International Journal of Mental Health and Addiction
https://doi.org/10.1007/s11469-024-01386-x

ORIGINAL ARTICLE

Online Gaming Disorder and Sports Betting Addiction: Convergences and Divergences

Rocío-Elena Ayala-Rojas[1] · Roser Granero[1,2,3] · Fernando Fernández-Aranda[2,3,4,5] · Mónica Gómez-Peña[3,4] · Laura Moragas[3,4] · Iván Perales[4] · Susana Jiménez-Murcia[2,3,4,5]

Accepted: 29 August 2024

Abstract

Worldwide estimates of the prevalence of online gaming disorder (OGD) and online sports betting addiction (OSBA) have become exceedingly high, particularly among young people. The objective of this study was to compare the sociodemographic and clinical profiles of treatment-seeking patients for these mental health disorders. The sample included $n=495$ patients ($n=108$ OGD and $n=387$ OSBA) recruited from a tertiary care unit specialized in the treatment of behavioral addictions. Sociodemographic variables, psychopathologic state, impulsivity, emotion regulation, substances, and personality traits were assessed and compared between both these diagnostic subtypes. The prevalence for OGD was 3.82% and for OSBA was 13.01% among the whole sample of $n=3{,}036$ patients. Compared with OGD, OSBA presented a profile characterized by a greater proportion of non-single men with higher levels of education, employed, and of higher socioeconomic status. OSBA was also characterized by older chronological age, later age of onset of the addictive behaviors, worse psychopathology state (greater likelihood of depression and anxiety), higher impulsivity, and higher substance use. The personality profile related to OSBA presented higher novelty seeking, reward dependence and persistence, and lower harm avoidance. Despite the similarities between OGD and OSBA, and even though both behaviors could be perceived by the general population as low-risk leisure activities (as opposed to other gambling types, such as casinos or slot machines), the differences in the clinical profiles should be considered in efforts to improve assessment tools and specialized intervention plans.

Keywords Behavioral addictions · Online gaming · Online sports betting · Clinical profile · Personality

The digital transformation in the gaming and gambling industries has provided immersive and awe-inspiring forms of entertainment worldwide. Online platforms can offer a new experience that transcends traditional offsite modalities, with a much larger and more diverse range of games, more personalized gaming experiences, more opportunities to interact with other players around the world, and countless gaming experiences across

Extended author information available on the last page of the article

multiple devices (e.g., smartphones, tablets, and PCs) (Gainsbury et al., 2015). This has led to the widespread acceptance of online gaming and online sports betting among the general population, and both activities have been identified as the most popular forms of online gambling in Europe, particularly among young men (European Gaming & Betting Association, 2019; Li et al., 2020).

The remarkable ascendancy of both video games and sports betting in digital format can increase players' susceptibility to problem gambling, as described by certain studies that have found higher rates of problematic behavior in samples of Internet gamblers compared to non-Internet gamblers (Gainsbury et al., 2014). A study of 6682 gamblers found that online problem gamblers were more likely to bet on sports and in a greater number of ways than their offline peers (Gainsbury et al., 2013).

Gaming Disorder: Definition and Epidemiological Data

Gaming disorder has been considered a type of behavioral addiction and has been defined as a pattern of problematic, persistent, uncontrolled, and recurrent gaming behavior that can occur both online or offline, generating maladaptive consequences for individuals. The latest version of the International Classification of Diseases published by the World Health Organization (ICD – 11th Revision, 2020) has incorporated this mental disorder into the section on non-substance related addictions, classified as *Gaming Disorder*. The latest version of the Diagnostic and Statistical Manual of Mental Disorders DSM-5-TR published by the American Psychiatric Association (American Psychiatric Association., 2022) has classified *Internet Gaming Disorder* in section III (which includes disorders requiring further empirical investigation).

Epidemiological studies have estimated the global mean prevalence of gaming disorder to be the range from 1 to 6% in developed countries (Darvesh et al., 2020; Feng et al., 2017; Mihara & Higuchi, 2017; Petry et al., 2014; Stevens et al., 2021; Wartberg et al., 2017; Yau & Potenza, 2014; Yu & Cho, 2016), but there is much variation between individual estimates. While some studies have reported values around 1 to 2% (Haagsma et al., 2012; Müller et al., 2015; Rehbein et al., 2015), others are as high as 14% (Wang et al., 2015; Wartberg et al., 2019) and even 20% (Vadlin et al., 2018). It has been observed that prevalence rates in Central and Eastern Europe are higher than those in Northern and Western Europe (Chia et al., 2020). This major variability among countries and studies has been associated with the influence of sociodemographic factors and methodological issues (such as the use of diverse screening and diagnostic tools) (González-Bueso et al., 2018; King et al., 2020). Other studies, including systematic reviews, have also reported important differences according to sex and age, finding greater risks associated with males and younger individuals (teenagers and young adults) (Romrell, 2014; Fam, 2018; Lopez-Fernandez et al., 2019; Palaus et al., 2017; Romrell, 2014; Vermeulen et al., 2017).

Sports Betting: Definition and Epidemiological Data

Sports betting addiction is typically viewed as a strategic form of gambling disorder, being a mental disorder categorized as a non-substance-related addiction in the latest version of the DSM-5-TR (American Psychiatric Association., 2022). Problematic sports betting disorder is characterized by an uncontrollable and persistent desire to bet on sports despite the

severe adverse consequences that can impact many areas of the individuals' life, including financial struggles (sometimes even debts), strain on personal relationships, or legal problems (such as fraud or embezzlement to finance the betting activity) (Estévez et al., 2017; Mestre-Bach et al., 2022).

Sports betting has expanded globally, especially in Western regions such as North America, Oceania, and Europe (Deans et al., 2017; Gainsbury et al., 2015). Differences have been observed between online versus offline modalities, with a higher prevalence of online betting platforms (the ratio is around 7 to 3) (Gainsbury et al., 2014), particularly among younger individuals (Gainsbury et al., 2013). This increase in sports betting has coincided with the incorporation of novel features, such as cash-out and live betting, instant deposits, and micro-betting (Lopez-Gonzalez et al., 2019; Winters & Derevensky, 2019). The Internet has contributed to this growth in gambling activity, since it permits immediate betting, anonymity, and access to a number of platforms that are easily accessible from any geographical location and at any time (McGee, 2020). The dynamics generated by betting on a sports event generate such engagement that some people consider the former to be an intrinsic part of the latter (Li et al., 2012; Mao et al., 2015; Koning and van Velzen, 2009). Excessive advertising targeted at people who like to watch sports has become extremely effective at encouraging them to engage in betting activities and is therefore a high risk factor for addiction to sports betting (Bouguettaya et al., 2020; Newall et al., 2019).

Correlates of Online Gaming Disorder and Sports Betting Addiction

Online gaming disorder (OGD) and online sports betting addiction (OSBA) are complex behavioral addictions (which are not related to substance use) to which multiple interacting biopsychosocial factors contribute (Wartberg et al., 2019). Certain common variables have commonly been associated with the onset and progression of both mental conditions. Regarding sociodemographic profiles, the features with the greatest associations are young age (adolescence and early adulthood) (Andreassen, 2015; Kuss et al., 2014), male gender (Durkee et al., 2012; Rehbein & Baier, 2013; van Deursen et al., 2015), not being married and living alone (Hing et al., 2016). Both OGD and OSBA have also been considered avoidance strategies to cope with and escape from stress, in a process consistent with the stress-coping model (Compas et al., 2001) and in contrast to effective problem-solving. Thus, addictive behaviors such as online gaming or betting could be conceptualized as attempts to disengage from stress and the associated negative emotional states. These motivational drivers have also been associated with negative reinforces, in a process described as cognitive-behavioral (Dong & Potenza, 2014), which has recently been modified on the basis of the individual differences in the self-regulatory executive function (Zhou et al., 2023).

Regarding personality traits, compared with control samples, OGD and OSBA have been related with higher levels of impulsivity, persistence and neuroticism, and lower levels of self-consciousness and extroversion (Andreassen et al., 2013; Kardefelt-Winther, 2014; Littel et al., 2012; Müller et al., 2014; Seong et al., 2019). Similar cognitive biases have also been observed in several domains among patients with online video gaming and sports betting problems. These distortions have been associated with a decrease in the perceived risk and potential long-term negative impacts caused by gaming/betting, together with an increase in the perceived notion that personal skills could contribute to positive gambling outcomes (Valenciano-Mendoza et al., 2023). The most typical cognitive biases are

considering gaming/betting as the only way to perceive satisfactory self-esteem and social acceptance, overvaluing the rewards and tangibility of gaming, or dysfunctional and inflexible rules about gaming behavior (Forrest et al., 2016; Hamonniere & Varescon, 2018; King & Delfabbro, 2014; Laier et al., 2018). A similar comorbid phenotype has also been identified, the psychopathological states with the greatest risk of concurrence with online gaming and sports betting addiction being depression, anxiety, social phobia, antisocial behavior, attention-deficit hyperactivity disorder, and other addictive behaviors, including substance-related disorders (Derevensky & Gupta, 2004; González-Bueso et al., 2018; Lee et al., 2017). Other typical impairments related with excessive-problematic online gaming and sports betting are academic problems, poor sleep quality, and worsening of social relationships (Bonnaire & Baptista, 2019; S. Wang et al., 2022; Wong et al., 2020).

Differences Between OGD and OSBA

Despite the similarities in the endophenotype of OGD and OSBA, differences do seem to exist. Based on the available literature, the phenotype of patients with OSBA is characterized by older age and higher education and employment levels (Hing et al., 2016; Jiménez-Murcia et al., 2021; Russell et al., 2019). Studies have also provided evidence of the major heterogeneity within each diagnostic subtype and the existence of separate empirical functional profiles (Mallorquí-Bagué et al., 2017). For example, a recent paper identified two separate clusters in sports betting disorder (Granero et al., 2020): (a) one group of patients with more severe addiction, with a higher proportion of single, younger and lower socioeconomic status individuals, and a greater likelihood of other comorbid substance and non-substance addiction related problems and (b) another group formed by individuals with less severe addiction, of older age, mostly married or with a stable partner, and of higher socioeconomic status.

Research exploring the existence of different profiles among a sample of patients seeking treatment for gaming disorder have also identified two separate empirical profiles (Granero et al., 2021); one of them characterized by older age, worse psychological state, and more dysfunctional personality traits. This evidence suggests that age could play a central role in both gaming disorder and gambling disorder, but the sense of the relationships could be different: while older age seems to predict a more complex clinical profile in terms of gaming disorder, it appears to predict a less severe clinical state in gambling disorder (including sports betting).

