



Sports-betting-related gambling disorder: Clinical features and correlates of cognitive behavioral therapy outcomes

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ABSTRACT

Background and aims: The number of patients with gambling disorder (GD) whose gambling preference is sports betting is increasing. However, their clinical profile and their responses to psychological treatments -compared to patients with other forms of gambling- have not been thoroughly studied. Therefore, the aims of this study were: (1) to compare the clinical characteristics of GD patients whose primary gambling activity was sports betting (SB+; $n = 113$) with GD patients with other primary gambling activities (SB-; $n = 1,135$); (2) to compare treatment outcomes (dropout and relapses) between SB + and SB- patients; and (3) to explore relationships between specific variables (GD severity, psychological distress and personality features) and treatment outcome in SB + and SB- GD patients, through correlation models and path-analysis.

Methods: The cognitive behavioral treatment consisted of 16 weekly sessions. Personality features, psychopathology, and sociodemographic and clinical factors were assessed.

Results: The SB + group included higher proportions of younger patients who were single and had higher educational levels, older ages of GD onset, and greater GD severities. Regarding treatment outcomes, the dropout rate was lower in the SB + group, and no between-group differences were found regarding relapse. Dropout within the SB + group was related to being unemployed, and relapse was related to being unmarried and experiencing more psychological distress.

Discussion and conclusion: The differences between SB + and SB- GD patients suggest that GD patients with sports-betting problems may benefit from tailored therapeutic approaches.

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1. Introduction

The gambling market has undergone unprecedented diversification and expansion. In the last decade, sports betting has become the fastest growing form of gambling (Gainsbury et al., 2015) representing approximately 43% of the online gambling market (Gainsbury & Russell, 2015). Sports betting has expanded at a greater rate compared to other forms of gambling, with the “gamblification” of sports (i.e., have gambling interspersed into sports, for example, through the provision of betting odds in mainstream media) being associated with an increased use of the internet for gambling on sports and the liberalization of advertising regulations (McGee, 2020).

Sports betting can be viewed as a strategic form of gambling characterized by a combination of chance and skill, as in the case of other gambling modalities such as poker. Sports betting has been associated with several positive aspects of sports, such as a culture of effort and training as a way to improve results (Deans et al., 2016; Hing et al., 2015). However, concerns about the possible negative consequences of sports betting have increased recently (McGee, 2020), with sports betting being associated with excessive gambling, or even with gambling disorder (GD) (Baggio et al., 2018; Lopez-Gonzalez et al., 2020; Nweze et al., 2020; Russell et al., 2019). GD is a psychiatric condition categorized as a non-substance-related addiction in the latest version of the Diagnostic and Statistical Manual of Mental Health Disorders (DSM-5; American Psychiatric Association, 2013). It is characterized by a recurrent and persistent pattern of gambling behavior that leads to clinically significant distress and/or dysfunction (American Psychiatric Association, 2013).

Among individuals with GD, those with sports-betting problems may show unique clinical features (Lopez-Gonzalez et al., 2020). For example: (A) Certain forms of sports betting such as in-play betting, have been associated with greater impulsivity and problem-gambling severity (Hing et al., 2018); (B) More permissive attitudes towards gambling and stronger gambling motivations have also been linked to sports betting in comparison with non-sports betting (Cooper et al., 2021); and (C) Sports betting, relative to non-sports betting, has been more strongly linked to gambling problems and cognitive distortions related to illusion of control, probability control and interpretive control (Cooper et al., 2021). It has been suggested that these biases (especially those related to self-perceived luck, chasing wins/loss, miscalculating the win/loss ratio, superstitious beliefs, and the perception of gambling as a skill) may contribute importantly to both maintaining and increasing the severity of disordered gambling behaviors (Subramaniam et al., 2017). However, individuals with sports-betting-related gambling problems are often involved in multiple forms of gambling (Cooper et al., 2021; Hing et al., 2016; LaPlante et al., 2014) and experience other behavioral addictions (Hing, Russell, et al., 2017). Therefore, individuals with sports betting may show a more severe clinical profile because sports betting usually occurs in conjunction with other forms of gambling, not necessarily because of sports betting per se. Thus, it is important to further examine sports betting in the context of GD.

Regarding sociodemographic characteristics, sports betting is more prevalent among males (Håkansson et al., 2017; Marchica & Der-evensky, 2016; Martin & Nelson, 2014; Richard et al., 2019), which is also the case for individuals with GD (Potenza et al., 2019). However, individuals who bet on sports are more likely to be younger, single, and college-educated and have higher incomes, compared to non-sports-betting individuals (Cooper et al., 2021; Jiménez-Murcia et al., 2021). In GD, lower socioeconomic status, poor academic performance and being married are frequently reported sociodemographic characteristics (Dowling et al., 2017; Subramaniam et al., 2015).

