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Abstract

Objective: Recently, the DSM-5 has developed a new diagnostic category named "Substance-related and Addictive Disorders". This category includes gambling disorder (GD) as the sole behavioral addiction, but does not include sex addiction (SA). The aim of this study is to investigate whether SA should be classified more closely to other behavioral addictions, via a comparison of the personality characteristics and comorbid psychopathology of individuals with SA with those of individuals with GD, which comes under the category of addiction and related disorders. Method: The sample included 59 patients diagnosed with SA, who were compared to 2190 individuals diagnosed with GD and to 93 healthy controls. Assessment measures included the Diagnostic Questionnaire for Pathological Gambling, the South Oaks Gambling Screen, the Symptom CheckList-90 Items-Revised and the Temperament and Character Inventory-Revised. Results: No statistically significant differences were found between the two clinical groups, except for socio-economic status. Although statistically significant differences were found between both clinical groups and controls for all scales on the SCL-90, no differences were found between the two clinical groups. The results were different for personality characteristics: logistic regression models showed that sex addictive behavior was predicted by a higher education level and by lower scores for TCI-R novelty-seeking, harm avoidance, persistence and self-transcendence. Being employed and lower scores in cooperativeness also tended to predict the presence of sex addiction. Conclusions: While SA and GD share some psychopathological and personality traits that are not present in healthy controls, there are also some diagnostic-specific characteristics that differentiate between the two clinical groups. These findings may help to increase our knowledge of phenotypes existing in behavioral addictions.

1. Introduction

The first theoretical conceptualization of excessive non-paraphilic sexual behavior as an addiction was introduced by Orford, who described it as a "maladaptive pattern of use and impaired control over a behavior with associated adverse consequences" [1]. Clinically, excessive non-paraphilic sexual behavior was classified in the first edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM) as a Psychosexual Disorder Not Elsewhere Classified and described as "distress about a pattern of repeated sexual conquests with a succession of individuals who exist only as things to be used (Don Juanism and nymphomania)". In the revised version of the DSM-III, the concept of excessive non-paraphilic sexual behavior was included in the category of Sexual Disorders Not Otherwise Specified and defined as "distress about a pattern of repeated sexual conquests of other forms of non-paraphilic sexual addiction, involving a succes- sion of peoplewho exist only as things to be used" [2]. Thus, sex addiction (SA) was included as a clinical phenomenon. However, because of the lack of empirical research and clinical consensus validating sexual behavior as an addiction, the "non- paraphilic sexual addiction (SA)" terminology was removed from the DSM-IV [3,4].

In the preparation of the latest version of DSM-5 [5], the possibility of including the diagnosis of SA was discussed and considered by the addictive disorders group, but eventually it was excluded due to lack of empirical evidence. The hypersexual disorder diagnosis was considered by the sexual disorders group, but also ultimately rejected.

Interestingly, although the DSM-5 developed a new diagnostic category named "Substance-related and Addictive Disorders", SA was not classified within this group [5]. Some authors have argued that SA fits best within an addictive model due to the presence of an escalation in behavior, withdrawal symptoms, and the feelings of dysphoria arising from attempts to stop or reduce the behavior [6–8]. Others consider the use of the term "addiction" inappropriate when describing SA and prefer to refer to it as a compulsive sexual behavior, characterized by the presence of sexually exciting fantasies (paraphilic or not) and recurrent and intense sexual urges and behaviors causing distress in social, occupational and other areas of the patient's life [9,10].

Authors in this field have also suggested that SA should be closely linked to other disorders manifested by impulsive problems [11]. In this regard, hypersexuality, like other addictive behaviors (including gambling disorder, henceforth GD), is linked to an initial impulsive behavior associated with frontal lobe hyperactivity and dopaminergic receptors, as well as to sensation-seeking, impulsivity, pleasure, positive reinforcement and the primary sexual drive [12,13]. Although there is little empirical evidence as yet on the neurobiology of SA, some findings suggest common vulnerability factors between behavioral addictions and substance addictions [14]. Some research has found that the risk of SA increases if a first-degree relative has the disorder [15,16]. Moreover, a small number of studies have investigated personality factors that may present a risk for the development of SA or GD [17]. For example, it has been hypothesized that novelty seeking (NS) behavior has a dopaminergic component [18–20]. Noble [20] found that of the three temperaments studied [novelty seeking (NS), harm avoidance (HA), and reward dependence (RD)], NS was most strongly and positively associated with mutations in the DRD2 and the DRD4 genes alone or in combination. They studied 119 healthy Caucasian boys, who had not yet begun to consume alcohol or take illicit substances. However, these findings were not replicated by other investigators [21,22]. In fact, a significant negative association was found between NS score and the DRD4 7R allele [22], suggesting that a re-evaluation is indicated of the DRD4 gene in this personality domain. However, genetic studies in behavioral addictions are limited, and even more so in SA; so at present there is insufficient evidence to assert that SA and GD share certain polymorphisms.

Nevertheless, individuals with these abnormalities may have a serotoninergic dysfunction. Some studies have demonstrated the efficacy of SSRIs in the treatment of this problem, due to their inhibitory effects on 5-HT2 receptors [16]. The fact that hypersexuality and GD have both been associated with complications in Parkinson's disease and its treatment with dopaminergic medications [23–26] suggests the existence of shared biological vulnerabilities in the two disorders [25,27,28]. What is more, studies in this field have also concluded that sexual compulsivity, like GD, can be understood as a compulsion that helps to confront anxiety [13,29–31].

Patients with SA present high degrees of co-morbidity with other addictive and related disorders, specifically substance use disorders and GD [13,32–35]. They also show high levels of impulsivity and sensation-seeking dimensions [13,36–39], as do subjects with other associated addictions such as alcohol or cocaine addiction [35,40]. These findings lend support to the argument that SA should be classified within the group of addictive and related disorders.

In order to investigate whether SA should be classified more closely to other behavioral addictive groups such as GD, this study was designed to compare personality characteristics and comorbid psychopathology in individuals with SA and in other subjects classified within the category of addiction and related disorders, specifically individuals with GD. GD has also undergone some modifications in the new DSM, as it has been placed in the new category of "Substance-related and Addictive Disorders" [5,41]. To our knowledge, this study is the first to compare a clinical sample seeking treatment for pathological gambling, individuals presenting sex addiction problems, and healthy controls.