Rationale of the Study and Objectives

In summary, current studies have revealed the increasing prevalence of OGD and OSBA, mainly among younger populations. But while gambling disorder is fully recognized as a behavioral addiction (and hence OSBA) in taxonomies such as the DSM-5, OGD requires further study before it can be considered and empirically based concrete mental condition classified into the non-substance addiction category. And although many studies have provided strong evidence regarding the similarities in the endophenotypes, current research suggest the need of a better understanding of OGD compared with OSBA, particularly in clinical samples of adult patients. An accurate characterization of the specific profiles related to each form of gambling (problematic video gaming versus problematic sports

betting) may help clinicians improve their screening of these two disorders and will allow to refer patients to more appropriate and effective treatments. Therefore, the aims of this study were to establish the prevalence of each diagnostic subtype (OGD and OSBA) in a large clinical sample of patients treatment seeking at a health unit specialized in the treatment of behavioral addictions and to explore the sociodemographic and clinical features that characterize each form of gambling. Based on the available scientific evidence, the profiles of OGD and OSBA patients are expected to differ.

Method

Participants

The sample included patients seeking treatment for OGD or OSBA at a tertiary care center, namely the Behavioral Addictions Unit of Bellvitge University Hospital. This tertiary center provides sub-specific health care for patients with behavioral addictions, after referral from the providers of primary and secondary care, and with clinic staff members specialized in these mental health conditions. The total sample of patients who consecutively received treatment for behavioral addictions between January 2012 and December 2022 was $n = 3036$. The inclusion criterion was to report OGD or OSBA as the reason for treatment. The exclusion criterion was the presence of any neurological disorder (e.g., traumatic brain injury, neurodegenerative disorder such as Parkinson's disease), psychotic disorders, or intellectual disability (these conditions were excluded because their presence could interfere with the standardized measures used in the assessment process).

The sample selected for the comparison between groups included $n = 495$ participants who met clinical criteria for OGD or OSBA (108 with OGD and 387 with OSBA), men and women (467 vs 28), with a mean age of 29.9 years (SD = 10.6). The groups were mutually exclusive, and the presence of the potential comorbid condition of gaming disorder plus sports betting was excluded in order to adequately assess the specific phenotypes related to each diagnostic condition.

Measures

Diagnostic Questionnaire for Pathological Gambling (Stinchfield, 2003) This is a self-report questionnaire developed to identify the presence of GD using 19 items based on the DSM criteria [diagnoses are available for the DSM-IV-TR (American Psychiatric Association, 2022) and DSM-5 versions (1)]. The psychometrical Spanish adaptation of this tool achieved adequate properties (Cronbach's alpha $\alpha = 0.81$ for a population-based sample and $\alpha = 0.77$ for a clinical sample) (Jiménez-Murcia et al., 2009). The internal consistency achieved in this study was good ($\alpha = 0.814$).

Clinical Criteria for Gaming Disorder A semi-structured face-to-face clinical interview assessed the criteria included in section 3 of the DSM-5 ("Conditions for Further Study") for the presence of gaming disorder (American Psychiatric Association, 2022; Petry et al., 2014), preoccupation or obsession, withdrawal, tolerance, loss of control, loss of interest, continued overuse, deception, release of negative feelings, and functional impairment. In addition to the cut-off proposed in the DSM-5 (5 out of 9 criteria are required to endorse the condition), the presence of gaming disorder in this study required the symptoms to be

endorsed within a 12-month period to establish the diagnosis [this method is aligned with recent research showing that laxer criteria are susceptible to pathologization of non-pathological gaming patterns] (Billieux et al., 2019; Deleuze et al., 2017). For patients assessed between 2005 and 2013 (before the release of DSM-5), gaming disorder was identified by means of a semi-structured face-to-face interview adapted from DSM-III-R pathological gambling criteria (Griffiths & Hunt, 1998).

Symptom Checklist-Revised (SCL-90-R) (Derogatis, 2002) This is a self-report questionnaire developed to assess 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), total positive symptoms (TPS), and positive symptom discomfort index (PSDI)]. The psychometrical Spanish adaptation of this tool obtained adequate properties (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 ($\alpha = 0.790$, for the paranoid ideation scale, to $\alpha = 0.981$ for the global indices).

Temperament and Character Inventory-Revised (TCI-R) (Cloninger et al., 1994) This is a self-report questionnaire developed to assess personality traits using 240 items based on Cloninger's multidimensional model and structured into seven factors [four for temperament (novelty seeking, harm avoidance, reward dependence, and persistence), and three for character (self-directedness, cooperation, and self-transcendence)]. The psychometrical Spanish adaptation of the tool obtained adequate properties (the mean Cronbach's alpha was a = 0.87) (Gutiérrez-Zotes et al., 2004). The internal consistency in the studied sample was in the adequate to good range ($a = 0.703$, for novelty seeking, to $a = 0.868$ for persistence).

Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004) Validated in the Spanish population (Wolz et al., 2015). This assesses emotion dysregulation in six subscales: non-acceptance of emotional responses, difficulties in pursuing goals when experiencing strong emotions, difficulties in controlling impulsive behaviors when experiencing negative emotions, the lack of emotional awareness, limited access to emotional regulation strategies, and the lack of emotional clarity. The measure consists of 36 items and is answered on a 5-point Likert scale. The internal consistency of the subscales for our sample ranges between α=0.796 and α=0.924, and the one for the total score was α=0.950.

The UPPS-P Impulsivity Scale (Whiteside et al., 2005) The UPPS-P Impulsivity Scale is a 59-item scale that assesses impulsive behavior on 5 different scales: sensation seeking, the lack of premeditation, the lack of perseverance, and negative and positive urgency. Positive urgency was included more recently. All items are rated on a 4-point scale from 1 (strongly agree) to 4 (strongly disagree). The UPPS-P has satisfactory psychometric properties in terms of both convergent and discriminative validity. The Spanish version of the UPPS-P scale was obtained via a back-translation process and presents adequate psychometric properties (Verdejo-García et al., 2010). The internal consistency in our sample was between $\alpha = 0.827$ (sensation seeking) and $\alpha = 0.911$ (total score).

Other Variables This study also analyzed additional data assessed by means of a semi-structured interview. This tool covered socio-demographic characteristics (sex,

marital status, level of education, employment status), as well as the socio-economic position index, according to Hollingshead's scale (based on the participants' level of education and profession) (Hollingshead, 2011). Patients also completed questions on OSBA-related variables (age of onset, duration, bets per gambling episode, and accumulated debts due to the gambling addiction) and substance use (no vs. at least sometimes).

Procedure

The data analyzed in this study was collected as part of different research projects approved by the Ethics Committee of Bellvitge University Hospital (Barcelona) (Ref: PR338/17 [CSI 18/04]). All the patients provided signed informed consent. No financial compensation was given to the participants. All data were collected by qualified clinical psychologists from a single assessment session lasting approximately 90 min.

Statistical Analysis

Statistical analysis was conducted with Stata18 for Windows. The comparison of sociodemographic variables between the groups was performed with chi-square (χ^2) tests for categorical variables and *T*-test for quantitative measures.

Next, clinical profiles were compared using analysis of covariance (ANOVA, for the quantitative scores) and logistic regression (for the categorical measures). For these analyses, the effect size was obtained with the Cohen's *d* coefficient for the mean differences and with the odds ratio (OR) coefficient for the proportional differences. Cohen's *d* are standardized coefficients, which are interpreted as having a null effect for values around 0, low-poor for values higher than 0.20, mild-moderate for values higher than 0.50, and large-high for values higher than 0.80. OR were interpreted as mild-moderate for OR > 1.86 and large-high for OR > 3.00. These procedures comparing the clinical profiles between OGD and OSBA also included as covariates the participants' sex and age, to avoid the presence of biases due to the impact of these two confounding variables. Additionally, the increase in the type I error due to the application of multiple significance tests was controlled by the Finner's method, a procedure that has proved far more powerful than classical Bonferroni correction.

A logistic regression was obtained to identify the variables with statistical discriminative capacity to differentiate between clinical profiles, by means of a back-stepwise method. The list of potential predictors included the main variables of the sociodemographic and clinical profiles, namely sex, age, duration of the addiction related problems, social position, global psychopathology distress (SCL-90R GSI), impulsivity (UPPS-P total), difficulties in emotion regulation (DERS total), and personality (TCI-R scales). Goodness-of-fit was calculated with the Hosmer–Lemeshow test, global predictive capacity with Nagelkerke's pseudo-R^2 coefficient, and global discriminative capacity with the area under the ROC curve (AUC).

Results

Descriptive and Between-Group Comparison of Sociodemographic Profiles

The first block in Table 1 includes the descriptive of the complete sample. Most patients in the study were men, single, with a primary or secondary education, employed and of

mean-low to low socioeconomic status. The mean age of onset of the addiction problems was 23.4 years old (SD = 8.3) and mean duration 3.8 years (SD = 3.5).

The second block in Table 1 includes a comparison between the groups for the sociodemographic variables. Compared with OGD, OSBA included a higher proportion of married or divorced men, with higher levels of education and employment, and higher socioeconomic indexes. OSBA was also characterized by older age and later age of onset of the addictive behaviors.

Prevalence of OGD and OSBA

Among the total sample of patients treated during the sample recruitment period, the prevalence of OSBA was 13.01% (95% confidence interval [95%CI] 11.81 to 14.21%), versus 3.82% for OGD (95%CI 3.14 to 4.50%). These estimates indicated that the likelihood of OSBA was almost four times higher than for OGD (prevalence ratio PR = 3.41, 95%CI 2.79 to 4.16). Figure 1 shows a line graph with the trajectories of the prevalence figures during the recruitment period. For OSBA, polynomial contrasts identified

Table 1 Descriptive for the sample

	Total *N* = 495		Gaming *N* = 108		Sports betting *N* = 387		
	n	%	*n*	%	*n*	%	*p*
Sex							
Female	28	5.7%	12	11.1%	16	4.1%	**.006***
Male	467	94.3%	96	88.9%	371	95.9%	
Civil status							
Single	351	70.9%	95	88.0%	256	66.1%	**< .001***
Married, couple	118	23.8%	12	11.1%	106	27.4%	
Divorced, separated	26	5.3%	1	0.9%	25	6.5%	
Education							
Primary	176	35.6%	55	50.9%	121	31.3%	**.001***
Secondary	241	48.7%	43	39.8%	198	51.2%	
University	78	15.8%	10	9.3%	68	17.6%	
Employment							
Unemployed	204	41.2%	80	74.1%	124	32.0%	**< .001***
Employed	291	58.8%	28	25.9%	263	68.0%	
Social position							
High	16	3.2%	3	2.8%	13	3.4%	**< .001***
Mean-high	43	8.7%	4	3.7%	39	10.1%	
Mean	65	13.1%	11	10.2%	54	14.0%	
Mean-low	184	37.2%	26	24.1%	158	40.8%	
Low	187	37.8%	64	59.3%	123	31.8%	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*p*
Age (years-old)	29.88	10.59	24.95	12.27	31.25	9.65	**< .001***
Onset of addiction (years-old)	23.38	8.26	20.05	10.72	24.30	7.18	**< .001***
Duration of the addiction (years)	3.75	3.47	4.04	3.23	3.67	3.53	.327

Note. SD: standard deviation. *Bold: significant comparison (.05 level)

a positive significant lineal trend (Wald-statistic = 20.65, $p < 0.001$), with an increase from 8.6% in 2012 to 15.5% in 2022. No significant lineal trend was identified for the OGD condition (Wald-statistic = 1.01, $p = 0.314$), with an increase from 3.4 in 2012 to 5.7 in 2022.

