Phenotype of Gambling Disorder Patients with Lotteries as a Preferred Form of Gambling

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Abstract

Objectives. Lottery gambling can become an addictive behavior which can significantly interfere with daily functioning. The objectives of this work were to estimate the prevalence of lottery gambling, to assess the profile related to this gambling type in a large clinical sample of patients who met criteria for gambling disorder (GD), and to compare this profile with the other two non-strategic forms of gambling (slot-machines and bingo). **Method.** Sample included *n*=3,531 patients consecutively attended for treatment-seeking due to gambling related problems. All the participants met criteria for GD and were into the range 18 to 85 years-old. Sociodemographic variables, GD severity, psychopathological state and personality traits were assessed. Statistical comparisons between the groups defined by the patients' gambling preference (lotteries versus other gambling activities) were conducted, with chi-square test and analysis of variance. **Results.** The prevalence of lotteries as the only gambling activity was 2.5%, 8.9% for lotteries gambling as primary activity with other secondary gambling types, and 20.6% for lotteries as primary or secondary gambling activity. Lotteries gambling and bingo gambling were more prevalent among women (bingo included the highest percentage of women). Compared to slot-machines gambling, lotteries and bingo grouped older patients and those with later age of onset of the gambling related problems. Bingo gambling showed the highest psychological distress and the most dysfunctional personality traits. **Conclusion.** This study shows the high frequency of lotteries gambling among treatment-seeking for GD patients, and it provides empirical evidence about the profile associated to this gambling activity compared to other non-strategic gambling forms. The likelihood of lotteries gambling is higher for women, patients married or living with a stable partner, and those within higher social position indexes.

Keywords: Bingo · Gambling disorder · Lotteries · Phenotype · Slot-machines.

Introduction

Gambling disorder (GD) constitutes a psychological problem characterized by recurrent difficulties to resist the urge to gamble, and an excessive involvement in gambling which causes severe deficits in different functional areas (including family, social relationships and work). Patients who suffer from GD show a strong need to gamble increasing amounts of money and invest of time to achieve the desired degree of excitement, they report repeated attempts to stop the gambling behavior and show high levels of discomfort when the gambling activity is interrupted. From a nosologic perspective, the last edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) has included GD into the group of conditions related to addictive substances and disorders (gambling is the only behavioral addiction in this section), since it has been considered that scientific research demonstrates that gambling behavior activates neurobiological systems similar to those that occur in substances use disorders such as alcohol or drugs (Cía, 2013; Potenza, 2014; Rash et al., 2016).

Etiological findings show that GD is a multi-causal condition, with complex interactions between biological, psychological and environmental factors. GD is also frequently comorbid with other psychosocial and psychiatric problems, such as substances related disorders, somatic disorder, depression and anxiety problems (Dowling et al., 2015; Lorains et al., 2011). The rate of progression of the gambling addiction varies greatly, frequently leading to social isolation, difficulties at work, and family conflicts. Gambling problems usually appear during late adolescence or early adulthood (Welte et al., 2015). Early onset has also been associated with greater severity and worse developmental trajectory (S. Jiménez-Murcia et al., 2016). Other risk factors for the onset and progression of GD are male sex, low socioeconomic levels and the presence of multiple stressful life events (Hing, Russell, Tolchard, et al., 2016; Hing, Russell, Vitartas, et al., 2016; Moragas et al., 2015; Pilver et al., 2013; Sanscartier et al., 2018). Recent studies suggest that emotional dysregulation and cognitive biases increase predisposition to gambling problems, and therefore these variables are also high-risk factors for the onset and the GD

severity levels (Di Trani et al., 2017; Rogier & Velotti, 2018). The early onset and the higher GD severity have been related with a personality profile characterized by high levels in impulsiveness, novelty seeking, harm avoidance, and low self-directedness (Donald W Black et al., 2015; Donald Wayne Black et al., 2012; Mackillop et al., 2014; Sundqvist & Wennberg, 2015).

Worldwide epidemiological research estimates the cross-sectional prevalence for gambling related problems (also named "problematic gambling") between 0.1% and 5.8% among adulthood general populations, and estimations increase to the range 1.1% to 10.6% for lifetime prevalence (Subramaniam, Tang, et al., 2016). The high variability in the point-estimated prevalences has been related to many factors, being the most relevant the differences in clinical definitions, assessment methods/tools, gambling activities and geographical areas. For example, while prevalence obtained in North America for problematic gambling is between 2% and 5%, the estimate in Europe is between 0.1% and 3.4%, in Asia between 0.5% and 5.8%, and in Oceania between 0.4% and 0.7% (Calado & Griffiths, 2016). Current prevalence studies also conclude that easy access to online gambling platforms increase the opportunity to gamble, and this situation could contribute to the rapid increase for the rates of problematic gambling and GD (Suissa, 2015). It also seems that specific groups could have higher vulnerability, such as adolescence (even at ages when gambling is not legal) and early adulthood (Giralt et al., 2018; Ricijaš et al., 2016).

Regarding gambling preferences, the selection of a concrete preferred form may be clinically significant and provide a means of subtyping individuals with GD (Odlaug et al., 2011; Stevens & Young, 2010). Usually, gambling activities have been grouped into two broad categories: strategic (games allow gamblers to attempt to use knowledge of the game to influence or predict the outcome; eg, poker, sports/animals betting, craps, stock market) versus non-strategic (games involve little or no decision making or skill, and gamblers cannot influence the outcome of the game; eg, lotteries, slots-machines, bingo). Multiple reasons lead individuals to select a preferred style of gambling (eg, sex, age, educational level, social condition, geographical area, accessibility and availability) (Susana Jiménez-Murcia et al., 2020; Lorains et al., 2014), being sex and age two

of the primary factors. It has been postulated that high GD severity and high novelty seeking might be the main reasons for men prefer strategic forms, whereas escape from negative emotional states and sociability may underlie women's preference for non-strategic forms (Susana Jiménez-Murcia et al., 2013; Ledgerwood & Petry, 2010). Regarding age, non-strategic gambling is usually related with significantly older individuals, who tend to select low skill and high change gambling activities (Granero, Jimenez-Murcia, et al., 2020; Susana Jiménez-Murcia et al., 2020).