Based on the current literature, we hypothesized that patients suffering from GD and SA would present more similarities regarding general psychopathological features than healthy individuals. More specifically, we expected patients with GD and SA to report higher novelty-seeking and harm avoidance than our control sample. Therefore, the aims of this study were twofold: (a) to compare socio- demographic, psychopathological and personality variables between individuals with gambling disorder (GD), sex addiction (SA) and a control group (CG), and (b) to explore and select the best discriminative variables of sex addiction (from the complete set of socio-demographic, clinical and personality outcomes) through a logistic predictive model.

2. Method

2.1. Participants

The sample included 59 patients with diagnoses of SA who were compared to 2190 individuals with a diagnosis of GD and 93 healthy participants. The clinical groups were recruited from three Pathological Gambling or Behavioral Addictions Units at the psychiatry departments of general hospitals in the province of Barcelona, Spain. All patients consulted the units voluntarily requesting specific outpatient- treatment for their addiction problems. Diagnoses were made by experienced psychologists and psychiatrists (JMF, NA, MNA, MGP and SJM), with more than 15 years of clinical practice in behavioral addictions. Data were collected from February 2004 to July 2012.

The healthy control group consisted of a sample of undergraduate and postgraduate university students (matched by gender) who were recruited from the same geographical area as the clinical sample. All controls participated voluntarily. They were all assessed in order to rule out a diagnosis of sex addiction or gambling disorder. Informed consent was obtained, and respondents completed three questionnaires anonymously which were returned to the psychologist in a sealed envelope. Ethical approval was granted from a local research ethics committee for the clinical sample and from the University ethics committee for the non-clinical sample.

2.2. Instruments

A comprehensive evaluation battery was administered by psychologists who are experts in the assessment of behavioral addictions (NA, NMB, VF, AM, LGS and AR), over the course of two face-to-face clinical interviews, in order to measure gambling and sex behaviors and to record socio-demographic characteristics, general psychopathology and personality traits.

2.2.1. South Oaks Gambling Screen (SOGS) [42] The SOGS includes 20 items that give a total score

ranging from 0 to 20 (with higher values indicating more severe psychopathology). A score of 5 or more indicates probable GD. The psychometric properties of the Spanish version of this questionnaire have been shown to be satisfactory. Test–retest reliability is $r = 0.98$ and internal consistency is $\alpha = 0.94$ (Cronbach's alpha). Convergent validity with regard to DSM-III-R criteria for pathological gambling (APA, 1987) has been estimated at $r = 0.92$ [43]. Furthermore, several studies have reported satisfactory psychometric properties of the SOGS in both clinical and general population samples as an index of gambling problem severity [44–46].

2.2.2. Stinchfield's diagnostic questionnaire for PG according to DSM-IV criteria

This 19-item questionnaire measures the ten DSM-IV diagnostic criteria for GD [3, 47,48]. The tool has demonstrated satisfactory psychometric properties with an internal consistency (measured with Cronbach's alpha) which yielded values of $\alpha = 0.81$ for the general population and $\alpha = 0.77$ for a gambling treatment group. Convergent validity was estimated with a correlation with the SOGS as $r = 0.77$ for a general population sample and $r = 0.75$ for a gambling treatment sample. This scale has been adapted for the Spanish population by Jimenez-Murcia, Stinchfield and colleagues [48], and has demonstrated adequate psychometric properties. Cronbach's alpha in the present sample was high ($\alpha = 0.90$).

2.2.3. Temperament and Character Inventory–Revised (TCI-R) This is a 240-item questionnaire which uses a 5-point

Likert scale [49, 50]. It measures seven personality dimensions: four temperament (harm avoidance, novelty- seeking, reward dependence and persistence) and three character (self-directedness, cooperativeness and self- transcendence). The Spanish version of the inventory has demonstrated satisfactory psychometric properties [51].

2.2.4. Symptom Check List-90 Items–Revised (SCL-90-R) The SCL-90-R measures a broad range of psychological

problems and symptoms of psychopathology [52]. The questionnaire contains 90 items and measures nine primary symptom dimensions: somatization, obsession–compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. It also includes three global indices: a global severity index (GSI), designed to measure overall psychological distress; a positive symptom distress index (PSDI), designed tomeasure symptom intensity; and a positive symptom total (PST), which reflects self- reported symptoms. The GSI can be used as a summary of the subscales. The SCL-90-R has demonstrated satisfactory psychometric properties in a Spanish sample, obtaining a mean internal consistency of .75 (α coefficient) [53].

Additional demographic, clinical, and social/family variables related to gambling were measured using a semi- structured face-to-face clinical interview described else- where [54]. To assess sexual behaviors a battery of items was administered, which were based on the proposed definition in the DSM-IV [3] in the Sexual Disorders Not Otherwise Specified section (302.9), for the diagnosis of this disorder. The following clinical description was given serious consideration: “distress about a pattern of repeated sexual relationship involving a succession of lovers who are experienced by the individual only as things to be used”.

2.3. Procedure

This study was carried out in accordance with the latest version of the Declaration of Helsinki. The Ethics Commit- tee of the University Hospital of Bellvitge, the Research Ethics Committee of Hospital of Terrassa and the Ethics Committee of the Quirón-Dexeus University Hospital in Barcelona, Spain, approved the study, and informed consent was obtained from all participants.

2.4. Statistical analysis

Analyses were carried out with SPSS19.00 for Windows. The comparison of clinical variables and personality traits between the two groups of patients (pathological gambling and sex addiction) was based on analysis of variance (ANOVA) for quantitative features adjusted for covariate age, including Bonferroni–Holm correction to prevent the increase of type-I error (α was fixed at 0.05 for the set of comparisons). The effect size was assessed using Cohen's d coefficient, considering less than 0.50 as a small effect size, 0.50 to 0.80 as medium and more than 0.80 as large.

The selection of variables with the best discriminative power for the presence of sex addiction was based on step- wise logistic and multinomial regressions, including the set of socio-demographic variables and TCI-R scores. The multinomial model constitutes a generalization of the logistic regression by allowing more than two discrete outcomes. The goodness-of-fit for the final selected model was assessed with the Hosmer–Lemeshow test for logistic regression and with Pearson's chi-square test for the multinomial model. The global predictive validity was measured through Nagelkerke's R2 coefficient.

