the empirical clusters.

225   Table 2 shows the comparison of SOGS and DSM-IV
226 total scores between clusters. Patients in cluster 3 had the
227 highest intensity level of gambling, followed by cluster 2 and
228 1 whereas considering the individual items of the SOGS,
229 there were no statistical differences comparing the three
230 clusters. However, post-hoc analyses comparing specific
231 groups and Cohen's *d*-coefficients achieved relevant differ-
232 ences for: playing slot machines, other bets, spent more than
233 300 Euros, returning to win back lost money, claiming
234 winning when losing, gambling more than planned, being
235 criticized, being unable to stop gambling, discussions with
236 family or friends, borrowing money and not paying back,

237 skipping school or work due to gambling, obtaining money
238 from family or banks, using credit cards for gambling and
239 obtaining money for gambling from property sales (1.7% vs.
240 20.8%).

241   Table 3 shows the comparison of general psychopathol-
242 ogy (SCL-90-R) and personality traits (TCI-R) mean scores
243 between clusters. ANOVA tests obtained significant mean
244 differences between clusters for all the scales, except for
245 TCI-R novelty seeking, reward dependence and persistence.
246 Post-hoc comparisons showed that the three clusters differed
247 in all the measures (except for the TCI-R novelty seeking,
248 reward dependence and persistence scales), with the highest
249 mean scores for patients in cluster 3 followed by cluster 2.
250 Effect sizes were good to very good (Cohen's *d* clearly over
251 0.50), except for the three TCI-R scores that did not achieve
252 statistical significant differences.

Table 2

Differences between clusters on SOGS and DSM-IV total score.