Lotteries gambling

Lottery tickets are a widespread gambling activity around the world (Beckert & Lutter, 2013; Costes et al., 2018). Most individuals from the general population consider that lotteries are harmless forms of gambling, probably because this way of game is very popular and has high social acceptability. Particularly, non-instantaneous lotteries are perceived as games with low (or null) addictive capacity, because the large waiting time between the bets and the gambling outcome/s (between hours and days) interferes with activating brain reward mechanisms (Ariyabuddhiphongs, 2011). However, scientific research show that game preference and gambling related variables (such as age of onset, addictive capacity and severity) are associated to different multiple interacting factors, including individual characteristics (motives, personality traits, sex and age), situational conditions (availability, accessibility and social acceptance of games), and the own structural characteristics of the games (frequency of wins, payout interval, reward distribution, betting opportunities, or attractiveness of the gaming machine) (Binde, 2013; Coates & Blaszczynski, 2013; Leino et al., 2015; McCormack et al., 2013). In this line, some studies have concluded that instant win is related to higher addictive capacity than lottery tickets, since they generate higher exciting states and are perceived as more attractive by potential high-risk gamblers (Short et al., 2015). However, other studies have found that lottery gambling can causes significant harm depending on how the multiple individual, contextual and structural conditions are reflected in

each participant, and that even lotteries only gambling could cause significant daily dysfunction (including worse psychological state and substance use).

Although the high prevalence and recognized addictive capacity of lottery gambling, few empirical studies have analyzed the profile/s related to this gambling type. Some current classification studies including lottery tickets gamblers have concluded that preference for one particular gambling activity may concern different profiles of gamblers. For example, the study of Challet-Bouju and colleagues in a sample including both problem and non-problem gamblers identified an empirical cluster grouping instant lottery gamblers, which was characterized by lower psychological distress compared to other clusters of slot-machine gamblers, roulette gamblers and scratch card gamblers (these other groups reported higher depression levels, higher novelty seeking scores, more severe cognitive biases related with the gambling activity, and higher likelihood of comorbid conditions such as panic attacks and eating disorders) (Challet-Bouju et al., 2015). The epidemiologic research in two large surveys conducted with representative adult samples in France and Canada revealed that exclusive lottery gamblers (without other concurrent gambling activity) reported less gambling severity patterns and few comorbid risky behaviours compared to non-exclusive lottery gamblers, and that harms related with problematic gambling are associated to specific factors such as sex, age, income and education levels (Costes et al., 2018). Finally, the study of Granero and colleagues also explored empirical subgroups of treatment-seeking patients who reported lotteries as their preferred gambling activity, and they identified three mutually exclusive groups differentiated by the functionality level (mainly the psychological distress), the duration of the problematic lottery gambling, and other sociodemographic variables (sex, age, marital status, employment status and socioeconomic index) (Granero, León-Vargas, et al., 2020).

But most of the available empirical data on GD have grouped together different gambling types (including lottery tickets), making difficult to assess the characteristics specifically attributable to a gambling preference. Studies focused specifically on lotteries are scarce, and most have been planned in community samples with the concrete objective to estimate the point-

prevalence of individuals who reported this gambling behavior and those who were at high-risk to develop problems related to gambling. The available studies have associated lottery gambling with minority ethnic groups, older age individuals, low education levels, low incomes and worse general health state (Garibaldi et al., 2015; Griffiths, 2002; Griffiths & Wood, 2001; Lang & Omori, 2009). Studies have also concluded that compared to other gambling types, lottery gambling show lower gambling severity and lower psychological distress (Costes et al., 2018; Subramaniam, Tang, et al., 2016). Based on these evidences, it has been suggested that motivations for lottery gambling include the perception of this game as an escape way to social difficulties and/or as a means to reach the individuals' social expectations (Beckert & Lutter, 2013). It is also considered that lottery ticket contribute to wide social acceptance (Lutter et al., 2018). Lotteries tickets are also largely popular in many countries due the simplicity of this game, its wide publicity, easy accessibility, low cost, and even the misunderstanding of the basic rules of probability among the general population (Griffiths, 2002; Griffiths & Wood, 2001).

In summary, a large number of epidemiological, etiological and classification studies have evidenced that patients with GD constitute a heterogeneous group with clinical characteristics that vary according to factors such as the individuals' gender, age, onset, socioeconomic features, and also the gambling preference. However, some concrete gambling activities have been rarely investigated, such as the lotteries tickets, a gambling form that has enjoyed appeal around the world for many years and nowadays considered a recreational activity with great social acceptability among the general population. During the last years, lotteries have matured, introducing more exciting products to maintain the interest among players, and lottery organizations now offer a multitude of games that blur the boundaries between the traditional product and other types of gambling (including daily numbers of games or scratch tickets). Lotteries are also available among multiple different platforms, including Internet, increasing accessibility to broad sectors of the population. Lottery gambling is relatively inexpensive to play compared to other gambling activities, and it offers attractive jackpot prizes (the odds of winning are very low, but under-

estimated by most players). The available studies suggest that lottery players are distinct from nonplayers (Limbrick-Oldfield et al., 2021), that addicted lottery gamblers could exhibit a phenotype different from individuals with other gambling types (McGrath et al., 2018), and that different clusters can be identified among treatment seeking patients who report problems related to lottery gambling (Challet-Bouju et al., 2015; Granero, León-Vargas, et al., 2020). But little research has been devoted to lottery tickets playing compared to other gambling forms, and only a few studies focus on the aspects of this gambling activity with the aim to identify its underlying profile/s, its specific risk factors and the concrete clinical expressions and consequences.