3. Results 3.1. Socio-demographic characteristics

Table 1 shows the distribution of the socio-demographic and clinical characteristics for all study participants. The mean age of the total group was 41.7 years (SD = 13.3); there were no statistical differences between the clinical groups in terms of age (p = .999). The vast majority of the patients were male (90.3% of the total sample) and more than half (50.4%) were married or living with a partner (sex and marital status were also statistically equally distributed between groups). No statistically significant differenceswere found between the two clinical groups except for socio-economic status; individuals with SA were associated with higher socio-economic class (status) and with being in employment. The prevalence of smokers was higher among patients with GD (73.3 versus 37.3% for SA), but no differences were found for alcohol or other drug abuse, or for financial income. The prevalence of substance use was higher in SA than in GD (21.8 vs. 9.7%), and in the subsample of patients who reported substance use the most frequently used were cannabis-marihuana (GD = 47.3 vs. SA = 25.0%), cocaine (GD = 34.0% vs. SA = 50.0%), and designer substances (GD = 1.2% vs. SA = 25.0%). No differences were found in terms of the presence of comorbid psychological disorder between GD and SA patients (33.7 vs. 42.1%).

Statistical differences were found for age (GD were older than controls), for employment status (GD were the least likely to be employed) and for socio-economic status (controls were more likely to be in high and medium-high income groups).

3.2. Comparison for clinical, general psychopathology and personality traits

The first columns in Table 2 show the distribution of each diagnostic subtype (mean and standard deviation) of gambling disorder-related measures, general psychopathol- ogy (SCL-90 scales) and personality profiles (TCI-R scales). The second part of Table 2 includes the results of the ANOVA models (global p-value and pair-wise compari- sons), adjusted for the covariate participants' age, and compares the mean scores for the three diagnostic condi- tions. Although statistically significant differences were found between both clinical groups and controls for all scales of the SCL-90-R, none were found between the two clinical groups. The results were different for the tool measuring personality characteristics: except for the self-transcendence score all the TCI-R scales achieved significant discriminative capacity between GD and SA patients, with patients with sex addictive behavior obtaining lower mean scores. Compared to healthy controls, patients with sex addiction obtained higher mean scores on all the SCL-90-R scales (except for somatization, phobic anxiety and paranoid ideation), and lower means on all TCI-R scales (except for novelty-seeking and self-transcendence, which obtained non-significant results). In comparison to healthy controls, GD patients also achieved higher means on all the SCL-90-R dimensions and on the novelty-seeking, harm avoidance and self- transcendence subscales of the TCI-R. 3.3. Predictive models of sex addiction

Table 3 shows the final logistic regression with the independent variables that achieved the highest discrimina- tive accuracy for sex addiction in the sample of patients with GD and SA diagnoses. Within the clinical groups, the presence of sex addictive behavior was predicted by higher level of education and lower scores ion TCI-R novelty- seeking, harm avoidance, persistence and self-transcendence scales. Being in employment and having lower scores on cooperativeness also tended to predict the presence of SA. The final model achieved adequate goodness-of-fit (p = .453) and good predictive validity (R2 = .311).

Table 4 shows the final multinomial logistic predictive model with the variables that achieved the highest discriminative accuracy for sex addiction defining as the criterion (the dependent variable) the classification in three diagnostic conditions: SA, GD and healthy controls. The final model was adjusted starting with the set of socio- demographic features (excluding personal and family income, since these two variables were not available for controls) and the TCI-R scores. The final model showed that comparing the two cohorts of patients, the presence of sex addiction was predicted by high socio-economic status and low scores in TCI-R novelty-seeking, harm avoidance and persistence scales. Compared to controls, GD patients were older and had lower socio-economic status; they achieved higher scores for TCI-R novelty-seeking and lower scores for TCI-R self-directedness. Compared to controls, SA patients were older and obtained lower scores for TCI-R harm avoidance and self-directedness. The final model achieved adequate goodness-of-fit (p = .981) and good predictive validity (R2 = .242).

4. Discussion

The DSM-V classification system places SA together with other conditions that require further research. Within this context, we aimed to investigate whether it would be appropriate to remove SA from the "addiction" category. This is the first study to examine the differences and similarities in terms of socio-demographic, comorbid psychopathology and personality traits between two clinical groups which in the past have been defined and classified as suffering from addictive behavior psychopathology (GD and SA) and a healthy control group. The study showed a high degree of similarity between the two clinical groups regarding socio-demographic variables and psychopathology. The only area in which a significant difference was found was socio-economic status: individuals with SA had a higher socio-economic status than their GD counterparts, and in fact, high socio-economic status was found to be a predictive variable for SA. This could be explained by the fact that many patients with GD tend to have a low educational level and low income, especially when gambling preferences [55] or gender [56] are taken into account. Recent studies of GD have suggested that these sociodemographic characteristics act as risk factors for the development of the disorder [57]. As hypothesized, individuals with GD and SA obtained higher scores on all the SCL-90-R scales than healthy controls, with the exception of the somatization, phobic anxiety and paranoid ideation scales, where no significant differences were found. Several studies show that GD is generally associated with significant psychiatric comorbidity [58–62] and a positive relationship has been found between the presence of comorbidities (especially mood and anxiety problems) and disorder onset [63] and severity [64]. Similarly, previous studies observed that gambling is used to regulate negative emotions associated with life-events, distress and frustrations [65,66]. At the same time, high levels of psychopathology in the form of depression, anxiety, low self-esteem and stress have been described in samples with compulsive sexual behavior [41,67], and previous studies [68,69] have concluded that sexual compulsions are a mechanism for regulating negative affect.

The study also investigated and compared personality traits in individuals diagnosed with SA and GD. Compared to healthy controls, individuals with GD had lower mean scores on all the TCI-R scales except for novelty-seeking, harm avoidance and self-transcendence. SA patients presented a similar profile, with lower mean scores on all TCI-R scales except for harm avoidance. This finding corroborates those of other reports which suggest that GD and SA patients are characterized by more "sensation-seeking" and "risk-taking" behaviors. Because of these features, GD and SA have been classified in the behavioral addictions group in which subjects are predominantly seeking stimulation [70,71].