Positive associations between sports betting and psychological distress, as well as comorbidity with substance use disorders and behavioral addictions, have been reported (Bodor et al., 2018; Gainsbury et al., 2019; Granero et al., 2020; Hing, Vitartas, et al., 2017). These clinical features described in individuals with sports betting are similar

to those presented by individuals with GD (Potenza et al., 2019). Regarding personality features, high levels of impulsivity have been reported in GD (Hamilton, Littlefield, et al., 2015; Hamilton, Mitchell, et al., 2015; Hodgins & Holub, 2015), and high novelty seeking levels has been linked to multiple stages of addictions (Black et al., 2014; Wingo et al., 2016). Moreover, higher levels of persistence may link to greater gambling problems (Moragas et al., 2015) and have been associated with compulsivity (Atiye et al., 2015; Belloch et al., 2016; Lavender et al., 2017). Adequate functioning in self-directedness and cooperativeness may contribute importantly to fast and adaptive emotional responses and employment of types of cognitive regulation strategies (Chae et al., 2019). Moreover, the relevance of persistence to stress responses has also been considered (Eley et al., 2016). Specifically, high impulsivity and persistence (perseverance in spite of fatigue or frustration), and low self-directedness (diminished tendencies to adapt behaviors to demands to meet goals) are personality features that distinguish both sports-betting and non-sports-betting individuals (Cooper et al., 2021; DiCicco-Bloom & Romer, 2012; Estévez et al., 2017; Hing et al., 2018; Jiménez-Murcia et al., 2021).

To address GD symptomatology, multiple interventions have been proposed. Although pharmacological agents such as opioid-receptor antagonists may be effective, non-pharmacological interventions have been a main approach for treating GD (Cowlshaw et al., 2012; Pickering et al., 2018). Among them, Gamblers Anonymous, motivational interventions, and cognitive therapies have been used, although cognitive-behavioral therapy (CBT) has arguably the most empirical support for reducing GD severity and gambling-related cognitions and behaviors (Potenza et al., 2019). However, it has been suggested that the cognitive restructuring component of CBT for GD patients with sports-betting problems is challenging, perhaps due to specific cognitive patterns (characterized by more biased gambling-related cognitions) that differ from GD patients with problems primarily due to non-strategic gambling (Chrétien et al., 2017). Despite these findings, the treatment outcomes of patients with GD who report sports betting as their central gambling preference has not been examined in depth.

To address this gap in the literature, the general goal of this study was to explore the phenotype of GD patients with sports betting and analyze whether there were differences in response to CBT between patients with and without sports betting. In the former group, sports betting was the type of gambling generating the most negative consequences to the patient at all levels. Keeping this in mind, the specific aims were: (1) to compare the clinical characteristics of patients with GD whose primary gambling activity is sports betting (SB +) with those patients who do not have sports betting as their primary gambling activity (SB-); (2) to compare treatment outcomes (dropout and relapses) between SB + and SB- patients; and (3) to assess the relationship of variables (GD severity, psychological distress and personality features) with treatment outcomes in SB + and SB- GD patients through path-analysis. We hypothesized that patients in the SB + group would present a more maladaptive clinical and personality profile and higher severity of the disorder. Therefore they would show a worse response to treatment compared to the SB- group. In relation to the path analysis included in the present study, it was considered that the variables of gender, age, social position, marital status, personality, psychopathology and GD severity may be related to the probability of relapse and dropout. Specifically, it was hypothesized that these could be predictors of both relapse and dropout in both clinical groups (SB + and SB-).

A better understanding of adherence to CBT in these patients would allow improvement of existing treatment protocols. Although multiple measures have been proposed to evaluate treatment outcomes in GD (e.g., time and money, abstinence, global functioning and wellbeing) (Pickering et al., 2018), both dropout and relapses appear to be effective measures of treatment response in GD that have been used in multiple previous studies (Baño et al., 2021; Mena-Moreno et al., 2022; Ronzitti et al., 2017). Consequently, they were factors selected in the present study. Dropout has been mostly defined as the failure to attend

consecutive treatment sessions, with the precise number of sessions used to define a dropout varying across studies, although it usually has ranged from 2 to 3 (Baño et al., 2021; Ronzitti et al., 2017). Regarding relapse, there is no absolute consensus on how to operationalize this construct, perhaps given that abstinence is rare in GD (Müller et al., 2017). In the present study, relapse was considered as the occurrence of a gambling episode once treatment had begun, as done previously (Baño et al., 2021; Mena-Moreno et al., 2022).

2. Methods

2.1. Participants and procedures

The sample included 1,248 treatment-seeking patients recruited at the XXX XXX XXX within the Department of XXX at XXX XXX Hospital (XXX, XXX). This public hospital is accredited as a tertiary care center for the treatment of addictive behaviors, and it has extensive experience in the treatment of highly complex cases. Patients were referred to the XXX XXX Hospital XXX XXX XXX through general practitioners or via other healthcare professionals. Patients included continuous referrals for evaluation and treatment from January 2005 to January 2020. Experienced psychologists and psychiatrists with >20 years of clinical experience conducted two face-to-face clinical interviews and only patients who met DSM-5 criteria for GD (American Psychiatric Association, 2013) were included in the study. Sociodemographic characteristics and complementary clinical information were assessed, and patients completed the necessary questionnaires for this study before initiating outpatient treatment. Only patients who sought treatment for GD as their principal health concern were accepted into this study. Exclusion criteria included the following: an intellectual disability, a neurodegenerative condition (e.g., Parkinson's disease) or an active psychotic disorder. Participants were classified into two groups according to their main gambling activity: sports betting (SB+, $n = 113$) and non-sports betting (SB-, $n = 1,135$).

2.2. Instruments

2.2.1. DSM-5 criteria

Among early participants, a diagnosis of pathological gambling was initially confirmed if they met DSM-IV-TR criteria (American Psychiatric Association, 2000). With the release of the DSM-5 (American Psychiatric Association, 2013), the term pathological gambling was replaced with GD. All diagnosed patients were re-evaluated and re-codified post-hoc and only patients who met DSM-5 criteria for GD were included in analyses. Table S1 includes Cronbach's alpha values derived from the present sample.

