Pathological gambling and impulsivity: an Italian study

Gioco d'azzardo patologico e impulsività: uno studio italiano

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SUMMARY. Aim. Although the precise nature of pathological gambling (PG) is still elusive, currently it is considered an impulse-control disorder that shares several features with substance dependence, such as deficit in self-regulation and impaired impulsivity. The aim of this study was to evaluate the impulsivity of PG patients by means of the Barratt Impulsivity Scale, version 11 (BIS-11), as compared with healthy control subjects, and to explore the possible correlations with gambling severity. **Methods.** Thirty-five outpatients (all men) with a diagnosis of PG were recruited at their first psychiatric interview in a psychiatric outpatient ward, and compared with a similar group of healthy control subjects. The severity of PG was assessed by means of the South Oaks Gambling Screen (SOGS). **Results.** The results showed that the BIS-11 total score, as well as the scores of different factors (motor impulsity and cognitive complexity) and subscales (motor and non-planning impulsivity) were significantly higher in PG patients than in control subjects. In addition, positive correlations were detected between the SOGS and the BIS-11 total scores, and the attention and cognitive instability factor scores, or the attentional and motor impulsivity (r_s=0.459, p=.021) subscale scores. **Conclusions.** These findings support the notion that impulsivity represents a core element of PG linked to the severity of the clinical picture.

KEY WORDS: pathological gambling, addiction, impulsivity, SOGS, BIS-11.

RIASSUNTO. Scopo. Il gioco d'azzardo patologico (GAP) viene attualmente classificato nell'ambito dei disturbi del controllo degli impulsi e condivide caratteristiche cliniche comuni con il disturbo da uso di sostanze e con i disturbi del controllo degli impulsi. Da un punto di vista clinico e neurobiologico l'impulsività è considerata l'elemento chiave sia dei comportamenti impulsivi sia delle dipendenze. Scopo di questo lavoro è stato quello di valutare l'impulsività mediante la BIS-11, in un gruppo di pazienti drug-free affetti da GAP, rispetto a un gruppo di soggetti sani, e di esplorare le eventuali correlazioni con le caratteristiche cliniche e la gravità del disturbo stesso. **Metodi.** Sono stati inseriti nel nostro studio 35 pazienti (tutti di sesso maschile) affetti da GAP, diagnosticato secondo i criteri del DSM-IV-TR, e confrontati con 35 soggetti sani di controllo. La gravità della sintomatologia è stata valutata mediante il South Oaks Gambling Screen (SOGS). **Risultati.** I risultati ottenuti hanno evidenziato che il punteggio totale della BIS-11, di alcuni fattori (impulsività motoria e complessità cognitiva) e sottoscale (impulsività motoria e senza pianificazione) erano significativamente più alti nei pazienti rispetto ai controlli sani. Sono state inoltre rilevate alcune correlazione positive tra il punteggio totale della SOGS e quelli della BIS-11, delle scale relative all'impulsività attentiva e all'instabilità cognitiva, e delle sottoscale dell'impulsività attentiva e dell'impulsività motoria. **Discussione.** Questi dati suggeriscono che possa esistere un'associazione tra impulsività e GAP, in accordo con l'ipotesi che l'impulsività rappresenta un elemento chiave del GAP correlato alla gravità del quadro clinico.

PAROLE CHIAVE: gioco d'azzardo patologico, dipendenze, impulsività, SOGS, BIS-11.

INTRODUCTION

According to the previous edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV-TR)[1], pathological gambling (PG) is an impulse-control disorder, characterized by persistent and maladaptive gambling behaviors, that shares similarities with substance abuse disorders. In fact, the core features of PG are craving, tolerance, withdrawal symptoms, frequent relapse, loss of control, and disruption of life, until the point of loss of job, divorce, deterioration of patrimony or even criminal behavior[2,3]. Nowadays, a large agreement exists that deficits in self-regulation and impaired impulsivity represent the most salient features of both impulse control disorders, such as PG, and substance dependence[4]. This notion has led to the inclusion of PG amongst substance use disorders in the latest DSM edition (DMS-5)[5]. Therefore, according to several authors, PG should be considered a form of "behavioral or drug-less addiction" characterized by high impulsivity[6]. Nevertheless, an alternative model of