The second aim of the study was to identify predictive variables for SA. The personality profiles that predicted SA were lower scores on TCI-R novelty-seeking, harm avoidance, and persistence. Novelty-seeking is associated with exploratory activity in response to novel stimulation, impulsive decision-making, extravagance in approach to reward cues, and quick loss of temper and avoidance of frustration [50]. This personality trait has been found to be highly heritable and has been associated with high dopaminergic activity [72]. In our study, compared to controls, novelty-seeking was found to be higher in individuals with GD and lower in those with SA. Previous research has demonstrated that impulsivity and sensation-seeking are present in GD as well in SA [41,73]. In fact, numerous studies have found high impulsivity levels in GD patients [74–76], higher even than in other disorders where impulsivity is also considered a characteristic feature, like bulimia nervosa or binge eating disorder [77–79]. In fact, GD (or pathological gambling, as it was then called) was considered by the DSM-IV-TR and by previous versions as an impulse control disorder alongside kleptomania, pyromania and intermittent explosive disorder [80]. However, our study suggests an association between lower novelty-seeking and SA. Perhaps this unexpected finding should be interpreted in the light of the low harm avoidance levels, which were also found to predict SA behavior and were lower in SA than in controls. In general, individuals with low harm avoidance are carefree, energetic, outgoing and optimistic even in situations that worry most people [50]. The positive aspects of low harm avoidance are confidence, even with potentially threatening situations, and little or no distress. The negative aspects of this personality trait include unresponsiveness to danger or unreasonable optimism with potentially severe consequences in hazardous situations. People with low scores on harm avoidance tend to be more likely to engage in antisocial behavior [81,82]. In fact, this personality trait alone could explain the fact that the SA patients repeatedly seek new sexual partners and expose themselves to risk although they do not have high levels of impulsivity or novelty-seeking.

Finally, the last variable found to predict SA was low persistence, which is also a highly heritable trait. Individuals with low levels of persistence have a propensity to show low perseverance and difficulty managing frustrations [50].

In summary, the study did not find major socio- demographic and psychopathological differences between the two clinical groups of GD and SA. These findings support the argument that SA should be classifiedmore closely to other behavioral addictions such as GD [37,71,83]. However, SA patients presented major differences in relation to GD

individuals on most personality traits, with lower levels of novelty-seeking, harm avoidance and persistence being predictive traits of their condition. This finding suggests that the two groups present different responses to novelty and stimuli and may have an impact on further development of treatment modalities for GD and SA [84]. In other words, these disorders could benefit from "transdiagnostic" treatment programs, aimed to improve the character trait "self- directedness", since it is a factor associated with various personality disorders related to behavioral addictions [85,86].

Objectives such as increasing internal locus of control, learning to take responsibility for one's own decisions, increasing planning capacity and the perception of self- efficacy and satisfaction with one's own abilities are needed in both conditions. However, in the case of GD, treatment programs should also be directed at training self-control strategies and emotional regulation; in the case of SA, the focus should be on improving interpersonal relationships and other aspects related to socialization problems (cooperation, empathy, tolerance, etc.), and to enhance the ability to identify potentially hazardous physical conditions and the negative consequences of certain decisions.

Although this study is, to our knowledge, the first to investigate personality, socio-demographic and psychopatho- logical traits in two specific clinical groups, it is limited by its cross-sectional design which does not allow us to make any causal inferences. The nature of this specific clinical group also limits the study, as patients attending clinical services may show a level of awareness and possible guilt; the personality traits of subjects who do not seek help may be slightly different. Furthermore, the sample sizes of the three groups (GD, SA and HC) were not balanced. Nevertheless, all groups were large enough to ensure adequate statistical power, and many of the effect sizes for the comparisons were obtained with Cohen's d coefficient which represents the standardized mean difference and is independent of the sample sizes.

Finally, although the GD group was diagnosed by two standardized instruments, the SA group was not. Psychol- ogists and psychiatrists with extensive experience in behavioral addictions established the diagnosis, but as the diagnosis was made by a single clinician inter-rater reliability could not be assessed.

Future research is necessary in order to confirm the empirical evidence and the significant associations presented here. In spite of its limitations, the report expands our understanding of a condition that has not been studied in depth and opens up new directions for future studies, which may want to focus on other factors that influence the development of SA in individuals with these particular characteristic traits.

References

[1] Orford J. Hypersexuality: implications for a theory of dependence. Br J Addict Alcohol Other Drugs 1978;73(3):299-10.

[2] Association AP, American Psychiatric Association. Diagnostic and statistical manual of mental disorders [Internet]. Washington, DC: The Association; 1987 [Available from: http://scholar. google.com/scholar?hl=en&q=Diagnostic+and+STatistical+ manual&btnG=&as_sdt=1,5&as_sdtp=#2].

[3] APA. Diagnostic and statistical manual of mental disorders 4th ed. 1994.

[4] Garcia FD, Thibaut F. Sexual addictions. Am J Drug Alcohol Abuse 2010;36:254-60.

[5] American Psychiatric Association. Task Force on DSM-V. Diagnostic and statistical manual of mental disorders: DSM-5; 2013 [Arlington].

[6] Goodman A. Sexual addiction: designation and treatment. J Sex Marital Ther 1992;18:303-14.

[7] Potenza MN. Should addictive disorders include non-substance-related conditions? Addiction 2006;101:142-51 [Suppl.].

[8] Giugliano JR. Sexual addiction: diagnostic problems. Int J Ment Health Addict 2009:283-94.

[9] Miner MH, Coleman E, Center BA, Ross M, Rosser BRS. The compulsive sexual behavior inventory: psychometric properties. Arch Sex Behav 2007;36:579-87.

[10] Coleman E, Miner M, Ohlerking F, Raymond N. Compulsive sexual behavior inventory: a preliminary study of reliability and validity. J Sex Marital Ther 2001;27:325-32 [Available from: http://www.ncbi. nlm.nih.gov/pubmed/11441516].

[11] Griffiths MD. Sex addiction on the Internet. Janus Head 2004;7:188-217 [Available from: http://www.janushead.org/7-1/ Griffiths.pdf/n, http://www.sextherapy.co.uk/article/Sex-on-the- Internet:-observations-and-implications-for-Internet-sex- addiction_347.html].

[12] Klos KJ, Bower JH, Josephs KA, Matsumoto JY, Ahlskog JE. Pathological hypersexuality predominantly linked to adjuvant dopa- mine agonist therapy in Parkinson's disease and multiple system atrophy. Parkinsonism Relat Disord 2005;11:381-6.

[13] Mick TM, Hollander E. Impulsive–compulsive sexual behavior. CNS Spectr 2006;11:944-55.

[14] Leeman RF, Potenza MN. Similarities and differences between pathological gambling and substance use disorders: a focus on impulsivity and compulsivity. Psychopharmacology (Berl) 2012:469-90.

[15] Blum K, Braverman ER, Holder JM, Lubar JF, Monastra VJ, Miller D, et al. Reward deficiency syndrome: a biogenetic model for the diagnosis and treatment of impulsive, addictive, and compulsive behaviors. J Psychoactive Drugs 2000;32(Suppl:i–iv):1-112.