Comparison of Clinical Profiles

Tables 2, 3, and 4 contain a comparison between the groups for psychopathological state (SCL-90R), impulsivity (UPPS-P), emotion regulation (DERS), substance use, and personality traits (see also Fig. 2). After adjusting (controlling) by the patients' sex and age, compared with OGD, OSBA presented a profile characterized by worse psychological state (higher likelihood of depression, anxiety, paranoid ideation, and total psychological symptoms), higher impulsivity levels, higher difficulties in emotion regulation, and higher substance use. The personality profile related to OSBA presented higher novelty seeking, reward dependence and persistence, and lower harm avoidance.

Logistic Regression

Table 5 displays the logistic regression with the variables with statistical capacity to discriminate between the diagnostic conditions. The likelihood of OSBA is higher for men, older patients, shorter duration of the addictive problems, higher novelty seeking, higher persistence, and lower self-transcendence. Adequate goodness-of-fit was achieved ($p = 0.405$ in the Hosmer–Lemeshow test), along with a global predictive capacity of around 26% (Nagelkerke's-$R^2 = 0.263$) and global discriminative capacity of AUC = 0.850.

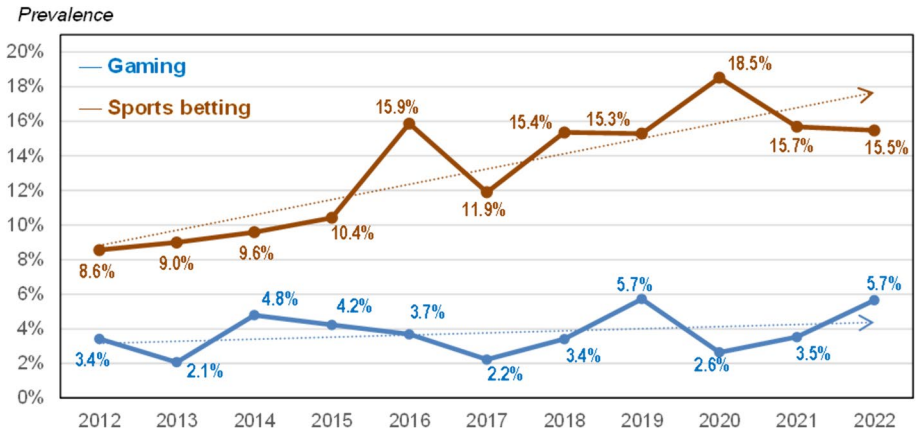

Fig. 1 Prevalence of gaming disorder and sports betting during the recruitment of data. Note. Dash line: linear trends

Table 2 Comparison of the clinical profiles: results adjusted (controlled) by the patients' sex and age

	Raw scores						Patients within the clinical range					
	Gaming *N* = 108		Sports betting *N* = 387				Gaming *N* = 108		Sports betting *N* = 387			
	Mean	*SD*	*Mean*	*SD*	*p*	|*d*|	*n*	%	*n*	%	*p*	*OR*
SCL-90R Somatization	0.79	0.75	0.85	0.76	.505	0.08	33	30.6%	133	34.4%	.896	1.03
SCL-90R Obsess.-comp	1.24	0.79	1.13	0.80	.232	0.14	51	47.2%	170	43.9%	.600	0.89
SCL-90R Interp.sensitivity	1.16	0.93	1.00	0.82	.073	0.19	57	52.8%	174	45.0%	.260	0.77
SCL-90R Depression	1.27	0.99	1.47	0.91	**.047***	0.20	50	46.3%	220	56.8%	**.048***	1.57
SCL-90R Anxiety	0.80	0.78	0.94	0.75	.079	0.19	30	27.8%	159	41.1%	**.026***	**1.89**†
SCL-90R Hostility	0.98	0.86	0.97	0.82	.874	0.02	36	33.3%	109	28.2%	.283	0.77
SCL-90R Phobic anxiety	0.50	0.75	0.39	0.62	.154	0.15	31	28.7%	92	23.8%	.292	0.76
SCL-90R Paranoid ideation	1.06	0.88	0.90	0.79	.092	0.18	44	40.7%	100	25.8%	**.019***	**2.15**†
SCL-90R Psychotic	0.73	0.76	0.82	0.71	.298	0.11	40	37.0%	169	43.7%	.252	1.31
SCL-90R GSI	0.98	0.72	1.01	0.68	.743	0.04	52	48.1%	208	53.7%	.313	1.26
SCL-90R PST	41.95	20.06	45.08	21.60	.188	0.15	47	43.5%	208	53.7%	**.049***	1.58
SCL-90R PSDI	1.90	0.60	1.86	0.53	.457	0.08	26	24.1%	72	18.6%	.151	0.68
UPPS-P Premeditation	23.73	5.56	25.17	4.91	**.013***	0.27	21	19.4%	78	20.2%	.526	1.20
UPPS-P Perseverance	24.70	4.08	22.85	4.47	**.001***	0.43	33	30.6%	86	22.2%	**.049***	0.66
UPPS-P Sensation seeking	28.48	5.92	29.33	6.92	.250	0.13	10	9.3%	44	15.4%	**.048***	**2.11**†
UPPS-P Positive urgency	26.81	8.13	30.21	8.58	**.001***	0.41	17	15.7%	125	32.3%	**.001***	**2.63**†
UPPS-P Negative urgency	29.17	6.60	31.62	6.14	**.001***	0.38	26	24.1%	99	25.6%	.761	1.08
UPPS-P Impulsivity total	132.93	18.88	139.18	21.66	**.009***	0.31	22	20.4%	116	30.0%	**.029***	**1.89**†
DERS Non acceptance	14.15	4.30	15.76	4.71	**.002***	0.36	13	12.0%	90	23.3%	**.015***	**2.23**†
DERS Goal directed behaviors	16.00	2.85	14.02	3.32	**.001***	**0.64**†	14	13.0%	39	10.1%	.517	0.80
DERS Impulse control	13.61	4.22	13.16	3.96	.316	0.11	13	12.0%	81	20.9%	**.012***	**2.36**†
DERS Lack awareness	16.88	3.39	16.81	3.48	.854	0.02	10	9.3%	62	16.0%	**.029***	**2.30**†

Table 2 (continued)

	Raw scores						Patients within the clinical range					
	Gaming *N* = *108*		Sports betting *N* = *387*				Gaming *N* = *108*		Sports betting *N* = *387*			
	Mean	*SD*	*Mean*	*SD*	*p*	|*d*|	*n*	%	*n*	%	*p*	*OR*
DERS Limited access	17.90	4.61	18.29	5.37	.506	0.08	12	11.1%	63	16.3%	.077	**1.87**†
DERS Emotional clarity	11.86	2.95	11.81	3.27	.886	0.02	12	11.1%	55	14.2%	.228	1.54
DERS Total	90.41	16.23	89.26	17.35	.555	0.07	14	13.0%	84	21.7%	**.023***	**2.10**†

Note. SD standard deviation. \|*d*\|: Cohen's *d* coefficient

SCL-90R Symptom Checklist-Revised, *UPPS-P* Impulsivity Behavior Scale

DERS, Difficulties in Emotion Regulation Scale

*Bold: significant comparison (.05 level)

†Bold: effect size into the ranges mild-moderate to high-large (\|*d*\| > 0.50 or *OR* > 1.86)

Table 3 Comparison of substances use: results adjusted (controlled) by the patients' sex and age

	Gaming *N* = *108*		Sports betting *N* = *387*			
	n	%	*n*	%	*p*	*OR*
Tabaco	24	22.2%	160	41.3%	**.001***	**2.43**†
Alcohol	2	1.9%	37	9.6%	**.021***	**5.60**†
Other illegal drugs	4	3.7%	48	12.4%	**.012***	**3.98**†

Note. *SD* standard deviation, *OR* odds ratio. *Bold: significant comparison (.05 level)

†Bold: effect size into the ranges mild-moderate to high-large (*OR* > 1.86)

Table 4 Comparison of the personality profiles: results adjusted (controlled) by the patients' sex and age

	Gaming *N* = *108*		Sports betting *N* = *387*			
	Mean	*SD*	*Mean*	*SD*	*p*	|*d*|
TCI-R Novelty seeking	102.56	13.94	112.00	13.42	**.001***	**0.69**†
TCI-R Harm avoidance	106.24	16.46	98.29	16.88	**.001***	0.48
TCI-R Reward dependence	92.05	16.49	95.16	14.19	**.041***	0.20
TCI-R Persistence	91.54	18.76	108.66	20.19	**.001***	**0.88**†
TCI-R Self-directedness	125.65	22.01	129.90	21.60	.085	0.19
TCI-R Cooperativeness	128.71	18.12	128.15	17.31	.775	0.03
TCI-R Self-transcendence	60.51	14.42	59.73	14.38	.634	0.05

Note. *SD* standard deviation. |*d*|: Cohen's-*d* coefficient

TCI-R, Temperament and Character Inventory-Revised

*Bold: significant comparison (.05 level)

†Bold: effect size into the ranges mild-moderate to high-large

Discussion

This study aimed to estimate the prevalence of OGD and OSBA among all patients seeking treatment at a hospital unit specialized in behavioral addictions during the period from 2012 to 2022 and to explore the sociodemographic and clinical features characterizing each diagnostic subtype. To our knowledge, this is the first study to have compared the phenotypes of these forms of online gambling, recruited from a large clinical sample of patients seeking treatment for behavioral addictions.