PG considers it related to obsessive-compulsive disorder (OCD), closer to the impulsive pole of an impulsivity-compulsivity dimensional axis[7,8]. In any case, some studies cast doubt about the significant association between PG and OCD[9-11]. Subsequently, impulsivity has been considered mainly as an endophenotype of individuals at risk for both PG and substance use disorder and, not surprisingly, in the next edition of DSM PG will be recategorized into the "addiction and related disorders"[12].

Impulsivity has been variously defined as a swift action without forethought or conscious judgment, behavior without adequate thought, and the tendency to act with less forethought than do most individuals of equal ability and knowledge. The most exhaustive definition of impulsivity is perhaps that given by the International Society for Research on Impulsivity (ISRI), which considers it as "a human behavior without adequate thought, the tendency to act with less forethought than do most individuals of equal ability and knowledge, or a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to negative consequences of these reactions". Impulsivity may be viewed as a state or a trait, the first referring to a transitory state in response to a peculiar event, while the other refers to a stable personality feature[13-15]. A great bulk of evidence suggests that impulsivity is widely implicated in the development and maintenance of both addictive behaviors and of PG that would arise from an impairment of inhibitory control and self-regulation[4,15,16].

When comparing PG patients with control subjects, some studies reported high levels of impulsivity in the first group, or no difference[17-21]. Part of the controversies might be related to the inclusion of heterogeneous samples of PG patients, but also to the use of different instruments for assessing impulsivity, such as neurocognitive tests or self-report questionnaires. Some authors, while using some neurocognitive tests, such as the Stop Signal Task, the Stroop task, the Wisconsin Card Sorting Test, the Tower of London and a few others, described low impulsivity in PG[21,22]. It should, however, be underlined that these instruments assess state impulsivity. On the contrary, this dimension resulted high on self-report tests, such as the Barratt Impulsivity Scale, version 11 (BIS-11), and the Eysenck Impulsiveness Questionnaires, assessing trait impulsivity[23-25]. Similar findings were obtained also with neuropsychological measures of trait impulsivity, such as the reaction time and number of errors at Go/No-Go tasks, while highlighting the impact of this dimension in the clinical picture of PG and, perhaps, in the development of the disorder itself[14,24,26-28].

Moreover, the combination of both BIS-11 and Iowa Gambling Task in a group of 42 PG patients compared with non gambler subjects showed that the first were more impulsive than the second[29].

Given the lack of information in our country, in order to provide a further contribution on this topic, our study aimed to compare impulsivity, by means of the BIS-11 questionnaire, in Italian PG outpatients and healthy control subjects, and to explore the possible correlations between PG severity and impulsivity characteristics.

MATERIALS AND METHODS

Subjects

Thirty-five outpatients (all men, mean age±SD: 46.23±11.6 years) with a diagnosis of PG, as assessed by the structured clinical interview for DSM-IV, patient version 2.0 (SCID-P)[30]. were recruited at their first psychiatric interview at the outpatient ward of the Dipartimento di Medicina Clinica e Sperimentale, Section of Psychiatry, University of Pisa, Italy. None suffered from any severe physical illness nor had ever taken psychotropic drugs, except for ten patients who had occasionally taken benzodiazepines for difficulty with sleeping or panic attacks. The severity of PG was assessed by means of the South Oaks Gambling Screen (SOGS, normal score <5): the total score (mean±SD) of the patients was 10.9±2.7[31]. The age of onset of the disorder (mean±SD) was 30.8±13.2 years. The majority of the patients used multiple types of gambling: electronic machines[25], internet lotteries or casino and bingo[15].

Six patients were suffering also from simple phobia, three from panic disorder, three from bipolar disorder of type II, and two from generalized anxiety disorder. Twelve patients were heavy cigarette smokers (>20/die), three were suffering from cannabis abuse and two from alcohol abuse.