Objectives

In light of the above literature review, the purposes of the present study are: a) to assess the prevalence of bets on lotteries into a large clinical sample of patients who met clinical criteria for GD and asked for treatment due to the problems specifically related with lotteries; and b) to explore the phenotype related to lotteries as preferred form of gambling. Based on the empirical available evidence we hypothesized that GD with lotteries as a preferred form of gambling presents a unique phenotype different to the other higher prevalence gambling subtypes.

Materials and methods

Participants

The study sample comprised *n*=3,531 patients consecutively attended at the Unit of Gambling Disorder and Other Behavioral Addictions of the University Hospital of Bellvitge. This treatment unit has the recognition of a tertiary medical center for the treatment of GD and other behavioral addictions. Tertiary medical settings provide a level of health care from specialists in large hospitals, who facilitate highly precise treatments to patients who require high level and/or intensive care, performed by clinicians who are specialist in state-of-the-art facilities (compared to primary and secondary care). Our treatment unit is part of the University Hospital

of Bellvitge, with a catchment area of two million people in the metropolitan area of Barcelona (Spain).

With the aim of analyzing a large sample of patients (study with high ecological and external validity), all the patients attended during the period 2005 to 2018 were included in the research. Inclusion criteria were meeting DSM-5 criteria for GD (American Psychiatric Association, 2013) and age equal or older than 18 years-old.

The number of men in the sample was *n*=3,205 (90.8%), and 326 were women (9.2%). Many patients achieved primary (*n*=2,063; 58.4%) or secondary education level (*n*=1,265; 35.8%), and were single (*n*=1,415; 40.1%) or married (*n*=1,637; 46.4%). Many patients also belonged to low (*n*=1,837; 52.0%) or medium-low (*n*=1,113; 31.5%) social position indexes, and were employed (*n*=2,033; 57.6%). The range for chronological age range was 18 to 85 years-old (mean=42.2, SD=13.3).

Materials

Diagnostic Questionnaire for Pathological Gambling (according to DSM criteria) (Stinchfield, 2003). This questionnaire was developed to assess the presence of GD through 19-items based on the DSM taxonomy. It allows to assess the diagnostic criteria for both, the DSM-IV-TR (American Psychiatric Association, 2010) and the DSM-5 versions (American Psychiatric Association, 2013) (this study considered DSM-5 diagnostic criteria for GD). The Spanish adaptation of the scale achieved good psychometric properties (α= 0.81 for general population and α=0.77 for GD clinical sample (Susana Jiménez-Murcia et al., 2009). This questionnaire was used in the study to assess the presence of the clinical criteria for GD, and the total number of DSM-5 criteria was also analyzed as a measure of the gambling problems severity. Cronbach's-alpha coefficients measuring internal consistency for the scale in the sample of the study are included in Table 3.

Temperament and Character Inventory-Revised (TCI-R) (Cloninger, 1999). This self-report questionnaire allows to measure personality trait through 240 items based on the Cloninger's multidimensional model. It is structured in 7 personality dimensions [4 for temperament (novelty seeking, harm avoidance, reward dependence and persistence) and 3 for character (self-directedness, cooperation and self-transcendence)]. The Spanish version of TCI-R used in the study obtained good psychometric indexes (mean Cronbach alpha α=0.87) (Gutiérrez-Zotes et al., 2004). The internal consistency in the sample of the study was good for all the scales (see Cronbach's-α in Table 1).

Symptom Checklist-Revised (SCL-90-R) (Derogatis, 1997). This self-report tool measures psychological state through 90 items structured in nine primary dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. It also includes three global indices: global index of severity (GSI), positive index of discomfort (PSDI), and a total of positive symptoms (PST). The Spanish version used in this work obtained good psychometric indices (mean α=0.75) (Gonzalez De Rivera et al., 1989). Internal consistency in the sample of this study is included in Table 1.

Other clinical and sociodemographic variables. A semi-structured clinical interview with the patient measured all additional data, which included sociodemographic measures (such as sex, education level, civil status and employment status), gambling related variables (age of onset of the gambling problem, duration of the gambling problem and bets per gambling-episode), and the social position index according to the Hollingshead's algorithm (which provides a global measurement based on the patients' education level and profession (Hollingshead, 2011).

Procedure

The study was approved by the Ethics Committee of the University Hospital of Bellvitge, center of origin of the data. All the data analyzed in the work correspond to the assessment at baseline (at the arrival of patients at the treatment unit and before inclusion in the therapy).

Psychologists and psychiatrists with extensive experience in behavioral addictions collected information of the semi-structured clinical interview, and they also helped the patients to complete the self-report tools (guaranteeing that all the items were answered and no missing-data due to lack of understanding). The psychological evaluation, in which the entire test battery was administered, was done in a single session of about 60-90 minutes. All the instruments were self-administered, but during this assessment session, a psychologist was present to clarify doubts and help the patients to complete the questionnaires. At the end of the tests, the psychologist checked, together with the patient, that all items were properly answered.

Statistical analyses

Statistical analysis was carried out with Stata16 (Stata-Corp, 2019) for Windows. Comparison between groups was based on chi-square tests (χ^2) for categorical variables and analysis of variance (ANOVA) for quantitative variables. Effect size for proportion and mean differences were estimated through Cohen's-*d* coefficient, considering poor-low effect size for $|d|>0.20$, moderate-medium for $|d|>0.5$ and large-high for $|d|>0.80$ (Kelley & Preacher, 2012). The familywise error rate Finner's method (more powerful test than the classical Bonferroni correction) was used to control Type-I error due to multiple comparisons (Finner, 1993).

Results

Prevalence of lotteries as a form of gambling

Table 1 includes the prevalence estimates of the lotteries, slot-machines and bingo as forms of gambling in the total sample of patients of the study (*n*=3,531). The total number of patients who reported problems with lotteries (with or without other preferred primary or secondary forms of gambling) was *n*=727 (prevalence=20.6%). The number of patients who reported lotteries as the preferred form of gambling (lotteries were perceived as the primary impairing gambling, although a

secondary gambling subtype could be also present), the number of prevalent cases was *n*=316 (prevalence=8.9%). And the number of participants who reported gambling problems only with lotteries (no other primary or secondary forms of gambling were reported) decreased to *n*=88 (prevalence=2.5%).

