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Gambling disorder duration and cognitive behavioural therapy outcome considering gambling preference and sex

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ABSTRACT

Gambling Disorder (GD) is a behavioural addiction that leads to high level of clinical distress and, in general, it is characterized by enduring symptomatology that presents high rates of chronicity. However, there is high variability of illness duration among patients who seek treatment for GD. Previous studies reported mixed results about the relevance of illness duration in GD treatment outcome. However, there are different profiles of patients who are diagnosed with GD. For this reason, this study aimed to evaluate the effect of illness duration in the treatment outcome of different profiles of GD patients according to their gambling preference and sex. The sample were 1699 patients diagnosed with GD. All patients received cognitive-behavioural therapy in a group format. Treatment outcome was evaluated in terms of relapsing to gambling behaviours and dropout from treatment. Results showed higher probability of poor outcome in the first years of the disorder for strategic gambling compared to non-strategic or mixed forms of gambling. Moreover, women also showed higher probability of poor outcomes than men since the first stages of the disorder. This study draws attention to the relevance of illness duration in the treatment outcome of specific profiles of GD patients. In particular, patients who presented a preference for strategic forms of gambling and women who are diagnosed with GD would have a higher risk of poor treatment outcomes since the first stages of the disorder. These results highlight the importance of an early intervention in these patients in order to prevent the chronicity of the disorder.

1. Introduction

Gambling disorder (GD) is defined as a persistent and recurrent gambling behaviour that leads to significant clinical distress (Diagnostic and Statistical Manual of Mental Disorders, DSM-5; American Psychiatric Association, 2013). GD is considered to be a long term mental illness with enduring symptomatology that presents high rates of chronicity (Abbott et al., 2018). However, GD onset is highly inconsistent across the lifespan (Guerrero-Vaca et al., 2019; Jiménez-Murcia et al., 2010), and the search for psychological therapy could appear at any stage of the problem, so there is a high variability of illness duration across patients who search for psychological treatment. Also, the presence of high impulsive traits, also typical from substance use and cluster B personality disorders, have been associated with elevated clinical severity and low success of treatment for GD (Blaszczynski et al., 1997; MacLaren et al., 2011; Ramos-Grille et al., 2015; Steel and Blaszczynski,

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1998). In line with this, low levels of neuroticism and low levels of sensation seeking have been associated with positive treatment outcomes (Merkouris et al., 2016). Therefore, a complex clinical profile of GD, in terms of comorbidity and specific personality traits, may imply resistance to treatment. All these factors contribute to the heterogeneous outcomes of the usual treatments for GD (Melville et al., 2007; Merkouris et al., 2016).

However, there is not a unique profile for all gambling related behaviours (Granero et al., 2020a; Milosevic and Ledgerwood, 2010; Moragas et al., 2015; Nower et al., 2013). The identification of differentiated subtypes has been a topic of interest for more than two decades, and many studies that established clinical profiles have been published, based on the presence of certain associated biopsychosocial factors (Kurilla, 2021). But also, a recurring categorization for gambling subtypes is based on the role of chance in the gambling behaviour. On the one hand, strategic gambling includes those games where skills and experience of the gambler are variables that can influence the outcome of the game. In other words, the gambler can adapt the strategy in order to obtain better results (e.g. sports betting, poker, blackjack). On the other hand, non-strategic gambling involves games completely driven by chance, where the player has no indicators to predict the result (e.g. bingo, slot-machines, lotteries). Gambling habit characterized by both preferences (non-strategic plus strategic) can be labelled as mixed (Mathieu et al., 2020; Nower and Blaszczynski, 2006; Pettorruso et al., 2021). Whereas non-strategic gambling has been associated with more recurrent gambling behaviours (Grant et al., 2012b; Ronzitti et al., 2016a), the preference for skill based forms of gambling was related to greater problems in terms of money spent and debts accumulated due to gambling (Jiménez-Murcia et al., 2020a). Moreover, strategic gambling has been associated with greater illusion of control (Myrseth et al., 2010), higher novelty seeking (Moragas et al., 2015) and alexithymia (Bonnaire et al., 2017), as well as poorer treatment outcomes (Jiménez-Murcia et al., 2020b; Mallorquí-Bagué et al., 2019) for this skill based form of gambling.

The comparison between GD in men and women is another categorization that reported different gambling patterns. Although the studies comparing GD features in women and men are scarce, the existing literature suggest that there are differences between both sexes. In particular, women tend to present later onset of the GD, but their disorder progresses more rapidly compared to men. This phenomenon has been labelled as "telescoping effect" (Grant et al., 2012b; Zakiniaeiz et al., 2017). Besides, compared to men, women who are diagnosed with GD are usually older when they seek treatment (Echeburúa et al., 2011; Grant et al., 2012c), they commonly show more depressive and anxious symptomatology (Grant et al., 2012a; Ronzitti et al., 2016b) and experience higher levels of psychological distress (Khanbhai et al., 2017). Additionally, women tend to present more non-strategic gambling behaviours than men (Jiménez-Murcia et al., 2020) and also worse therapy outcomes at short and medium terms (Merkouris et al., 2016; Toneatto and Wang, 2009).

