Suicidal behavior in patients with gambling disorder and their response to psychological treatment: The roles of gender and gambling preference

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ABSTRACT

Suicidal ideation and attempts are prevalent among patients with gambling disorder (GD). However, patients with GD and a history of lifetime suicidal events are not a homogeneous group. The main objective of this study was to compare sociodemographic, clinical, personality, and psychopathological features among different profiles of adults with GD with and without a history of suicidal behavior, taking into account two relevant variables: gender and gambling preference. The second aim was to examine how the different profiles of patients with a history of suicidal events responded to cognitive-behavioral therapy (CBT). A total of 1112 treatment-seeking adults who met the criteria for GD were assessed at a hospital specialized unit for the treatment of behavioral addictions. The participants completed self-reported questionnaires to explore GD, personality traits, and psychopathological symptomatology. The lifetime histories of suicidal ideation and attempts, and gambling preferences, were assessed during semi-structured face-to-face clinical interviews. Of the total sample, 229 patients (26.6%) reported suicidal ideation and 74 patients (6.7%), suicide attempts. The likelihood of presenting suicidal ideation was higher for women than men, but no differences were observed based on gambling preference. Regarding suicide attempts, the odds were higher among women with non-strategic forms of gambling. Suicidal ideation and attempts were associated with higher GD severity, a worse psychopathological state and higher self-transcendence levels. In terms of treatment outcomes, neither gambling preference nor past suicidal behavior had an influence on dropouts and relapses. Nevertheless, female gender and a lack of family support constitute two good predictors of a worse treatment outcome.

1. Introduction

Gambling disorder (GD) is marked by a loss of control over gambling behavior that affects an individual's day-to-day functioning and causes significant psychological distress (American Psychiatric Association, 2013). GD is associated with severe consequences such as interpersonal, financial, and legal problems, with suicidal behavior being the most dramatic of these (Lee et al., 2011; Petry and Kiluk, 2002). Suicidal behavior may be considered a continuum that begins with suicidal ideation and may continue with planning, attempts, and suicide

completion (Yuodelis-Flores and Ries, 2019), and it is prevalent among patients with GD even after considering depression and anxiety disorders, substance use disorders, attention deficit/hyperactivity disorder, and other relevant disorders commonly associated with suicidal behavior (Wardle et al., 2020). Therefore, research is needed in order to better understand the risk factors that are related to suicidal behavior and develop interventions for suicide prevention and detection.

Several studies have examined risk factors associated with suicidal ideation and attempts among individuals experiencing gambling problems, with evidence consistently supporting psychiatric comorbidities (mainly depressive and substance use disorders), female gender, and problem gambling severity as the most relevant factors (Carr et al., 2018; Giovanni et al., 2017; Guillou-Landreat et al., 2016; Husky et al., 2015; Ronzitti et al., 2017).

The literature has also identified other factors that often appear to be associated with suicidal behavior among individuals with GD. Higher levels of novelty seeking and harm avoidance personality traits (Guillou-Landreat et al., 2016) and financial problems are generally described. In addition, family conflict has been pointed out as a risk factor for suicidal behavior among patients with GD (Petry and Kiluk, 2002).

Studies examining the risk factors related to suicidal behavior tend to consider individuals with GD as a homogeneous group, while growing evidence indicates different subtypes of patients exhibiting certain characteristics, with gambling preference and gender being two promising factors that may account for these differences (Granero et al., 2018; Jiménez-Murcia et al., 2020; Ladd and Petry, 2002; Moragas et al., 2015).

In a sample of 442 pathological gamblers, Bischof et al. (2016) examined how the form of gambling contributed to suicidal events, finding that gambling on electronic gambling machines causes an almost threefold increase in the risk of suicidal events independently from lifetime mood or personality disorders. In the same vein, Petry (2003) found that higher rates of suicide attempts were reported for non-strategic gamblers/forms of gambling (those for which knowledge and skill are less necessary in order to participate in the game) than strategic gamblers (for which the gambler is more active, as certain skills are needed to take part in the game).

Gender also seems to be a key variable when understanding the heterogeneity among patients with GD and a lifetime history of suicidal behavior. Although pathological forms of gambling are more prevalent among males, women also experience GD but rarely seek treatment (Braun et al., 2014). This fact may explain why most studies have focused on male patients, to the detriment of females, even though several studies have found that female gender may be a risk factor for suicidal behavior (Bischof et al., 2015; Giovanni et al., 2017). In a community sample of individuals living in metropolitan France (Husky et al., 2015), the authors found that women with gambling problems were more prone to experiencing suicidal ideation and behaviors compared to men, underlying the fact that gender should be considered a relevant factor when assessing suicide risk in individuals with GD. The greater likelihood of women experiencing suicidal behavior has been hypothesized to be due to the fact that women are more prone to gambling as a form of emotional regulation (Hing et al., 2016) and this has been associated with suicidality (Hatkevich et al., 2019; Neacsiu et al., 2018).

Cognitive behavioral therapy (CBT) has been described as the most commonly used treatment for GD (Menchon et al., 2018; Petry et al., 2017). Studies on CBT response have described heterogeneity in the profiles of individuals with GD regarding treatment outcomes, with significant discrepancies in the literature in respect of relapse and dropout rates (Merkouris et al., 2016), which require the identification of subgroups of patients. An increased likelihood of dropout in GD patients undergoing treatment has been associated with older age, early age of gambling onset, longer duration of the disorder, lower gambling debts, and comorbid psychopathology including anxiety, substance use,

and greater levels of impulsivity (Melville et al., 2007). A lower severity of the gambling problem has been described as one of the most consistent predictors of successful treatment outcomes (Gómez-Peña et al., 2012). In addition, suicidal behavior has been found to be associated with poorer treatment outcomes in other mental disorders, including depressive disorders (Abbott et al., 2019; Kim et al., 2011). In spite of the relevance of suicidal behavior, to our knowledge, no studies have examined whether patients with GD and suicidal behavior constitute an at-risk subgroup for poorer treatment outcomes among patients attending a psychological intervention. Based on the heterogeneity of treatment outcomes among patients with GD, a recent study examined whether these differences may be explained by gender and gambling preference. The authors did not find differences among the subgroups in terms of treatment outcomes (Khanbhai et al., 2017) but acknowledged the need to further examine the contributions of gender and gambling preference in terms of treatment outcomes, given that only electronic gambling machines and track race gamblers were considered in the study.