2.2.2. South Oaks gambling screen (SOGS; Lesieur and Blume, 1987)

This self-report questionnaire includes 20 items used to screen current problem-gambling severity with a proposed cut-off of 5 to identify probable pathological gambling (Echeburúa et al., 1994). A Spanish validation of the instrument is available, and it has demonstrated strong internal consistency (Cronbach's alpha = 0.94) and test-retest reliability ($r = 0.98$) (Echeburúa et al., 1994). Table S1 includes Cronbach's alpha values derived from the present sample.

2.2.3. Symptom Checklist-Revised (SCL-90-R; Derogatis, 1990)

This 90-item questionnaire is intended to measure psychological distress. The items cover nine symptom dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The global score (Global Severity Index, GSI) is a commonly used index of psychological distress. The Spanish adapted version was used in this study (Derogatis, 2002). Cronbach's alpha in this sample was in the good to excellent range (Table S1 includes Cronbach's alpha values for each scale).

2.2.4. Temperament and character Inventory-Revised (TCI-R; Cloninger, 1999)

This is a self-report questionnaire composed of 240 items that aim to assess personality features. Responses are considered on a 5-point Likert-type scale. The scale is organized in seven primary dimension scores: four temperamental factors (novelty-seeking, harm-avoidance, reward-dependence, and persistence) and three character dimensions (self-directedness, cooperativeness, and self-transcendence). The Spanish revised version used in this study exhibited satisfactory internal consistency, with a Cronbach's alpha mean value equal to 0.87 (Gutiérrez-Zotes et al., 2004). Cronbach's alpha in this sample was in the moderate to excellent range (Cronbach's alpha values are in Table S1).

2.2.5. Other sociodemographic and clinical variables

Through a semi-structured face-to-face clinical interview described elsewhere (Jiménez-Murcia et al., 2006), sociodemographic variables and variables related to gambling were measured. Some of the GD behavioral variables included the mean and maximum amount of money spent in a single gambling episode, the age of GD onset and the total amount of gambling-related debts. It was also determined what their main gambling problem was at the time of requesting treatment. This problem was considered as the one that generated the most negative consequences for the patient. Based on this, patients were classified into two groups, sports betting or others.

2.3. Treatment

In this study, group cognitive-behavioral therapy (CBT) was used for outpatients, and it consisted of 16 weekly sessions, each lasting 90 min. An experienced clinical psychologist and a licensed co-therapist led the CBT groups. Treatment providers were trained on how to strictly adhere to the treatment manual to ensure fidelity of treatment (Jiménez-Murcia et al., 2006).

The purpose of this treatment plan was to provide patients with the knowledge and skills necessary to execute CBT strategies in order to reduce all types of gambling behavior and to obtain abstinence from all types of gambling. The topics addressed in the treatment plan included: psychoeducation regarding the disorder (e.g., its course, vulnerability factors, diagnostic criteria), stimulus control (e.g., money management, avoidance of potential triggers, self-exclusion programs), response prevention (i.e., alternative and compensatory behaviors), cognitive restructuring focused on illusions of control over gambling and magical thinking, emotion-regulation skills training and other relapse prevention techniques.

This treatment program has been described previously (Jiménez-Murcia et al., 2006), and its short and medium-term effectiveness have been reported in several studies (Jiménez-Murcia et al., 2012; Jiménez-Murcia et al., 2007; Jiménez-Murcia et al., 2017). During treatment, attendance at treatment sessions, the control of spending and the occurrence of relapses were recorded on a weekly basis through an observation sheet. Relapse was defined as the occurrence of a gambling episode once treatment had begun. This is common for many studies conducted with patients who meet criteria for GD (Jiménez-Murcia et al., 2017; Mestre-Bach et al., 2016; Müller et al., 2017). Failure to attend three consecutive CBT sessions was the criterion adopted for treatment dropout.

2.4. Ethics

The study procedures were conducted in accordance with the Declaration of Helsinki. The Hospital Ethics Committee of Clinical Research approved the study. All participants were informed about the study and provided informed consent for participation.

2.5. Statistical analysis

Statistical analysis was conducted with Stata17 for Windows (Stata-Corp, 2021). Comparisons between groups (SB + versus SB-) for the clinical measures at baseline were based on analyses of covariance (ANCOVAs), adjusting for gender and age (since most studies within the GD research area are adjusted by these two features, the inclusion of these covariates permitted comparisons of this work with previous studies). Comparisons for likelihoods of dropout and relapse were based on logistic regression, also adjusting for gender and age. Additionally, survival analyses estimated and compared cumulative functions for rates to dropout and relapse. This analysis is adequate for measuring the probability of patients “surviving” without the presence of the outcome over time. One advantage of this procedure is allowing modeling of censored data, which occurs if patients withdrew from the study or were lost to follow-up (Singer & Willett, 2003). In this work, Cox-regression compared the survival functions for dropout and relapses adjusted by gender and age.