SOGS	Prevalence (%)				Logistic regression/ANOVA					
	Cluster 1 (n = 52)	Cluster 2 (n = 44)	Cluster 3 (n = 14)	p	Contrasts: OR/MD (Cohens' d)[a]					
					Cl2 vs Cl1		Cl3 vs Cl1		Cl3 vs Cl2	
1a-Playing cards	36.54%	38.64%	57.14%	.381	1.094	(0.04)	2.31	(0.42)	2.12	(0.38)
1b-Playing horse races	1.92%	0.00%	0.00%	.998	—	(0.20)	—	(0.20)	1.00	(0.00)
1c-Playing sports	3.85%	6.98%	0.00%	.898	1.875	(0.14)	—	(0.28)	—	(0.39)
1d-Playing numbers-lotteries	75.00%	84.09%	78.57%	.587	1.762	(0.23)	1.22	(0.08)	0.69	(0.14)
1e-Playing casino	34.62%	34.09%	50.00%	.545	0.977	(0.01)	1.89	(0.32)	1.93	(0.33)
1f-Playing bingo	50.00%	68.18%	50.00%	.553	2.143	(0.38)	1.00	(0.00)	0.47	(0.38)
1g-Stock market	5.77%	0.00%	7.14%	.733	—	(0.35)	1.26	(0.06)	—	(0.39)
1h-Playing slot machines	84.31%	100.00%	100.00%	.998	—	**(0.61)**	—	**(0.61)**	1.00	(0.00)
1i-Other bets	17.31%	22.73%	57.14%	.064	1.405	(0.14)	**6.37***	**(0.90)**	**4.52***	**(0.75)**
2-Amount money spent: ≥ 300 euros	51.92%	54.55%	92.86%	.083	1.111	(0.05)	**12.05***	**(1.03)**	**10.87***	**(0.97)**
3-Family antecedents of gambling	26.92%	38.64%	42.86%	.331	1.709	(0.25)	2.04	(0.34)	1.19	(0.09)
4-Going back to win back lost money	86.54%	100.00%	100.00%	.998	—	**(0.56)**	—	**(0.56)**	1.00	(0.00)
5-Claimed winning when loosing	34.62%	59.09%	71.43%	.064	**2.728***	**(0.51)**	**4.72***	**(0.79)**	1.73	(0.26)
6-Problem recognition	90.38%	97.73%	100.00%	.248	4.574	(0.31)	1.00	(0.46)	1.00	(0.22)
7-Gambling more than planned	82.69%	97.73%	100.00%	.085	**9.000***	**(0.52)**	—	**(0.65)**	—	(0.22)
8-Being criticized	53.85%	84.09%	85.71%	.064	**4.531***	**(0.69)**	**5.15***	**(0.74)**	1.14	(0.05)
9-Feeling guilty	86.54%	97.73%	100.00%	.144	6.689	(0.42)	—	**(0.56)**	—	(0.22)
10-Unable to stop gambling	76.47%	93.18%	100.00%	.064	**4.205***	**(0.50)**	—	**(0.78)**	—	(0.38)
11-Hiding signs of gambling	64.71%	77.27%	78.57%	.331	1.855	(0.28)	2.00	(0.31)	1.08	(0.03)
12-Discussions with family/friends	86.54%	88.64%	100.00%	.360	1.213	(0.06)	—	**(0.56)**	—	**(0.51)**
13-Discussions and fights	62.75%	65.12%	78.57%	.490	1.108	(0.05)	2.18	(0.35)	1.96	(0.30)
14-Borrowing money, not paying back	44.23%	59.09%	92.86%	.064	1.821	(0.30)	**16.39***	**(1.23)**	**9.01***	**(0.86)**
15-Skipping work due to gambling	42.31%	43.18%	100.00%	.064	1.036	(0.02)	—	**(1.65)**	—	**(1.62)**
16a-Money from home	56.86%	63.64%	69.23%	.497	1.328	(0.14)	1.71	(0.26)	1.29	(0.12)
16b-Money from couple	19.61%	34.09%	30.77%	.331	2.121	(0.33)	1.82	(0.26)	0.86	(0.07)
16c-Money from family	25.00%	40.91%	61.54%	.064	2.077	(0.34)	**4.81***	**(0.79)**	2.31	(0.42)
16d-Money from banks	25.00%	47.73%	61.54%	.064	**2.739***	**(0.50)**	**4.81***	**(0.79)**	1.73	(0.28)
16e-Credit cards	26.92%	45.45%	69.23%	.064	2.262	(0.39)	**6.10***	**(0.93)**	2.70	(0.50)
16f-Money from money lender	3.92%	4.55%	0.00%	.733	1.167	(0.03)	—	(0.29)	—	(0.31)
16 g-Money from financial papers	1.96%	0.00%	0.00%	.998	—	(0.20)	—	(0.20)	—	(0.00)
16 h-Money from property sales	1.96%	20.45%	7.69%	.193	**12.86***	**(0.61)**	4.17	(0.27)	0.32	(0.37)
16i-Money from falsified checks	0.00%	2.27%	0.00%	.701	—	(0.22)	1.00	(0.00)	—	(0.22)
16j-Money from credit account casino	1.92%	2.27%	7.69%	.501	1.186	(0.02)	4.26	(0.27)	3.58	(0.25)
SOGS: total score; *mean (SD)*	8.58 (3.7)	11.14 (2.8)	12.71 (1.8)	<.001	**2.56***	**(0.78)**	**4.14***	**(1.41)**	1.58	**(0.68)**
DSM-IV: total criteria; *mean (SD)*	6.27 (2.4)	7.98 (1.4)	8.93 (1.1)	<.001	**1.71***	**(0.80)**	**2.66***	**(1.42)**	0.95	**(0.63)**

p-value with Bonferroni–Finner's correction. SD: standard deviation, —: not estimable due extreme prevalences.

[a] OR/MD: odds ratio and mean differences, respectively.

* Bold: significant contrast (.05) or good Cohen's *d*.

t3.1 Table 3

t3.2 Differences between clusters on psychopathology and personality measures.