In order to cover these gaps in the literature, the aims of the current study were threefold: 1) to identify sociodemographic and clinical factors associated with the presence of suicidal behavior in patients with GD; 2) to identify sociodemographic and clinical factors associated with the risk of dropout and relapse in the framework of a CBT intervention; and 3) to assess whether suicidal behavior, gender, and gambling preference may contribute to explaining the risk of dropout and relapse during CBT. We hypothesized that both suicidal ideation and attempts would be more prevalent among women with non-strategic forms of gambling, given that this subgroup of gamblers is more prone to using gambling as a form of emotional regulation. Additionally, we presumed that gamblers who attempted suicide would be more likely to experience worse treatment outcomes (both dropouts and relapses), as suicidal behavior is associated with a greater severity of the disorder.

2. Methods

2.1. Participants and procedure

The sample consisted of N = 1112 consecutive patients who met the clinical criteria for GD (American Psychiatric Association, 2013) and attended the Gambling Disorder Unit within the Department of Psychiatry at Bellvitge University Hospital (Barcelona, Spain) between January 2005 and January 2019. The following exclusion criteria were considered: a) presence of an organic medical condition such as Parkinson's disease and Alzheimer disease, b) lifetime history of brain injury or intellectual disabilities.

Patients who met DSM-5 criteria for GD (American Psychiatric Association, 2013) were invited to take part in the study during a first clinical interview conducted by an experienced clinical psychologist. The voluntariness of participation in the study was emphasized as well as the independence of participating in the study and the psychological treatment they would receive afterwards. All participants attended two initial face-to-face clinical interviews and completed a set of questionnaires as part of the assessment process. Information on sociodemographic variables was collected under the supervision of experienced psychologists.

2.2. Measures

South Oaks Gambling Screen (SOGS) Lesieur and Blume, 1987. This is a self-report questionnaire composed of 20 items that aims to screen current problem gambling severity with a suggested cutoff of 5 (Echeburúa et al., 1994). A Spanish validation of the questionnaire is available, and it has shown excellent internal consistency ($\alpha = 0.94$) and test–retest reliability ($r = 0.98$) (Echeburúa et al., 1994).

Diagnostic Questionnaire for Gambling Disorder (according to DSM criteria) (Stinchfield, 2003). This is a 19-item self-report

questionnaire designed to identify the presence of GD. The questionnaire covers the previous 12 month period and is based on the DSM criteria (diagnoses are available for the DSM-IV-TR (*Diagnostic Stat. Man. Ment. Disord. Fourth Ed. Text Revis.*, 2000) and the DSM-5 versions (American Psychiatric Association, 2013)). The psychometrical Spanish adaptation of this tool has achieved adequate results (Cronbach's alpha $\alpha = 0.81$ for a population-based sample and $\alpha = 0.77$ for a clinical sample) (Jiménez-Murcia et al., 2009).

Symptom Checklist-Revised (SCL-90-R) (Derogatis, 1994)**.** This is a self-report questionnaire developed to assess the psychological state using 90 items factorized into nine primary (first-order) dimensions (somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism) and three global indices [global severity index (GSI: it combines the number of symptoms with its severity, and it is interpreted as a measure of the psychopathology distress), positive symptom total (PST: the number of items/symptoms endorsed, with a positive answer), and positive symptom distress index (PSDI: it measures the patients' response style, who could tend to overvalue or undervalue the psychopathology distress)]. Cut-off/normative scores have been provided within general population-based samples and within clinical populations, but it is recommended analyzing raw scores with research purposes because they provide a more accurate multidimensional symptom profile. The psychometrical Spanish adaptation of this tool has obtained adequate results (the mean Cronbach's alpha was $\alpha = 0.75$) Gonzalez De Rivera et al., 1989. The internal consistency in our sample was also in the adequate to good range ($\alpha = 0.764$ for the paranoid ideation scale, to $\alpha = 0.979$ for the global indices).

Temperament and Character Inventory-Revised (TCI-R) (Cloninger et al., 1994). This is a reliable and valid 240-item questionnaire that measures seven personality dimensions, four related to temperament (novelty seeking, harm avoidance, reward dependence, and persistence) and three related to character (self-directedness, cooperativeness, and self-transcendence). All the items of the questionnaire are measured using a 5-point Likert-type scale. The psychometrical Spanish adaptation of the questionnaire used in this study showed adequate results (the mean Cronbach's alpha was $\alpha = 0.87$) (Gutiérrez-Zotes et al., 2004). The internal consistency in the sample for the study was in the adequate to good range (from $\alpha = 0.708$ for novelty seeking, to $\alpha = 0.863$ for persistence).

Other sociodemographic and clinical variables: sociodemographic information including gender, marital status, education level, employment status, and socioeconomic position index (according to Hollingshead's scale which is based on a participant's level of education and profession Hollingshead, 2011 was collected during a semi-structured interview. Regarding the gambling problem, information was collected concerning the gambling preference (strategic/mixed vs non-strategic), age of onset, duration of the disorder (measured in years), debts due to GD (in euros), and patient's perception of family support.

During a face-to-face semi-structured interview conducted by an experienced clinical psychologist or psychiatrist, information on suicidal behavior (including suicidal ideation and attempts) was collected through the following questions:

1) Have you, in the past, or do you currently have, thoughts related with death or the desire to die? 2) Have you attempted to take your own life either recently or in the past?

Face-to-face clinical interviews have been reported to be a valid tool to assess suicidal behavior (Yigletu et al., 2004).

2.3. Cognitive behavioral therapy intervention

All participants in this study received protocolized CBT outpatient treatment that consisted of 16 weekly group sessions lasting 90 min each. This treatment protocol has previously been described and it has shown adequate effectiveness for GD in both short- and medium-terms (Jimenez-Murcia et al., 2012; Jiménez-Murcia et al., 2007; Jiménez-Murcia et al., 2006). A detailed description of the characteristics of this psychological intervention can be found in the supplementary material.

2.4. Ethics

Written informed consent was obtained from the participants before starting the study, which was approved by the Ethics Committee of the University Hospital of Bellvitge in accordance with the Helsinki Declaration of 1975 as revised in 2000 (reference number 307/06). Participants did not receive any compensation for taking part in the study.