Path analysis assessed relationships between sociodemographic variables (gender, age, marital status, employment status and social position), personality features (TCI-R scales), GD severity (SOGS total), global psychological distress (SCL-90-R-GSI) and therapy outcomes (dropout and relapse). Path analysis was used as a straightforward extension of multiple regression modeling with the aim of estimating the magnitude and significance of hypothesized associations into a set of variables, including different effects/roles [direct, indirect (mediational links) and totals] (Kline, 2005). Path analysis in this study was implemented through structural equation modeling (SEM), and all parameters were freely estimated. An initial model included all possible direct and indirect effects within variables. Next, with the aim to obtain a more parsimonious model and increase statistical power, parameters with non-significant findings were deleted and the model was re-specified and re-adjusted. Additionally, a latent variable was defined based on the TCI-R scores (it was labeled as “personality” within the model), which simplified the data structure and facilitated a more parsimonious fitting (Borsboom et al., 2003). The maximum-likelihood estimation (MLE) method of parameter estimation was used, and goodness-of-fit was evaluated using standard statistical measures: the root mean square error of approximation (RMSEA), Bentler’s Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the standardized root mean square residual (SRMR). Adequate model fit was considered for RMSEA < 0.08, TLI > 0.90, CFI > 0.90 and SRMR < 0.10 (Barrett,

2007).

2.6. Descriptive for the sample

Table 1 displays sociodemographic variables and between-group comparisons. Among the total sample (n = 1,248), most patients were men, were married, had low educational levels, were employed and had mean-low to low social position indexes. The mean age was 41.7 years (SD = 12.8). Between-group differences were found for marital status, education, and socioeconomic position (the SB + group included higher proportions of patients who were single, had higher education levels, and had higher social indexes). The SB + group included patients with younger mean ages.

2.7. Comparisons at baseline

Table 2 compares the groups on the clinical variables. Results obtained in the ANCOVA adjusted by gender and age showed that compared to the SB- group, SB + patients reported an older age at GD onset, greater GD severity and lower persistence. No between-group differences were observed for GD duration, psychological distress, and the other personality features measured with the TCI-R.

2.8. Comparison of treatment outcomes

Table 3 includes data on the risk of dropout and relapse (defined as the cumulative incidence of patients dropping and with gambling/episodes), including between-group comparisons adjusted by gender and age. Numerically lower risk estimates were obtained for the SB + group; however, the difference with SB- was only statistically significant for the dropout rate.

In survival analyses, Cox-regression analyses adjusted by gender and age showed that dropout was more frequent for the SB- group, and no differences were found with respect to relapse (Fig. 1).

2.9. Correlation and path analyses

Table 4 contains the correlation matrix for the variables considered in the structural equation model (SEM). The upper part of the Table includes the R-coefficients obtained within the SB- group and the lower part estimates within the SB + group. Given strong associations between the null-hypothesis test for correlation models with sample

Table 1 Sociodemographics and between-group comparison.

	Total sample (n = 1,248)		SB (n = 1,135)		SB+ (n = 113)		²	DF	p	C-V
	n	%	n	%	n	%				
Gender										
Women	51	4.1%	49	4.3%	2	1.8%	1.70	1	0.192	0.037
Men	1197	95.9%	1086	95.7%	111	98.2%				
Marital status										
Single	443	35.5%	373	32.9%	70	61.9%	38.17	2	<0.001*	0.175†
Married - in couple	663	53.1%	629	55.4%	34	30.1%				
Divorced - separated	142	11.4%	133	11.7%	9	8.0%				
Education										
Primary	683	54.7%	646	56.9%	37	32.7%	55.36	2	<0.001*	0.211†
Secondary	490	39.3%	437	38.5%	53	46.9%				
University	75	6.0%	52	4.6%	23	20.4%				
Employment										
Unemploy.	440	35.3%	409	36.0%	31	27.4%	3.31	1	0.068	0.052
Employed	808	64.7%	726	64.0%	82	72.6%				
Social position										
High	18	1.4%	13	1.1%	5	4.4%	31.62	4	<0.001*	0.159†
Mean-high	58	4.6%	46	4.1%	12	10.6%				
Mean	156	12.5%	136	12.0%	20	17.7%				
Mean-low	424	34.0%	379	33.4%	45	39.8%				
Low	592	47.4%	561	49.4%	31	27.4%				
Age (years-old)	Mean	SD	Mean	SD	Mean	SD	F-stat	DF	p	²
	41.69	12.77	42.56	12.71	32.97	9.76	60.75	1/1,246	<0.001*	0.046

Note. GD: gambling disorder. SB: sports betting absent. SB+: sports betting present. SD: standard deviation. DF: degrees of freedom. C-V: Cramer-V coefficient. ²: Partial eta-squared. *Bold: significant comparison (0.05 level). †Bold: effect size within the ranges mild-moderate to high-large.

Table 2
Baseline clinical characteristics: ANOVAs adjusted by gender and age.