Furthermore, GD treatment present high levels of dropout (Dunn et al., 2012; Maniaci et al., 2017), with up to half of patients who start a treatment abandoning it before completion (Roberts et al., 2020). In addition, a significant percentage of patients with GD often relapse in gambling behaviours, even if the total abstinence is the goal of the treatment (Aragay et al., 2015; Jiménez-Murcia et al., 2007). Overall, the success rates at the completion of treatment do not show optimal results either, with only between 39% and 89% of patients fully recovering after the full treatment (Merkouris et al., 2016). The broad ranges might be explained because of the inconsistence of defining treatment outcomes among the literature (Melville et al., 2007; Pickering et al., 2018). Taken together, all these evidences highlight the importance of applying effective treatments that successfully deal with GD. With this purpose, several research has been focused on identifying which individual factors predict poor therapy outcomes in GD (Jiménez-Murcia et al., 2019; Mallorquí-Bagué et al., 2018; Maniaci et al., 2017; Merkouris et al., 2016; Roberts et al., 2020; Ronzitti et al., 2017). Previous studies found a positive relationship between GD duration and dropout risk (Roberts et al., 2020) and gambling severity (Ledgerwood et al., 2020), while other studies did not find a relationship between illness duration and gambling treatment outcomes (Maniaci et al., 2017; Merkouris et al., 2016). Although this evidence is inconsistent, the duration of illness has been pointed out as one important variable that has to be taken into account when predicting treatment outcome in GD (Medeiros et al., 2017).

As far as we know, no study has defined how the duration of GD is related with its treatment response in a large cohort of patients, taking into account the different GD classifications. Moreover, given the heterogeneous profiles of patients with GD, it is important to understand how the variables associated with the disorder could influence the treatment outcome depending on individual features. Therefore, the aim of this study is to precisely define how the years from the onset of the disorder relate with the non-response to treatment taking different GD profiles also in consideration. First, considering the aforementioned studies that associated strategic forms of gambling with a more complex gambling profile and higher resistance to treatment, we assume that strategic gambling preference would be associated with a higher impact of duration in treatment outcome. Second, considering the literature about the "telescoping effect" in women, we hypothesize that women would also present worse treatment outcomes in the early stages of the disorder, compared to men.

2. Method

2.1. Participants

The sample consisted of N = 1699 patients who met DSM-5 criteria for GD (American Psychiatric Association, 2013) and voluntarily sought outpatient treatment at the Gambling Disorder Unit within the Department of Psychiatry at Bellvitge University Hospital (Barcelona, Spain). They completed a manualized CBT intervention program between January-2005 and August-2020. Exclusion criteria were having an intellectual disability or a severe mental disorder (i.e. active psychotic disorder).

2.2. Procedure

All the sociodemographic and clinical data used for this study (except treatment outcome) were collected as baseline. Prior to the start of the treatment, all participants were evaluated in two sessions by experienced clinical psychologists with high knowledge in GD. During the first session, the psychologist conducted a semi-structured clinical interview to endorse the clinical diagnosis of GD and explore different aspects of the gambling behaviour (e. g. type of gambling, money spent, frequency of gambling, debts, illegal acts, familiar and personal gambling background, etc), motivational status toward treatment and other psychopathological symptoms. During this interview, participants also self-reported the onset (defined as the onset of the symptoms related with the gambling behaviour) and duration of illness (defined as the period of time from the onset of symptoms to the beginning of the treatment). Sociodemographic variables were also collected in this first session. During this visit, participants were offered to participate in the study. Both the voluntariness of participation in the study and the independence of participating and the psychological treatment received afterwards were strongly emphasized. During the second visit, participants completed a battery of validated psychometric instruments. After the two initial evaluation sessions, the patients started the psychological treatment. The study procedures were carried out in accordance with the Declaration of Helsinki. The University Hospital of Bellvitge's Ethics Committee of Clinical Research approved the study (Refs. 34/05, 307/06) and all the participants provided signed informed consent.

2.3. Psychological assessment

Diagnostic Questionnaire for Pathological Gambling According to DSM Criteria (Stinchfield, 2003)**.** This is a 19-item questionnaire based on the DSM-IV-TR (American Psychiatric Association, 2000) that aims to identify the presence of pathological gambling. Noteworthy, with the appearance of the DSM-5, pathological gambling was reclassified and renamed as gambling disorder. So, all patients' diagnoses were re-evaluated and recodified post hoc and only patients who met DSM-5 criteria for GD were involved in our study. The Spanish version of this instrument used in this study has shown adequate internal consistency (Cronbach's alpha α = 0.77) (Jiménez-Murcia et al., 2009). This tool was used to confirm the presence of GD, and also as a measure of the GD severity, according to the criteria established in the DSM-5 (Number of criteria met). The internal consistency in the study was into the adequate range (Cronbach's alpha, α = 0.78).

