

Personality Disorders: the Treatment of Gambling Disorders in Male Patients from the Perspective of Cloninger's Theory

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AIM: The first objective was to conduct a comparative clinical study comparing a set of patients being treated for a GD with the norm. The second objective was to divide the group of patients being treated for gambling disorders according to the scale of Self-directedness (SD) into a group without personality disorders, a group with suspected personality disorders, and a group with personality disorders. The third objective was to find a relationship between the observed dimensions of Cloninger's questionnaire and the severity of the problems associated with gambling. **METHODS:** We used the South Oaks Gambling Screen (SOGS) and a standardised version of the Temperament and Character Inventory (TCI-r) revised for use in the Czech Republic. **SAMPLE:** A total of 147 clients admitted to the Bohnice, Kroměříž, and Opava psychiatric hospitals with the

Gambling Disorder diagnosis. Their average age was 34.6 years. **RESULTS:** Patients with a GD scored higher on the Novelty Seeking (NS) scale and lower on the Self-directedness (SD), Cooperativeness (CO), and Reward Dependence (RD) scales in the TCI-r when compared to the norm of healthy men. We identified three groups of gamblers: i) without comorbidity with PD (54.7%), ii) with a tendency to PD (32.8%), and iii) suspected of PD (12.5%). The total SOGS score correlates slightly with the Novelty Seeking (NS), Persistence (PS), Self-directedness (SD), and Self-transcendence subscales of the TCI-r. **CONCLUSION:** In terms of personality profile, patients with a GD are a heterogeneous group. The sample has a slightly higher prevalence of personality disorders than the general population. This comorbidity influences the course of their gambling career and potentially their treatment.

Keywords | Personality Profile – Personality Disorder – Gambling Disorder – Cloninger's Theory – Problematic Gambling

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● 1 INTRODUCTION

The latest research on the lifetime prevalence (LTP) of problematic gambling (PG) in the Czech Republic (CR) indicates that 1.7–2.3% of the members of the population aged between 15 to 64 years are problematic gamblers, of whom 0.6–1% are seen as being at high risk of developing a gambling disorder (GD). The vast majority (85–90%) of people with a GD in the CR are men (Mravčík et al., 2014). In 2012 in the CR 1153 male and 162 female patients were diagnosed with a GD and subsequently treated by outpatient methods. In addition, 477 male patients and 50 female patients were hospitalised in psychiatric wards (Nechanská, 2013). As the CR has approximately 10 million inhabitants, it is noted that unfortunately, only a small fraction of all GD patients gain access to treatment centres. We do not deny that there is a gambling problem among women, but because of the small number of women undergoing specialised treatment in hospital, in comparison to men, we decided to focus our research solely on the male gender. During our research we encountered only six women and we therefore excluded them from our study. In comparison with other countries, Cox et al. (2005) estimate that the prevalence of problematic gambling in Canada is 2% of the population. Another study estimates that in North America, the prevalence of problematic gambling is 20% of the adolescent population and 6% of the adult population (Pietrzak et al., 2003). The LTP of GD in research studies of the general public in other countries range between 0.4 and 2% (Cunningham-Williams et al., 1998; Petry, Stinson, & Grant, 2005; Welte et al., 2001). Petry, Stinson, and Grant (2005) estimate a prevalence of people with a GD in the USA of 0.42% and they emphasise that a GD is often connected with other psychological problems, especially those associated with alcohol and drugs. The studies mentioned above clearly show that the prevalence of GDs in other populations is similar to that in the Czech Republic. Adolescents with gambling experience belong among the more vulnerable groups. This is also evidenced by our study, in which most of the respondents started gambling during adolescence. The situation is further amplified by the increased availability of electronic gaming devices (EGD) in the CR. In the CR in 2013 there were 7.5 EGDs per 1000 inhabitants, which, according to the available data, is the highest rate among 16 observed member states of The European Union (Mravčík et al., 2014). Research indicates that problematic gambling and GDs are connected with a higher prevalence of personality disorders, as we identified and show below. The prevalence of specific personality disorders (PDs) varies noticeably among different sources. It is also clear from recent studies that the prevalence of PDs is increasing. In the past it was around 6–9% but now it is estimated to be between 11 and 23%. This increase is due to the different methodology used in diagnosing PDs. The frequency of disorders according to gender varies in different diagnostic units (Faldyna, 2006). Weissman (1993) stated that the lifelong prevalence of PDs in a population was 10–13%. Clarkin (1998) stated that the overall prevalence of personality disorders in a given population is between 10 and 15%. In 2008 the median prevalence rate of PDs in the general population was estimated at 10.6% based on mod-

ern epidemiological studies conducted in different populations (Lenzenweger, 2008).