The prevalence of OSBA was higher than that of OGD (13.0% vs. 3.8%). Different factors may explain this difference. First, among the general population, sports betting (both offline and online) could be perceived as a leisure behavior of low risk and little social stigma. Secondly, the large rise in OSBA advertising and marketing, as well as the immediacy and easy access to multiple virtual platforms (apps and websites) for largely uncontrolled and private betting (Buil et al., 2015), may also have contributed to the fast-growing popularity of this gambling trend (Gainsbury et al., 2015). Indeed, some subjects consider betting to be an intrinsic part of the sports event itself, which reduces awareness of the risks that this type of behavior entails and hence increases vulnerability to OSBA (Brevers

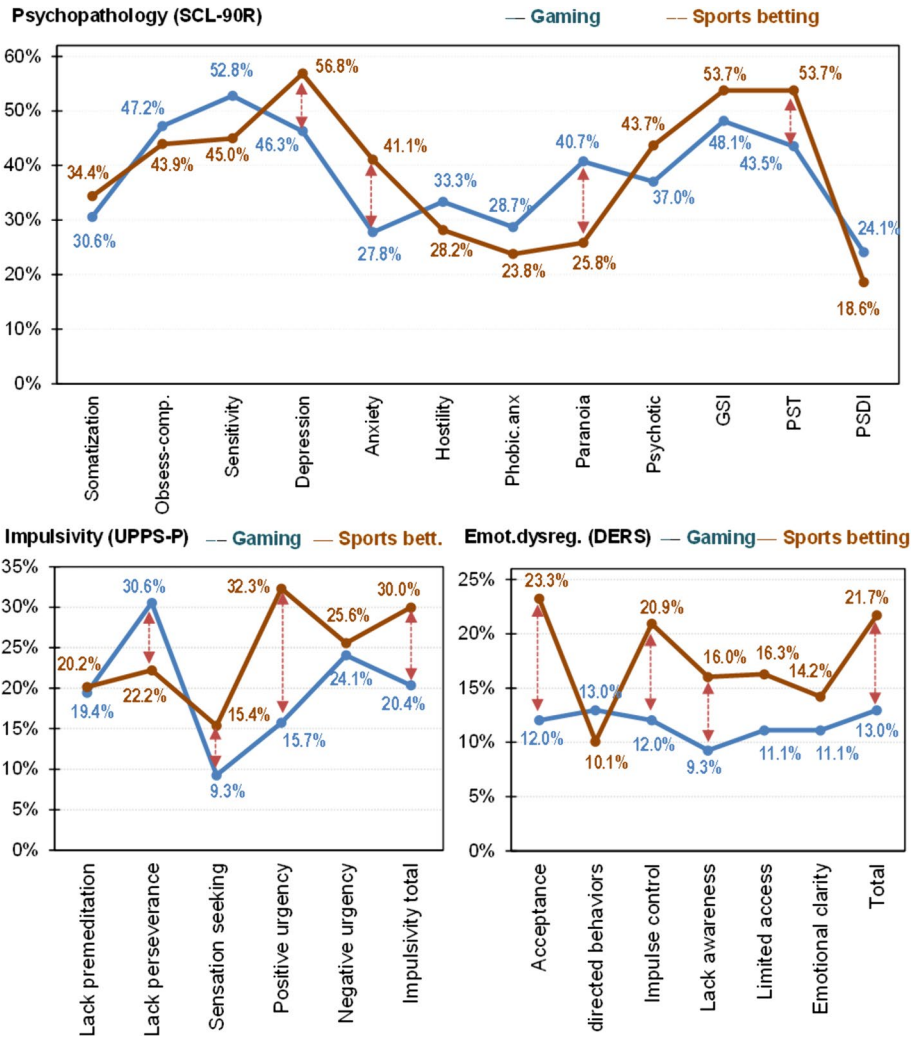

Fig. 2 Prevalence of patients within the clinical ranges. Note. Dash line: significant comparison (adjusted by sex and age)

et al., 2022). Additionally, individuals with other gambling behaviors may be attracted by the popularity of online sports betting, which increases the risk of onset and advance of OGD (Hing et al., 2015b; Russell et al., 2019), particularly among males and young people (Gainsbury et al., 2013). This result is consistent with previous studies, which observed that young subjects are currently most vulnerable to advertising of sports betting on online platforms (Derevensky et al., 2010; Lopez-Gonzalez et al., 2019; Martin & Nelson, 2014; Martin et al., 2016, 2018).

This study also observed an increase in the prevalence of OGD and OSBA in recent years, with a positive linear trend for OSBA (increasing from 8.6% in 2012 to 15.5% in 2022, compared with an increase from 3.4 to 5.7% for OGD). This increase is strongly related with faster, easier and more widely available access to internet and advances in

Table 5 Logistic regression with the final discriminative model

	B	SE	p	OR	95%CI (OR)	
Sex (1 = men versus 0 = women)	1.866	0.560	.001	6.464	2.156	19.376
Age (years-old)	0.098	0.016	< .001	1.103	1.069	1.138
Duration of the problems (years)	− 0.109	0.040	.006	0.897	0.829	0.970
TCI-R Novelty seeking	0.063	0.011	< .001	1.065	1.043	1.089
TCI_R Persistence	0.055	0.008	< .001	1.057	1.040	1.074
TCI-R Self-transcendence	− 0.031	0.010	.001	0.969	0.950	0.988
Fit-statistics:	Hosmer–Lemeshow: $p = .405$, Nagelkerke's-R2 = .263; AUC = .850					

Note. Criterion: diagnostic subtype: 1 = OSBA (online sports betting addiction) versus 0 = OGD (online gambling disorder)

SE standard error, *OR* odds ratio, *95%CI* 95% confidence interval, *AUC* area under ROC curve

List of predictors: sex, age, duration of the addiction related problems, social position, global psychology distress (SCL-90R GSI, impulsivity (UPPS-P total), emotion dysregulation (DERS total), and personality (TCI-R scales)

modern technology (Baggio et al., 2017; Gainsbury et al., 2015). Regarding the growth in the prevalence of OGD in our study (from 3.4 to 5.7% during the recruitment period between 2012 to 2022), recent studies have also concluded that the advancement of technology in developed countries has occurred in parallel with increasingly serious OGD prevalences among high-risk populations (such as young age people) (Kim et al., 2022). The increasing popularity of online video games has also been related with the increase in reported negative consequences on physical, mental, and social well-being of gamers (Alhamoud et al., 2022), which have led the considerable interest of researchers across the world to estimate accurate prevalence of OGD and its correlates among groups of people with different vulnerabilities. Variable prevalence rates have been related with strong discrepancies in the measurement tools, the lack of consensus among researchers regarding diagnostic criteria (that may result in false positive screening inflating prevalence rates), and even the impact of cultural background (Zhou et al., 2024). But there is a clear consensus on the worldwide increase of OGD prevalences.

Compared with OGD, this study found that OSBA affects a higher proportion of males, with higher levels of education, in active employment and of higher socioeconomic status. Regarding these differences in the sociodemographic profile, it seems consistent to assume that sports betting is associated with a better economic situation, since this activity is more expensive to finance than gaming (which is typically associated with younger males with fewer financial resources) (Andreassen, 2015; Kuss et al., 2014). These findings agree with other studies which have also reported that, as opposed to many other types of gambling (and also compared to gambling disorder), sports betting is associated with higher likelihood of males (Håkansson et al., 2017; Richard et al., 2019), higher levels of education (Cooper et al., 2021; Jiménez-Murcia et al., 2021), and active employment (Hing et al., 2016).

Other differences between OSBA and OGD in this work were the means for chronological age and for the age of onset of the problematic addictive behavior. Concretely, OSBA patients were older, and reported later onset of the disorder. These results could be explained by the fact that in many patients OSBA may have evolved from previous forms of gaming. Indeed, previous studies have observed that some individuals who

play videogames (even as a non-problematic recreational activity) may progress to other gambling behaviors such as sports betting (Kuss et al., 2014). Previous research has estimated the prevalence of gaming disorder at around 15% in a clinical sample of patients seeking treatment for gambling disorder (Jiménez-Murcia et al., 2014). In fact, both cross-sectional and longitudinal research has found that gambling disorder is a highly prevalent comorbid condition of gaming disorder (Zendle & Cairns, 2018). It has been suggested that certain structural features of video games (such as "loot boxes") and the proliferation of betting websites may lead to the natural progression from online video gaming to online gambling platforms (King & Delfabbro, 2018; King et al., 2011). Another explanation is that they start out as land-based gamblers, where it is a form of entertainment, and later switch to online gambling, which studies have revealed to be the cause of greater dependence and problem gambling than the offline form (Gainsbury et al., 2014), with problem Internet gamblers betting more on sports and in a greater number of ways than off-line gamblers (Gainsbury et al., 2013). However, there is a lack of further research on the different types of game and their impact on the onset of problem gambling. Both OGB and OSBA are behavioral addictions, and some studies have attempted to explain the cross-sectional or longitudinal concurrence between the two.

Furthermore, compared with OGD, OSBA is characterized by worse psychological state (specifically in terms of depression, anxiety, paranoid ideation and total psychological symptoms), greater difficulties in emotion regulation, and higher likelihood of substance use. This clearly more dysfunctional clinical profile has also been identified in other previous studies on problematic and disordered sports betting (Derevensky & Gupta, 2004), and the explanation can be found in the higher levels of impulsivity among OSBA. Studies have observed that more difficulties in the impulse control may act as a transdiagnostic trait associated with a wide range of clinical disorders (including depression, anxiety, and substance related disorders) (Hing et al., 2016, 2015a; Johnson et al., 2013). Previous research has also linked higher impulsivity with high emotionally dysregulation (Bagby et al., 2007), and this specific concurrence has been found in the basis of the onset and maintenance of addictions. For example, studies have found that alcoholism is more comorbid with gambling disorder than with gaming disorder (Cronce & Corbin, 2010), and clinical studies have also identified a greater presence of comorbid mental conditions in OSBA as compared with OGD [particularly other problematic forms of gambling (Cooper et al., 2021; Hing et al., 2016; LaPlante et al., 2014) and other behavioral addictions (Hing et al., 2017)]. This empirical evidence suggests that individuals with higher levels of emotion dysregulation would exhibit higher impulsivity, and therefore constitute a group at higher risk for developing multiple problematic behaviors and mental illnesses.

In comparison with OGD, the personality profile associated with OSBA showed higher scores in novelty seeking, reward dependence and persistence, and lower scores for harm avoidance and self-transcendence. Research also suggests a dysfunctional self-regulatory capacity in many heavy sports betters (Hing et al., 2018). Indeed, the lack of self-control is a significant characteristic among problem gamblers (Bergen et al., 2014). Novelty seeking defines the exploratory level in response to novel situations and impulsive decision-making (Costa et al., 2014). High levels of this trait are characteristic of individuals who pursue excitement are inclined to explore new experiences and make decisions quickly and on the basis of limited information and therefore are at greater risk of engaging in addictive behaviors. It is also worth noting that novelty seeking and persistence have been shown to have a strong relationship with impulsive-compulsive behavior. The association of OSBA with higher levels of impulsivity and persistence (as compared with OGD) is congruent

with other studies on sports betting and non-sports betting (Cooper et al., 2021; Jiménez-Murcia et al., 2021).

Reward dependence has also been observed as one of the key drivers of addiction high levels of which are related to extroversion (De Fruyt et al., 2000; Smillie, 2013), a personality trait that is typically observed among individuals with sports betting disorders as compared with other gamblers (Hodgins & Holub, 2015; Jiménez-Murcia et al., 2017; Mestre-Bach et al., 2016). Research on OSBA has also observed that higher rates of persistence are related with reward dependence (Grant et al., 2012; Ledgerwood & Petry, 2010; Odlaug et al., 2011), suggesting that OSBA patients (as opposed to those with other behavioral addictions, including OGD) may represent a specific subgroup within the addiction spectrum characterized with specific personality traits that could increase the likelihood of associated negative outcomes (Estévez et al., 2017).