	Mean; standard deviation					Comparison between clusters: contrasts (Cohen's d)					
	Cluster 1 (n = 52)		Cluster 2 (n = 44)		Cluster 3 (n = 14)		p	Cl1 vs Cl2		Cl1 vs Cl3		Cl2 vs Cl3
t3.5 SCL-90-R scores												
t3.6 Somatization	0.34;	0.36	0.95;	0.51	2.18;	0.87	<.001	−0.61∗	(1.38)	−1.84∗	(2.76)	−1.23∗	(1.72)
t3.7 Obsessive/compulsive	0.52;	0.38	1.23;	0.50	2.43;	0.69	<.001	−0.71∗	(1.60)	−1.91∗	(3.43)	−1.20∗	(1.99)
t3.8 Interpersonal sensitivity	0.30;	0.28	1.10;	0.52	2.19;	0.87	<.001	−0.80∗	(1.92)	−1.89∗	(2.92)	−1.09∗	(1.52)
t3.9 Depressive	0.58;	0.44	1.59;	0.58	2.45;	0.71	<.001	−1.01∗	(1.96)	−1.87∗	(3.17)	−0.86∗	(1.33)
t3.10 Anxiety	0.36;	0.36	1.13;	0.54	2.43;	0.54	<.001	−0.78∗	(1.68)	−2.07∗	(4.51)	−1.29∗	(2.41)
t3.11 Hostility	0.44;	0.36	1.22;	0.71	2.38;	1.03	<.001	−0.79∗	(1.39)	−1.95∗	(2.51)	−1.16∗	(1.31)
t3.12 Phobic anxiety	0.15;	0.22	0.46;	0.49	1.56;	0.92	<.001	−0.31∗	(0.82)	−1.41∗	(2.11)	−1.10∗	(1.49)
t3.13 Paranoid Ideation	0.34;	0.34	1.02;	0.59	2.06;	0.67	<.001	−0.68∗	(1.41)	−1.72∗	(3.24)	−1.04∗	(1.65)
t3.14 Psychotic	0.27;	0.31	0.96;	0.43	1.98;	0.47	<.001	−0.69∗	(1.84)	−1.71∗	(4.30)	−1.02∗	(2.26)
t3.15 GSI score	0.40;	0.24	1.13;	0.32	2.22;	0.43	<.001	−0.73∗	(2.58)	−1.82∗	(5.23)	−1.09∗	(2.88)
t3.16 PST score	24.6;	13.8	53.5;	12.5	71.6;	8.55	<.001	−28.9∗	(2.19)	−47.0∗	(4.09)	−18.03∗	(1.69)
t3.17 PSDI score	1.41;	.29	1.90;	0.31	2.80;	0.46	<.001	−0.49∗	(1.63)	−1.39∗	(3.61)	−0.90∗	(2.29)
t3.18 TCI-R scores												
t3.19 Novelty seeking	112.2;	13.1	115.0;	11.7	117.0;	13.1	.362	−2.78	(0.22)	−4.81	(0.37)	−2.02	(0.16)
t3.20 Harm avoidance	92.4;	13.8	101.6;	16.1	106.3;	7.0	.001	−9.15∗	(0.61)	−13.8∗	(1.27)	−4.69	(0.38)
t3.21 Reward dependence	100.7;	15.7	94.5;	15.2	99.6;	9.8	.137	6.75	(0.40)	1.07	(0.08)	−5.10	(0.40)
t3.22 Persistence	110.4;	19.2	108.6;	22.8	113.3;	15.8	.749	1.75	(0.08)	−2.90	(0.16)	−4.65	(0.24)
t3.23 Self-directedness	139.1;	18.0	119.5;	16.0	107.4;	14.4	<.001	19.6∗	(1.15)	31.7∗	(1.94)	12.12∗	(0.79)
t3.24 Cooperativeness	132.2;	18.9	124.4;	17.5	111.9;	16.1	.001	7.79	(0.43)	20.3∗	(1.16)	12.5∗	(0.74)
t3.25 Self-Transcendence	55.7;	14.1	65.5;	14.2	75.4;	11.7	<.001	−9.74∗	(0.69)	−19.7∗	(1.52)	−9.90∗	(0.76)

t3.26 *p*-value including Bonferroni–Finner's correction.

Q2 t3.27 ∗ ~~Bold:~~ significant contrast (mean differences with Scheffé procedure).