South Oaks Gambling Screen (SOGS) (Lesieur and Blume, 1987). This is a self-report screening questionnaire for GD that showed correlations with DSM-IV diagnostic criteria and other measures of gambling severity (Stinchfield, 2002). It consists of 20 items that measure cognitions, emotions and other behaviours strongly related to problem gambling. The Spanish version of this tool has shown high internal consistency (Cronbach's alpha α = .94) and good test–retest reliability (r = 0.98) (Echeburúa et al., 1994). The SOGS total score was used in the study as a measure of the gambling symptom level at baseline. The internal consistency in this work was into the adequate range (α = 0.72).

Symptom Checklist-Revised (SCL-90-R) (Derogatis, 1994)**.** It consists of a self-report questionnaire that aims to assess global psychopathology. By using 90 items, it measures nine symptom dimensions and three global indices. One of the most widely used indexes is the global severity index (GSI), also called the index of psychopathological distress, which is a direct indicator of the level of severity of the symptoms. The Spanish adapted version used in this study showed adequate results (Cronbach's alpha α = 0.75) (Derogatis, 1997). The internal consistency in the study was into the ranges good to excellent (between α = 0.80 for phobic anxiety to α = 0.98 for the global indexes).

Temperament and Character Inventory-Revised (TCI-R) (Cloninger, 1999)**.** This is a 240-item questionnaire that measures four temperament dimensions and three characteristics of personality. All items of the questionnaire are measured using a 5-point Likert-type scale. The Spanish version of this tool used in this study showed adequate internal consistency (the mean Cronbach's alpha was α = 0.87) (Gutiérrez-Zotes et al., 2004). The internal consistency in the study was into the ranges adequate to very good (between α = 0.72 for novelty seeking to α = 0.85 for persistence).

Other sociodemographic and clinical variables: Additional sociodemographic information including gender, marital status and social status (measured through the Hollingshead's scale (Hollingshead, 2011)) was collected during a semi-structured interview (see description in: (Jiménez-Murcia et al., 2019). Other clinical variables related to gambling collected in the present study were the age of GD onset, duration of the disorder (in years), debts due to GD (in euros) and gambling activity (which allowed the classification of the gambling type in three groups: non-strategic, strategic, and mixed). Table 1 summarizes sociodemographic and addictive-related variables of the sample.

2.4. Treatment

All participants received manualized cognitive-behavioural therapy (CBT) intervention of 16 weekly outpatient sessions of 90 min each, in a group format (averaging approximately 10 patients-per-group). The program was implemented by a qualified clinical psychologist and a clinically trained co-therapist at the Hospital Unit (Bellvitge University Hospital). The treatment aims to provide patients with training in self-control and emotion regulation strategies, to improve their expectations of recovery and, ultimately, to obtain a complete and definitive abstinence from any type of gambling behaviour. A full description of this CBT program has been previously published and it is available directly from the corresponding author of the manuscript (Jiménez-Murcia et al., 2006). Both short- and medium-term

Table 1
Descriptive of the sample.

	Total sample		Non-strategic		Strategic		Mixed		*p*	C–V	Women		Men		*p*	C–V
	n = 1699		n = 1228		n = 173		n = 298				n = 232		n = 1467			
	n	%	*n*	%	*n*	%	*n*	%			*n*	%	*n*	%		
Sex Female	232	13.7%	194	15.8%	11	6.4%	27	9.1%	**.001**[a]	**.103**[b]	–	–	–	–	–	–
Male	1467	86.3%	1034	84.2%	162	93.6%	271	90.9%			–	–	–	–		
Marital status Single	651	38.3%	417	34.0%	101	58.4%	133	44.6%	**.001**[a]	**.162**[b]	100	43.1%	551	37.6%	**.001**[a]	**.110**[b]
Married	834	49.1%	644	52.4%	59	34.1%	131	44.0%			86	37.1%	748	51.0%		
Divorced	214	12.6%	167	13.6%	13	7.5%	34	11.4%			46	19.8%	168	11.5%		
Education Primary	946	55.7%	745	60.7%	52	30.1%	149	50.0%	**.001**[a]	**.232**[b]	139	59.9%	807	55.0%	.375	.034
Secondary	650	38.3%	439	35.7%	93	53.8%	118	39.6%			80	34.5%	570	38.9%		
University	103	6.1%	44	3.6%	28	16.2%	31	10.4%			13	5.6%	90	6.1%		
Employed No	662	39.0%	508	41.4%	51	29.5%	103	34.6%	**.003**[a]	.084	116	50.0%	546	37.2%	**.001**[a]	**.100**[b]
Yes	1037	61.0%	720	58.6%	122	70.5%	195	65.4%			116	50.0%	921	62.8%		
Social index High	22	1.3%	8	0.7%	5	2.9%	9	3.0%	**.001**[a]	**.212**[b]	1	0.4%	21	1.4%	**.001**[a]	**.143**[b]
Mean to high	79	4.6%	38	3.1%	15	8.7%	26	8.7%			11	4.7%	68	4.6%		
Mean	194	11.4%	124	10.1%	29	16.8%	41	13.8%			27	11.6%	167	11.4%		
Mean to low	554	32.6%	386	31.4%	75	43.4%	93	31.2%			40	17.2%	514	35.0%		
Low	850	50.0%	672	54.7%	49	28.3%	129	43.3%			153	65.9%	697	47.5%		
Previous treat. No	213	12.5%	141	11.5%	11	6.4%	61	20.5%	**.001**[a]	**.120**[b]	29	12.5%	184	12.5%	.985	.001
Yes	1486	87.5%	1087	88.5%	162	93.6%	237	79.5%			203	87.5%	1283	87.5%		
GD type Non-strat.	1228	72.3%	–	–	–	–	–	–	–	–	194	83.6%	1034	70.5%	**.001**[a]	**.103**[b]
Strategic	173	10.2%	–	–	–	–	–	–			11	4.7%	162	11.0%		
Mixed	298	17.5%	–	–	–	–	–	–			27	11.6%	271	18.5%		
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*p*	η^2	*Mean*	*SD*	*Mean*	*SD*	*p*	η^2
Age (yrs)	42.99	13.38	44.72	13.18	34.31	12.15	40.91	12.64	**.001**[a]	.059	49.16	12.35	42.02	13.28	**.001**[a]	.034
Onset GD (yrs)	30.55	12.07	31.29	12.27	27.54	9.68	29.25	12.13	**.001**[a]	.011	37.43	11.95	29.47	11.73	**.001**[a]	.051
Duration GD (yrs)	5.85	5.55	6.06	5.72	3.71	3.95	6.25	5.38	**.001**[a]	.017	5.65	5.66	5.89	5.54	.542	.001