Twenty-three patients were single or divorced, ten married and two were widowed. Twenty-eight patients had completed a high school, four had a university degree and three had completed only the primary school.

The patients were compared with a similar group of healthy control subjects (35 men, mean age±SD: 47.19±13.4 years), who had no family or personal history of any major psychiatric disorder, as assessed by a psychiatric interview, carried out by a senior psychiatrist (DM) by means of the SCID. They were recruited amongst medical and nursing staff at the Department of Psychiatry, Neurobiology, Pharmacology, and Biotechnology, University of Pisa, Italy. These subjects were also free of any physical illness, as documented by a general check-up and by the normal blood and urine tests and were completely psychotropic drug-free for about 12 months. None of them were heavy cigarette smokers; none of the participants belonged to a high-risk HIV group, and none took any regular medication. All gave their informed consent to participation in this study, which was approved by the Ethics Committee of Pisa University.

Impulsivity assessment

The impulsivity was assessed by means of the BIS-11 questionnaire validated into Italian[32]. The BIS-11 is a self-report scale developed to measure impulsivity as a stable characteristic, composed by 30 items, which are answered on a four-point scale; items are scored 1, 2, 3, 4, where 4 indicates the most impulsive response: the higher the total scores for all items, the higher the level of impulsivity. The total score ranges between 30 and 120, with no established cut-off point and is the result of the sum of three different subscales: attentional (rapid shifts of attention and impatience with complexity), motor (impetuous action), and non-planning (lack of future orientation) impulsivity. In addition, the 30 items form six factors determined by principal component analyses: attention, motor impulsivity, self-control, cognitive complexity, perseverance and cognitive instability.

Statistical analyses

The unpaired Student's t test was used to compare parametric variables, such as the age. Since the BIS-11 scales, subscales and

factors are not normally distributed, the comparisons between the two independent samples were assessed by the non-parametric Mann-Whitney test, and the relationships between variables by the Spearman's coefficient. All analyses were carried out using the SPSS version 14.0, by means of personal computer programs.

RESULTS

The BIS-11 total score (mean±SD) was significantly higher in PG patients than in control subjects (65.46±12.08 vs 57.34±11.04; Mann-Whitney test: Z=-2.50, p=.012).

As far as the BIS-11 factors were concerned, the "motor impulsivity" and "cognitive complexity" scores were significantly higher in PG patients than in control subjects (16.34±4.84 vs 11.26±3.40, Z=-3.88, p=.001; 13.73±2.75 vs 12.38±2.70, Z=-1.96, p=.050). The same was true for "motor" and "nonplanning" impulsivity subscale scores (23.96±5.17 vs 18.53±3.89, Z=-3.87, p=.001; 18.88±4.00 vs 16.58±4.11; Z=-1.90, p=.047) (Table 1). The comparison of the "self-control" factor scores showed a similar, albeit not significant, trend.

No differences were measured between patients suffering and not suffering from substance abuse, or between those with and without comorbid psychiatric disorders.

A significant and positive correlation was detected between the SOGS and the BIS-11 total scores (r_s=0.486, p=.014). Statistically significant and positive correlations were also observed between the SOGS total score and the attention (r_s=0.492, p=.012) and cognitive instability (r_s=0.461, p=.020) factor scores, or the attentional (r_s=0.405, p=.045) and motor impulsivity (r_s=0.459, p=.021) subscale scores.