[16] Wainberg ML, Muench F, Morgenstern J, Hollander E, Irwin TW, Parsons JT, et al. A double-blind study of citalopram versus placebo in the treatment of compulsive sexual behaviors in gay and bisexual men. J Clin Psychiatry 2006;67:1968-73.

[17] Noble EP. Addiction and its reward process through polymorphisms of the D2 dopamine receptor gene: A review. Eur Psychiatry 2000:79-89.

[18] Benjamin J, Li L, Patterson C, Greenberg BD, Murphy DL, Hamer DH. Population and familial association between the D4 dopamine receptor gene and measures of novelty seeking. Nat Genet 1996;12:81-4.

[19] Cloninger CR. Neurogenetic adaptive mechanisms in alcoholism. Science 1987;236:410-6.

[20] Noble EP, Ozkaragoz TZ, Ritchie TL, Zhang X, Belin TR, Sparkes RS. D2 and D4 dopamine receptor polymorphisms and personality. Am J Med Genet B Neuropsychiatr Genet 1998;81:257-67.

[21] Jonsson EG, Nothen MM, Gustavsson JP, Neidt H, Brene S, Tylec A, et al. Lack of evidence for allelic association between personality traits and the dopamine D4 receptor gene polymorphisms. Am J Psychiatry

1997;154:697-9 [Available from: http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt= Citation&list_uids=9137132].

[22] Malhotra AK, Virkkunen M, Rooney W, Eggert M, Linnoila M, Goldman D. The association between the dopamine D4 receptor (D4DR) 16 amino acid repeat polymorphism and novelty seeking. Mol Psychiatry 1996;1:388-91.

[23] Klos KJ, Bower JH, Josephs KA, Matsumoto JY, Ahlskog JE. Pathological hypersexuality predominantly linked to adjuvant dopa- mine agonist therapy in Parkinson's disease and multiple system atrophy. Parkinsonism Relat Disord 2005;11:381-6.

[24] Jiménez-Murcia S, Bove FI, Israel M, Steiger H, Fernández-Aranda F, Alvarez-Moya E, et al. Cognitive–behavioral therapy for pathological gambling in Parkinson's disease: a pilot controlled study. Eur Addict Res 2012;18(6):265-74 [cited 2014 May 5, Available from: http://www.ncbi.nlm.nih.gov/pubmed/22760081].

[25] De Chazeron I, Llorca P-M, Chéreau-Boudet I, Blanc O, Perriot J, Ouchchane L, et al. Hypersexuality and pathological gambling in Parkinson's disease: a cross-sectional case-control study. Mov Disord 2011;26:2127-30 [Available from: http://www.ncbi.nlm.nih.gov/ pubmed/21735482].

[26] Meco G, Rubino A, Caravona N, Valente M. Sexual dysfunction in Parkinson's disease. Parkinsonism Relat Disord 2008;14:451-6.

[27] Vitale C, Santangelo G, Trojano L, Verde F, Rocco M, Grossi D, et al. Comparative neuropsychological profile of pathological gambling, hypersexuality, and compulsive eating in Parkinson's disease. Mov Disord 2011;26:830-6.

[28] Ávila A, Cardona X, Martín-Baranera M, Bello J, Sastre F. Impulsive and compulsive behaviors in Parkinson's disease: a one-year follow-up study. J Neurol Sci 2011;310:197-201.

[29] Farré J, Navarro-Sanchis J, Mallorqui-Bague N. Impulso sexual excesivo. In: Soler Insa P, & Gascón J, editors. Recomendaciones Terapéuticas en los Trastornos Mentales (RTM IV). Barcelona: Cyesan; 2012. p. 273-7.

[30] Koob GF. Neurobiological substrates for the dark side of compulsivity in addiction. Neuropharmacology 2009:18-31.

[31] Kingston DA, Firestone P. Problematic hypersexuality: a review of conceptualization and diagnosis. SexAddictCompulsivity 2008:284-310.

[32] Kaplan MS, Krueger RB. Diagnosis, assessment, and treatment of hypersexuality. J Sex Res 2010;47:181-98.

[33] Långström N, Hanson RK. High rates of sexual behavior in the general population: correlates and predictors. Arch Sex Behav 2006;35:37-52.

[34] Raymond NC, Coleman E, Ohlerking F, Christenson GA, Miner M. Psychiatric comorbidity in pedophilic sex offenders. Am J Psychiatry 1999;156:786-8.

[35] Raymond NC, Coleman E, Miner MH. Psychiatric comorbidity and compulsive/impulsive traits in compulsive sexual behavior. Compr Psychiatry 2003;44:370-80.

[36] Kastner RM, Sellbom M. Hypersexuality in college students: the role of psychopathy. Personal Individ Differ 2012;53:644-9.

[37] Raviv M. Personality characteristics of sexual addicts and pathological gamblers. J Gambl Stud 1993;9(1):17-30 [Kluwer Academic Pub- lishers-Human Sciences Press, Available from: http://dx.doi.org/10. 1007/BF01019922].

[38] Reid RC, Carpenter BN, Spackman M, Willes DL. Alexithymia, emotional instability, and vulnerability to stress proneness in patients seeking help for hypersexual behavior. J Sex Marital Ther 2008;34:133-49.

[39] Bancroft J, Vukadinovic Z. Sexual addiction, sexual compulsivity, sexual impulsivity, or what?

Toward a theoretical model. J Sex Res 2004;41:225-34.

[40] Krueger RB, Kaplan MS. Disorders of sexual impulse control in neuropsychiatric conditions. Semin Clin Neuropsychiatry 2000;5:266-74.

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[41] Kafka MP. Hypersexual disorder: a proposed diagnosis for DSM-V. Arch Sex Behav 2010;39:377-400.

[42] Lesieur HR, Blume SB. The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. Am J Psychiatry 1987;144:1184-8.

[43] Echeburúa E, Báez C, Fernéndez-Montalvo J, Pérez D. Cuestionario de juego patológico de South Oaks (SOGS): Validación Española. Análisis y Modif Conduct 1994;20:769-91 [Available from: http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=1996- 02462-001&site=ehost-live].

[44] Alessi SM, Petry NM. Pathological gambling severity is associated with impulsivity in a delay discounting procedure. Behav Processes 2003;64:345-54.

[45] Stinchfield R. Reliability, validity, and classification accuracy of the South Oaks Gambling Screen (SOGS). Addict Behav 2002:1-19.