Note. GD: gambling disorder. SD: standard deviation. Previous treat.: Previous treatments. C–V: Cramer-V. η^2: Partial-eta-square.

[a] Bold: significant comparison (p < .05 level).

[b] Bold: effect size into the range mild-moderate to high-large.

effectiveness of the protocol has been previously described elsewhere (Jiménez-Murcia et al., 2007, 2015). A relapse has been defined as the presence of a gambling episode once the intervention started and, the dropout criteria established was missing three consecutive sessions of CBT therapy. The presence of relapses or treatment dropout was considered a poor therapy outcome.

2.5. Statistical analysis

Statistical analysis was carried out with Stata17 for Windows (Stata-Corp, 2021). First, the comparison between the groups was based on chi-square tests (χ^2) for categorical variables and on analysis of variance (ANOVA) for quantitative variables. In this study, different classification in independent groups were considered, based on the gambling preference (non-strategic, strategic and mixed) and the treatment outcomes (dropout: no/yes; relapses: no/yes; poor outcome: no/yes). Effect size for the comparisons was based on Cramer-*V* coefficient: null-low effect size was considered for *C–V*<0.10, moderate-mild for *C–V*>0.10, and large-high for *C–V*>030 (Cohen, 1988); partial-eta-squared coefficient was used for the ANOVAs: values of $\eta^2 > 0.06$ were interpreted as low-poor effect size, $\eta^2 > 0.10$ as moderate-mild, and $\eta^2 > 0.25$ as large-high (Levine and Hullett, 2002). In this study, and since the samples consisted of hundreds of patients, normality of the distribution of the variables was ignored because according to the central limit theorem, the sampling distribution tends to be normal regardless of the shape of the data (Altman and Bland, 1995). Control for increase in Type-I error due to the multiple null-hypothesis tests was based on Finner's method, a stepwise multiple test procedure aimed to adjust the *p-values* controlling the familywise procedure (Finner and Roters, 2001). The algorithm implemented in this procedure consists in adjusting the rejection criteria for each of the individual hypotheses fixing the familywise error rate no higher than a certain pre-specified significance level (0.05 in this work). The procedure starts sorting into order lowest-to-highest the p(unadjusted)-values p1, …, pk obtained in k-independent null-hypothesis tests.

Survival analysis was used to identify the time-point in the self-reported duration of the GD to reach the cumulative probability of at least 50% for a poor therapy outcome, defined as the presence of relapses or treatment dropout. This method is used in clinical research to estimate the probability of patients who "survive" without the presence of an event in this work for surviving without dropout and relapses. It has the advantage of allowing censored data about patients who arrive alive to the end of the treatment without event occurrence (Aalen et al., 2008). We used the Kaplan-Meier method for estimating the cumulative survival function, defining the "survival time" as the progression/duration of the GD (the time between the onset of the GD and the beginning of the treatment). The gambling preference (non-strategic, strategic or mixed) and the patients' sex were included in the modelling to assess the potential role of these features as moderator/-interaction variables (Log Rank Mantel-Cox test was used for valuing the interaction term).

The median estimated in the Kaplan-Meier survival functions were next employed for classifying the individuals in two groups: a) patients with GD progression higher than the median (these subjects had a probability of poor treatment outcome higher than 50%, and therefore the group was labelled as "poor responders"); and b) patients with GD progression lower than the median (subjects within this group were characterized by a probability of poor outcome lower than 50%, and therefore the group was labelled as "good responders"). That is, poor treatment responders grouped patients with a duration of the GD higher than the median (percentile-50) estimated in the survival functions, and therefore they were characterized by a duration of the disorder higher than patients with a high risk of poor response (at least 50%). Contrarily, good treatment responders grouped patients with a duration of the GD lower than the median in the survival functions, who represent individuals with a duration of the disorder lower than patients with a high risk of good response (above 50%).