2.5. Statistical analysis

Statistical analysis was carried out with Stata16 for Windows (StataCorp, 2019). The comparisons between the groups for the sociodemographic and clinical measures were performed with chi-squared tests (χ^2) for categorical variables and analysis of variance (ANOVA) for quantitative measures [the comparison of the psychopathology state and the personality traits was adjusted by the covariates gender and GD severity through analysis of covariance (ANCOVA)]. The Pearson's χ^2 was used for the contingency tables [all the expected frequencies were equal or higher than 5 ($e_{ij} \geq 5$)]. The use of the ANOVA/ANCOVA is also justified by the large number of simulation/Monte-Carlo studies proving the robustness of the model under a variety of conditions involving non-normal distributions, particularly with large samples sizes (F-test has proved being a valid option for testing hypothesis about means even for non-normal data) (Blanca et al., 2017). The effect size for the proportion differences was obtained with Cramer-V coefficient, equivalent to phi coefficient (ϕ) in 2×2 contingency tables (low/poor effect size was considered C–V$<$0.10, moderate for C–V$>$0.10, mild for C–V$>$0.30, and large/high for C–V$>$0.40) (Cohen, 1988; Rea and Parker, 1992), and the effect size for the mean differences estimated through the contrasts in the ANOVA/ANCOVA was measured using the standardized Cohen's d coefficient (the effect size was considered low/poor $|d|>$0.20, moderate/medium for $|d|>$0.5, and large/high for $|d|>$0.8) (Kelley and Preacher, 2012).

The rate for the presence of relapses and dropout during the CBT was estimated with cumulative survival functions, obtained through Cox's regression models. The cumulative survival function is used to measure the probability of patients living ("surviving") for a certain amount of time during a follow-up (for example, during a treatment). In the study, surviving was considered as the absence of gambling episodes and the absence of dropout. Survival analysis is a technique used for modeling censored data, which in this study occurred if patients withdrew from the treatment (reaching the end of the CBT "alive" or lost during the follow-up) (Aalen et al., 2008). In the current study, a relapse was defined as the occurrence of an episode of gambling activity during the psychological intervention. Dropout was considered when the patient missed two or more CBT sessions in a row without returning in later sessions. Survival analyses were adjusted by the GD severity (DSM-5 total criteria for GD).

To control the increases in the Type-I error due to the multiple statistical comparisons carried out in this study, Finner's method was used (a familywise error rate procedure that is more powerful than the classical Bonferroni system) (Finner, 1993).

3. Results

3.1. Characteristics of the participants

Detailed information regarding the characteristics of the participants can be found in Table S1. Due to the low prevalence of strategic

preference, the gambling preferences were analyzed and re-codified in two groups: non-strategic versus strategic/mixed.

3.2. Prevalence of suicidal behavior and related variables

Table 1 contains the study of the variables related to suicidal behavior in the study. The first block shows the comparison between patients without and with suicidal ideation, and the second block the comparison between patients without and with suicide attempts. The table is also organized in three sections: comparison for sociodemographic variables (gambling preference, gender, marital status, education level, social index, occupational state and perceived family support), comparison for gambling related variables (age, onset of the disorder, duration of the disorder, number of DSM-5 criteria for GD, SOGS total and debts due to the gambling activity), and comparison for psychological measures (SCL-90R and TCI-R scales). For each comparison, the result of the null-hypothesis test and a measure of the effect size is provided.

The number of patients with a lifetime history of suicidal ideation was n = 229 (20.6%) and of suicide attempts was n = 74 (6.7%). The upper parts of Table 1 and Fig. 1 show the associations of gambling preference and gender with suicidal behavior. For suicidal ideation, no statistical differences were found comparing gambling preference, marital status, education level, social position index, occupational status, and family support, but the likelihood of presenting these thoughts was higher for women compared to men ($p < .001$, C–V = 0.122). The likelihood of suicide attempts increased for patients who reported non-strategic gambling ($p = .035$, C–V = 0.060), were female ($p < .001$, C–V = 0.147), were not married ($p = .045$, C–V = 0.053), and did not received family support ($p = .031$, C–V = 0.065).

The bar charts in Fig. 1 show the prevalence estimates stratified by both gambling preference and gender. Within the participants who reported non-strategic games, the likelihood of suicidal ideation was higher for women ($p < .001$, C–V = 0.135), but no differences in respect of gender were observed for participants within the strategic/mixed gambling group ($p = .447$, C–V = 0.049). Regarding the suicide attempts, women had a higher likelihood among non-strategic and strategic/mixed gambling, and the association between gender and trying to commit suicide was higher for non-strategic games ($p < .001$, C–V = 0.158) than for strategic/mixed games ($p = .407$, C–V = 0.054).

Table 1
Variables related with suicidal behavior.