[46] Strong DR, Breen RB, Lesieur HR, Lejuez CW. Using the Rasch model to evaluate the South Oaks Gambling Screen for use with nonpathological gamblers. Addict Behav 2003;28:1465-72.

[47] Stinchfield R. Reliability, validity, and classification accuracy of a measure of DSM-IV diagnostic criteria for pathological gambling. Am J Psychiatry 2003;160:180-2.

[48] Jiménez-Murcia S, Stinchfield R, Alvarez-Moya E, Jaurrieta N, Bueno B, Granero R, et al. Reliability, validity, and classification accuracy of a Spanish translation of a measure of DSM-IV diagnostic criteria for pathological gambling. J Gambl Stud 2009;25:93-104.

[49] Cloninger C. The temperament and character inventory (TCI): a guide to its development and use. St Louis, MO: Center for Psychobiology and Personality, University of Washington; 1994.

[50] Cloninger CR, Svrakic DM, Przybeck TR. A psychobiological model of temperament and character. Arch Gen Psychiatry 1993;50:975-90.

[51] Gutiérrez-Zotes JA, Bayón C, Montserrat C, Valero J, Labad A, Cloninger CR, et al. Inventario del Temperamento y el Carácter- Revisado (TCI-R). Baremación y datos normativos en una muestra de población general. Actas Españolas Psiquiatr 2004;32:8-15 [Available from: jazotes@yahoo.es\n, http://search.ebscohost.com/login.aspx? direct=true&db=psyh&AN=2004-14394-002&site=ehost-live].

[52] Derogatis LR. SCL-90-R Symptom Checklist-90-R. Administration, scoring and procedures manual. Minneapolis: National Computer System; 1994.

[53] Martínez-Azumendi O, Fernández-Gómez C, Beitia-Fernández M. Factorial variance of the SCL-90 in a Spanish outpatient psychiatric sample. Actas Españolas Psiquiatr 2001;29:95-102.

[54] Jiménez-Murcia S, Aymamí MN, Gómez-Peña M, Álvarez-Moya EM, Vallejo J. Protocols de tractament cognitivoconductual pel joc patològic i d´altres addicions no tòxiques ([Guidelines of cognitive–behavioral treatment of pathological gambling and other non-toxic addictions]). Barcelona: Hospital Universitari de Bellvitge, Departa- ment de Salut, Generalitat de Catalunya; 2006.

[55] Jiménez-Murcia S, Stinchfield R, Fernández-Aranda F, Santamaría JJ, Penelo E, Granero R, et al. Are online pathological gamblers different from non-online pathological gamblers on demographics, gambling problem severity, psychopathology and personality characteristics? Int Gambl Stud 2011:325-37.

[56] Afifi TO, Cox BJ, Martens PJ, Sareen J, Enns MW. The relation between types and frequency of gambling activities and problem gambling among women in Canada. Can J Psychiatry 2010;55:21-8.

[57] Johansson A, Grant JE, Kim SW, Odlaug BL, Götestam KG. Risk factors for problematic gambling: a critical literature review. J Gambl Stud 2009;25:67-92.

[58] Aragay N, Roca A, Garcia B, Marqueta C, Guijarro S, Delgado L, et al. Pathological gambling in a psychiatric sample. Compr Psychiatry 2012;53:9-14.

[59] Lorains FK, Cowlishaw S, Thomas SA. Prevalence of comorbid disorders in problem and pathological gambling: systematic review and meta-analysis of population surveys. Addiction 2011;106:490-8.

[60] Petry NM, Stinson FS, Grant BF. Comorbidity ofDSM-IV pathological gambling and other psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry 2005;66:564-74 [Available from: http://www.ncbi.nlm.nih. gov/pubmed/15889941].

[61] Quilty LC, Watson C, Robinson JJ, Toneatto T, Bagby RM. The prevalence and course of pathological gambling in the mood disorders. J Gambl Stud 2011;27:191-201.

[62] Von Ranson KM, Wallace LM, Holub A, Hodgins DC. Eating disorders, substance use disorders, and impulsiveness among disor- dered gamblers in a community sample. Eur Eat Disord Rev 2013;21 (2):148-54 [cited 2014 May 11, Available from: http://www.ncbi.nlm. nih.gov/pubmed/23080054].

[63] Kessler RC, Hwang I, LaBrie R, Petukhova M, Sampson NA, Winters KC, et al. DSM-IV pathological gambling in the National Comorbidity Survey Replication. Psychol Med 2008;38:1351-60.

[64] Winters KC, Kushner MG. Treatment issues pertaining to pathological gamblers with a comorbid disorder. J Gambl Stud 2003;19:261-77.

[65] Blaszczynski A, Nower L. A pathways model of problem and pathological gambling. Addiction 2002;97:487-99.

[66] Kim SW, Grant JE, Eckert ED, Faris PL, Hartman BK. Pathological gambling and mood disorders: clinical associations and treatment implications. J Affect Disord 2006;92:109-16 [Available from: http://www.ncbi.nlm.nih.gov/entrez/query.fcgi? cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=16443282].

[67] Odlaug BL, Lust K, Schreiber LRN, Christenson G, Derbyshire K, Harvanko A, et al. Compulsive sexual behavior in young adults. Ann Clin Psychiatry 2013;25:193-200 [Available from: http://www.ncbi. nlm.nih.gov/pubmed/23926574].

[68] Coleman E. Compulsive sexual behavior: what to call it, how to treat it? SIECUS Rep 2003;31:12 [Available from: http://proquest.umi. com.proxy.lib.umich.edu/pqdweb?did=404228731&Fmt=2& clientId=17822&RQT=309&VName=PQD].

[69] Carnes PJ. Sexual addiction and compulsion: recognition, treatment, and recovery. CNS Spectr 2000;5:63-72.

[70] Powell J, Hardoon K, Derevensky JL, Gupta R. Gambling and risk- taking behavior among university students. Subst Use Misuse 1999;34:1167-84.

[71] Huang J-H, Jacobs DF, Derevensky JL. Sexual risk-taking behaviors, gambling, and heavy drinking among U.S. College athletes. Arch Sex Behav 2010;39:706-13.

[72] Cloninger CR. A unified biosocial theory of personality and its role in the development of anxiety states. Psychiatr Dev 1986;4:167-226.

[73] Teese R, Bradley G. Predicting recklessness in emerging adults: a test of a psychosocial model. J Soc Psychol 2008;148:105-26.