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The percentage of patients who reported problems due to slot-machine gambling was 76.6%, being the prevalence equal to 59.0% considering slots the primary impairing gambling, and 45.7% considering this game as the unique form of gambling. The prevalence point estimate for problems related to bingo was equal to 14.8%, equal to 6.0% when bingo was considered the primary impairing gambling, and 2.3% considering bets on bingo as the unique form of gambling.

Figure 1 illustrates the evolution of the lotteries, slot-machines and bingo as unique forms of gambling during the recruitment period, stratified by sex and age.

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Comparison of phenotype for lotteries, slot-machines and bingo

Table 2 contains the comparison for three forms of non-strategic gambling (slot-machines, lotteries and bingo) for the sociodemographic variables analyzed in the study. The grouping of gambling preference in this table considered patients who reported a unique form of gambling activity (without any other primary or secondary game). Regarding the distribution of the patients' sex, results showed that lottery gambling was associated to higher proportion of women compared with slot-machines, but with a lower proportion of women compared with bingo. Education levels were different comparing lotteries with slot-machines (higher levels related to lotteries), but equal comparing lotteries and bingo games. The proportion of married or living with a stable couple was the highest for the lotteries group compared to the other two gambling subtypes. The lowest social position indexes were more strongly related to slot-machines, followed by bingo and lotteries.

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Comparison for the clinical profile (see Table 3) showed no differences between lotteries and bingo for chronological age and age of onset of the gambling problems, but these two variables achieved significantly higher means compared to slot-machines. The mean bets per gambling-episode were the highest registered into the lotteries group compared with bingo. The psychopathological state (SCL-90R scores) was similar for lotteries and slot-machines subtypes, and significantly better than global state registered into the bingo group. For the personality traits, bingo achieved the highest means in harm avoidance and reward dependence (compared to the other two groups, lotteries and slot-machines), while slot-machines obtained the highest level in persistence (compared to both, lotteries and bingo).

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Figure 2 contains, as a summary of the comparison of the phenotypes associated with each form of gambling, the radar-chart with the z-standardized means (these values have been represented to allow easy interpretation of the graph, since the variables were measured with different measurement scale). As a whole, lottery gambling was characterized by the highest proportion of patients within high education levels, being married, within the highest social position indexes and the highest mean bets per gambling-episode. The profile related to slot-machines gambling included the highest prevalence of men, patients with low education levels, the youngest age of onset of the gambling problems and the highest mean in the persistence trait. Bingo gambling was characterized by including the highest proportion of women, being single, with the oldest mean age, the worse psychopathological functioning and the most dysfunctional scores in harm avoidance and reward dependence.

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Discussion

This study was aimed to estimate the prevalence of lotteries as preferred form of gambling in a large sample of patients who met DSM-5 criteria for GD and compared this estimate with slot machines and bingo. The sociodemographic and clinical profiles were also compared between these

gambling preferences. The main results of this research related lotteries more strongly with being married or living with a stable couple, the highest social position indexes and the highest mean bets per gambling-episode (for this last variable, only compared with bingo). Slot-machines preference was related to male sex, lower social position indexes, younger age and early age of onset of the gambling problems. Bingo gambling included the highest proportion of women and showed the worse psychopathological state and the most dysfunctional personality traits.

In this work, a substantial proportion of patients seeking-treatment for GD reported lotteries as the preferred gambling form. In Spain, lottery is one of the most traditional game mode with a relevant presence in the general population and within the clinical settings specialized in the treatment of behavioral addictions (Clotas et al., 2020). The prevalence rate in our work is consistent with other studies carried out in different countries, which have also reported a high percentage of people engaging in lottery and/or raffle tickets as their favorite gambling activity (Bhatia et al., 2019; Valleur, 2015; Williams et al., 2021). But it should be highlighted that the rates of gambling behavior/s worldwide evidence large variations across and within settings (Calado & Griffiths, 2016), and other studies have identified lottery gambling in a low proportion of treatment-seeking patients compared to alternative gambling forms (Ariyabuddhiphongs, 2011). Some potential hypothesis could explain these large divergences. For example the lower social acceptance of lotteries as a gambling activity among general population in other countries compared to Spain. And maybe also people who gamble on lottery tickets but do not seek treatment (because they under-estimate the addictive power of this modality), and progress to worse on other gambling types before they seek treatment. One potential contribution of our study is providing empirical evidence about the high prevalence of problematic/disordered lotteries gambling in a clinical sample who met criteria for GD, which could even suggest the possibility of reaching these people earlier. Our results point to the need for early identification of high-risk lottery players and for prevention efforts to avoid the progression of this gambling activity and its potential harms [studies suggest that some lotteries modes such as video-lottery are more hazardous and harmful to

consumers than other forms of gambling habits (MacLaren, 2016)]. Future studies in this area could also potentially examine trends in lottery tickets gamblers, and protective and risk factors associated with this activity.

The evolution of the three types of games analyzed in this study shows variable trajectories (in terms of prevalence estimates), but with an identifiable trend when assessing the role of the participants' sex and age. Bingo is preferred by women, slot-machines is a game more linked to the male sex, and lotteries are more likely to be chosen by women than men. Regarding the groups of age, lotteries and bingo are selected more often by older gamblers, while slot machines are preferred by gamblers into middle or young age groups.

Previous research has evidenced that GD is influenced by specific sociodemographic, clinical and other contextual factors, which can have a different impact on the patients depending on the gambling preferences (Susana Jiménez-Murcia et al., 2019). Studies have also shown that even within a sample of persons with GD related to a specific gambling form (lotteries), there are different sociodemographic and clinical profiles, which allows the empirical grouping of patients within differentiate clusters (Granero, León-Vargas, et al., 2020). The identification of the variables most related to each gambling type contributes to the conceptualization of the disorder, to the development of accurate screening/assessment tools, and to the design of effective and precise intervention treatments focused in the specific needs of each treatment-seeking patient. This study contributes to this area, providing empirical evidence of the profile associated to the lottery gambling compared to other common non-strategic gambling types.