OSBA is viewed as strategic, whereby gamblers attempt to use their skill and knowledge of the game to influence or predict sports results (Odlaug et al., 2011). This attribute could boost the perception of gambling as a low risk activity, thereby minimizing concerns and making it appear acceptable as a harmless form of recreation (Cantinotti et al., 2004; Lopez-Gonzalez et al., 2020). However, misguided beliefs about this ability to control one's luck may cause sports gamblers to miscalculate win/loss ratios and overestimate their own gambling skills, leading them to place riskier bets, which might explain the lower scores for harm avoidance in the OSBA group as compared with OGD (Cooper et al., 2021; Subramaniam et al., 2017).

Limitations and Strengths

Despite its positive aspects, the findings of this study are limited by several factors. One is the gender distribution, since the low prevalence of women means the results cannot necessarily be generalized to all women with problematic online gaming or sports betting behaviors. The counterargument is that the proportion of women in our sample is consistent with those of treatment-seeking patients in clinical studies (mainly because gambling and gaming disorders are far more prevalent among men). Second, the cross-sectional design means the evidence cannot be interpreted in the form of causal relationships. And finally, the low incidence of patients being treated at the Behavioral Addictions Unit for video game addiction, due to the fact that many young people view this addiction as a harmless form of everyday entertainment.

The main strengths of the study are the inclusion of two large samples of treatment-seeking patients for OGD and OSBA and the assessment of multiple variables related to a wide variety of sociodemographic and psychological areas.

Conclusions and Implications

Online gaming and sports betting share similarities and differences. Both are considered forms of entertainment among the general population, and especially young men. Both are normalized and perceived as low-risk and are also easily accessible. Sports betting is even associated with such a healthy activity as sport.

Our study adds to the few empirical studies of clinical samples of patients with OGD and OSBA, and it provides new evidence about the differing characteristics of both mental

disorders. Our results should be considered in the development of reliable assessment tools and the design of precise preventive and intervention plans that are focused on the concrete needs of the patients. For example, it is well known that online sports betting advertising and marketing greatly impact among individuals, particularly late adolescence and emerging adulthood, so effective educational and legislative public health policies are required for controlling access to gambling and improving comprehensive regulatory frameworks. These actions are particularly needed to target highly vulnerability groups, such as young age video gamers and/or individuals with history of problematic gaming. On the other hand, assessment tools in clinical settings specialized in behavioral addictions should include comprehensive procedures to identify the presence and severity of comorbid mental disorders (particularly depression, anxiety, and substance-related disorders), as well as tools to measure the impulsivity levels, difficulties in emotion regulation strategies, and personality profiles. The combination of these measures will help to accurately establish the patients' personalized profiles, who would benefit from the precise care for their comorbid mental conditions and the required training in coping, problem-solving skills, and in control of impulsive behaviors.

Acknowledgements CARLOSIII: CIBERobn (an initiative of ISCIII), FEDER funds/European Regional Development Fund (ERDF), a way to build Europe, and European Social Fund (ESF, investing in your future). CERCA: We thank CERCA Programme/Generalitat de Catalunya for institutional support. We also thank Instituto de Salud Carlos III (ISCIII). Additional support was received by AGAUR Generalitat de Catalunya (2021-SGR-00824) and European Union's Horizon 2020 research and innovation programme under Grant agreement no. 847879 (PRIME/H2020, Prevention and Remediation of Insulin Multimorbidity in Europe). R-E A-R is supported by the FI-SDUR program (2022 FISDU 00206, Generalitat de Catalunya). RG is supported by the Catalan Institution for Research and Advanced Studies (ICREAAcademia, 2021-Programme). The funders had no role in the study design, data collection and interpretation, decision to publish, or preparation of the manuscript.

Author Contribution Conceptualization: Susana Jiménez-Murcia.
Methodology, data curation, and formal analysis: Roser Granero.
Project administration: Mónica Gómez-Peña, Laura Moragas, Iván Perales.
Supervision: Susana Jiménez-Murcia, Fernando Fernández-Aranda.
Validation and visualization: Susana Jiménez-Murcia, Fernando Fernández-Aranda.
Writing—original draft preparation: Roser Granero, Rocío-Elena Ayala-Rojas.
Writing—review and editing: Susana Jiménez-Murcia, Roser Granero.

Funding Open Access funding provided thanks to the CRUE-CSIC agreement with Springer Nature. This manuscript and research were supported by grants from the Delegación del Gobierno para el Plan Nacional sobre Drogas (2021I031/2023I055), Ministerio de Ciencia e Innovación (PDI2021-124887OB-I00), Ministerio de Sanidad y Política Social, Plan Nacional sobre Drogas, Fondos Europeos para Adicciones (2022/008847), Ministerio de Consumo (231102), Instituto de Salud Carlos III (ISCIII) (FIS PI20/00132), and co-funded by FEDER funds/European Regional Development Fund (ERDF), a way to build Europe. Roser Granero was supported by The Catalan Institution for Research and Advanced Studies (ICREA Academia Program, 2021). 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.

Data Availability The datasets analyzed during the study are not publicly available due to patient confidentiality and other ethical reasons but are available from the corresponding author on reasonable request.

Declarations

Ethics Approval The data analyzed in this study was collected as part of different research projects approved by the Ethics Committee of Bellvitge University Hospital (Barcelona) (Ref: PR338/17 [CSI 18/04]). All the patients provided signed informed consent.

Conflict of Interest FFA and SJM received consultancy and speaking honoraria from Novo Nordisk. The rest of the authors declare that they have no known competing financial interests or personal relationships that

could have appeared to influence the work reported in this paper.

References

Alhamoud, M. A., Alkhalifah, A. A., Althunyan, A. K., Mustafa, T., Alqahtani, H. A., & Awad, F. A. A. (2022). Internet gaming disorder: Its prevalence and associated gaming behavior, anxiety, and depression among high school male students, Dammam, Saudi Arabia. *Journal of Family & Community Medicine, 29*(2), 93–101. https://doi.org/10.4103/jfcm.jfcm_48_22

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders–5th edition-text revision*. American Psychiatric Association Publishing

Andreassen, C. S. (2015). Online social network site addiction: A comprehensive review. *Current Addiction Reports, 2*(2), 175–184. https://doi.org/10.1007/s40429-015-0056-9

Andreassen, C. S., Griffiths, M. D., Gjertsen, S. R., Krossbakken, E., Kvam, S., & Pallesen, S. (2013). The relationships between behavioral addictions and the five-factor model of personality. *Journal of Behavioral Addictions, 2*(2), 90–99. https://doi.org/10.1556/JBA.2.2013.003

Bagby, R. M., Vachon, D. D., Bulmash, E. L., Toneatto, T., Quilty, L. C., & Costa, P. T. (2007). Pathological gambling and the five-factor model of personality. *Personality and Individual Differences, 43*(4), 873–880. https://doi.org/10.1016/j.paid.2007.02.011

Baggio, S., Dupuis, M., Berchtold, A., Spilka, S., Simon, O., & Studer, J. (2017). Is gambling involvement a confounding variable for the relationship between Internet gambling and gambling problem severity? *Computers in Human Behavior, 71*, 148–152. https://doi.org/10.1016/j.chb.2017.02.004

Bergen, A. E., Newby-Clark, I. R., & Brown, A. (2014). Gambling increases self-control strength in problem gamblers. *Journal of Gambling Studies, 30*(1), 153–162. https://doi.org/10.1007/s10899-012-9350-9

Billieux, J., Flayelle, M., Rumpf, H.-J., & Stein, D. J. (2019). High involvement versus pathological involvement in video games: A crucial distinction for ensuring the validity and utility of gaming disorder. *Current Addiction Reports, 6*(3), 323–330. https://doi.org/10.1007/s40429-019-00259-x

Bonnaire, C., & Baptista, D. (2019). Internet gaming disorder in male and female young adults: The role of alexithymia, depression, anxiety and gaming type. *Psychiatry Research, 272*, 521–530. https://doi.org/10.1016/j.psychres.2018.12.158

Bouguettaya, A., Lynott, D., Carter, A., Zerhouni, O., Meyer, S., Ladegaard, I., Gardner, J., & O'Brien, K. S. (2020). The relationship between gambling advertising and gambling attitudes, intentions and behaviours: A critical and meta-analytic review. *Current Opinion in Behavioral Sciences, 31*, 89–101. https://doi.org/10.1016/j.cobeha.2020.02.010

Brevers, D., Vögele, C., & Billieux, J. (2022). The evolving landscape of sports betting: A risk for young people? In *Wohlbefinden und Gesundheit im Jugendalter* (pp. 363–392). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-35744-3_17

Buil, P., Solé Moratilla, M. J., & García Ruiz, P. (2015). La regulación publicitaria de los juegos de azar online en España. Una reflexión sobre la protección del menor. *Adicciones, 27*(3), 198–204. https://doi.org/10.20882/adicciones.706

Cantinotti, M., Ladouceur, R., & Jacques, C. (2004). Sports betting: Can gamblers beat randomness? *Psychology of Addictive Behaviors, 18*(2), 143–147. https://doi.org/10.1037/0893-164X.18.2.143

Chia, D. X. Y., Ng, C. W. L., Kandasami, G., Seow, M. Y. L., Choo, C. C., Chew, P. K. H., Lee, C., & Zhang, M. W. B. (2020). Prevalence of Internet addiction and gaming disorders in Southeast Asia: A meta-analysis. *International Journal of Environmental Research and Public Health, 17*(7), e-2582. https://doi.org/10.3390/ijerph17072582

Cloninger, C. R., Przybeck, T, R., Svrakic, D. M., & Wetzel R. D. (1994). *The temperament and character inventory (TCI). A guide to its development and use*. Washington University, St. Louis, MO: Center for Psychobiology of Personality.

Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin*, *127*(1), 87–127. https://doi.org/10.1037/0033-2909.127.1.87

Cooper, A., Olfert, K., & Marmurek, H. H. C. (2021). Predictors of problem gambling for sports and non-sports gamblers: A stochastic search variable selection analysis. *Journal of Gambling Studies, 38*(3), 767–783. https://doi.org/10.1007/s10899-021-10025-2

Costa, V. D., Tran, V. L., Turchi, J., & Averbeck, B. B. (2014). Dopamine modulates novelty seeking behavior during decision making. *Behavioral Neuroscience, 128*(5), 556–566. https://doi.org/10.1037/a0037128

Cronce, J. M., & Corbin, W. R. (2010). Effects of alcohol and initial gambling outcomes on within-session gambling behavior. *Experimental and Clinical Psychopharmacology, 18*(2), 145–157. https://doi.org/10.1037/a0019114

Darvesh, N., Radhakrishnan, A., Lachance, C. C., Nincic, V., Sharpe, J. P., Ghassemi, M., Straus, S. E., & Tricco, A. C. (2020). Exploring the prevalence of gaming disorder and Internet gaming disorder: A rapid scoping review. *Systematic Reviews, 9*(1), e-68. https://doi.org/10.1186/s13643-020-01329-2

Deans, E. G., Thomas, S. L., Derevensky, J., & Daube, M. (2017). The influence of marketing on the sports betting attitudes and consumption behaviours of young men: Implications for harm reduction and prevention strategies. *Harm Reduction Journal, 14*(1), e-5. https://doi.org/10.1186/s12954-017-0131-8

De Fruyt, F., Van De Wiele, L., & Van Heeringen, C. (2000). Cloninger's psychobiological model of temperament and character and the five-factor model of personality. *Personality and Individual Differences*, *29*(3), 441–452. https://doi.org/10.1016/S0191-8869(99)00204-4

Deleuze, J., Nuyens, F., Rochat, L., Rothen, S., Maurage, P., & Billieux, J. (2017). Established risk factors for addiction fail to discriminate between healthy gamers and gamers endorsing DSM-5 Internet gaming disorder. *Journal of Behavioral Addictions, 6*(4), 516–524. https://doi.org/10.1556/2006.6.2017.074

Derevensky, J., Sklar, A., Gupta, R., & Messerlian, C. (2010). An empirical study examining the impact of gambling advertisements on adolescent gambling attitudes and behaviors. *International Journal of Mental Health and Addiction, 8*(1), 21–34. https://doi.org/10.1007/s11469-009-9211-7

Derevensky, J. L., & Gupta, R. (2004). Adolescents with gambling problems: A synopsis of our current knowledge. *Journal of Gambling Issues*, *10*. https://doi.org/10.4309/jgi.2004.10.3

Derogatis, L. R. (2002). *SCL-90-R. Cuestionario de 90 Síntomas-Manual.* Madrid: TEA Ediciones.

Dong, G., & Potenza, M. N. (2014). A cognitive-behavioral model of Internet gaming disorder: Theoretical underpinnings and clinical implications. *Journal of Psychiatric Research, 58*, 7–11. https://doi.org/10.1016/j.jpsychires.2014.07.005

Durkee, T., Kaess, M., Carli, V., Parzer, P., Wasserman, C., Floderus, B., Apter, A., Balazs, J., Barzilay, S., Bobes, J., Brunner, R., Corcoran, P., Cosman, D., Cotter, P., Despalins, R., Graber, N., Guillemin, F., Haring, C., Kahn, J.-P., … Wasserman, D. (2012). Prevalence of pathological internet use among adolescents in Europe: demographic and social factors. *Addiction*, *107*(12), 2210–2222. https://doi.org/10.1111/j.1360-0443.2012.03946.x

Estévez, A., Rodríguez, R., Díaz, N., Granero, R., Mestre-Bach, G., Steward, T., Fernández-Aranda, F., Aymamí, N., Gómez-peña, M., Del Pino-Gutiérrez, A., Baño, M., Moragas, L., Mallorquí-Bagué, N., López-González, H., Jauregui, P., Onaindia, J., Martín-Romera, V., Menchón, J. M., & Jiménez-Murcia, S. (2017). How do online sports gambling disorder patients compare with land-based patients? *Journal of Behavioral Addictions, 6*(4), 639–647. https://doi.org/10.1556/2006.6.2017.067

European Gaming & Betting Association. (2019). European online gambling key figures 2018. *European Gaming and Betting Association*, 1–4. Available at: https://www.egba.eu/uploads/2019/12/European-Online-Gambling-Key-Figures-2018.pdf. Accessed 1 Nov 2023.

Fam, J. Y. (2018). Prevalence of internet gaming disorder in adolescents: A meta-analysis across three decades. *Scandinavian Journal of Psychology, 59*(5), 524–531. https://doi.org/10.1111/sjop.12459

Feng, W., Ramo, D. E., Chan, S. R., & Bourgeois, J. A. (2017). Internet gaming disorder: Trends in prevalence 1998–2016. *Addictive Behaviors, 75*, 17–24. https://doi.org/10.1016/j.addbeh.2017.06.010

Forrest, C. J., King, D. L., & Delfabbro, P. H. (2016). The measurement of maladaptive cognitions underlying problematic video-game playing among adults. *Computers in Human Behavior, 55*, 399–405. https://doi.org/10.1016/j.chb.2015.09.017

Gainsbury, S. M., Russell, A., Hing, N., Wood, R., & Blaszczynski, A. (2013). The impact of internet gambling on gambling problems: A comparison of moderate-risk and problem Internet and non-Internet gamblers. *Psychology of Addictive Behaviors, 27*(4), 1092–1101. https://doi.org/10.1037/a0031475

Gainsbury, S. M., Russell, A., Hing, N., Wood, R., Lubman, D. I., & Blaszczynski, A. (2014). The prevalence and determinants of problem gambling in Australia: Assessing the impact of interactive

gambling and new technologies. *Psychology of Addictive Behaviors, 28*(3), 769–779. https://doi.org/10.1037/a0036207

Gainsbury, S. M., Russell, A., Hing, N., Wood, R., Lubman, D., & Blaszczynski, A. (2015). How the Internet is changing gambling: Findings from an Australian prevalence survey. *Journal of Gambling Studies, 31*(1), 1–15. https://doi.org/10.1007/s10899-013-9404-7

Granero, R., Fernández-Aranda, F., Castro-Calvo, J., Billieux, J., Valero-Solís, S., Mora-Maltas, B., Rivas-Pérez, S., Valenciano-Mendoza, E., del Pino-Gutiérrez, A., Gómez-Peña, M., Moragas, L., Baenas, I., Mena-Moreno, T., Casalé-Salayet, G., Codina, E., González-Bueso, V., Santamaría, J. J., Baño, M., Menchón, J. M., & Jiménez-Murcia, S. (2021). Subtyping treatment-seeking gaming disorder patients. *Addictive Behaviors, 123*, 107086. https://doi.org/10.1016/j.addbeh.2021.107086

Gonzalez De Rivera, J. L., Derogatis, L. R., De las Cuevas, C., Gracia Marco, R., Rodríguez-Pulido, F., Henry-Benitez, M., & Monterrey, A. (1989). *The Spanish version of the SCL-90-R. Normative data in the general population.* Towson: Clinical Psychometric Research.

González-Bueso, V., Santamaría, J., Fernández, D., Merino, L., Montero, E., & Ribas, J. (2018). Association between Internet gaming disorder or pathological video-game use and comorbid psychopathology: A comprehensive review. *International Journal of Environmental Research and Public Health, 15*(4), e-668. https://doi.org/10.3390/ijerph15040668

Granero, R., Jiménez-Murcia, S., del Pino-Gutiérrez, A., Mora, B., Mendoza-Valenciano, E., Baenas-Soto, I., Gómez-Peña, M., Moragas, L., Codina, E., López-González, H., Mena-Moreno, T., Mestre-Bach, G., Valero-Solís, S., Rivas, S., Agüera, Z., Vintró-Alcaraz, C., Lozano-Madrid, M., Menchón, J. M., & Fernández-Aranda, F. (2020). Gambling phenotypes in online sports betting. *Frontiers in Psychiatry*, *11*. https://doi.org/10.3389/fpsyt.2020.00482

Grant, J. E., Odlaug, B. L., Chamberlain, S. R., & Schreiber, L. R. N. (2012). Neurocognitive dysfunction in strategic and non-strategic gamblers. *Progress in Neuro-Psychopharmacology and Biological Psychiatry, 38*(2), 336–340. https://doi.org/10.1016/j.pnpbp.2012.05.006

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41–54. https://doi.org/10.1023/B:JOBA.0000007455.08539.94

Griffiths, M. D., & Hunt, N. (1998). Dependence on computer games by adolescents. *Psychological Reports, 82*(2), 475–480. https://doi.org/10.2466/pr0.1998.82.2.475

Gutiérrez-Zotes, J. A., Bayón, C., Montserrat, C., Valero, J., Labad, A., Cloninger, C. R., & Fernández-Aranda, F. (2004). Temperament and character inventory revised (TCI-R): Standardization and normative data in a general population sample. *Actas Españolas De Psiquiatría, 32*(1), 8–15.

Haagsma, M. C., Pieterse, M. E., & Peters, O. (2012). The prevalence of problematic video gamers in the Netherlands. *Cyberpsychology, Behavior, and Social Networking, 15*(3), 162–168. https://doi.org/10.1089/cyber.2011.0248

Håkansson, A., Mårdhed, E., & Zaar, M. (2017). Who seeks treatment when medicine opens the door to pathological gambling patients—Psychiatric comorbidity and heavy predominance of online gambling. *Frontiers in Psychiatry*, *8*. https://doi.org/10.3389/fpsyt.2017.00255

Hamonniere, T., & Varescon, I. (2018). Metacognitive beliefs in addictive behaviours: A systematic review. *Addictive Behaviors, 85*, 51–63. https://doi.org/10.1016/j.addbeh.2018.05.018

Hing, N., Lamont, M., Vitartas, P., & Fink, E. (2015). Sports bettors' responses to sports-embedded gambling promotions: Implications for compulsive consumption. *Journal of Business Research, 68*(10), 2057–2066. https://doi.org/10.1016/j.jbusres.2015.03.003

Hing, N., Russell, A. M. T., Gainsbury, S. M., & Blaszczynski, A. (2015). Characteristics and help-seeking behaviors of Internet gamblers based on most problematic mode of gambling. *Journal of Medical Internet Research, 17*(1), e-13. https://doi.org/10.2196/jmir.3781

Hing, N., Russell, A. M. T., Vitartas, P., & Lamont, M. (2016). Demographic, behavioural and normative risk factors for gambling problems amongst sports bettors. *Journal of Gambling Studies, 32*(2), 625–641. https://doi.org/10.1007/s10899-015-9571-9

Hing, N., Russell, A. M. T., Lamont, M., & Vitartas, P. (2017). Bet anywhere, anytime: An analysis of internet sports bettors' responses to gambling promotions during sports broadcasts by problem gambling severity. *Journal of Gambling Studies, 33*(4), 1051–1065. https://doi.org/10.1007/s10899-017-9671-9

Hing, N., Li, E., Vitartas, P., & Russell, A. M. T. (2018). On the spur of the moment: Intrinsic predictors of impulse sports betting. *Journal of Gambling Studies, 34*(2), 413–428. https://doi.org/10.1007/s10899-017-9719-x

Hodgins, D. C., & Holub, A. (2015). Components of impulsivity in gambling disorder. *International Journal of Mental Health and Addiction, 13*(6), 699–711. https://doi.org/10.1007/s11469-015-9572-z

Hollingshead A. B. (2011). Four factor index of social status. . *Yale Journal of Sociology*, *8*, 21–51. Available at: https://sociology.yale.edu/sites/default/files/files/yjs_fall_2011.pdf. Accessed 1 Nov 2023.