4. Discussion

The heterogeneity of PG has led to several attempts to establish different subtypes within the spectrum of the disorder. This study found evidence for three different clusters of young people, aged 17 to 25 years attending outpatient PG treatment.

The sociodemographic features were equally distributed between clusters, with the exception of educational level. Lack of education was associated with greater PG severity. The first cluster (or Type I) was composed of cases with high educational level (secondary or university studies) and who reported fewer negative consequences of gambling according to the questions in the SOGS (spending more money gambling, returning to win back lost money, gambling more than planned, being criticized due to the gambling addiction, being unable to stop gambling, borrowing money and not paying back, skipping school or work due to gambling, using credit cards to gamble and obtaining money destined to gambling from property sales). This cluster also achieved the lowest mean scores in the severity of the disorder (SOGS-Total score and DSM-IV-Total score), lower levels of general psychopathology (assessed with the SCL-90-R questionnaire) and healthier personality traits (lower scores on Harm Avoidance and Self-Transcendence and higher on Self-Directedness and Cooperativeness). This subtype, which we named High General Functioning (Type I), coincides with the "Behaviorally Conditioned Problem Gamblers" Pathway 1 type among adult PGs, as described by Blaszczynski & Nower [8]. Our High General Function-

ing group (Type I) was the healthiest group compared to the other two in terms of psychopathology. If anxiety or depressive symptoms were present among these patients, they would be treated quickly once treatment is initiated. Type I also coincides with cluster I described in a study by Lesieur [29] named "normal problem gambler": a group that presented low levels of psychopathology, impulsivity, depression, and anxiety, amongst other clinical characteristics. Likewise, our Type I resembles Class 2 in the study by Gupta et al. [12] conducted among adolescents.

The second cluster (Type II) that we call Depressive Type was characterized by major emotional distress, shame, immaturity, hostility and negative feelings. This cluster resembles the Pathway 2 type among adults described by Blaszczynski & Nower [8] as "Emotionally Vulnerable Problem Gamblers", and would include those PGs that have suffered premorbid states of anxiety and depression, as well as significant deficits in coping strategies. This type feels the need to regulate and modulate their negative emotional states through gambling behavior. Similarly, our group partially coincides with the cluster II identified by Lesieur [29], which he labeled as "moderately-impulsive action seeker" patients with moderate levels of psychopathology and impulsivity, as well as those with more severe gambling behavior. However, Lesieur's cluster also includes individuals with early age of onset and high levels of search for excitement.

Our Type II coincides with those called Class 4 and 5 in the study of Gupta et al. [12] among adolescents. While Class 4 is associated with depression, suicidal tendencies, childhood abuse and family conflicts, Class 5 is strictly

associated with depressive symptoms (which the authors suggest as a unique subtype in adolescents). According to the Cloninger et al. [14] model of personality, three character dimensions (Self-directedness, Cooperativeness and Self-Transcendence) can be subsyndromic indicators of depressive or psychotic episodes. In our Type II, we observe low scores in Self-Directedness and Cooperativeness, but moderate scores in Self-Transcendence. This profile would fit the melancholy character, described by Cloninger et al. [14], in which immature traits, emotional reactivity, selfishness, competition and rivalry feelings toward others are present. Basically, the affective state of these individuals would be negative, rarely experiencing positive emotions. In these cases, and as suggested by Blaszczynski & Nower [8], gambling would be a maladaptive strategy to escape from and/or modulate these symptoms and negative emotions.

We identified a third subgroup, which we called Disorganized Type, or Type III, with the most severe psychopathological profile, including schizotypal traits, and most severe gambling behavior (assessed by the SOGS and DSM-IV questionnaires). Consistent with Cloninger et al. [14], these subjects, with low scores in Self-Directedness and Cooperativeness and high scores in Self-Transcendence, could be considered as disorganized or schizotypal. They would appear suspicious, illogical and immature, prone to imagination and fantasy, as well as demonstrating peculiar and unconventional behavior. In addition, this configuration is associated with the temperament traits Novelty Seeking and Harm Avoidance (as in the case of this subtype), as well as borderline personalities (explosive and overly-sensitive). This type coincides with the Pathway 3 among adults described by Blaszczynski & Nower [8] as "Antisocial and Impulsivist Problem Gamblers": a subgroup with major alterations in psychopathology, major psychosocial interference due to their gambling behavior and more dysfunctional personality profiles. To these authors, this subgroup would represent an etiology of the disorder strongly associated with both neurobiological and psychological risk factors.