	SB (n = 1,135)		SB+ (n = 113)		F _(DF=1;1244)	p	²
	Mean	SD	Mean	SD			
Onset of GD (years-old)	28.91	11.30	31.08	7.44	8.56	0.003*	0.007
Duration of GD (years)	5.90	5.47	4.89	3.49	3.67	0.056	0.003
DSM-V criteria: total	7.14	1.50	7.52	1.31	6.67	0.010*	0.005
SOGS: total score	10.57	2.90	11.33	3.05	6.82	0.009*	0.005
SCL-90-R: Somatization	0.91	0.77	0.89	0.76	0.09	0.765	0.001
SCL-90-R: Obsess-compulsive	1.07	0.76	1.20	0.73	2.56	0.110	0.002
SCL-90-R: Sensitivity	0.96	0.75	0.96	0.75	0.01	0.926	0.000
SCL-90-R: Depressive	1.45	0.86	1.59	0.89	2.71	0.100	0.002
SCL-90-R: Anxiety	0.96	0.76	0.98	0.65	0.11	0.740	0.001
SCL-90-R: Hostility	0.88	0.78	1.02	0.81	3.01	0.083	0.002
SCL-90-R: Phobic	0.42	0.58	0.35	0.47	1.17	0.280	0.001
SCL-90-R: Paranoid	0.85	0.73	0.86	0.71	0.01	0.915	0.001
SCL-90-R: Psychotic	0.88	0.72	0.90	0.67	0.10	0.752	0.001
SCL-90-R: GSI score	1.01	0.65	1.05	0.62	0.49	0.483	0.001
SCL-90-R: PST score	45.60	20.39	47.35	20.57	0.73	0.392	0.001
SCL-90-R: PSDI score	1.85	0.55	1.88	0.49	0.38	0.536	0.001
TCI-R: Novelty-seeking	110.83	13.14	108.59	12.29	3.06	0.081	0.002
TCI-R: Harm-avoidance	99.17	15.93	102.18	15.60	3.63	0.057	0.003
TCI-R: Reward-dependence	99.18	14.23	97.36	14.12	1.59	0.207	0.001
TCI-R: Persistence	109.85	18.87	103.02	18.96	12.98	<0.001*	0.010
TCI-R: Self-directedness	128.17	19.43	127.63	20.76	0.08	0.782	0.001
TCI-R: Cooperativeness	131.54	15.44	128.50	17.12	3.72	0.054	0.003
TCI-R: Self-Transcendence	63.77	14.17	61.27	13.18	3.21	0.074	0.003

Note. GD: gambling disorder. SB: sports betting absent. SB+: sports betting present.

SD: standard deviation. DF: degrees of freedom. ²: Partial eta-squared.

*Bold: significant comparison (0.05 level). †Bold: effect size within the ranges mild-moderate to high-large.

Table 3
Comparison of likelihoods of dropout and relapse (results adjusted by gender and age).

Risk	SB (n = 1,135)		SB+ (n = 113)		Wald	p	OR	1/OR
	n	%	n	%				
Dropout	344	30.7%	25	18.2%	7.06	0.008*	0.525	1.905†
Relapse	259	22.8%	21	18.8%	0.92	0.337	0.781	1.280

Note. SB: sports betting absent. SB+: sports betting present.

SD: standard deviation. DF: degrees of freedom. C-V: Cramer-V coefficient. ²: Partial eta-squared.

*Bold: significant comparison (0.05 level). †Bold: effect size within the ranges mild-moderate to high-large (OR > 1.86).

sizes (coefficients with low effect sizes can provide significant results estimated with large samples), only coefficients with effect sizes within the mild-moderate to high-large ranges were considered as relevant (†bold font in Table 4).

The correlation matrix revealed that, among the SB- patients, higher GD severity was associated with greater psychopathology, higher novelty-seeking levels and lower self-directedness. Within this group, more psychological distress correlated with higher harm avoidance and self-transcendence and with lower self-directedness and cooperativeness. Among the SB + group, higher GD severity was associated with higher psychological distress and lower self-directedness, and greater psychopathology was associated with higher novelty-seeking, harm avoidance and self-transcendence, and with lower persistence, self-directedness, and cooperativeness. For SB + patients, the likelihood of relapse was also higher for patients with greater psychopathology and lower self-directedness.

Fig. 2 shows the path diagrams with the standardized coefficients obtained in the SEM analyses (Table S1, Supplementary material, includes the complete results: tests of direct, indirect and total effects). Adequate goodness-of-fit was achieved: a) for the SB- group: RMSEA = 0.048 (95%CI: 0.041 to 0.056), CFI = 0.947, TLI = 0.907, and SRMR = 0.037; and, b) for the SB + group: RMSEA = 0.041 (95%CI: 0.001 to 0.074), CFI = 0.966, TLI = 0.947, and SRMR = 0.064.

Within the SB- group, the latent variable measuring the personality

profile obtained significant coefficients with all the TCI-R scales, except for persistence. Patients with higher scores on this latent TCI-R variable were characterized by a personality profile with higher novelty-seeking, harm-avoidance and self-transcendence, and lower reward-dependence, self-directedness and cooperativeness. The likelihood of dropout for SB-patients was greater for women, older individuals and people within lower social positions (these direct effects obtained significant results). The likelihood of relapse was directly related to marital status (being unmarried) and greater psychological distress. Indirect effects were also found in this model: concretely, psychological state achieved a mediational role with respect to the links between gender, age and personality features and the likelihood of relapse (women, patients with older age and patients with higher dysfunctional personality reported higher psychological distress, and worse greater psychopathology contributed to increased likelihood of relapse). GD severity was positively correlated with psychopathology, but it did not directly contribute to the likelihoods of dropout or relapse.