Sociodemographics		Suicidal ideation				p	C–V	Suicide attempts				p	C–V
		No (n = 883)		Yes (n = 229)				No (n = 1038)		Yes (n = 74)			
		n	%	n	%			n	%	n	%		
Gambling	Non-strategic	688	77.9%	187	81.7%	.218	.037	810	78.0%	65	87.8%	**.035***	.060
	Strategic/Mixed	195	22.1%	42	18.3%			228	22.0%	9	12.2%		
Gender	Female	146	16.5%	65	28.4%	**.001***	**.122**†	181	17.4%	30	40.5%	**.001***	**.147**†
	Male	737	83.5%	164	71.6%			857	82.6%	44	59.5%		
Marital	Married/Partner	478	54.1%	114	49.8%	.240	.035	560	53.9%	32	43.2%	**.045***	.053
	Not married	405	45.9%	115	50.2%			478	46.1%	42	56.8%		
Education	Secondary-univers.	371	42.0%	102	44.5%	.491	.021	441	42.5%	32	43.2%	.899	.004
	Primary	512	58.0%	127	55.5%			597	57.5%	42	56.8%		
Social index	Mean to high	154	17.4%	42	18.3%	.750	.010	184	17.7%	12	16.2%	.742	.010
	Mean-low to low	729	82.6%	187	81.7%			854	82.3%	62	83.8%		
Occupational	Employed	526	59.6%	128	55.9%	.314	.030	613	59.1%	41	55.4%	.538	.018
	Unemployed	357	40.4%	101	44.1%			425	40.9%	33	44.6%		
Family support	Yes	754	85.4%	185	80.8%	.087	.051	883	85.1%	56	75.7%	**.031***	.065
	No-partial	129	14.6%	44	19.2%			155	14.9%	18	24.3%		
Gambling relates variables		*Mean*	*SD*	*Mean*	*SD*	*p*	*|d|*	*Mean*	*SD*	*Mean*	*SD*	*p*	*|d|*
Chronological age (years-old)		43.45	13.54	45.14	11.26	.083	0.14	43.69	13.24	45.23	11.24	.331	0.13
Onset of disorder (years-old)		30.82	12.25	31.58	11.02	.395	0.07	30.93	12.09	31.72	10.81	.583	0.07
Duration of disorder (years)		5.78	5.44	6.04	5.68	.525	0.05	5.82	5.46	5.96	5.90	.838	0.02
DSM-5 criteria for GD		6.84	1.78	7.14	1.60	**.019***	0.18	6.87	1.76	7.30	1.40	**.042***	0.27
SOGS total		10.17	3.03	10.84	2.94	**.003***	0.22	10.26	2.99	10.95	3.47	**.049***	0.21
Debts due to GD (euros)		5662	12623	9576	16116	**.001***	0.27	6377	13284	7741	16315	.402	0.09
[1]*Psychological variables*	α	*Mean*	*SD*	*Mean*	*SD*	*p*	*|d|*	*Mean*	*SD*	*Mean*	*SD*	*p*	*|d|*
SCL-90R Somatic	.914	0.90	0.76	1.27	0.97	**.001***	0.42	0.96	0.81	1.26	0.97	**.001***	0.34
SCL-90R Obsse.compuls.	.874	1.06	0.75	1.33	0.83	**.001***	0.34	1.10	0.78	1.23	0.72	.157	0.17
SCL-90R Interpers.sensit.	.858	0.95	0.73	1.15	0.89	**.001***	0.24	0.98	0.77	1.13	0.89	.097	0.18
SCL-90R Depression	.906	1.42	0.84	1.84	0.95	**.001***	0.47	1.48	0.87	1.88	0.93	**.001***	0.45
SCL-90R Anxiety	.893	0.94	0.74	1.26	0.92	**.009***	0.39	0.98	0.78	1.33	0.88	**.001***	0.42
SCL-90R Hostility	.828	0.85	0.73	0.99	0.87	**.001***	0.18	0.87	0.75	1.04	0.93	**.043***	0.21
SCL-90R Phobic anxiety	.811	0.44	0.61	0.60	0.79	**.004***	0.22	0.46	0.63	0.67	0.91	**.006***	0.27
SCL-90R Paranoia	.764	0.84	0.69	0.99	0.86	**.001***	0.19	0.87	0.72	0.96	0.88	.261	0.12
SCL-90R Psychotic	.847	0.83	0.67	1.09	0.83	**.001***	0.34	0.87	0.70	1.12	0.78	**.002***	0.34
SCL-90R GSI	.979	0.99	0.63	1.27	0.77	**.001***	0.40	1.03	0.67	1.28	0.74	**.001***	0.36
SCL-90R PST	.979	44.37	20.86	50.35	20.73	**.001***	0.29	45.29	21.07	50.08	19.71	**.044***	0.24
SCL-90R PSDI	.979	1.84	0.54	2.07	0.65	**.001***	0.38	1.87	0.56	2.13	0.63	**.001***	0.42
TCI-R Novelty seeking	.708	109.3	13.3	110.7	12.8	.145	0.11	109.4	13.1	111.7	13.7	.157	0.17
TCI-R Harm avoidance	.812	100.2	15.9	104.1	17.4	**.001***	0.24	100.8	16.1	104.0	18.9	.105	0.18
TCI-R Reward depend.	.763	98.9	13.9	100.4	14.6	.171	0.10	99.1	14.0	101.3	14.6	.205	0.16
TCI-R Persistence	.863	108.3	18.9	108.3	19.1	.987	0.00	108.2	18.8	109.6	21.3	.554	0.07
TCI-R Self-directedness	.838	128.1	19.4	123.4	19.6	**.001***	0.24	127.4	19.6	123.7	18.8	.102	0.19
TCI-R Cooperativeness	.789	131.7	15.1	131.7	15.5	.943	0.01	131.6	15.2	133.2	14.2	.412	0.10
TCI-R Self-transcendence	.821	63.5	14.1	66.2	15.0	**.014***	0.18	63.8	14.0	68.0	17.7	**.017***	0.27

Note. SD: standard deviation. CV: Cramer's-V coefficient. α: Cronbach alpha in the sample.
[1]ANCOVA adjusted by sex and the GD severity (number of DSM-5 criteria).*Bold: significant parameter (0.05).
†Bold: effect size into the ranges mild-moderate-large (C–V>0.10).
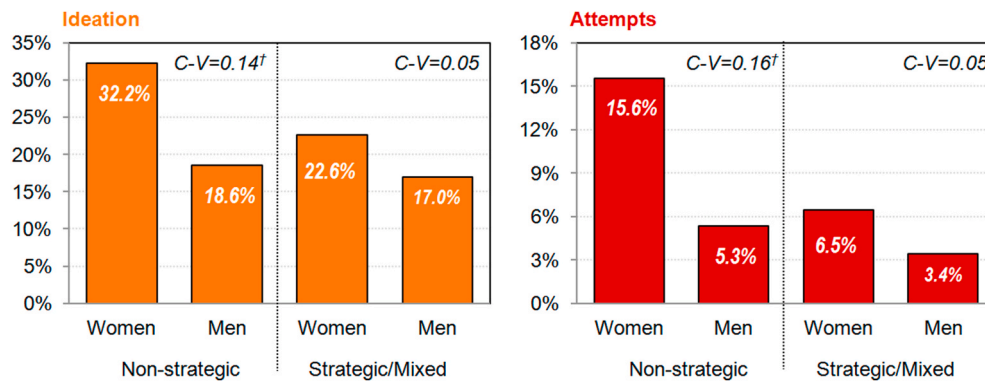†Bold: effect size into the ranges mild-moderate-large (|d|>0.5).

Fig. 1. Prevalence of suicidal behavior ($n = 1112$).

Table 2
Variables related with dropout and relapses during the CBT.