Both the subgroup described in the explanatory model of Blaszczynski & Nower [8] and our Type III, are equivalent with the Class 1 in the study by Gupta et al. [12]. Furthermore, Goldstein et al. [13] found a subgroup of adolescent gamblers with many consequences of gambling that was associated with substance abuse, delinquency and violence, which resembles the "Antisocial Impulsivist"/ Pathway 3 in the model by Blaszczynski & Nower [8] and our Type III which scored high on Novelty seeking. One may speculate that some of the adolescents in the high consequence group in the study by Goldstein et al. [13] represent our Type III at a younger age.

Lesieur's [29] cluster 3, composed of "impulsive escape seekers", only partially coincides with our results. In this group, Lesieur [29] included individuals with the most elevated levels of impulsivity and psychopathology, although also those with later age of onset and with low levels of excitement seeking. In other words, this group would better meet the Type II and Type III in our study and the clusters 2 and 3 obtained by Blaszczynski and Nower [8]. However, it is important to highlight that Lesieur's [29] results were based on an inpatient sample, with elevated levels of severity, which could explain the partial concordance with the subtypes observed in other studies.

The impact that the identification of homogeneous subgroups in PG has in the design of therapeutic approaches is crucial. Although studies exploring the treatment response suggest that this disorder can be successfully treated [30], there are high rates of dropouts and relapses throughout the rehabilitation process of these patients [11,31]. Studies about the response to treatment programs show that mood disorders or substance dependence [32] and dysfunctional personality traits such as Sensation-seeking traits [33] Harm Avoidance and Self-Directedness [34] are associated with poor response to treatment. Based on research considering the subgroups, including our present findings, we might consider that the Type II and III patients would be those at risk for a more torpid and complex response to treatment. Therefore, including techniques and strategies for specific treatment of cognitive strategies for inhibitory control or regulation of negative emotions, among other aspects, could be crucial to improve the results of treatment programs. It is of great scientific interest to further investigate the effectiveness of new tools aimed at treating the underlying neurocognitive PG processes such as cognitive remediation [35], serious games [36,37] or mindfulness training based treatments [38].

4.1. Limitations

The first limitation concerns generalization: the results of this study must only be extrapolated to populations of young male gamblers who seek treatment due to problems related to gambling. Another limitation is related to the sample size: the small number of participants attenuated the power of the cluster analysis to detect more differences for the set of variables. Finally, although our main objective was to obtain an early identification of the subtypes of pathological gamblers, the average age of the sample was 22 years. The facts that gambling is illegal under the age of 18 in our country and that only the most severe cases seek treatment [39] are factors that may be related to the average age of the subjects studied. Several studies have shown that from the start of gambling behavior to loss of control it usually takes 6–7 years [5,40,41] which could also justify that although gambling starts earlier for most people (in some cases younger than 18), they do not seek treatment until they are older (e.g. 20–22 years of age).

4.2. Implications

To our knowledge, this is the first study examining subgroups of PG in a treatment-seeking sample of youth, so the findings have high relevance from a clinical point of view.

Overall, the results of this work indicate that PG constitutes a complex disorder with heterogeneous clusters even among adolescents and young adults. Identifying the specific earliest manifestations of this problem is essential in order to develop adequate therapeutic programs and to prevent the disorder from progressing to the most severe stages. Finally, research should test for the empirical clusters that emerged in this study with larger and more diverse samples particularly in relation to gender and response to treatment. Future research on PG types should also consider examining biological, neuropsychological, biochemical and genetic variables. The goal is to better understand this disorder and provide more effective assessment and treatment.

Acknowledgment

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