Regarding the sociodemographic profile, lotteries gambling tended to include higher proportion of women compared to slot-machines, but lower proportion of females compared to bingo, the higher percentage of married or living with a stable couple, higher formal educational levels and social position indexes compared to slot-machines (similar, however, compared to the bingo group), older age and later age of onset of the gambling problems. These results are consistent to those obtained in the multicenter study carried out in Spain with treatment-seeking

patients for gambling related problems (Jimenez-Murcia et al.), which related lotteries to women, older ages and low socioeconomic and educational levels. Regarding social position indexes and education, it must be considered, however, that most of the patients of this work were grouped into the low levels (independent of their gambling preference), and therefore differences between the forms of gambling do not allow to conclude that lotteries are related to high social index position levels nor to high formal education. On the contrary, it must be argued that lotteries, as well as slot-machines, are highly accessible for subjects who attained lower education level (Challet-Bouju et al., 2015), and that lottery players could view their gambling behavior as a socially acceptable risk-taking activity which provides them with a powerful way for escaping from their current status and for achieving their social/economic expectancies (Guilcher et al., 2019; Sharman et al., 2019).

Lotteries gambling profile included patients with the lower severity in the GD screening tool, which is consistent with previous studies (MacLaren, 2016; Subramaniam, Abdin, et al., 2016; Subramaniam, Tang, et al., 2016). The recent large multicenter study concluded that exclusive lottery gamblers (compared to non-exclusive lottery gamblers who reported different forms of gambling) exhibited less intensive gambling patters and lower risky behaviors related with gambling activity (Costes et al., 2018). Regarding the higher mean bets per gambling-episode on lotteries compared to bingo, it can be considered that as a whole GD patients are highly susceptible and stimulated by situational factors, and therefore lotteries players could be likely to increase their purchases simply when the lottery jackpot grows in size (which usually happens for many forms of lotteries in Spain, which represent the most frequent form of gambling by the general population). On the other hand, the relatively inexpensive prize of lotteries tickets offers attractive expectancies for players, who would tend to bet larger amounts of money in different numbers/tickets while waiting to get success in obtaining the jackpot. Patients who choose lotteries as preferred form of gambling tend not to consider the very low odds of winning (on the contrary, they usually believe that their *"lucky"* numbers will have a good chance of winning), and they believe that compared with other games the chances of winning in lotteries are higher. Moreover, these biases and

irrational thinking patterns related with the gambling activity are typical of the gambling-related cognitive factors, which have been well described (Levésque et al., 2017; Lévesque et al., 2018), and could stimulate lotteries gambling even with low jackpot profits. Other previous studies had obtained higher likelihood for lottery tickets compared to slot-machines, bets on sports, card players or bets on horse/dog tracks, which could result in a significant increase in the bets per gambling episode for this gambling activity (Short et al., 2015). Other studies have also concluded that making more intensive bets is related with a higher payback percentage and with less frequent wins (Leino et al., 2015), two of the structural characteristics of the lotteries compared to bingo and slot-machines.

With respect to psychological profile, our results evidence that lotteries gamblers exhibit similar psychopathological state than slot-machines players, and better functioning than bingo players. Although these results are not consistent with previous research which relate lotteries gambling with a worse general health state (Garibaldi et al., 2015; Lang & Omori, 2009), it must be argued that our study was carried out into a clinical sample of patients who met DSM-5 criteria for GD, and that no healthy group was used as comparison. Results of our research are consistent with the studies comparing different forms of gambling, which evidence that lotteries preference is associated with less comorbid psychopathology (Costes et al., 2018; Subramaniam, Abdin, et al., 2016; Subramaniam, Tang, et al., 2016).

Regarding personality traits, our study shows that lotteries as preferred gambling showed a similar profile compared to slot-machines, which was more functional than the profile registered for bingo gambling activity. A recent research carried out in a sample of at high-risk of gambling disorder has found different relationships between personality domains and preferred gambling subtypes, and it has concluded that bingo form profile is similar to gambling on cards, sports, stock market, dice and skill games, characterized by low levels of agreeableness (Whiting et al., 2019). In a large multidimensional pathways' analysis, psychological vulnerabilities (personality-related factors and mood disturbances) have also shown a mediational role between cognitive distortions on

gambling with gambling severity and with preferred gambling activity (S. M. Gainsbury, 2015; Goodie & Fortune, 2013; Levésque et al., 2018). Finally, based on latent class analysis, a current study has also suggested that patients who reported only lotteries tickets gambling obtained the lowest gambling detrimental patterns and the most functional personality traits compared to other gambling activities (such as casino gamblers or participants reporting multiple-gambling activities) (Studer et al., 2016). This last research concluded that other gambling types different to lottery tickets are related to higher scores in sensation seeking (defined as the search for experiences and feelings perceived as novel and intense, and the readiness to drive more risky behaviors and experiences), aggression-hostility and anxiety levels. The results obtained in our study are consistent with these previous evidences, in the sense that differences in personality traits may predispose individuals to different gambling preferences, and these gambling types are also related to more or less negative outcomes. Finally, the association between lotteries gambling and slot-machines gambling with the best functionality profile in psychopathology and personality in our study could be partly explained by the higher proportion of men included in these groups compared to bingo (bingo gamblers included mostly women, who usually tend to present greater psychological distress compared to men).

Limitations

The findings of this study have to be seen in light of some limitations. The first is the analysis of cross-sectional data and the lack of longitudinal measures, with the consequent inability to assess incidence and state causal inference.

The second limitation concerns the measures considered in the analysis, covering the sociodemographic profile, the GD severity, the comorbid psychopathological state, and the personality traits. It should be noted that these variables have been recruited for a long period of time, and correspond to the routine assessment and collection in our treatment unit at the baseline (prior to the intervention/s). Other potential domains that could have also an impact on the lottery

gambling profile (such as the impulsive levels, the cognitive biases related with the gambling activity or the difficulties in the emotion regulation state) have been included in our unit as regular measurements during the last years, and therefore were only available for a few number of the participants. Other studies should assess how these other indicators (biological, psychological and social variables), may influence on the onset and progression of the problematic/disordered lottery gambling.