Jiménez-Murcia, S., Stinchfield, R., Álvarez-Moya, E., Jaurrieta, N., Bueno, B., Granero, R., Aymamí, M. N., Gómez-Peña, M., Martínez-Giménez, R., Fernández-Aranda, F., & Vallejo, J. (2009). Reliability, validity, and classification accuracy of a Spanish translation of a measure of DSM-IV diagnostic criteria for pathological gambling. *Journal of Gambling Studies, 25*(1), 93–104. https://doi.org/10.1007/s10899-008-9104-x

Jiménez-Murcia, S., Fernández-Aranda, F., Granero, R., Chóliz, M., La Verde, M., Aguglia, E., Signorelli, M. S., Sá, G. M., Aymamí, N., Gómez-Peña, M., del Pino-Gutiérrez, A., Moragas, L., Fagundo, A. B., Sauchelli, S., Fernández-Formoso, J. A., & Menchón, J. M. (2014). Video game addiction in gambling disorder: clinical, psychopathological, and personality correlates. *BioMed Research international*, *2014,* 315062. https://doi.org/10.1155/2014/315062

Jiménez-Murcia, S., Fernández-Aranda, F., Mestre-Bach, G., Granero, R., Tárrega, S., Torrubia, R., Aymamí, N., Gómez-Peña, M., Soriano-Mas, C., Steward, T., Moragas, L., Baño, M., del Pino-Gutiérrez, A., & Menchón, J. M. (2017). Exploring the relationship between reward and punishment sensitivity and gambling disorder in a clinical sample: A path modeling analysis. *Journal of Gambling Studies, 33*(2), 579–597. https://doi.org/10.1007/s10899-016-9631-9

Jiménez-Murcia, S., Giménez, M., Granero, R., López-González, H., Gómez-Peña, M., Moragas, L., Baenas, I., Del Pino-Gutiérrez, A., Codina, E., Mena-Moreno, T., Valenciano-Mendoza, E., Mora-Maltas, B., Valero-Solís, S., Rivas-Pérez, S., Guillén-Guzmán, E., Menchón, J. M., & Fernández-Aranda, F. (2021). Psychopathogical status and personality correlates of problem gambling severity in sports bettors undergoing treatment for gambling disorder. *Journal of Behavioral Addictions, 10*(3), 422–434. https://doi.org/10.1556/2006.2020.00101

Johnson, S. L., Carver, C. S., & Joormann, J. (2013). Impulsive responses to emotion as a transdiagnostic vulnerability to internalizing and externalizing symptoms. *Journal of Affective Disorders, 150*(3), 872–878. https://doi.org/10.1016/j.jad.2013.05.004

Kardefelt-Winther, D. (2014). The moderating role of psychosocial well-being on the relationship between escapism and excessive online gaming. *Computers in Human Behavior, 38*, 68–74. https://doi.org/10.1016/j.chb.2014.05.020

Kim, H. S., Son, G., Roh, E. B., Ahn, W. Y., Kim, J., Shin, S. H., Chey, J., & Choi, K. H. (2022). Prevalence of gaming disorder: A meta-analysis. *Addictive Behaviors, 126*, e-107183. https://doi.org/10.1016/j.addbeh.2021.107183

King, D. L., & Delfabbro, P. H. (2014). The cognitive psychology of Internet gaming disorder. *Clinical Psychology Review, 34*(4), 298–308. https://doi.org/10.1016/j.cpr.2014.03.006

King, D. L., & Delfabbro, P. H. (2018). Predatory monetization schemes in video games (e.g. 'loot boxes') and Internet gaming disorder. *Addiction, 113*(11), 1967–1969. https://doi.org/10.1111/add.14286

King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2011). The role of structural characteristics in problematic video game play: An empirical study. *International Journal of Mental Health and Addiction, 9*(3), 320–333. https://doi.org/10.1007/s11469-010-9289-y

King, D. L., Chamberlain, S. R., Carragher, N., Billieux, J., Stein, D., Mueller, K., Potenza, M. N., Rumpf, H. J., Saunders, J., Starcevic, V., Demetrovics, Z., Brand, M., Lee, H. K., Spada, M., Lindenberg, K., Wu, A. M. S., Lemenager, T., Pallesen, S., Achab, S., Kyrios, M., … & Delfabbro, P. H. (2020). Screening and assessment tools for gaming disorder: A comprehensive systematic review. *Clinical Psychology Review*, *77*, 101831. https://doi.org/10.1016/j.cpr.2020.101831

Koning, R. H., & van Velzen, B. (2009). Betting exchanges: The future of sports betting? *International Journal of Sport Finance, 4*(1), 42–62.

Kuss, D., Griffiths, M., Karila, L., & Billieux, J. (2014). Internet addiction: A systematic review of epidemiological research for the last decade. *Current Pharmaceutical Design, 20*(25), 4026–4052. https://doi.org/10.2174/13816128113199990617

Laier, C., Wegmann, E., & Brand, M. (2018). Personality and cognition in gamers: Avoidance expectancies mediate the relationship between maladaptive personality traits and symptoms of Internet-gaming disorder. *Frontiers in Psychiatry*, *9*. https://doi.org/10.3389/fpsyt.2018.00304

LaPlante, D. A., Nelson, S. E., & Gray, H. M. (2014). Breadth and depth involvement: Understanding Internet gambling involvement and its relationship to gambling problems. *Psychology of Addictive Behaviors, 28*(2), 396–403. https://doi.org/10.1037/a0033810

Ledgerwood, D. M., & Petry, N. M. (2010). Subtyping pathological gamblers based on impulsivity, depression, and anxiety. *Psychology of Addictive Behaviors, 24*(4), 680–688. https://doi.org/10.1037/a0019906

Lee, S.-Y., Lee, H. K., & Choo, H. (2017). Typology of Internet gaming disorder and its clinical implications. *Psychiatry and Clinical Neurosciences, 71*(7), 479–491. https://doi.org/10.1111/pcn.12457

Li, H., Mao, L. L., Zhang, J. J., Wu, Y., Li, A., & Chen, J. (2012). Dimensions of problem gambling behavior associated with purchasing sports lottery. *Journal of Gambling Studies, 28*(1), 47–68. https://doi.org/10.1007/s10899-011-9243-3

Li, E., Hing, N., Russell, A. M. T., & Vitartas, P. (2020). Impulsive sports betting: The effects of food or substance consumption. *Journal of Gambling Studies, 36*(2), 539–554. https://doi.org/10.1007/s10899-020-09938-1

Littel, M., van den Berg, I., Luijten, M., van Rooij, A. J., Keemink, L., & Franken, I. H. A. (2012). Error processing and response inhibition in excessive computer game players: An event-related potential study. *Addiction Biology, 17*(5), 934–947. https://doi.org/10.1111/j.1369-1600.2012.00467.x

Lopez-Fernandez, O., Williams, A. J., & Kuss, D. J. (2019). Measuring female gaming: Gamer profile, predictors, prevalence, and characteristics from psychological and gender perspectives. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.00898

Lopez-Gonzalez, H., Estévez, A., & Griffiths, M. D. (2019). Internet-based structural characteristics of sports betting and problem gambling severity: Is there a relationship? *International Journal of Mental Health and Addiction, 17*(6), 1360–1373. https://doi.org/10.1007/s11469-018-9876-x

Lopez-Gonzalez, H., Griffiths, M. D., & Estévez, A. (2020). In-play betting, sport broadcasts, and gambling severity: A survey study of Spanish sports bettors on the risks of betting on sport while watching it. *Communication & Sport, 8*(1), 50–71. https://doi.org/10.1177/2167479518816338

Mallorquí-Bagué, N., Fernández-Aranda, F., Lozano Madrid, M., Granero, R., Mestre-Bach, G., Baño, M., Del Pino-Gutiérrez, A., Gómez-Peña, M., Aymamí, N., Menchón, J. M., & Jiménez-Murcia, S. (2017). Internet gaming disorder and online gambling disorder: Clinical and personality correlates. *Journal of Behavioral Addictions, 6*(4), 669–677. https://doi.org/10.1556/2006.6.2017.078

Mao, L. L., Zhang, J. J., & Connaughton, D. P. (2015). Sports gambling as consumption: Evidence from demand for sports lottery. *Sport Management Review, 18*(3), 436–447. https://doi.org/10.1016/j.smr.2014.11.006

Martin, R. J., & Nelson, S. (2014). Fantasy sports, real money: Exploration of the relationship between fantasy sports participation and gambling-related problems. *Addictive Behaviors, 39*(10), 1377–1382. https://doi.org/10.1016/j.addbeh.2014.05.017

Martin, R. J., Nelson, S. E., & Gallucci, A. R. (2016). Game on: Past year gambling, gambling-related problems, and fantasy sports gambling among college athletes and non-athletes. *Journal of Gambling Studies, 32*(2), 567–579. https://doi.org/10.1007/s10899-015-9561-y

Martin, R. J., Nelson, S. E., Gallucci, A. R., & Lee, J. G. L. (2018). Daily and season-long fantasy sports participation and gambling-related problems among a sample of college students at three universities. *International Gambling Studies, 18*(3), 395–407. https://doi.org/10.1080/14459795.2017.1409248

McGee, D. (2020). On the normalisation of online sports gambling among young adult men in the UK: A public health perspective. *Public Health, 184*, 89–94. https://doi.org/10.1016/j.puhe.2020.04.018

Mestre-Bach, G., Granero, R., Steward, T., Fernández-Aranda, F., Baño, M., Aymamí, N., Gómez-Peña, M., Agüera, Z., Mallorquí-Bagué, N., Moragas, L., del Pino-Gutiérrez, A., Soriano-Mas, C., Navas, J. F., Perales, J. C., Menchón, J. M., & Jiménez-Murcia, S. (2016). Reward and punishment sensitivity in women with gambling disorder or compulsive buying: Implications in treatment outcome. *Journal of Behavioral Addictions*, *5*(4), 658–665. https://doi.org/10.1556/2006.5.2016.074

Mestre-Bach, G., Granero, R., Mora-Maltas, B., Valenciano-Mendoza, E., Munguía, L., Potenza, M. N., Derevensky, J. L., Richard, J., Fernández-Aranda, F., Menchón, J. M., & Jiménez-Murcia, S. (2022). Sports-betting-related gambling disorder: Clinical features and correlates of cognitive behavioral therapy outcomes. *Addictive Behaviors*, *133*. https://doi.org/10.1016/j.addbeh.2022.107371

Mihara, S., & Higuchi, S. (2017). Cross-sectional and longitudinal epidemiological studies of Internet gaming disorder: A systematic review of the literature. *Psychiatry and Clinical Neurosciences, 71*(7), 425–444. https://doi.org/10.1111/pcn.12532

Müller, K. W., Beutel, M. E., Egloff, B., & Wölfling, K. (2014). Investigating risk factors for Internet gaming disorder: A comparison of patients with addictive gaming, pathological gamblers and healthy controls regarding the big five personality traits. *European Addiction Research, 20*(3), 129–136. https://doi.org/10.1159/000355832

Müller, K. W., Janikian, M., Dreier, M., Wölfling, K., Beutel, M. E., Tzavara, C., Richardson, C., & Tsitsika, A. (2015). Regular gaming behavior and internet gaming disorder in European adolescents: Results from a cross-national representative survey of prevalence, predictors, and psychopathological correlates. *European Child & Adolescent Psychiatry, 24*(5), 565–574. https://doi.org/10.1007/s00787-014-0611-2

Newall, P. W. S., Moodie, C., Reith, G., Stead, M., Critchlow, N., Morgan, A., & Dobbie, F. (2019). Gambling marketing from 2014 to 2018: A literature review. *Current Addiction Reports, 6*(2), 49–56. https://doi.org/10.1007/s40429-019-00239-1

Odlaug, B. L., Marsh, P. J., Kim, S. W., & Grant, J. E. (2011). Strategic vs nonstrategic gambling: Characteristics of pathological gamblers based on gambling preference. *Annals of Clinical Psychiatry : Official Journal of the American Academy of Clinical Psychiatrists, 23*(2), 105–112.