Within the SB + group, the latent variable defined for the personality features achieved significant coefficients with all TCI-R scores. Patients with higher scores on this latent measurement factor were characterized by a personality profile with higher novelty-seeking, harm-avoidance, and self-transcendence, and with lower reward-dependence, persistence, self-directedness and cooperativeness. The likelihood of dropout within the SB + group was directly related to being unemployed, and

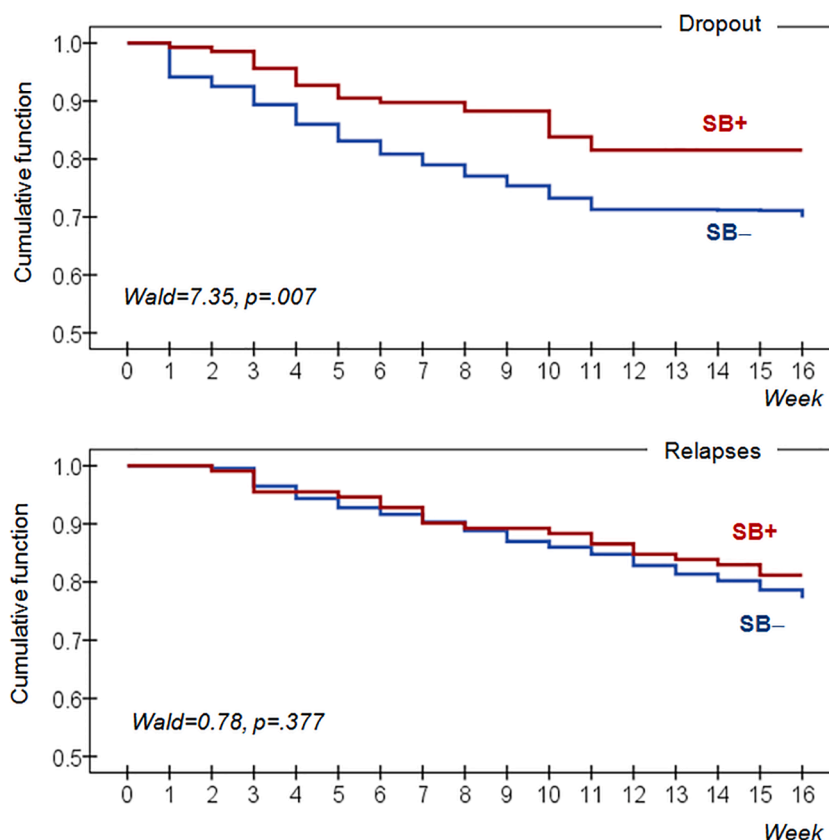


Fig. 1.

likelihood of relapse was directly related to marital status (not being married) and greater psychopathology. A mediational link was also found in this SEM: higher scores on the latent variable defined for the personality features contributed to higher psychological distress, which increased the likelihood of relapse. Higher GD severity was associated with greater psychopathology, but did not directly contribute to the likelihoods of dropout or relapse.

2.10. Discussion

To our best knowledge, this study is one of the first exploring treatment outcomes in a large clinical sample of treatment-seeking GD patients reporting problems primarily associated with sports betting. The present analyses indicated that sports-betting patients were younger, more frequently single, and more highly educated compared to the non-sports-betting group. These results are consistent with several previous studies investigating the sociodemographic characteristics associated with sports betting (Aragay et al., 2021; Hing et al., 2016). The finding that sports-betting patients were younger may be at least partially explained by the association between sports betting and the use of digital technologies, as well as by the impact of sponsorship promotions, which have been found to target younger audiences (Aragay et al., 2021; McGee, 2020). Additionally, sports betting can be done in some land-based venues, with young patients often reporting that their first sports bets were made with colleagues and friends, including participation in fantasy sports pools sharing bets in land-based venues, typically for limited amounts of money. However, they also report that when they began to gamble more frequently, they were already doing so individually and via mobile phones, so they had transitioned from land-based to online gambling. Sports betting has become very popular in many countries in recent years, and gambling has become a more socially accepted activity. Young people often see it as an activity associated with sports-viewing, and this may minimize the perception of risk

and serve as a potential risk factor for gambling initiation that may become problematic if other potential risk factors are present (Allami et al., 2021; Williams et al., 2021). Furthermore, higher levels of education could be associated with false perceptions of having more skill, knowledge and greater probabilities of winning (Aragay et al., 2021). Alternatively, some researchers have proposed that sociodemographic factors associated with sports-betting-related problems (e.g., being single and having higher educational levels) may be confounded by age (Delfabbro, 2012; Russell et al., 2019).

Relative to SB- patients, SB + patients typically being older at age of GD onset and a greater severity of GD. Previous studies reported similar findings, with GD severity among SB + individuals being statistically predicted by factors such as older age, greater psychopathology, lower self-directedness, and greater novelty-seeking (Jiménez-Murcia et al., 2021). It is important to note that a newer, younger generation of SB + individuals may experience gambling problems at earlier ages.

Regarding CBT treatment outcomes, the likelihood of dropout was lower for the SB + group. As SB + patients typically had higher levels of GD severity, it suggests that there may have been greater motivation for them to remain in treatment, among other possible reasons (Jara-Rizzo et al., 2018). In line with previous studies (Baño et al., 2021), lower GD severity was linked to a higher likelihood of dropout in the present study. A possible explanation for this finding may be that higher GD severity would be generating in these patients a greater interference in their daily lives and, consequently, a greater motivation to address GD behaviors.