The objective of this study was to analyse the profile of a group of GD patients currently undergoing treatment. The research is set in the context of personality disorders according to Cloninger's theory. We also hoped to further identify possible subtypes of gamblers according to the observed psychopathology.

Principally, Cloninger & Svrakic (2009) studied the usage of temperamental dimensions in predicting personality disorders. On the basis of their partial findings it is possible to observe a specific general inclination towards personality disorders dependent on temperamental measures. People with anxiety or fear personality disorders (cluster C) display high harm avoidance and low novelty seeking. Dramatic, emotional, or erratic personality disorders (cluster B) are connected with high novelty seeking. Odd personality disorders (cluster A) are connected with high harm avoidance or reward dependence. The Temperament and Character Inventory questionnaire (TCI and TCI-r) is often used in research studies for diagnosing these categories. The importance of these questionnaires in connection with personality disorders is long established. These questionnaires originated in Cloninger's theory (Cloninger et al., 1994; Svrakic et al., 1993; Mulder & Joyce, 1997).

Therefore, the first significant finding is based on the low values of Self-directedness (SD) and Cooperativeness (CO) of all personality disorders. The second finding confirms a relationship between subtypes of personality disorders and specific profiles according to the TCI questionnaire. The first finding has been verified from several sources (Svrakic et al., 1993; Bejerot et al., 1998); the second has been proved only partially (Preiss & Klose, 2001). The risk of personality disorders increases in cases indicating high Novelty Seeking and high Harm Avoidance and vice versa (Preiss & Klose, 2001). The clinical application of Cloninger's theory and its use in diagnosing personality disorders in different groups of the population across the Czech Republic was studied by Preiss (2000). In his article, Preiss (2000) uses Cloninger's questionnaire for screening psychiatric patients to diagnose personality. Preiss & Klose (2001) present a clinically useful method for diagnosing personality disorders on the basis of low self-directedness (SD) scores in the TCI questionnaire and the configuration of the Novelty Seeking, Harm Avoidance, and Reward Dependence temperament types. The authors propose to interpret in clinical practice a scale of Self-directedness (SD) in the range from $-1 SD$ to $-2 SD$ below the group average as a trend towards a personality disorder and results of $-2 SD$ or less as a personality disorder. The authors describe the discriminatory ability of the questionnaire in psychiatric patients compared to the general population. The authors compare a group of psychiatric patients ($N = 54$) with three groups of people from the non-psychiatric population. The differences between the psychiatric group and the three other groups were shown mainly in the temperament dimension of HA and the character dimensions of SD and CO. The results confirm pre-

vious findings obtained with a questionnaire in research in psychiatric patients and the general population (Preiss, Klose, & Španěl, 2000).

Nordin and Nylander (2007) confirmed in their research that 53% of people with a GD displayed a mood disorder, while 40% displayed an anxiety disorder. They scored higher in the dimensions of Novelty Seeking (NS) and Harm Avoidance (HA) than the control group. People with GD are less rigid but more impulsive and eccentric. They had lower values than the control group for Cooperativeness (CO) and Self-Transcendence (ST). Janiri et al. (2007) described in their research that GDs scored higher in Novelty Seeking (NS) than problematic gamblers and the control group. Novelty Seeking correlates highly with antisocial and borderline personality disorders. The Reward Dependence (RD) values differed significantly from those recorded for the rest of the control group but not from those found among problematic gamblers. The Self-directedness (SD) and Cooperativeness (CO) of GDs were significantly lower than for problematic gamblers and the control group. Significantly, low scores for SD and CO are also typical for GDs. Janiri et al. (2007) also found a significant negative correlation of NS and age and a significant positive correlation of ST and age in the same sample of gamblers. Meyer et al. (2005) state that the Self-directedness (SD) scale can predicate the seriousness of a GD. Savron, De Luca, & Pitti (2008) describe gamblers as having higher levels of depression, anxiety, and impulsiveness. In the sphere of temperament, the gamblers in the same study scored higher in novelty seeking (NS) and Reward Dependence (RD) than the control group did. In terms of character dimensions they had higher scores for Self-transcendence (ST) and lower ones for Self-directedness (SD) and Cooperativeness (CO). There were no significant differences in the areas of Harm Avoidance (HA) and Persistence (PS).