Stepwise logistic regression obtained models with the significant capacity for discriminating between poor and good responders (as defined in the previous paragraph), selecting in the list of potential predictors the sociodemographics (marital status, employment status, education, socioeconomic position), age of onset of the GD, gambling severity (DSM-5 criteria for GD), SOGS total score, previous treatments for GD, psychological distress (SCL-90R GSI), and personality traits (TCI-R scale scores). These models were estimated in two blocks/steps: a) first block entered and fixed the predictors sex, age and gambling type (these variables were entered in the first step to keep them in the model and avoid the possibility that they were excluded in the stepwise procedure); and b) second block automatically selected the significant predictors. Goodness of fit for the final models were assessed with Hosmer-Lemeshow test (satisfactory fitting was considered for $p > .05$) and global predictive capacity was measured with the Nagelkerke's pseudo-R^2 coefficient [low-poor effect was considered for $R^2 > 0.06$, mild-moderate for $R^2 > 0.13$ and high-large for $R^2 > 0.26$ (Miles and Shevlin, 2001)]. The area under the ROC curve (AUC) was also obtained as a measure of the global discriminative capacity.

3. Results

3.1. Characteristics of the participants

Table 1 displays the descriptive for the sample (sociodemographics and variables related with the gambling profile). Majority (86.3%) of the participants were men, married (49.1%), with low education levels (55.7%), employed, were within mean to low social position indexes, and had received no previous treatments. Non-strategic games were the most preferred types of gambling by the participants (72.3%) followed by mixed games (17.5%), and strategic games (10.2%). Mean age was 43.0 years, the mean age of onset of the GD was 30.6 years, and the duration 5.9 years. Comparison between the groups defined by the gambling preference and the sex obtained significant differences for most of the variables reported in Table 1. Moreover, in Table S1 we include the distribution of gambling activity types for all the groups.

3.2. Distribution of the treatment outcomes and comparison between the groups

Table 2 shows the therapy outcomes and the comparison between the groups defined by the gambling type and the sex. In the complete sample, the risk of dropout was 34.8% and the risk of relapses during the intervention was 25.1%. No association was found between the treatment outcome and the gambling type, but men reported better treatment outcomes compared to women.

Table S2 shows the bivariate analyses performed to identify variables associated with the risk of dropout, relapses and poor outcome. As a whole, the poorest treatment outcomes were related to female sex, being single or divorced, lower social position indexes, younger age, worse psychopathology state, higher novelty seeking level, lower self-directedness and cooperativeness levels and use of tobacco and other illegal drugs.

3.3. Survival functions

Fig. 1 shows the Kaplan-Meier curves for the rate of dropout, relapses and poor outcome. The X-axis represents the progression/duration of the GD (years), the Y-axis represents the estimated proportion of patients who *"survive"* without the presence of each event, and the black curve is the cumulative survival function (interpreted as the probability that patients will survive beyond each duration-time). The horizontal and vertical dashed-lines measure the median estimates (percentile 50) in the survival functions. Therefore, the duration of the GD associated with at least 50% likelihood of dropout during the treatment is 13 years (95%

Table 2
Distribution of the outcome.

	Total sample		Non-strategic		Strategic		Mixed		*p*	C–V	Women		Men		*p*	C–V
	n = 1699		n = 1228		n = 173		n = 298				n = 232		n = 1467			
	n	%	*n*	%	*n*	%	*n*	%			*n*	%	*n*	%		
Dropout	591	34.8%	429	34.9%	65	37.6%	97	32.6%	.532	.027	113	48.7%	478	32.6%	**.001**[a]	**.116**[b]
Relapses	426	25.1%	314	25.6%	31	17.9%	81	27.2%	.061	.057	85	36.6%	341	23.2%	**.001**[a]	**.106**[b]
Poor outcome	914	53.8%	671	54.6%	88	50.9%	155	52.0%	.514	.028	167	72.0%	747	50.9%	**.001**[a]	**.145**[b]

Note. C–V: Cramer-V. Poor outcome: drop-out or relapses.
[a] Bold: significant comparison (p < .05 level).
[b] Bold: effect size into the range mild-moderate to high-large. C–V: Cramer-V.