Table 1. BIS-11 total, factor, and subscale scores (mean±SD) in PG patients and healthy control subjects

	PG patients	Control subjects
BIS-11 total score	65.46 ± 12.08	57.34 ± 11.04*
BIS-11 factor score		
attention	8.88 ± 3.01	9.85 ± 2.92
motor impulsivity	16.34 ± 4.84	11.26 ± 3.40**
self-control	13.73 ± 3.53	11.81± 3.74
cognitive complexity	13.73 ± 2.75	12.38 ± 2.70***
perseverance	7.62 ± 2.00	7.27 ± 1.66
cognitive instability	5.15 ± 1.57	4.77 ± 1.63
BIS-11 subscale score		
attentional	22.61 ± 4.73	22.23 ± 5.01
motor	23.96 ± 5.17	18.54 ± 3.89****
nonplanning	18.88 ± 4.00	16.58 ± 4.11*****

** significant: z=-2.50, p=.012; **significant: z=-3.88, p=.001.*
**** significant: z=-1.96, p=.050.*
***** significant: z=-3.87, p=.001.*
****** nearly significant: z=-1.90, p=.057.*

DISCUSSION

One of the main results of the present study was that a sample of Italian PG patients showed higher levels of impulsivity, as measured by the BIS-11 total score, than control subjects. This finding is the first of this kind in Italy and supports the existence of the already and widely reported association between impulsivity and PG[3,5,14,29]. In addition, it is in agreement with the notion that impulsivity may represent a core element of PG, perhaps related to a typical personality trait or structure that may predict the development of addictive and impulsive behaviors[6,11,12,23,26,33]. Moreover, our findings, while highlighting the positive correlation between gambling severity, as assessed by the SOGS, and BIS-11 total and some factor/subscale scores, would support the assumption that a strict link may exist between PG severity and impulsivity, as already reported by using other questionnaires[11]. However, some controversies do exist on this topic[19]. While comparing the scores of each BIS-11 factor and scale between patients and healthy control subjects, it turned out that PG patients showed higher scores than healthy individuals on the motor impulsivity and cognitive complexity factors, and on the motor and non-planning impulsivity subscales, with no differences either on the attentional impulsivity subscale or attention factor. Similar finding were reported recently in gamblers with different degrees of clinical severity[33], and in strategic and non strategic gamblers assessed by neurocognitive tests[34]. These data have been generally interpreted along the hypothesis that impulsivity in PG might originate from deficits of executive functions rather than of attention[23,26,27,35-41]. We would add with cautions that this assumption is indirectly supported by our findings showing that the attention factor and the attentional impulsivity subscale scores were positively related to the severity of PG, as measured by the SOGS total scores.

Moreover, the perseverance factor was not different between the groups. This last aspect could be considered as consistent with some studies reporting no link with OCD or obsessional personality, as perseverance is a feature typical of these two conditions[26]. However, recently, Blanco et al.[25] observed that, although PG patients exhibit characteristics of both obsessionality/compulsivity and impulsivity, impulsivity is prevalent, and changes in gambling severity are paralleled by those in impulsivity. The results of the present study should be interpreted while keeping in mind some limitations. First, we utilized one instrument only, in particular the BIS-11, to assess impulsivity. It is noteworthy to keep in mind that the BIS-11 is a self-report scale that was developed to measure impulsivity as a stable characteristic or trait. A second limitation is the small sample size, so that it was not possible to perform subgroup analyses aimed at investigating the possible correlation between the BIS-11 factors /scales and the severity of PG. Third, a relevant bias is represented

by the fact that 14 patients were suffering from different comorbid psychiatric disorders and 17 from substance abuse, conditions that are all characterized by high levels of impulsivity[42]. Interestingly, disinhibition, that often equates impulsivity, is considered an endophenotype of subjects at high risk for PG and substance abuse[12]. Fourth, the gambling severity was assessed by the SOGS only. This scale was chosen because it is the most used in our country and can be useful for comparing the results deriving from different centers. Fourth, our sample was composed almost entirely by men, so that we cannot exclude a gender effect on impulsivity, although literature findings on this topic are controversial[43].

CONCLUSIONS

Taken together, the findings of the present study support the notion that impulsivity represents a core element of PG perhaps linked to the severity of the clinical picture. However, further studies, carried out in larger samples of PG patients of both sexes with and without comorbid psychiatric disorders, and assessed by means of multiple neurocognitive tests and neuroimaging techniques, such as those used recently[44-47], are necessary to explore the possible relationships between impulsivity and PG.

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