[74] Fernandez-Aranda F, Jimenez-Murcia S, Alvarez-Moya EM, Granero R, Vallejo J, Bulik CM. Impulse control disorders in eating disorders: clinical and therapeutic implications. Compr Psychiatry 2006;47:482-8 [Available from: http://www.sciencedirect.com/science/article/ B6WCV-4JW15JC-3/2/17cd60dc17f37e4d17f10224ae5d0f15].

[75] Jiménez-Murcia S, Steiger H, Isräel M, Granero R, Prat R, Santamaría JJ, et al. Pathological gambling in eating disorders: prevalence and clinical implications. Compr Psychiatry 2013;54(7):1053-60 [Elsevier Inc., cited 2014 May 5, Available from: http://www.ncbi.nlm.nih.gov/ pubmed/23759149].

[76] Verdejo-Garcia A, Lawrence AJ, Clark L. Impulsivity as a vulnerability marker for substance-use

disorders: review of findings from high-risk research, problem gamblers and genetic association studies. Neurosci Biobehav Rev 2008:777-810.

[77] Alvarez-Moya EM, Jimenez-Murcia S, Moragas L, Gomez-Pena M, Aymami MN, Ochoa C, et al. Executive functioning among female pathological gambling and bulimia nervosa patients: preliminary findings. J Int Neuropsychol Soc 2009;15:302-6 [ST – Executive functioning among female pat. Available from: http://www.ncbi.nlm. nih.gov/pubmed/19203440 LA - eng\n, http://www.ncbi.nlm.nih.gov/ pubmed/19203440].

[78] Alvarez-Moya EM, Jiménez-Murcia S, Granero R, Vallejo J, Krug I, Bulik CM, et al. Comparison of personality risk factors in bulimia nervosa and pathological gambling. Compr Psychiatry 2007;48 (5):452-7 [cited 2014 May 11, Available from: http://www.ncbi.nlm. nih.gov/pubmed/17707254].

[79] Claes L, Jimenez-Murcia S, Agüera Z, Sánchez I, Santamaría J, Granero R, et al. Eating disorders and pathological gambling in males: can they be differentiated by means of weight history and temperament and character traits? Eat Disord 2012:395-404.

[80] APA. Diagnostic and statistical manual of mental disorders: DSM-IV- TR. New York American Psychiatric Press Inc.; 2000

[81] De Fruyt F, Van De Wiele L, Van Heeringen C. Cloninger's psychobiological model of temperament and character and the five- factor model of personality. Personal Individ Differ 2000:441-52.

[82] Tikkanen R, Holi M, Lindberg N, Virkkunen M. Tridimensional Personality Questionnaire data on alcoholic violent offenders: specific connections to severe impulsive cluster B personality disorders and violent criminality. BMC Psychiatry 2007;7:36.

[83] Petry NM. Gambling problems in substance abusers are associated with increased sexual risk behaviors. Addiction 2000;95:1089-100.

[84] Hall P. Sex addiction—an extraordinarily contentious problem. Sex Relatsh Ther 2014;29(1):68-75.

[85] Fernández-Aranda F, Jiménez-Murcia S, Alvarez-Moya EM, Granero R, Vallejo J, Bulik CM. Impulse control disorders in eating disorders: clinical and therapeutic implications. Compr Psychiatry 2006;47:482-8 [Available from: http://www.ncbi.nlm. nih.gov/pubmed/17067872].

[86] Jiménez-Murcia S, Fernández-ArandaF,GraneroR,CházlizM,LaVerdeM, Aguglia E, et al. Video game addiction in gambling disorder: clinical, psychopathological, and personality correlates. Biomed Res Int 2014:315062 [Available from: http://www.pubmedcentral.nih.gov/ articlerender.fcgi?artid=4122146&tool=pmcentrez&rendertype=abstract].

Table 1

Socio-demographic and clinical characteristics of the total sample divided by GD, SA and healthy controls.

		GD	SA	HC	*SA vs. GD	*SA vs. GD vs HC
		(*n* = 2190)	(*n* = 59)	(*n* = 93)		
Age (years); Mean (*SD*)		42.2 (13.4)	40.1 (8.8)	31.0 (9.5)	.999	<.001
Sex (% males)		90.1%	98.3%	89.2%	.240	.178
Marital status (% couple)		51.2%	50.8%	39.3%	.999	.178
Employed (% yes)		59.0%	79.7%	92.1%	.008	<.001
Education (%)	No studies	2.9%	0%	1.1%	<.001	<.001
	Primary	54.7%	20.4%	13.8%		
	Secondary	37.0%	42.6%	57.5%		
	University	5.3%	37.0%	27.6%		
[a]Socioeconomic status (%)	High	2.3%	24.5%	6.5%	<.001	<.001
	Medium-high	6.5%	18.4%	22.6%		
	Medium	15.6%	16.3%	9.7%		
	Medium-low	40.3%	18.4%	29.0%		
	Low	35.3%	22.4%	32.3%		
Personal income (€/month); mean (*SD*)		1216.3 (711)	1407.6 (687)	—	.999	—
Family income (€/month); mean (*SD*)		2106.9 (1183)	2201.4 (1526)	—	.999	—
Smokers (%)		73.3%	37.3%	—	<.001	—
[b]Tobacco use (cigarettes-day); mean (*SD*)		22.7 (11.8)	17.7 (9.0)	—	.048	
Alcohol abuse (%)		14.9%	14.0%	—	.863	—
Other drug use (%)		9.7%	21.8%	—	.003	—
Comorbid disorders (%)		33.7%	42.1%	—	.441	—

Table 2

Differences between GD with and without sex addiction for clinical measures.