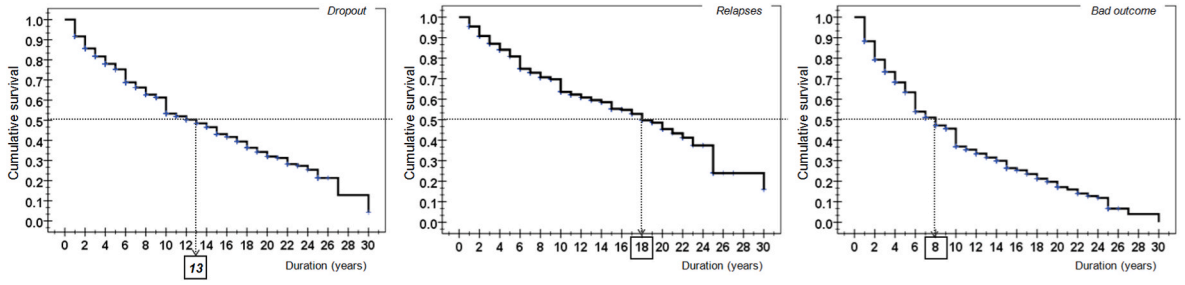

Fig. 1. Cumulate survival functions of the presence of dropout (left), relapses (centre) and poor outcome (right), depending on GD duration at the start of the treatment, for the total sample
Note. Poor outcome considered for dropout or the presence of relapses.

confidence interval −95%CI-: 11.8–14.2 years). The probability of 50% or higher for relapses is associated with a duration of the GD of 18 years (95%CI: 15.5–20.5 years) and the probability of 50% or higher for poor outcome is related with a duration of the GD of 8 years (7.5–8.5 years).

The upper panel in Fig. 2 shows the Kaplan-Meier curves stratified by the gambling preference (non-strategic, strategic and mixed). The duration of the GD associated with at least 50% likelihood of dropout for strategic gambling was 7 years, 13 years for non-strategic gambling, and 14 years for mixed gambling (significant differences between the curves were observed: $\chi^2 = 18.49$, $p < .001$). For the survival representing the rate of relapses, the duration of the GD associated with at least 50% of probability of presenting gambling/episodes was 18 years for strategic games, 19 years for non-strategic games and 20 years for mixed games (without statistical differences between the groups: $\chi^2 = 0.36$, $p = .836$).

The progression of the GD associated with 50% or higher probability of poor outcome was statistically lower for strategic games compared to the other gambling preferences (5 years versus 8 years; $\chi^2 = 18.49$, $p < .001$).

The lower panel in Fig. 2 shows the cumulate survival functions for the rate of dropout, relapses and poor outcome, stratified by the patients' sex. These plots indicate that the progression of the GD associated with 50% or higher probability of poor treatment outcomes is lower for women compared to men (dropouts:: $\chi^2 = 18.21$, $p < .001$; relapses:: $\chi^2 = 18.18$, $p < .001$; poor outcome:: $\chi^2 = 22.16$, $p < .001$).

3.4. Stepwise regressions

The results of the binary logistic regressions are displayed in Table 3.

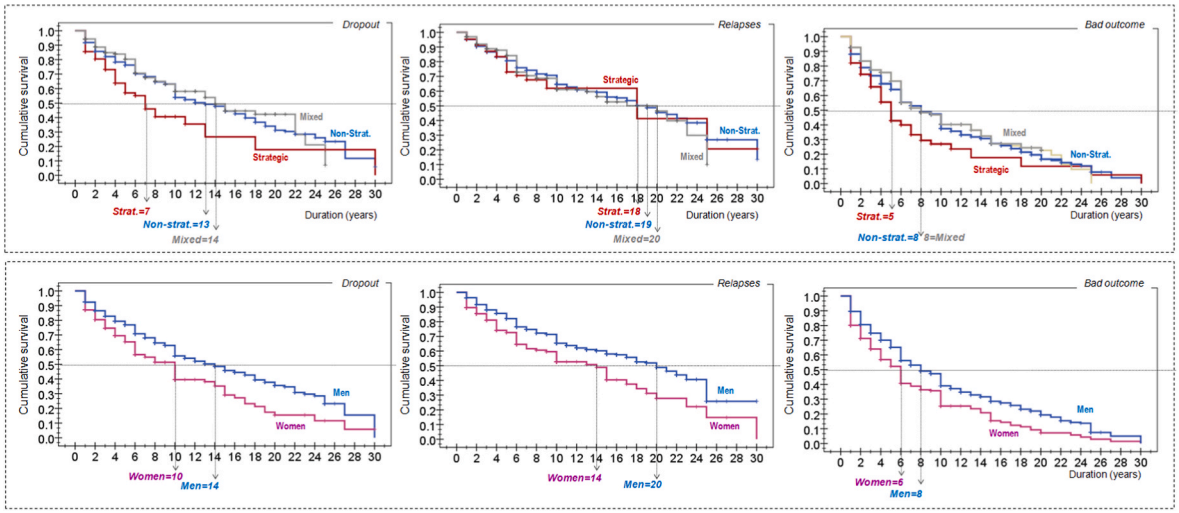

Fig. 2. Cumulate survival functions of the presence of dropout (left), relapses (centre) and poor outcome (right), depending on GD duration at the start of the treatment, stratified by the gambling preference (up) and sex (down)
Note. Poor outcome considered for dropout or the presence of relapses.

Table 3
Stepwise regressions of the long-time duration of the GD comprising treatment (total sample: N = 1699).