The likelihood of treatment dropout within the SB + group was related to being unemployed. These results resonate with prior findings in other psychopathologies (Seidler et al., 2021) such as panic disorder (Keefe et al., 2021) or psychosis (Myhr et al., 2013). By contrast, the likelihood of dropout for SB- patients was greater for women, older individuals, and people within lower social positions. Among SB + and SB- patients, the likelihood of relapse was linked to not being married and

Table 4
Correlation matrix.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Age (years-old)	-															
2 Marital (unm.)	-0.394 [†]	-														
3 Education (low)	0.126	-0.092	-													
4 Employment (no)	0.006	-0.094	0.688 [†]	-												
5 Social pos. (low)	0.057	-0.146	0.018	0.336 [†]	-											
6 GD severity	0.056	-0.136	0.163	0.165	0.213	-										
7 Psychol. distress	0.174	-0.066	0.057	0.049	0.049	0.227	-									
8 Novelty-seeking	0.003	-0.309 [†]	0.060	0.077	0.055	0.108	0.303 [†]	-								
9 Harm-avoidance	0.003	-0.002	0.014	0.070	0.051	0.107	0.519 [†]	0.013	-							
10 Reward-depend.	0.068	-0.242 [†]	0.011	-0.104	0.051	0.175	-0.097	-0.033	-0.146	-						
11 Persistence	0.070	0.030	0.008	-0.156	-0.077	-0.276 [†]	-0.289 [†]	-0.119	-0.544 [†]	0.059	-					
12 Self-directedness	0.070	0.002	-0.067	-0.066	-0.082	-0.165	-0.325 [†]	-0.333 [†]	-0.132	0.381 [†]	0.064	-				
13 Cooperativeness	0.080	-0.106	0.159	0.116	0.258 [†]	0.154	0.344 [†]	0.124	0.040	0.094	0.140	0.523 [†]	-			
14 Self-Transcend.	0.043	0.110	0.027	0.198	-0.016	-0.053	0.031	-0.195	-0.021	-0.019	-0.040	0.025	-0.122	-		
15 Dropout	0.022	0.093	-0.146	0.165	0.128	0.195	0.332 [†]	-0.005	0.204	0.069	-0.082	-0.293 [†]	0.042	0.015	-	
16 Relapses															0.136	-0.035

Note. Upper part of the matrix: correlation for the SB group. Lower part of the matrix: correlation for the SB + group.

GD severity (SOGS total), psychological distress (SCL-90R GSI), personality features (TCI-R).

†Bold: effect size within the ranges mild-moderate to high-large ($|R| > 0.24$).

reporting more psychological distress. Several studies exploring treatment outcome in GD suggested that factors such as gender, severity of the disorder, anxiety symptoms, lack of social support, impulsivity, cognitive distortions or lack of coping skills may predict relapse (Ledgerwood & Petry, 2006).

Finally, and contrary to our expectations, SB + patients reported lower levels of persistence compared to the SB- group. Previous studies have reported higher levels of persistence among SB + individuals (Estévez et al., 2017). Likewise, it has been suggested that persistence is a personality feature associated with better clinical prognoses for other addictive behaviors (Álvarez et al., 2018). It could have been anticipated, therefore, that patients in the SB + group would have had higher persistence and, consequently, better treatment outcomes. However, the SB + group presented lower levels of persistence. Speculatively, high persistence in this group may reflect rigidity or less cognitive flexibility. Thus, patients with sports-betting problems, despite presenting more severe gambling problems, may be more easily willing to discard their dysfunctional behavior (gambling) and learn new lifestyles. In short, it could be postulated that they started sports betting because of their passion for sports, risk minimization of this activity and a wish to win money. These factors, in association with other possible risk factors (e. g., gender, age, being single, high levels of impulsivity and novelty-seeking), may have increased the likelihood of developing GD symptoms. However, by the time they accepted their disorder and sought treatment, low persistence could have acted as a protective factor, improving adherence to treatment. This could be in line with what has been reported by Jiménez-Murcia et al. (2021), in which the highest betting frequency was associated with lower levels of persistence. Currently, these notions are speculative. Further studies are needed to elucidate the specific role of persistence in the treatment outcomes of patients with GD.

2.11. Clinical implications

GD patients with sports betting, despite having lower levels of persistence and greater GD severity, showed lower likelihoods of dropout, which suggests that these patients may be highly motivated and respond well to psychological treatment. The finding that they show greater adherence to treatment could be due to, among other factors, their higher levels of education enhancing their understanding of the objectives and tasks of CBT or even, as has been discussed previously, low persistence could be understood as representing greater cognitive flexibility and better responsiveness to cognitive restructuring interventions. All in all, CBT requires significant involvement as the responsibility for recovery is centered on patients and their commitments to complete a series of tasks between sessions. Thus, it is not only a matter of attending scheduled group visits, but of putting into practice a series of activities and behaviors in the context of techniques such as stimulus control or cognitive techniques. So it may not be surprising that specific sociodemographic variables, social and family support or personality characteristics were the responsive to this type of therapy. However, these notions are currently speculative and warrant direct future examination. Likewise, knowing that factors such as unemployment or more psychological distress may be associated with higher likelihoods of dropout and relapse in SB + patients could possibly prevent abandonment of therapy if clinicians were to evaluate and address these factors throughout the therapeutic process.