Antisocial and borderline personality disorders are often presented in clinical pictures of GDs, which was confirmed by Bagby et al. (2008), who used both a self-report and a semi-structured interview study of 204 GDs. As expected, PD prevalence rates with the self-report measure were high (92%); they were lower with the interview tool (23%). These investigators found that only those with a borderline personality disorder (BPD) had consistently high and significant prevalence rates in their non-treatment-seeking samples across both types of measures. Because impulsivity and mood dysregulation are hallmarks of both BPD and PG, it follows that BPD would distinguish GD from other disorders. In the study of Pietrzak and Petry (2005) ($N = 234$), thirty-nine pathological gamblers (16.5%) met the DSM-IV diagnostic criteria for ASPD. Compared to pathological gamblers without ASPD, the pathological gamblers with ASPD were younger, more likely to be male and divorced/separated, and had fewer years of education. They also began gambling earlier in life, reported increased severity of gambling, medical, and drug problems, and scored higher on the paranoid ideation, somatisation, and phobic anxiety sub-scales of the BSI. The study of Pietrzak and Petry (2005) focused on 153 GDs, Sacco et al. (2008) draw attention to the relationship between depression and borderline personali-

ty disorders in GDs. The prevalence of an antisocial personality disorder, antisocial characteristics, and lawbreaking is higher for gamblers and can also be the hidden reason for gambling (Blaszczynski & Nower, 2002).

Other personality and temperament characteristics of gamblers include issues such as: sensation seeking (Johansson et al., 2009) and novelty seeking (McCormick et al., 2012). Because of the miscellaneous characteristics of the comorbidity of gamblers, some authors have suggested the existence of different sub-groups based on psychopathological and phenomenological features; for example, Meyer (1991) described a type of emotionally unstable personality with a borderline personality disorder and emotionally unstable, with features of depression. He also described a group of gamblers without obvious psychopathology. González-Ibáñez et al. (2003) described a group that scored highly for depression, psychoticism, anxiety, and obsessive-compulsive behaviour. The second group they described was characterised by a high score in the scale of somatisation. The third group had the highest scores in all dimensions from all three groups. Toce-Gerstein et al. (2003) distinguish two groups – emotionally vulnerable problematic gamblers and antisocial impulsive problematic gamblers. Alvarez-Moya et al. (2010) described four sub-groups of GDs according to the clinical methods used (SOGS, TCI, interview, SCL 90-R).

Type I (disorganised and emotionally unstable) displayed schizotypal characteristics, high impulsivity, alcohol and drug abuse, and the early onset of psychopathological disorders. Type II (schizoid) showed high levels of avoidance, social indifference, and alcohol abuse. Type III (reward sensitive) showed high levels of novelty seeking and impulsiveness but no psychopathological disorders. Type IV (high functioning) showed a globally adaptive personality profile with low alcohol abuse levels, little use of addictive substances, and no psychopathological disorders. On the basis of previous research and a theoretical review, we focused our study on male patients and decided to pursue three objectives concerning the relationship between the temperament and character dimensions of personality according to Cloninger on the one hand and GD on the other hand.

The first objective was to conduct a comparative clinical study comparing a set of GD patients in treatment with the norm. We expected to find the sample of gamblers to have a higher score for novelty seeking (NS) and lower scores for Self-directedness (SD) and Cooperativeness (CO) in comparison with healthy men. (2) The second objective was to divide the group of GD patients in treatment according to the Self-Directedness scale (SD) into a group without a personality disorder, a group with a suspected personality disorder, and a group with a personality disorder. We observed this differentiation of gamblers with regard to possible specific needs or complications in treatment such as treatment drop-outs or suicidal tendencies, etc. (3) The third objective was to find a relationship between the observed dimensions of Cloninger's questionnaire and the severity of the problems associated with gambling.

● 2 MATERIALS AND METHODS

2.1 Sample

This study in the Czech Republic is unique, given its focus on the comorbidity of personality disorders of GD. The selection of institutions was based on the following criterion – their implementation of specific programmes for the treatment of GD (GDs are treated separately from other types of addiction) and long-term experience of working with this condition. This criterion was met by three psychiatric hospitals in the Czech Republic (Bohnice, Kroměříž, Opava), and they represent the total number of institutions in the Czech Republic providing specialised treatment programmes for GDs.

When addressing the participants, we held to the principle of selecting all the male clients (100% of all the patients who were treated, i.e. 149) who were hospitalised in those institutions during the period (from September 2012 to August 2013) and who gave their informed consent to participation in the study. Two patients declined to participate in the research. The patients had to meet the following predetermined criteria: male gender, to be in the first phase of treatment, and to have been diagnosed with a gambling disorder, as diagnosed by a psychiatrist (more precisely with Pathological gambling F63.0, based on ICD-10). In this way, we had a sufficient number of participants for the planned statistical analysis ($N = 147$). This was almost a third of all residentially treated gamblers in the Czech Republic that year (the remaining two-thirds were in the programmes without a specialisation in GD). The average age of the men in the whole sample was 34.6 years ($SD = 11.7$; $Min = 19$, $Max = 67$). The largest proportion of clients was aged 22 to 28 and from 30 to 35 years. The problem of gambling is evident across the whole population, but young adults are prominent in residential treatment centres.