The third limitation concerns the low prevalence of women in the study, which adversely affects the statistical power and the capacity to explore the potential moderator effect of gender on the differences between groups. In the other hand, the low proportion of women compared to men should not be considered a potential bias in the sampling procedure: on the contrary, the high asymmetric distribution of sexes in our study represents the real proportion of women treatment-seeing for gambling related problems compared to men. In fact, this is a pioneer study exploring the potential contributions of gender on the lotteries gambling profile, and therefore the differences between men and women evidenced in our wok can be the basis for the further development of highly sensitive/specific screening tools and more precise intervention plans.

Finally, prior research studies focused on the scope of our work are limited, which has hindered laying a foundation for understanding the research problem and discussing the empirical evidences (in any case, this highlights the need for further development in this area of study).

Strengths

One strength of this study is providing new empirical data regarding the differences between the lottery gambling profile compared to other non-strategic gambling types. To our knowledge, previous research has explored the existence of empirical groups within samples of GD patients based on sociodemographic and other clinical variables (for example through cluster analysis and other classification analytical procedures), but this is the first work examining the potential

differences between lottery tickets and other non-strategic games also very popular in the general population in Spain (slot-machines and bingo).

Other strength is the sample composition: a large number of patients have been included (*n*=3,531) during a long period of recruitment (years 2005 to 2018), which gives the research of a high ecological and external validity (our empirical evidence allows high capacity to generalize the results to clinical setting).

The use of multiple measurement instruments, which allow a full assessment for the sociodemographic and clinical profile, is also one of the most relevant aspects of this work, since it provides a broad measure for the phenotype related to lotteries as a form of gambling and its comparison with other gambling subtypes.

Conclusion

Lotteries is a traditional and common form of gambling for the general population, often considered a playful activity with a low-risk for gambling problems (particularly compared to other usual forms of gambling, such as slot-machines or bingo). However, although a common form of gambling and although the high prevalence of GD patients who report lotteries as a preferred form of gambling in the clinical settings, gambling related problems and psychopathology of GD associated to lotteries has not been systematically studied. To our knowledge, this study is one of the few studies carried out aimed to distinguish the phenotype of lotteries pathological gamblers, and to identify the main differences versus other highly prevalent forms of non-strategic gambling (slot-machines and bingo). To identify the specific phenotype of this gambling activity could allow developing reliable screening and diagnostic tools, as well as implementing personalized prevention and intervention programs according to the concrete characteristic of their sociodemographic and clinical profile. According to the high social acceptance of the lotteries as a recreational activity among the general population in some developed countries, the development of prevention

strategies plans should also consider what specific characteristics are related to this gambling subtype compared to other different forms of gambling.

Our study also reinforces the need for further research on GD focused on lotteries as a preferred form of gambling. The differences in the sociodemographic and clinical profile compared to other highly prevalent gambling subtypes could directly influence the effectiveness of treatment programs, which probably require therapeutic adaptations to include differences at baseline as well as differences in the course of the interventions. For example, the lottery gambling group registered a proportion of female sex higher than slot-machine gambling. Studies have showed that women face a number of barriers to on-site outpatient therapy for gambling related problems, including practical concerns such as need for childcare, travel obstacles or time constraints (work and caretaking demands) (S. Gainsbury et al., 2014). Some women also report psycho-social barriers to clinical-facilitated face-to-face sessions such as fear of being recognized and judgment (social stigma related to gambling activity is higher for female sex compared to male) (Tse et al., 2013). Interventions using teleconferencing, webinar or alternative internet technology could be a way to avoid these obstacles to treatment in women. Differences in the comorbid psychological state also was found across groups in our study, being the mean number of psychiatric problems lower for lottery gamblers compared to bingo gamblers. This evidence suggests that patients who report bingo addiction may be likely to benefit from a through screening and additional treatment for potential concurrent psychiatric conditions.

Data Availability Statement

Data cannot be shared publicly because of being part of a public hospital clinical database. Data are available from the Hospital Universitari de Bellvitge Institutional Data Access / Ethics Committee (IDIBELL; otri@idibell.cat) for researchers who meet the criteria for access to confidential data.

Ethics

All procedures followed were in accordance with the ethical standards of the Ethics Committee of the Bellvitge University Hospital (approval references of the projects: PR241/11 and PR286/14), and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

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Table 1

Prevalence estimate of lotteries, slot-machines and bingo as forms of gambling (n=3,531)

	Lotteries				Slot-machines				Bingo			
	n	*%*	*95%CI*		*n*	*%*	*95%CI*		*n*	*%*	*95%CI*	
Gambling activity	727	*20.6%*	19.3%	21.9%	2,709	*76.7%*	75.3%	78.1%	524	*14.8%*	13.7%	16.0%
Primary gambling	316	*8.9%*	8.0%	9.9%	2,084	*59.0%*	57.4%	60.6%	211	*6.0%*	5.2%	6.8%
Unique gambling	88	*2.5%*	2.0%	3.0%	1,614	*45.7%*	44.1%	47.4%	81	*2.3%*	1.8%	2.8%

Note. 95%CI: 95% confidence interval.