Sociodemographics		Relapses				p	C–V	Dropout				p	C–V
		No (n = 832)		Yes (n = 280)				No (n = 823)		Yes (n = 289)			
		n	%	n	%			n	%	n	%		
Gambling	Non-strategic	649	78.0%	226	80.7%	.338	.029	647	78.6%	228	78.9%	.921	.003
	Strategic/Mixed	183	22.0%	54	19.3%			176	21.4%	61	21.1%		
Gender	Female	135	16.2%	76	27.1%	**.001***	**.121†**	122	14.8%	89	30.8%	**.001***	**.179†**
	Male	697	83.8%	204	72.9%			701	85.2%	200	69.2%		
Marital	Married/Partner	466	56.0%	126	45.0%	**.001***	.096	452	54.9%	140	48.4%	.058	.057
	Not married	366	44.0%	154	55.0%			371	45.1%	149	51.6%		
Education	Second.-univ.	364	43.8%	109	38.9%	.158	.042	357	43.4%	116	40.1%	.338	.029
	Primary	468	56.3%	171	61.1%			466	56.6%	173	59.9%		
Social	Mean to high	151	18.1%	45	16.1%	.430	.024	159	19.3%	37	12.8%	**.012***	.075
	Mean-low to low	681	81.9%	235	83.9%			664	80.7%	252	87.2%		
Occupational	Employed	508	61.1%	146	52.1%	**.009***	.079	485	58.9%	169	58.5%	.893	.004
	Unemployed	324	38.9%	134	47.9%			338	41.1%	120	41.5%		
Family support	Yes	718	86.3%	221	78.9%	**.003***	.088	708	86.0%	231	79.9%	**.014***	.074
	No-partial	114	13.7%	59	21.1%			115	14.0%	58	20.1%		
Suicidal ideation	No	652	78.4%	231	82.5%	.139	.044	654	79.5%	229	79.2%	.935	.002
	Yes	180	21.6%	49	17.5%			169	20.5%	60	20.8%		
Suicide attempts	No	777	93.4%	261	93.2%	.919	.003	768	93.3%	270	93.4%	.949	.002
	Yes	55	6.6%	19	6.8%			55	6.7%	19	6.6%		
Gambling relates variables		Mean	SD	Mean	SD	*p*	*|d|*	Mean	SD	Mean	SD	*p*	*|d|*
Age (years-old)		43.54	13.01	44.55	13.42	.264	0.08	44.18	13.01	42.70	13.37	.097	0.11
Onset GD (years-old)		30.66	12.00	31.93	11.99	.125	0.11	30.92	11.90	31.15	12.31	.777	0.02
Duration GD (years)		5.83	5.47	5.86	5.53	.934	0.01	5.89	5.52	5.67	5.39	.551	0.04
DSM-5 criteria for GD		6.86	1.77	7.02	1.66	.185	0.09	6.98	1.69	6.67	1.88	.061	0.17
SOGS total		10.22	3.00	10.56	3.10	.107	0.11	10.30	3.00	10.33	3.11	.876	0.01
Debts due to GD (euros)		6892	13645	5206	13010	.071	0.13	6739	13913	5695	12246	.258	0.08
[1]*Psychological variables*		Mean	SD	Mean	SD	*p*	*|d|*	Mean	SD	Mean	SD	*p*	*|d|*
SCL-90R Somatic		0.96	0.81	1.02	0.88	.324	0.06	0.98	0.81	0.98	0.86	.995	0.00
SCL-90R Obs.-compulsive		1.09	0.77	1.18	0.81	**.048***	0.12	1.11	0.78	1.11	0.79	.992	0.00
SCL-90R Interpers.sensit.		0.95	0.77	1.10	0.79	**.003***	0.19	0.99	0.75	0.99	0.83	.882	0.01
SCL-90R Depression		1.48	0.87	1.57	0.93	.115	0.10	1.51	0.88	1.49	0.90	.682	0.03
SCL-90R Anxiety		0.98	0.77	1.06	0.87	.122	0.10	1.00	0.78	1.01	0.83	.868	0.01
SCL-90R Hostility		0.86	0.77	0.94	0.77	.096	0.11	0.87	0.75	0.90	0.81	.657	0.03
SCL-90R Phobic anxiety		0.45	0.62	0.54	0.75	**.041***	0.12	0.47	0.63	0.50	0.73	.420	0.05
SCL-90R Paranoia		0.85	0.73	0.94	0.74	**.048***	0.11	0.87	0.72	0.87	0.78	.910	0.01
SCL-90R Psychotic		0.86	0.71	0.95	0.73	**.046***	0.13	0.88	0.71	0.87	0.73	.768	0.02
SCL-90R GSI		1.02	0.67	1.11	0.72	**.047***	0.12	1.04	0.67	1.04	0.70	.969	0.00
SCL-90R PST		45.37	21.03	46.29	21.31	.494	0.04	45.78	20.89	45.06	21.60	.595	0.03
SCL-90R PSDI		1.87	0.57	1.95	0.60	**.030***	0.14	1.89	0.56	1.89	0.61	.932	0.01
TCI-R Novelty seeking		109.6	12.8	109.7	14.1	.874	0.01	109.1	13.4	111.1	12.6	**.028***	0.15
TCI-R Harm avoidance		100.8	16.3	101.6	16.7	.474	0.05	101.1	16.3	100.8	16.6	.803	0.02
TCI-R Reward dependence		99.3	14.1	99.0	13.9	.740	0.02	99.1	14.4	99.5	13.2	.688	0.03
TCI-R Persistence		108.5	18.7	107.5	19.7	.455	0.05	108.3	18.8	108.2	19.3	.950	0.00
TCI-R Self-directedness		127.4	19.5	126.2	19.9	.335	0.06	127.9	19.8	124.8	19.1	**.012***	0.16
TCI-R Cooperativeness		132.0	15.1	130.9	15.3	.311	0.07	132.3	15.1	130.0	15.2	**.027***	0.15
TCI-R Self-transcendence		64.0	14.3	64.0	14.5	.992	0.00	64.1	14.3	64.0	14.4	.967	0.00

Note. SD: standard deviation. CV: Cramer's-V coefficient.
[1]ANCOVA adjusted by sex and the GD severity (number of DSM-5 criteria).*Bold: significant parameter (0.05).
†Bold: effect size into the ranges mild-moderate-large (C–V>0.10).
†Bold: effect size into the ranges mild-moderate-large (|d|>0.5).

The lower part of Table 1 shows the association between suicidal behavior and chronological age, onset age, duration of problematic gambling, GD severity, debts due to gambling activity, psychopathological state (SCL-90R scales), and personality (TCI-R scores) (analyses for SCL-90R and TCI-R adjusted by the covariates gender and GD severity levels). Suicidal ideation grouped patients with higher GD severity, higher debts related to the gambling activity, worse psychopathological state, higher harm avoidance and self-transcendence levels, and lower self-directedness means. Suicide attempts were related to higher GD severity levels, worse psychopathology state and higher self-transcendence score.