The types of games played in the sample (with the possibility of multiple answers) included: gambling on slot machines and VLT machines (138; 93.8%), lotteries or betting on numbers (104; 70.7%), betting on sports results (99; 67.3%), playing cards for money (84; 57.1%), and playing the stock market or commodity market (12; 8.2%). Furthermore, we noted the age at which they had their first experience of gambling ($M = 24.53$; $SEM = 0.91$; $SD = 10.76$; $Mdn = 20$; $Min = 12$, $Max = 58$), the age at which they became regular gamblers ($M = 24.94$; $SEM = 0.90$; $SD = 10.59$; $Mdn = 20.5$; $Min = 12$, $Max = 58$), the age at which the gamblers first realised they had serious problems with gambling ($M = 30.81$; $SEM = 0.94$; $SD = 11.05$; $Mdn = 28$; $Min = 13$, $Max = 64$), and the age of the gamblers undergoing treatment ($M = 34.43$; $SEM = 0.97$; $SD = 11.46$; $Mdn = 32$; $Min = 19$; $Max = 67$). This data, among other things, indicates that gambling usually starts at around the age of twenty, but the first experience may be at almost any age, sometimes even around fifty-five. Furthermore, this shows that in the group of gamblers who were being treated there was virtually no inter-phase between their first experience with gambling and the subsequent transition into regular gambling. According

to the participants, there is a realisation of the seriousness of the problems caused by gambling after about six to eight years, although this period can depend on the individual. It took almost four years (on average) from the onset of lasting problems before the gamblers resolved to enter treatment.

A total of 128 respondents completed the TCI-R questionnaire validly. Three participants refused to complete this questionnaire and sixteen participants had between one and four unsatisfactory answers according to the validation scales and therefore according to the instruction manual, these answers were considered invalid and excluded from the analysis. The complete data matrix was constructed from the duly completed questionnaire data.

In the remaining validly completed questionnaires only 18 fields were found to have omissions, i.e. missing values. Little's MCAR test showed that data was missing according to a random pattern, and we were able to calculate this using the Expectation-maximisation (EM) algorithm.

Using Breakdown tables and ANOVA, we further checked whether the files from the three treatment facilities did not differ in the basic variables that were monitored, such as age, the severity of the gambling problem (total SOGS score), and individual TCI-R scales (NS, HA, RD, PS, SD, CO, and ST). None of the groups differed significantly in these variables $F_{(2,125)}$ from 2.864 to 0.222 and p values from 0.066 to 0.801, and thus they will be considered one homogeneous set of gamblers being treated for the purposes of the following analyses.

The norm values (the control group), which we compared with the values obtained from the gamblers, were obtained from a study by Preiss et al. (2007). This standardised study presents the normalised values of gross scores (Means and SDs) of all the scales in the set of the general healthy (non-psychiatric) population $N = 200$ balanced by age (the mean age was 40.4 and $SD = 20.2$) and education. The standard values of the scales are as follows: NS $M = 100.9$, $SD = 15.3$, $\alpha = .85$; HA $M = 96.3$, $SD = 16.3$, $\alpha = .88$; RD $M = 97.1$, $SD = 12.9$, $\alpha = .82$; PS $M = 109.3$, $SD = 16.5$, $\alpha = .91$; SD $M = 136.5$, $SD = 16.5$, $\alpha = .86$; CO $M = 126.0$, $SD = 14.5$, $\alpha = .85$; ST $M = 67.0$, $SD = 12.5$, $\alpha = .84$. These standard values were used to obtain weighted z-scores from our group of GD patients.

The research was completed anonymously, the participants signed an informed consent, and the ethical principles of research by COPE were complied with.

2.2 Measures

The first method included in the questionnaire battery was the South Oaks Gambling Screen (SOGS) (Lesieur & Blume, 1987), which was completed by all 147 participants. The questionnaire meets the criteria of the diagnosis according to the DSM. For the diagnosis of F63.0 according to ICD 10 in the Czech Republic (ICD 11 Gambling disorder), it is stand-

ard procedure to use an interview, which, because of its content, corresponds to the questions in the SOGS. Furthermore, the interview deals with the analysis of the negative effects of gambling. Our study used the Czech version of the SOGS by Dr. Karel Nešpor (Nešpor, 1999). According to this version, the limit for determining the problem with gambling is a total SOGS score of five or more points. Everyone from our sample met this condition. In addition, most respondents scored much higher on the SOGS questionnaire. The distribution of the total gross scores from the SOGS questionnaire is as follows ($M = 14.01$; $SD = 2.92$; $SEM = 0.24$; $Mdn = 14$; $Min = 5$; $Max = 20$).