Table 2

Comparison of the phenotypes for only-lotteries with only-slot/machines and only-bingo (sociodemographic variables)

		Lotteries gambling						Global Omnibus Test					Pairwise comparisons					
		Lotteries (*n*=88)		Slot-machines (*n*=1,614)		Bingo (*n*=81)							Lotteries *vs* Slot-machines		Lotteries *vs* Bingo		Slot-mach. *vs* Bingo	
		n	%	*n*	%	*n*	%	χ^2	*df*	*p*	*Cramer-V*	*Power*	*p*	|*d*|	*p*	|*d*|	*p*	|*d*|
Sex	Women	14	15.9	99	6.1	55	67.9	349.4	2	**.001***	.443	1.00	**.001***	0.32	**.001***	**1.24†**	**.001***	**1.66†**
	Men	74	84.1	1515	93.9	26	32.1											
Origin	Spain	84	95.5	1495	92.6	75	92.6	1.00	2	.607			.318	0.12	.431	0.12	.991	0.00
	Immigrant	4	4.5	119	7.4	6	7.4											
Education	Primary	39	44.3	1017	63.0	47	58.0	38.01	4	**.001***	.024	.715	**.001***	0.38	.188	0.28	**.016***	0.10
	Secondary	37	42.0	550	34.1	27	33.3							0.16		0.18		0.02
	University	12	13.6	47	2.9	7	8.6							0.40		0.16		0.25
Civil status	Single	21	23.9	611	37.9	35	43.2	19.33	4	**.001***	.103	.991	**.019***	0.31	**.001***	0.42	**.005***	0.11
	Married / couple	56	63.6	793	49.1	27	33.3							0.30		**0.64†**		0.33
	Divorced / separated	11	12.5	210	13.0	19	23.5							0.02		0.29		0.27
Employment	Unemploy.	36	40.9	670	41.5	43	53.1	4.29	2	.117	.049	.057	.911	0.01	.113	0.25	.069	0.23
	Employed	52	59.1	944	58.5	38	46.9											
Social	Mean-high to high	11	12.5	56	3.5	5	6.2	28.57	6	**.001***	.127	.736	**.001***	0.34	.155	0.22	**.021***	0.13
	Mean	12	13.6	157	9.7	13	16.0							0.12		0.07		0.19
	Mean-low	25	28.4	524	32.5	15	18.5							0.09		0.23		0.32
	Low	40	45.5	877	54.3	48	59.3							0.18		0.28		0.10

*Note.*df: degrees of freedom. *Bold: significant comparison.

†Bold: effect size into the moderate-mild (|*d*|>0.50) to large-high range (|*d*|>0.80).

Table 3

Comparison of the phenotypes for only-lotteries with only-slot/machines and only-bingo (clinical variables)

		Lotteries gambling						Global Omnibus Test		Eta		Pairwise comparisons					
		Lotteries (*n=88*)		Slot-machines (*n=1,614*)		Bingo (*n=81*)						Lotteries *vs* Slot-machines		Lotteries *vs* Bingo		Slot-mach. *vs* Bingo	
	α	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	$F_{(df:2;1780)}$	*p*	*η*	*Power*	*p*	|*d*|	*p*	|*d*|	*p*	|*d*|
Age (yrs-old)		49.86	14.14	41.86	12.60	52.22	11.92	40.58	**.001***	.209	1.00	**.001***	**0.60†**	.226	0.18	**.001***	**0.84†**
Onset gambling (yrs-old)		36.90	12.08	28.91	10.96	36.97	12.53	39.98	**.001***	.207	1.00	**.001***	**0.69†**	.967	0.01	**.001***	**0.68†**
Duration gambling (yrs)		6.15	5.78	6.22	6.05	6.09	6.51	0.03	.976	.005	.054	.910	0.01	.948	0.01	.844	0.02
Bets/episode (max, euros)		571	672	572	747	445	512	1.16	.315	.036	1.00	.985	0.00	.267	0.21	.129	0.20
Bets/episode (mean, euros)		130	249	75	154	94	122	5.33	**.005***	.077	1.00	**.002***	0.26	.143	0.18	.299	0.14
DSM-5 total criteria	.73	6.86	1.67	7.08	1.52	7.05	1.52	0.83	.437	.031	.193	.200	0.13	.429	0.12	.869	0.02
SCL-90R somatization	.91	0.96	0.76	0.93	0.76	1.44	0.96	16.48	**.001***	.135	1.00	.781	0.03	**.001***	**0.56†**	**.001***	**0.58†**
SCL-90R obsess.-comp.	.88	1.14	0.85	1.15	0.80	1.26	0.86	0.80	.449	.030	.187	.950	0.01	.330	0.14	.208	0.14
SCL-90R interper. sensitivity	.87	0.98	0.81	1.04	0.79	1.25	0.88	3.02	**.048***	.057	.569	.535	0.07	**.033***	0.31	**.022***	0.25
SCL-90R depressive	.91	1.53	0.89	1.50	0.85	2.00	1.00	13.23	**.001***	.121	.998	.701	0.04	**.001***	**0.50†**	**.001***	**0.54†**
SCL-90R anxiety	.89	1.07	0.79	1.00	0.77	1.37	0.98	8.76	**.001***	.099	.971	.451	0.08	**.011***	0.34	**.001***	0.42
SCL-90R hostility	.85	0.90	0.82	0.89	0.79	0.95	0.77	0.22	.803	.016	.084	.904	0.01	.690	0.06	.512	0.08
SCL-90R phobic anxiety	.82	0.54	0.81	0.48	0.62	0.80	0.89	9.54	**.001***	.103	.981	.378	0.09	**.010**	0.30	**.001***	0.41
SCL-90R paranoid	.78	0.95	0.82	0.91	0.73	1.17	0.84	4.51	**.001***	.071	.771	.688	0.04	.054	0.27	**.003***	0.32
SCL-90R psychotic	.85	0.95	0.73	0.90	0.71	1.11	0.79	3.23	**.040***	.060	.617	.531	0.07	.163	0.20	**.013***	0.27
SCL-90R GSI	.98	1.08	0.70	1.05	0.66	1.37	0.79	8.93	**.001***	.100	.973	.703	0.04	**.004***	0.39	**.001***	0.44
SCL-90R PST	.98	46.26	21.51	46.19	20.71	52.60	21.79	3.67	**.026***	.064	.677	.975	0.00	**.048***	0.29	**.007***	0.30
SCL-90R PSDI	.98	1.94	0.54	1.89	0.58	2.14	0.62	7.02	**.001***	.088	.928	.473	0.08	**.026***	0.34	**.001***	0.41
TCI-R novelty seeking	.70	107.7	13.10	109.2	12.55	110.7	11.50	1.23	.293	.037	.269	.268	0.12	.118	0.25	.293	0.12
TCI-R harm avoidance	.82	100.6	16.52	101.4	15.99	107.0	16.61	4.89	**.008***	.074	.806	.647	0.05	**.010***	0.39	**.002***	0.34
TCI-R reward dependence	.77	96.8	12.41	98.2	13.82	102.4	14.52	4.22	**.015***	.069	.741	.351	0.11	**.008***	0.42	**.007***	0.30
TCI-R persistence	.87	104.8	18.97	108.9	18.17	102.6	19.82	6.22	**.002***	.083	.894	**.045***	0.22	.427	0.12	**.003***	0.33
TCI-R self-directedness	.84	129.2	19.00	126.9	19.03	123.6	20.79	1.80	.166	.045	.377	.283	0.12	.060	0.28	.132	0.16
TCI-R cooperativeness	.80	129.4	15.60	130.8	14.86	133.4	15.07	1.63	.197	.043	.345	.366	0.10	.078	0.26	.130	0.17
TCI-R self-transcendence	.83	64.6	15.86	63.7	14.00	65.3	14.68	0.67	.513	.027	.163	.554	0.06	.738	0.05	.307	0.11