	Descriptives				Analysis of variance (ANOVA) adjusted by age.					
	Means (standard deviation)				GD versus SA		GD versus HC		SA versus HC	
	GDGD; n = 2190	SASA; n = 59	HCHC; n = 93	p	MD $\lvert\varphi\rvert$	Coh. $\lvert d\rvert$	MD $\lvert\varphi\rvert$	Coh. $\lvert d\rvert$	MD $\lvert\varphi\rvert$	Coh. $\lvert d\rvert$
Age of onset problem (years)	36.27 (13.16)	33.37 (8.60)	—	.890	0.168	0.261	—	—	—	—
Duration of problem (years)	5.63 (6.09)	5.63 (4.54)	—	.797	0.335	0.000	—	—	—	—
Maximum money/episode (€)	900.1 (2379.3)	538.0 (367.7)	—	.790	346.0	0.213	—	—	—	—
Average money/episode (€)	177.1 (741.8)	41.7 (10.4)	—	.790	134.8	0.258	—	—	—	—
Total accumulated debts (€)	9728.9 (29055)	1500.0 (3082)	—	.523	8011.9	0.398	—	—	—	—
SCL: somatization	0.92 (0.80)	0.77 (0.73)	0.63 (0.63)	.014	0.148	0.200	**0.241[a]**	**0.410**	0.093	0.207
SCL: obsessive–compulsive	1.10 (0.81)	1.23 (0.95)	0.78 (0.58)	.001	0.127	0.142	**0.314[a]**	**0.464**	**0.441[a]**	**0.575**
SCL: interpersonal sensitivity	1.00 (0.82)	1.01 (0.81)	0.63 (0.69)	<.001	0.005	0.007	**0.372[a]**	**0.483**	**0.378[a]**	**0.494**
SCL: depressive	1.44 (0.91)	1.37 (1.06)	0.61 (0.63)	<.001	0.060	0.066	**0.779[a]**	**1.061**	**0.720[a]**	**0.872**
SCL: anxiety	0.98 (0.81)	0.96 (0.87)	0.49 (0.57)	<.001	0.017	0.023	**0.469[a]**	**0.694**	**0.451[a]**	**0.633**
SCL: hostility	0.88 (0.82)	0.83 (0.89)	0.48 (0.62)	<.001	0.047	0.049	**0.433[a]**	**0.546**	**0.386[a]**	**0.463**
SCL: phobic anxiety	0.47 (0.67)	0.33 (0.55)	0.21 (0.37)	<.001	0.143	0.236	**0.258[a]**	**0.496**	0.115	0.262
SCL: paranoid ideation	0.86 (0.75)	0.84 (0.93)	0.63 (0.75)	.032	0.028	0.034	**0.223[a]**	**0.310**	0.195	0.241
SCL: psychotic	0.86 (0.74)	0.91 (0.85)	0.37 (0.48)	<.001	0.053	0.062	**0.466[a]**	**0.784**	**0.518[a]**	**0.783**
SCL-90-R: GSI score	1.02 (0.70)	1.06 (0.80)	0.57 (0.50)	<.001	0.043	0.058	**0.428[a]**	**0.746**	**0.472[a]**	**0.741**
SCL-90-R: PST score	45.50 (21.76)	42.89 (25.79)	30.17 (19.28)	<.001	2.630	0.109	**14.54[a]**	**0.746**	**11.91[a]**	**0.559**
SCL-90-R: PSDI score	1.86 (0.59)	1.99 (0.57)	1.50 (0.45)	<.001	0.126	0.218	**0.332[a]**	**0.684**	**0.458[a]**	**0.945**
TCI-R: novelty seeking	108.99 (14.40)	101.37 (23.56)	101.77 (14.96)	<.001	**7.991[a]**	**0.391**	**10.17[a]**	**0.492**	2.183	0.021
TCI-R: harm avoidance	101.29 (17.08)	90.17 (23.24)	95.16 (17.79)	<.001	**10.89[a]**	**0.545**	**4.436[a]**	**0.352**	**6.456[a]**	**0.241**
TCI-R: reward dependence	99.90 (15.55)	91.90 (24.80)	103.18 (13.48)	<.001	**7.923[a]**	**0.386**	**4.00[a]**	**0.226**	**11.92[a]**	**0.565**
TCI-R: persistence	109.99 (20.85)	96.38 (27.09)	111.05 (18.45)	<.001	**13.75[a]**	**0.563**	0.177	0.054	**13.93[a]**	**0.633**
TCI-R: self-directedness	127.41 (21.54)	116.52 (47.79)	144.20 (21.68)	<.001	**10.85[a]**	**0.294**	**17.14[a]**	**0.777**	**27.98[a]**	**0.746**
TCI-R: cooperativeness	132.27 (17.56)	119.50 (39.60)	136.11 (18.61)	<.001	**12.65[a]**	**0.417**	**4.95[a]**	**0.212**	**17.60[a]**	**0.537**
TCI-R: self-transcendence	64.71 (15.37)	62.81 (16.84)	61.27 (14.40)	.681	1.592	0.118	1.097	0.231	0.495	0.098

Table 3

Predictive model of sex addiction into the cohort of GD and SA patients (step-wise logistic regression).

	χ^2 (Wald)	*df*	*B*	*p*	OR	95% CI (OR)	
[a]Level of education	58.41	2		<.001			
Secondary studies	7.915	1	1.351	.005	3.86	1.51	9.90
University studies	48.60	1	3.506	<.001	33.3	12.43	89.23
In employment	2.757	1	0.670	.097	1.95	0.89	4.31
TCI-R: novelty seeking	6.355	1	−0.026	.012	0.97	0.96	0.99
TCI-R: harm avoidance	20.70	1	−0.043	<.001	0.96	0.94	0.98
TCI-R: persistence	16.31	1	−0.039	<.001	0.96	0.94	0.98
TCI-R: cooperativeness	3.190	1	−0.014	.074	0.99	0.97	1.00
TCI-R: self-transcendence	3.847	1	0.012	.050	1.02	1.00	1.05

Table 4

Predictive model of sex addiction including GD and healthy controls (step-wise multinomial regression).

Predictors	Likelihood ratio tests		SA vs. GD		GD vs. HC		SA vs. HC	
	$\chi^2_{(df=2)}$	*p*	OR	95% CI (OR)	OR	95% CI (OR)	OR	95% CI (OR)
Age (years)	17.46	<.001	0.995	0.96;1.03	**1.088**[a]	**1.04;1.14**	**1.083**[a]	**1.03;1.14**
[b]Socioeconomic status	37.42	<.001	**8.459**[a]	**4.14;17.3**	**0.261**[a]	**0.11;0.61**	2.204	0.76;6.40
TCI-R: novelty seeking	14.46	.001	**0.975**[a]	**0.95;0.99**	**1.047**[a]	**1.02;1.08**	1.021	0.98;1.06
TCI-R: Harm avoidance	30.28	<.001	**0.949**[a]	**0.93;0.97**	0.989	0.96;1.02	**0.939**[a]	**0.91;0.97**
TCI-R: Persistence	10.85	.004	**0.972**[a]	**0.96;0.99**	1.009	0.99;1.03	0.980	0.95;1.01
TCI-R: Self-directedness	6.59	.037	0.993	0.98;1.01	**0.978**[a]	**0.96;1.00**	**0.972**[a]	**0.95;1.00**