Outcome: dropout		B	SE	p	OR	95%CI (OR)		H-L	N-R^2	AUC
Fixed variables	Sex (male)	0.159	0.224	.479	1.172	0.755	1.819	.054	.027	.644
	Age (yrs-old)	0.036	0.006	<.001	1.037	1.024	1.049			
	Gambling type			.007						
Predictors	SOGS total	0.125	0.027	<.001	1.133	1.074	1.196	.842	.078	.671
Outcome: relapses		*B*	*SE*	*p*	*OR*	*95%CI (OR)*		*H-L*	*N-R^2*	*AUC*
Fixed variables	Sex (male)	0.698	0.330	.034	2.009	1.053	3.835	.059	.022	.645
	Age (yrs-old)	0.047	0.008	<.001	1.048	1.031	1.065			
	Gambling type			.231						
Predictors	SOGS total	0.088	0.039	.024	1.092	1.012	1.178			
	Psychology distress	0.464	0.147	.002	1.590	1.191	2.122	.240	.094	.717
Outcome: poor outcome		*B*	*SE*	*p*	*OR*	*95%CI (OR)*		*H-L*	*N-R^2*	*AUC*
Fixed variables	Sex (male)	0.308	0.169	.068	1.361	0.977	1.896	.060	.041	.642
	Age (yrs-old)	0.035	0.005	<.001	1.036	1.026	1.045			
	Gambling type			<.001						
Predictors	Marital status (not married)	0.275	0.120	.022	1.316	1.041	1.665	.935	.105	.670
	SOGS total	0.130	0.020	<.001	1.138	1.095	1.184			
	TCI-R Persistence	−0.007	0.003	.017	0.993	0.987	0.999			

Note. OR: odds ratio. H-L: Hosmer-Lemeshow test. Poor outcome: dropout or presence of relapses.
N-R^2: Nagelkerke's pseudo-R^2 coefficient. AUC: area under the ROC curve.
List of predictors: sociodemographics (marital status, employment status, education, socioeconomic position), gambling severity (DSM-5 criteria for GD), SOGS total, psychological distress (SCL-90R GSI), and personality traits (TCI-R scale scores).

The criteria variable of the models was the classification of poor and good treatment response according to the results of the cumulative survival analysis. After entering and fixing the variables sex, age and gambling type, the variable with significant capacity to identify poor-responders with high likelihood for dropout was higher SOGS total score at baseline. For identifying poor-responders associated with a high rate of relapse, the significant predictors were higher SOGS total score and worse psychopathological state prior to treatment. Finally, the poor-responder associated with high likelihood of poor outcome was best predicted by the civil status (being not married), higher SOGS total score at baseline and lower persistence levels. Adequate goodness-of-test was achieved for all the models displayed in Table 3 ($p > .05$ in the Hosmer-Lemeshow tests), and global predictive and discriminative capacity was low (Nagelkerke's-$R^2 < 0.13$, and AUC <0.70).

4. Discussion

Regarding our first hypothesis, the results show that strategic forms of gambling are associated with a higher impact of duration in treatment outcome since the first years of the disorder. According to our results, patients with a preference for strategic gambling had a higher risk of poor treatment outcome if the treatment was applied after five years from the onset of the disorder, while in patients with other gambling preferences this higher risk was observed after eight years. However, patients who preferred strategic forms of gambling also presented significantly lower duration of the disorder, so it could prone them to earlier poor outcomes. But the fact that people who prefer strategic subtype develop more severe gambling behaviours and acquire more debts in a smaller period of time could be related with higher risk of treatment dropout from the first stages of the disorder and, therefore, points towards the necessity of an early intervention for strategic gambling behaviours (Fernández-Aranda et al., 2021; Jiménez-Murcia et al., 2020). Still, regarding gambling preference, other factors may also be influencing GD prognosis, such as metacognitive functioning, emotion regulation or personality traits (Jiménez-Murcia et al., 2020; Rogier et al., 2021; Velotti et al., 2021).

Concerning the second hypothesis, women presented higher risk of dropout and relapse in gambling behaviours than men since the first years of the GD and throughout the evolution of the disorder. Women were more likely to have a poor treatment outcome if they received treatment after six years from the onset of the disorder, while men were more likely to have a poor treatment outcome after eight years. The sample of women diagnosed with GD present similar duration of the disorder, but later onset, compared with the sample of men. These results agree with the telescoping effect that has been proposed by previous studies (Grant et al., 2012b; Zakiniaeiz et al., 2017; Zakiniaeiz and Potenza, 2018). According to this assumption, women tend to present later GD onset, but faster evolution of the disorder. Attending our results, they would also present higher probabilities of poor treatment outcome at the earlier stages of the disorder. Furthermore, even though women tend to present a preference for non-strategic gambling and strategic gambling behaviours are associated with higher severity of the GD and worse treatment outcomes (Jiménez-Murcia et al., 2020), women show higher risk of dropout and relapse from the first stages of the disorder. Previous studies already pointed out that women have higher risk of poor treatment outcome (Merkouris et al., 2016; Toneatto and Wang, 2009). Our results agree with these assumptions and highlight the importance of illness duration, especially in female patients, given the high risk of dropping out from the treatment and relapses in women even in the first years from the disorder onset. Moreover, these results fit with recent findings that already highlighted the need to investigate specific risk factors in women (Baño et al., 2021). However, these findings should be interpreted taking into account potential confounding factors, as women may feel that they are not fulfilling the societal gender roles and social expectations (Hing et al., 2014) and could be suffering from lack of social support and comorbid disorders, that have been related to worse treatment outcomes (Black and Shaw, 2019).