Note. SD: standard deviation. df: degrees of freedom. α: Cronbach's alpha in the sample.

*Bold: significant comparison. †Bold: effect size into the moderate-mild (|*d*|>0.50) to large-high range (|*d*|>0.80).

Figures legends

Figure 1

Evolution of prevalence of lotteries, slot/machines and bingo during 2005 and 2018 (preferred and unique forms of gambling)

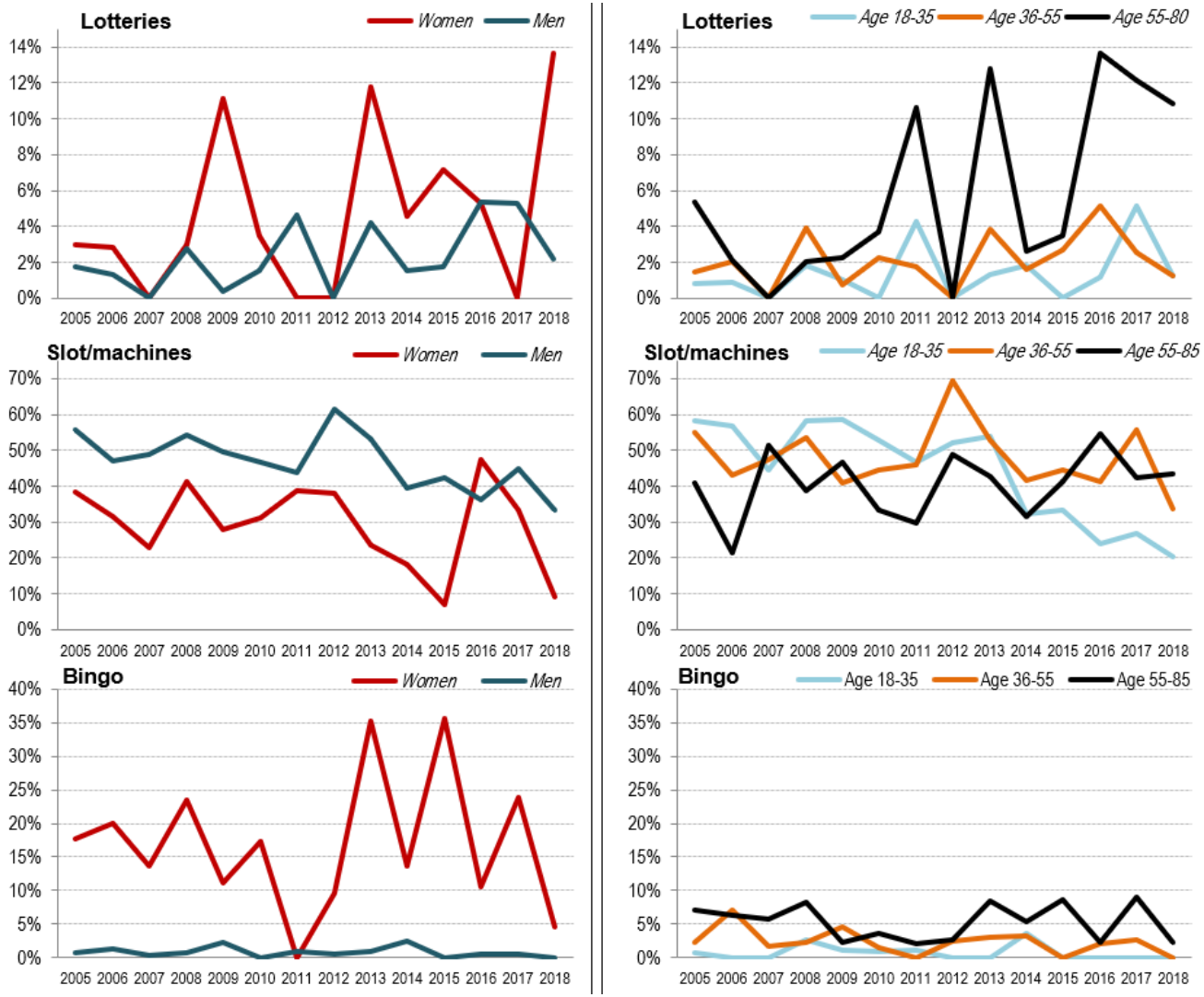

Lotteries
Women
Men
Slot/machines
Women
Men
Bingo
Women
Men
Lotteries
Age 18-35
Age 36-55
Age 55-80
Slot/machines
Age 18-35
Age 36-55
Age 55-85
Bingo
Age 18-35
Age 36-55
Age 55-85
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

Figure 2

Radar-chart (z-standardized mean values)