3.3. Treatment outcomes and related variables

Table 2 contains the study of the variables related to the CBT outcomes analyzed in the study (relapses and dropout), and it has been built with the same format than Table 1 (separate analyses for relapses and dropouts, and separating in three sections the sociodemographic, gambling related measures and psychological measures).

The presence of relapses during the CBT was reported by n = 280 (25.2%) patients, and the number of patients who dropped out during the treatment was n = 289 (26.0%). The upper part of Table 2 shows the association between these treatment outcomes and gambling preference, gender, and the lifetime history of suicidal ideation and attempts. The risk of relapses was increased for women, unmarried patients, unemployed status, and absence of family support. The likelihood of dropout was also increased for women, lower social position indexes, and patients without family support.

The bar chart in Fig. 2 shows the prevalence estimates of the therapy outcomes, considering simultaneously the presence of gender with gambling preference and suicidal behavior. The chart shows that women achieved the highest prevalence compared to men, as well as low differences based on gambling preferences and suicidal behavior.

The lower part of Table 2 shows the results of assessing which psychopathological and personality variables were related to relapse and dropout (ANCOVA results adjusted by the covariates gender and GD severity levels). The patients who reported gambling episodes during the treatment reported higher means in most SCL-90R dimensions (except for somatic, depression, anxiety, hostility and PST). Dropout was only related to the higher mean scores in novelty seeking and lower mean scores in self-directedness and cooperativeness.

Fig. 3 shows the survival cumulates functions (adjusted by the covariate GD severity) with the rate to relapse and dropout. The X-axis represents the time (week) during the application of the CBT, and the Y-axis the cumulate probability (which represents the proportion of patients who have not reported the concrete criterion, relapse or dropout in the study). The contribution of the gambling preference and the suicidal behavior on the survival functions was assessed stratified by the patients' gender (which showed a moderator-interaction test). Every time a patient reported the event, a step-down is displayed on the graph. The curves obtained in the study indicated that the occurrence of relapses and dropouts were reported quickly for women compared to men, independent of the gambling preference and the presence of the suicidal behaviors (the functions estimated for women are always plotted under the functions estimated for men). Regarding the gambling preference, only small differences were observed comparing non-strategic versus strategic/mixed preference. The same pattern was observed for the presence of suicide attempts (a slight impact was obtained on the survival functions). For the suicidal ideation, it was observed that the absence of these thoughts was associated to quickly occurrence of relapses and dropouts, but only for women.

4. Discussion

Given the relevance of suicidal ideation and attempts in individuals with GD and considering the heterogeneity described in the previous literature regarding profiles of patients with GD and their responses to psychological treatment, we aimed to identify sociodemographic and clinical factors associated with the presence of suicidal ideation and attempts in treatment-seeking patients with GD, as well as identifying which of these factors may be associated with an increased risk of dropout and relapse during CBT intervention, paying special attention to two relevant factors (gender and gambling preference).
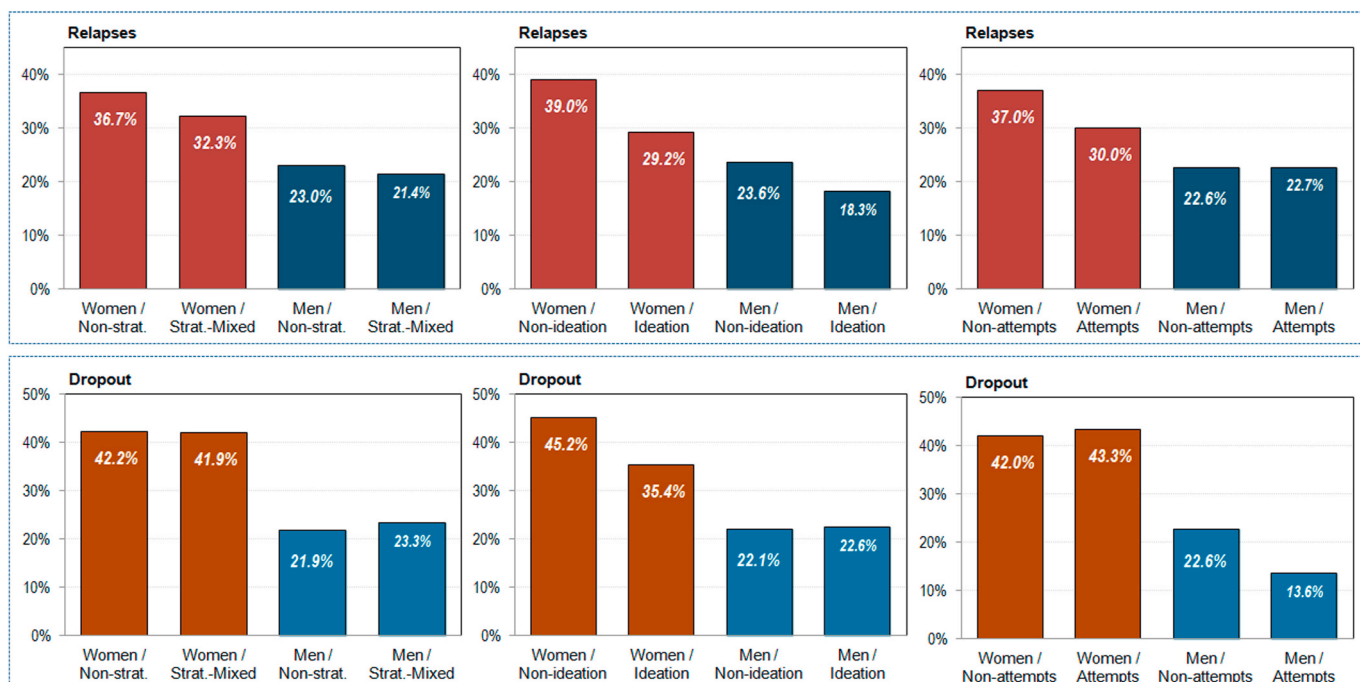