2.12. Limitations and future studies

The present study is not without limitations. First, the sample sizes of both groups and the gender composition of the patients were not balanced. Future studies could benefit from including more treatment-seeking SB + patients and women. Second, personality features and psychological distress were assessed using self-report measures, with the associated biases that self-report instruments have. Third, our study only

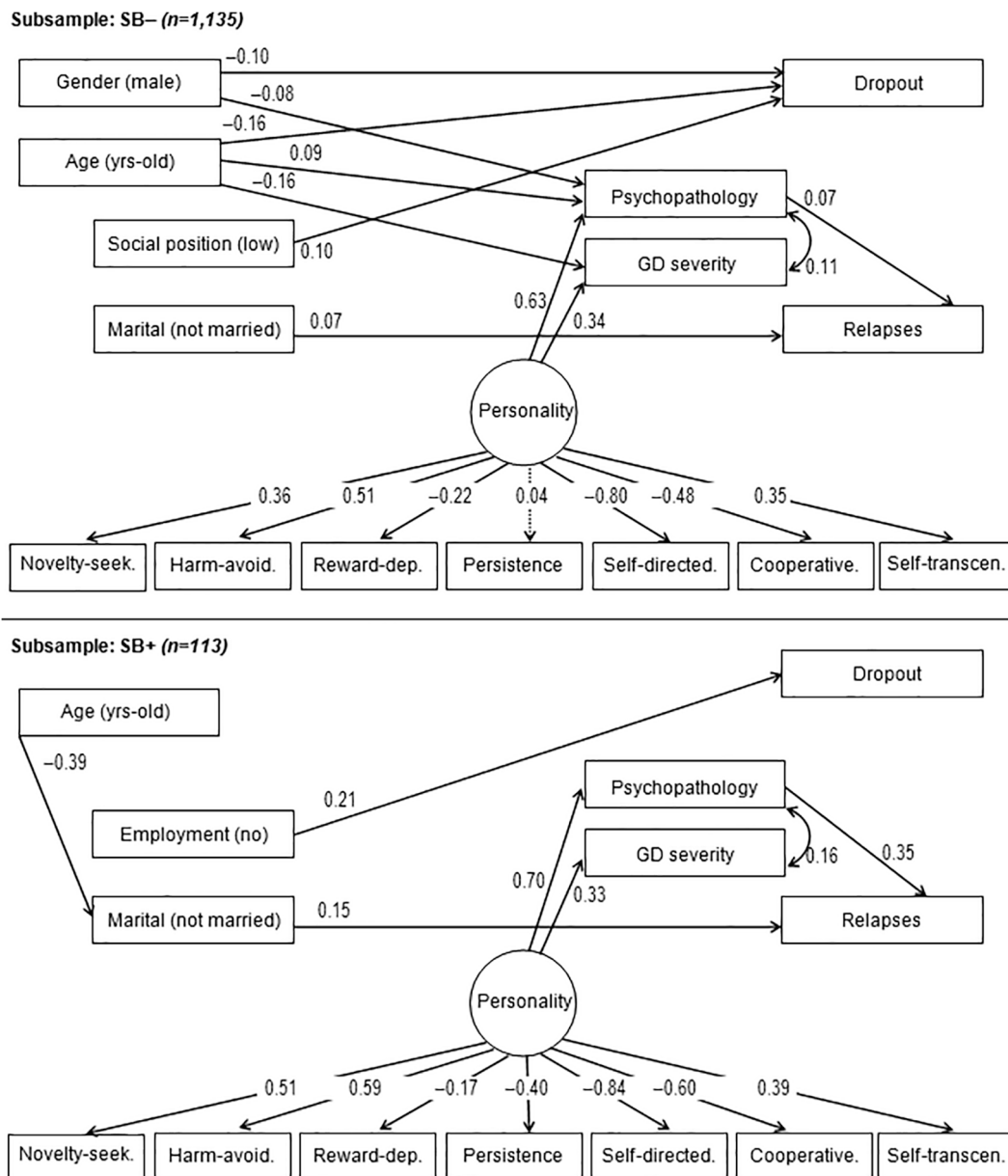


Fig. 2.

examined the effectiveness of group CBT, and it would be useful to know if similar results would be found for different treatments. Fourth, clinical factors associated with sports betting, such as involvement in micro-betting and online versus offline wagering or payment methods, were not evaluated and may be related to treatment outcomes. Finally, the present study did not include a follow-up phase to examine potential relapse after treatment.

3. Conclusion

SB + patients constitute a clinically important group due to the greater severity of the disorder compared to patients engaged in other forms of gambling. However, SB + patients had better treatment outcomes in terms of lower likelihoods of dropout, suggesting that early treatment may be especially important for SB + patients. In addition, the sociodemographic and clinical differences between SB + and SB- patients suggest that the former may benefit from specific therapeutic approaches. As sports betting becomes increasingly normalized and more easily accessible, further studies are needed to investigate the

characteristics of SB + patients and to gain knowledge regarding the key components of effective psychological interventions for them.

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Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Dr. Potenza discloses that he has consulted for and advised Game Day-Data, Addiction Policy Forum, AXA, Idorsia, Baria-Tek and Opiant Therapeutics; been involved in a patent application with Yale University and Novartis; received research support from the Mohegan Sun Casino, the Connecticut Council on Problem Gambling, and the National Center for Responsible Gaming; consulted for or advised legal and gambling entities on issues related to impulse control and addictive behaviors; provided clinical care related to impulse-control and addictive behaviors; performed grant reviews; edited journals/journal sections; given academic lectures in grand rounds, CME events, and other clinical/scientific venues; and generated books or chapters for publishers of mental health texts. Dra. Fernández-Aranda received consultancy honoraria from Novo Nordisk and editorial honoraria as EIC from Wiley. The rest of the authors have no conflicts of interest with the content of this manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.addbeh.2022.107371>.

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