Gambling disorder is a heterogeneous condition that can be associated with high levels of psychopathology and maladaptive personality traits, such as high impulsivity, and comorbidities, resulting in a more complex clinical profile (Blaszczynski et al., 1997; MacLaren et al., 2011; Steel and Blaszczynski, 1998) that may negatively influence treatment response (Huneke et al., 2021; Merkouris et al., 2016; Ramos-Grille et al., 2015). It should be noted that most patients in all groups had already undergone previous treatments. The results also show that the baseline SOGS total score, as well as general psychopathology, low levels of persistence as a personality trait and being unmarried are variables associated with poor response to treatment. In fact, these findings, obtained in such a large clinical sample, confirm those of previous studies regarding the importance of gambling symptomatology measured with an instrument like the SOGS as a factor associated with the risk of treatment dropout or relapse (Granero et al., 2020b; Jiménez-Murcia et al., 2019; Merkouris et al., 2016). In this study, nearly one third of the patients who sought treatment for GD dropped out before completing it. Additionally, one in four patients relapsed in their gambling behaviours during therapy. Considering these

two signs of poor treatment outcome, more than half of patients who sought treatment for GD did not have a successful treatment outcome. As expected, patients with these poor treatment outcomes had a more severe psychopathological profile according to the clinical variables analysed. All these results are consistent with previous findings present in the literature (Merkouris et al., 2016). Besides, according to our results, in specific types of patients, longer illness duration would be related with enduring symptomatology that present high rates of chronicity and, therefore, greater difficulties to treatment (Abbott et al., 2018). This is also consistent with the aforementioned literature about the importance of illness duration in the risk of having poor treatment outcomes in patients with GD (Medeiros et al., 2017; Roberts et al., 2020). Still, other studies did not find the relationship between illness duration and worse treatment outcomes (Maniaci et al., 2017; Merkouris et al., 2016). In our study, no differences were found in illness duration between any of the forms of poor treatment outcomes analysing the whole sample. Hence, these previously found heterogeneous results about the effect of illness duration in the treatment outcome of GD could be explained taking into account the different features of the patients. Therefore, unique features of patients diagnosed with GD should be taken into account to evaluate the importance of illness duration in the potential risk of having a poor treatment outcome.

The results presented in this study cannot be fully interpreted without taking into account some limitations. As expected, the sample sizes of the groups were not homogeneous, as the prevalence of the disorder is not balanced between different gambling subtypes or sex. Also, data only included short-term therapy outcomes, so it would be interesting for future studies to include longitudinal data of long-term outcomes. Additionally, self-reported duration may be vulnerable to recall bias. Another limitation of this study is the lack of control for other complementary psychological and pharmacological treatments. Moreover, this study only focuses in gambling type and sex categorizations, but further research should also investigate if other features (as online/offline gambling preference) could also be associated with a stronger impact of illness duration in treatment outcomes.

Previous studies reported diverse results about the impact of illness duration in GD treatment outcome. This study fills this gap, providing evidence of different influences of illness duration in GD depending on patients' features. According to these results, those patients who prefer strategic forms of gambling and female patients would have a more dangerous impact of illness duration in treatment outcomes. The results provide evidence of the importance of taking into account the duration of the GD to forecast possible treatment outcomes in these particular profiles of patients as, for them, longer duration is strongly related to worse treatment outcomes. Therefore, this paper highlights the importance of defining precisely which factors may be representing a vulnerability to develop and maintain gambling related behaviours in order to design accurate protocols that prevent its chronicity.

Authors' contribution

IL, FFA, and SJM contributed to the development of the study concept and design. RG performed the statistical analysis. IB, MGP, LM, BMM and MLLH aided with data collection. IL, RG, NSM, FFA and SJM aided with interpretation of data and the writing of the manuscript. ZD, FFA and SJM aided with supervision, review and editing of the manuscript.

Patient consent statement

Informed consent was obtained from all individual participants included in the study.

Data availability

The datasets generated during and/or analysed during the current study are not publicly available due to ethical restrictions in order to protect the confidentiality of the participants, but are available from the corresponding author on reasonable request.

Declaration of competing interest

FFA received consultancy honoraria from Novo Nordisk and editorial honoraria as EIC from Wiley. ELTE Eötvös Loránd University receives funding from the Szerencsejáték Ltd. to maintain a telephone helpline service for problematic gambling. ZD has also been involved in research on responsible gambling funded by Szerencsejáték Ltd. and the Gambling Supervision Board and provided educational materials for the Szerencsejáték Ltd's responsible gambling program. The University of Gibraltar receives funding from the Gibraltar Gambling Care Foundation. However, these funding aren't related to this study and the funding institution had no role in the study design or the collection, analysis, and interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychires.2022.12.031.

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