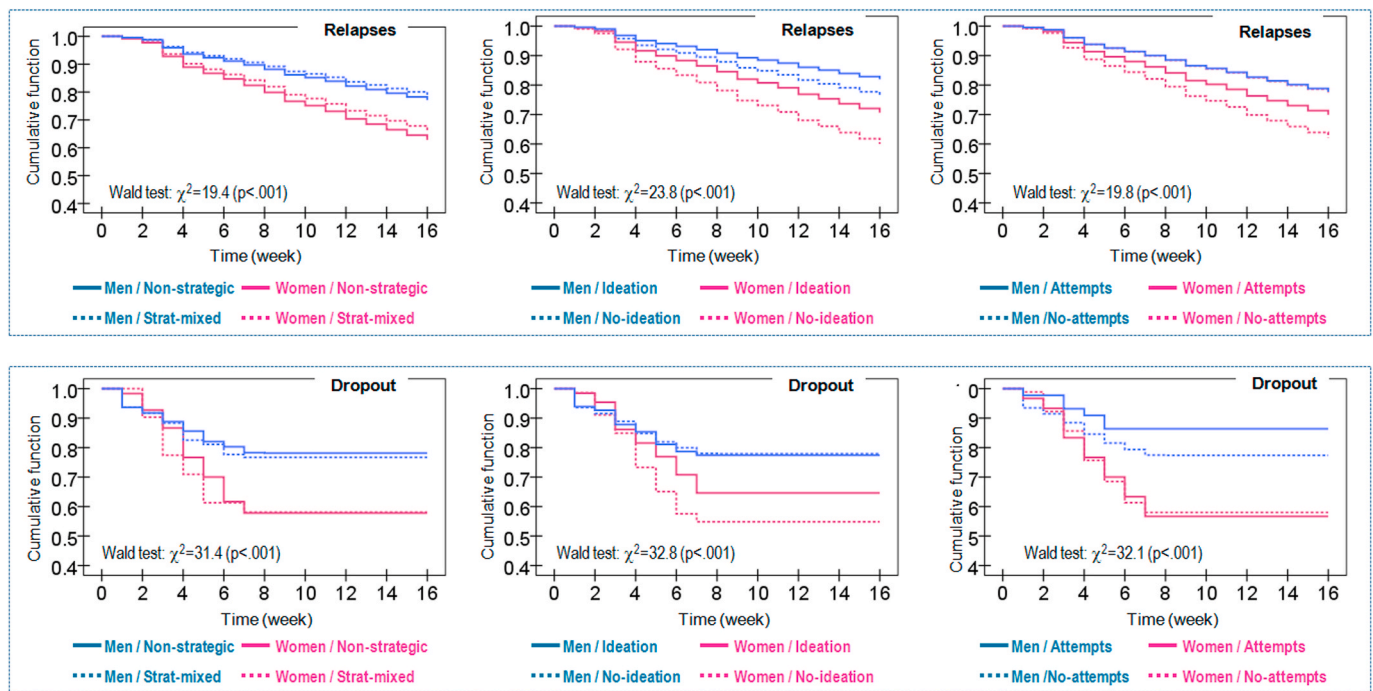**Fig. 2.** Prevalence of relapses and dropout (*n* = 1112).

Fig. 3. Survival functions for the rate of relapses and dropout (*n* = 1112).

4.1. Prevalence of suicidal behavior

Our findings of 20.6% and 6.7%, respectively, for lifetime suicidal ideation and attempts are lower compared to most of the literature that has examined these issues in clinical settings (Guillou-Landreat et al., 2016; Ledgerwood and Petry, 2004; Petry and Kiluk, 2002). The lower presence of self-reported suicidal behavior in this study may be due to geographic and cultural particularities and the way suicide is measured (Moghaddam et al., 2015). Countries based on a welfare state system, in which family constitutes a fundamental pillar for the protection of individuals, could reduce the risk of loneliness and despair and, consequently, may protect against suicide (León and Migliavacca, 2013).

4.1.1. Risk factors associated with suicidal behavior: the role of gambling preference and gender

In our study, female gender constituted a risk factor for both suicidal ideation and attempts among patients with GD. This finding is in accordance with previous studies that have identified women as a vulnerable group in terms of suicidal behavior (Bischof et al., 2015; Carr et al., 2018; Husky et al., 2015), although the relevance of female gender in terms of suicidal behavior in GD has not been consistently described in the literature (Petry and Kiluk, 2002). Our finding is consistent with others highlighting a greater co-occurrence of GD and depressive and anxiety symptomatology in women compared to men. This combination of gambling and emotional symptoms has been described as a possible explanation for why women constitute a more vulnerable group that experiences suicidal behavior (Ronzitti et al., 2017).

We also identified that gambling preference was associated with suicide attempts but not with suicidal ideation. In our study, patients with non-strategic gambling preferences reported a higher likelihood of having experienced lifetime suicide attempts. However, no differences were observed between gambling preference and suicidal ideation. This result is partially in line with two previous studies that found that non-strategic gamblers using electronic gambling machines and lottery gambling reported an increased likelihood of reporting suicidal events (Bischof et al., 2016; Ledgerwood et al., 2005). However, this association could not be found in a study carried out in the United Kingdom (Ronzitti et al., 2017).

The results from the current study led us to partially support our first hypothesis, stating that women with non-strategic gambling preferences represent a vulnerable group in terms of suicidal behavior. Women with non-strategic gambling preferences could be at higher risk of experiencing a lifetime history of suicide attempts and this may be due to the fact that women use gambling as a form of regulating distressing emotional states (Aldao et al., 2010; Estévez et al., 2017; Farstad and von Ranson, 2020; Granero et al., 2009; Grant and Kim, 2002). Emotional dysregulation has been described as a risk factor for suicidal behavior, and this may explain our findings regarding women as a risk group for suicidal behavior (Hatkevich et al., 2019; Neacsiu et al., 2018).

In the present study it was also reported that not being married (including being single, widowed, separated, or divorced), as well as a lack of family support, are risk factors for lifetime suicide attempts but not for suicidal ideation. This finding is consistent with other research, which found that being married constitutes a protective factor preventing suicidal behavior (Weissman et al., 1999). Likewise, having a partner who supports the patient with the therapeutic process reduces relapses and dropouts in patients with GD (Jiménez-Murcia et al., 2017).

Suicide risk either due to ideation or attempts was more prevalent in our study in patients with a greater severity of GD. This observation dovetails with other research finding that gambling-related severity is a risk factor for committing suicidal acts (Battersby et al., 2006; Carr et al., 2018).

In line with previous studies, our study found an association between financial debts and suicidal ideation (Guillou-Landreat et al., 2016; Komoto, 2014; Ledgerwood et al., 2005). In addition, and consistent with previous research, patients expressing suicidal ideation and a lifetime history of suicide attempts experienced more severe psychopathology, particularly regarding depressive and anxiety symptoms (Bischof et al., 2015; Guillou-Landreat et al., 2016; Mallorquí-Bagué et al., 2018), suggesting the importance of these symptoms when assessing patients with GD who are at risk of committing a suicidal act.