Palaus, M., Marron, E. M., Viejo-Sobera, R., & Redolar-Ripoll, D. (2017). Neural basis of video gaming: A systematic review. *Frontiers in Human Neuroscience, 11*, e-248. https://doi.org/10.3389/fnhum.2017.00248

Petry, N. M., Rehbein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H.-J., Mößle, T., Bischof, G., Tao, R., Fung, D. S. S., Borges, G., Auriacombe, M., González Ibáñez, A., Tam, P., & O'Brien, C. P. (2014). An international consensus for assessing internet gaming disorder using the new DSM-5 approach. *Addiction, 109*(9), 1399–1406. https://doi.org/10.1111/add.12457

Rehbein, F., & Baier, D. (2013). Family-, media-, and school-related risk factors of video game addiction. *Journal of Media Psychology, 25*(3), 118–128. https://doi.org/10.1027/1864-1105/a000093

Rehbein, F., Kliem, S., Baier, D., Mößle, T., & Petry, N. M. (2015). Prevalence of internet gaming disorder in German adolescents: Diagnostic contribution of the nine DSM-5 criteria in a state-wide representative sample. *Addiction, 110*(5), 842–851. https://doi.org/10.1111/add.12849

Richard, J., Potenza, M. N., Ivoska, W., & Derevensky, J. (2019). The stimulating nature of gambling behaviors: Relationships between stimulant use and gambling among adolescents. *Journal of Gambling Studies, 35*(1), 47–62. https://doi.org/10.1007/s10899-018-9778-7

Romrell, D. (2014). *Gender and gaming: A literature review.* 36th Annual Proceedings: Selected research and development papers presented at the Annual Convention of the AECT. 170–182. Available at: https://members.aect.org/pdf/Proceedings/proceedings13/2013/13_25.pdf. Accessed 1 Nov 2023.

Russell, A. M. T., Hing, N., & Browne, M. (2019). Risk factors for gambling problems specifically associated with sports betting. *Journal of Gambling Studies, 35*(4), 1211–1228. https://doi.org/10.1007/s10899-019-09848-x

Seong, W., Hong, J. S., Kim, S., Kim, S. M., & Han, D. H. (2019). Personality and psychological factors of problematic Internet gamers seeking hospital treatment. *Frontiers in Psychiatry*, *10*. https://doi.org/10.3389/fpsyt.2019.00583

Smillie, L. D. (2013). Extraversion and reward processing. *Current Directions in Psychological Science, 22*(3), 167–172. https://doi.org/10.1177/0963721412470133

Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry, 55*(6), 553–568. https://doi.org/10.1177/0004867420962851

Stinchfield, R. (2003). Reliability, validity, and classification accuracy of a measure of DSM-IV diagnostic criteria for pathological gambling. *American Journal of Psychiatry, 160*(1), 180–182. https://doi.org/10.1176/appi.ajp.160.1.180

Subramaniam, M., Chong, S. A., Browning, C., & Thomas, S. (2017). Cognitive distortions among older adult gamblers in an Asian context. *PLoS ONE, 12*(5), e0178036. https://doi.org/10.1371/journal.pone.0178036

Vadlin, S., Åslund, C., & Nilsson, K. W. (2018). A longitudinal study of the individual- and group-level problematic gaming and associations with problem gambling among Swedish adolescents. *Brain and Behavior, 8*(4), e00949. https://doi.org/10.1002/brb3.949

Valenciano-Mendoza, E., Mora-Maltas, B., Mestre-Bach, G., Munguía, L., Richard, J., Derevensky, J. L., Potenza, M. N., & Jiménez-Murcia, S. (2023). Clinical correlates of sports betting: A systematic review. *Journal of Gambling Studies, 39*(2), 579–624. https://doi.org/10.1007/s10899-023-10196-0

van Deursen, A. J. A. M., Bolle, C. L., Hegner, S. M., & Kommers, P. A. M. (2015). Modeling habitual and addictive smartphone behavior. *Computers in Human Behavior, 45*, 411–420. https://doi.org/10.1016/j.chb.2014.12.039

Verdejo-García, A., Lozano, Ó., Moya, M., Alcázar, M. Á., & Pérez-García, M. (2010). Psychometric properties of a Spanish version of the UPPS–P impulsive behavior scale: Reliability, validity and association with trait and cognitive impulsivity. *Journal of Personality Assessment, 92*(1), 70–77. https://doi.org/10.1080/00223890903382369

Vermeulen, L., Van Bauwel, S., & Van Looy, J. (2017). Tracing female gamer identity. An empirical study into gender and stereotype threat perceptions. *Computers in Human Behavior, 71*, 90–98. https://doi.org/10.1016/j.chb.2017.01.054

Wang, C.-W., Ho, R. T. H., Chan, C. L. W., & Tse, S. (2015). Exploring personality characteristics of Chinese adolescents with internet-related addictive behaviors: Trait differences for gaming addiction and

social networking addiction. *Addictive Behaviors, 42*, 32–35. https://doi.org/10.1016/j.addbeh.2014.10.039

Wang, S., Li, J., Wang, S., Wang, W., Mi, C., Xiong, W., Xu, Z., Tang, L., & Li, Y. (2022). Abnormal psychological performance as potential marker for high risk of Internet gaming disorder: An eye-tracking study and support vector machine analysis. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.995918

Wartberg, L., Kriston, L., & Thomasius, R. (2017). The prevalence and psychosocial correlates of Internet gaming disorder. *Deutsches Ärzteblatt International, 114*(25), 419–424. https://doi.org/10.3238/arztebl.2017.0419

Wartberg, L., Kriston, L., Zieglmeier, M., Lincoln, T., & Kammerl, R. (2019). A longitudinal study on psychosocial causes and consequences of Internet gaming disorder in adolescence. *Psychological Medicine, 49*(2), 287–294. https://doi.org/10.1017/S003329171800082X

Whiteside, S. P., Lynam, D. R., Miller, J. D., & Reynolds, S. K. (2005). Validation of the UPPS impulsive behaviour scale: A four-factor model of impulsivity. *European Journal of Personality, 19*(7), 559–574. https://doi.org/10.1002/per.556

Winters, K. C., & Derevensky, J. L. (2019). A review of sports wagering: Prevalence, characteristics of sports bettors, and association with problem gambling. *Journal of Gambling Issues, 43*, 102–127. https://doi.org/10.4309/jgi.2019.43.7

Wolz, I., Agüera, Z., Granero, R., Jiménez-Murcia, S., Gratz, K. L., Menchón, J. M., & Fernández-Aranda, F. (2015). Emotion regulation in disordered eating: Psychometric properties of the Difficulties in Emotion Regulation Scale among Spanish adults and its interrelations with personality and clinical severity. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.00907

Wong, H. Y., Mo, H. Y., Potenza, M. N., Chan, M. N. M., Lau, W. M., Chui, T. K., Pakpour, A. H., & Lin, C.-Y. (2020). Relationships between severity of Internet gaming disorder, severity of problematic social media use, sleep quality and psychological distress. *International Journal of Environmental Research and Public Health, 17*(6), e-1879. https://doi.org/10.3390/ijerph17061879

World Health Organization (WHO). (2020). *The international classification of diseases and related health problems.* (11th. ed). https://icd.who.int/en. Accessed 1 Nov 2023.

Yau, Y., & Potenza, M. (2014). Internet gaming disorder. *Psychiatric Annals, 44*(8), 379–383. https://doi.org/10.3928/00485713-20140806-05

Yu, H., & Cho, J. (2016). Prevalence of Internet gaming disorder among Korean adolescents and associations with non-psychotic psychological symptoms, and physical aggression. *American Journal of Health Behavior, 40*(6), 705–716. https://doi.org/10.5993/AJHB.40.6.3

Zendle, D., & Cairns, P. (2018). Video game loot boxes are linked to problem gambling: Results of a large-scale survey. *PLoS ONE, 13*(11), e0206767. https://doi.org/10.1371/journal.pone.0206767

Zhou, H., Dang, L., Wells, A., & Wu, A. M. S. (2023). Risk factors for Internet gaming disorder: Testing the contribution of metacognitions, stress, and coping. *Addictive Behaviors, 147*, e-107836. https://doi.org/10.1016/j.addbeh.2023.107836

Zhou, R., Morita, N., Ogai, Y., Saito, T., Zhang, X., Yang, W., & Yang, F. (2024). Meta-analysis of Internet gaming disorder prevalence: Assessing the impacts of DSM-5 and ICD-11 diagnostic criteria. *International Journal of Environmental Research and Public Health, 21*(6), 700. https://doi.org/10.3390/ijerph21060700

Authors and Affiliations

Rocío-Elena Ayala-Rojas[1] · Roser Granero[1,2,3] · Fernando Fernández-Aranda[2,3,4,5] · Mónica Gómez-Peña[3,4] · Laura Moragas[3,4] · Iván Perales[4] · Susana Jiménez-Murcia[2,3,4,5]

✉ Susana Jiménez-Murcia
sjimenez@bellvitgehospital.cat

Rocío-Elena Ayala-Rojas
rocio.ayala@uab.cat

Roser Granero
Roser.Granero@uab.cat

Fernando Fernández-Aranda
ffernandez@bellvitgehospital.cat

Mónica Gómez-Peña
monicagomez@bellvitgehospital.cat

Laura Moragas
lmoragas@bellvitgehospital.cat

Iván Perales
iperales@bellvitgehospital.cat

[1] Department of Psychobiology and Methodology, Universitat Autònoma de Barcelona - UAB, Barcelona, Spain

[2] Ciber Fisiopatología Obesidad y Nutrición (CIBERobn), Instituto Salud Carlos III, Madrid, Spain

[3] Psychiatry and Mental Health Group, Institut d'Investigació Biomèdica de Bellvitge - IDIBELL, Neuroscience Program, L'Hospitalet de Llobregat, Spain

[4] Department of Clinical Psychology, Hospital Universitari de Bellvitge, L'Hospitalet de Llobregat, Spain

[5] Department of Clinical Sciences, School of Medicine, Universitat de Barcelona - UB, L'Hospitalet de Llobregat, Spain