Another relevant finding from our study is that the combination of three personality traits (high scores in harm avoidance and self-transcendence and low self-directedness) are associated with higher odds of presenting suicidal ideation. In a study carried out in a sample of

patients with major depression, the authors found that suicidal ideation was related to low self-directedness and high self-transcendence (Conrad et al., 2009). However, in the present study, only high scores of self-transcendence appeared to be associated with an increased risk of lifetime suicide attempts while previous studies described higher scores in harm avoidance and low scores in self-directedness as well (Erić et al., 2017; Forcano et al., 2009; Kose et al., 2020).

4.1.2. Treatment outcome in patients with suicidal behavior: the influence of gender and gambling preference

Our second hypothesis stated that patients with GD and either suicidal ideation or a history of suicide attempts will experience poorer treatment outcomes due to the greater clinical severity of these profiles of individuals with GD. Unexpectedly, neither patients with suicidal ideation nor those with a history of suicide attempts had higher rates of dropouts or relapses. This result is in line with other studies that evidenced how depressed patients with suicidal ideation attained treatment outcomes that were nearly as good as those for patients without suicidal ideation (von Brachel et al., 2019). This finding may be due to the fact that, once patients find themselves in a safe therapeutic context, in which they start envisioning the possibility of achieving a solution to their critical situation, their belief that death is the only solution may be reduced, and therefore, they do well in terms of treatment outcomes.

Additionally, female gender and lack of family support appeared to be related to worse treatment outcome in terms of higher rates of relapse and dropout, underlining the relevance of women as a vulnerable group, not only in terms of suicidal behavior but also in terms of poorer treatment outcome. This finding underlines a need to reinforce the participation of patients' families in the treatment process. Furthermore, following the results from the cumulative survival functions concerning relapses and dropouts, women experienced these worse treatment outcomes quicker than men, which provides additional evidence of the vulnerability of this subgroup of patients with GD.

In line with a previous study (Khanbhai et al., 2017), we observed no differences in terms of treatment outcome (neither dropouts nor relapses) when gambling preference was considered. Previous studies highlighted the fact that gamblers whose preferences were for strategic forms of gambling showed deficiencies in decision-making behaviors and higher levels of substance dependence (Hewig et al., 2007; Pantalon et al., 2008). Our findings were unexpected given that comorbid alcohol or substance dependence has been identified as a predictor of poor outcomes among individuals undergoing psychological treatment.

Finally, our findings also revealed that no differences were observed in terms of personality traits regarding the risk of relapse. However, lower scores in self-directedness and cooperativeness and higher scores in novelty seeking were present in patients showing greater dropout rates. Lower scores in self-directedness has been described previously as a risk factor for worse treatment outcomes in GD (Granero et al., 2020). Low self-directedness and low cooperativeness have been previously found as two good predictors of dropout in patients with eating disorders (Fassino et al., 2009) while higher scores in novelty seeking has been pointed out as a good predictor of dropout in patients with alcohol use disorder (Escribano et al., 2016). Therefore, Cloninger's temperament and character inventory has been described as a powerful tool to predict treatment outcome (Escribano et al., 2016).

Clinicians may benefit from giving special attention in their clinical interviews to patients reporting suicidal ideation and/or attempts, especially in the case of women with non-strategic forms of gambling and a lack of social support. In addition, CBT would benefit patients by including strategies to ameliorate emotional regulation, decision making, planification, and objective organization, as well as specific sessions devoted to increasing interpersonal relationships and rewarding activities with significant others in order to diminish the risk of solitude and social isolation.

4.2. Limitations and strengths

The results of the study should be evaluated within the context of several limitations. First, suicidal ideation and suicide attempts were assessed using a clinical interview based on two direct questions, without the administration of validated scales to measure them. Second, the low number of patients with strategic and mixed gambling preferences made us unify these two categories into only one, which we are aware may have cause a certain bias in the results. Third, suicidal ideation and attempts were measured only once. It would be of interest to assess suicidal cognitions and acts at the end of the treatment to enable evaluation of the effect of the therapy in suicidal behavior. Additionally, suicidal behavior lies in a continuum including suicidal ideation, plans and attempts (Yuodelis-Flores and Ries, 2019). The present study only focused on suicidal ideation and attempts and therefore future studies should benefit from considering suicidal plans as well. Likewise, in the present study, suicidal behavior was assessed through a face-to-face clinical interview. Adding self-reported scales to measure suicidal behavior would be an important contribution in future research. Fourth, the present study did not include information on medical treatment that patients with suicidal behavior may have. Fifth, comorbid psychopathology was assessed through SCL-90. Future research may benefit from including a tool to assess comorbid psychiatric disorders. Finally, this study was carried out in a clinical sample of treatment-seeking patients with GD, which implies that the results cannot be generalized to the general population.

Nevertheless, the abovementioned limitations are compensated for by the strengths of the study, i.e., a large sample of treatment-seeking patients with GD assessed following protocolized assessment tools. To the authors' knowledge, this work provides further understanding of the risk factors associated with suicidal behavior and provides clinical insight for the treatment of patients with GD who are susceptible to committing suicidal acts.

CRediT authorship contribution statement

Eduardo Valenciano-Mendoza: Conceptualization, Data curation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Fernando Fernández-Aranda:** Conceptualization, Data curation, Funding acquisition, Methodology, Supervision, Visualization, Writing – original draft. **Roser Granero:** Conceptualization, Data curation, Formal analysis, Methodology, Supervision, Visualization, Writing – original draft, Writing – review & editing. **Mónica Gómez-Peña:** Project administration. **Laura Moragas:** Project administration. **Amparo del Pino-Gutierrez:** Project administration. **Bernat Mora-Maltas:** Project administration. **Isabel Baenas:** Project administration. **Elías Guillén-Guzmán:** Project administration. **Susana Valero-Solís:** Project administration. **Milagros Lizbeth Lara-Huallipe:** Project administration. **Ester Codina:** Project administration. **Gemma Mestre-Bach:** Project administration. **Mikel Etxandi:** Project administration. **José M. Menchón:** Validation. **Susana Jiménez-Murcia:** Conceptualization, Data curation, Funding acquisition, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

FFA received consultancy honoraria from Novo Nordisk and editorial honoraria as EIC from Wiley. The rest of the authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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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.2021.09.027.

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