The second method, revised for use in the Czech Republic, provided a standardised version of the Temperament and Character Inventory (TCI-R) (Preiss & Klose, 2001; Cloninger, 1999). Similarly to the TPQ version, the TCI was translated into Czech in a standard way (by Kozeny & Tisan-ska, 1998; Kozeny, Kubicka, & Prochazkova, 1989). Czech versions of both the TCI and TCI-R were then obtained from the Prague Psychiatric Centre, together with the kind approval of C. Robert Cloninger. The Czech percentile norms were created on a sample ($N = 200$) (Preiss & Klose, 2001). The TCI-R has four dimensions of temperament and three dimensions of character. The dimensions of temperament are Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD), and Persistence (PS). The dimensions of character are Self-directedness (SD), Cooperativeness (CO), and Self-transcendence (ST). A detailed description of these dimensions of the questionnaire can be found in the articles by Cloninger et al. (1994) and Cloninger (1997).

The third method was a semi-structured interview, which focused mainly on anamnestic data (e.g. the beginnings of gambling, treatment attempts, dual diagnoses, use of other addictive substances including alcohol and cigarettes, effects of gambling, etc.). A total of 139 respondents completed the structured interview, but only 121 of them also validly completed the TCI-R and SOGS.

The results were processed using statistical methods from Statistica version 12. The first phase involved descriptive statistics describing the distribution of the scores for the individual variables, i.e. monitoring frequency, measures

of central tendency and variability, etc. In the next phase, because of the agreed objectives, inference statistics were used to test the pre-determined hypothesis and monitor the differences between the chosen sample of gamblers and the norm and also the possible relationship between the observed variables from the TCI-R and SOGS. Specifically, Pearson's correlation coefficients, a chi-square test, and one-sample and two independent samples t-tests were used.

3 RESULTS

3.1 The comparison of the results of the group of GD patients that was researched with the norm on the scales of TCI-r

To compare the sample of treated GD patients with the norm of healthy men, we used one-sample t-tests. The results are summarised in *Table 1* and *Figure 1*. We conclude that four of the t-tests showed statistically significant differences from the mean value of the norm on a significance level $\alpha = 0.01$. As estimated, the GD showed increased Novelty Seeking (NS) and reduced Self-directedness (SD) and Cooperativeness (CO). Furthermore, contrary to our expectations, a difference from the norm was proved on the Reward Dependence (RD) scale; the gamblers showed lower Reward Dependence when compared to the norm. On the Harm Avoidance (HA), Persistence (PS), and Self-transcendence (ST) scales our sample of gamblers matched the norm.

As the results of for the NS, RD, SD, and CO scales are statistically significant, we were interested in knowing whether or not they are also clinically significant. Therefore, we calculated the individual effect sizes, using Cohen's d. On the Novelty Seeking (NS) and Self-directedness (SD) scales, we can state that there is large clinical significance (> 0.8). On the Cooperativeness (CO) scale there is medium clinical significance (> 0.5 and < 0.8). On the Reward Dependence (RD) scale there is small clinical significance (> 0.2 and < 0.5).

Scale	M of sample	SD	N	SEM	CI -95%	CI +95%	M of norm	t	d.f.	p	Cohen's d
NS	0.95	0.78	128	0.07	0.8	1.08	0	13.796	127	< .000**	1.03
HA	-0.18	1.12	128	0.10	-0.4	0.01	0	-1.834	127	.069	-0.17
RD	-0.33	0.88	128	0.08	-0.5	-0.18	0	-4.253	127	< .000**	-0.35
PS	0.14	1.25	128	0.11	-0.1	0.36	0	1.231	127	.221	0.13
SD	-0.85	1.07	128	0.09	-1.0	-0.66	0	-8.942	127	< .000**	-0.83
CO	-0.58	0.92	128	0.08	-0.7	-0.41	0	-7.084	127	< .000**	-0.60
ST	0.21	1.23	128	0.11	-0.0	0.42	0	1.920	127	.057	0.19

Table 1 | Differences between gamblers and the normal population on the subscales of TCI-r

** p < 0.01

Note: Means and Standard deviations are in z-scores

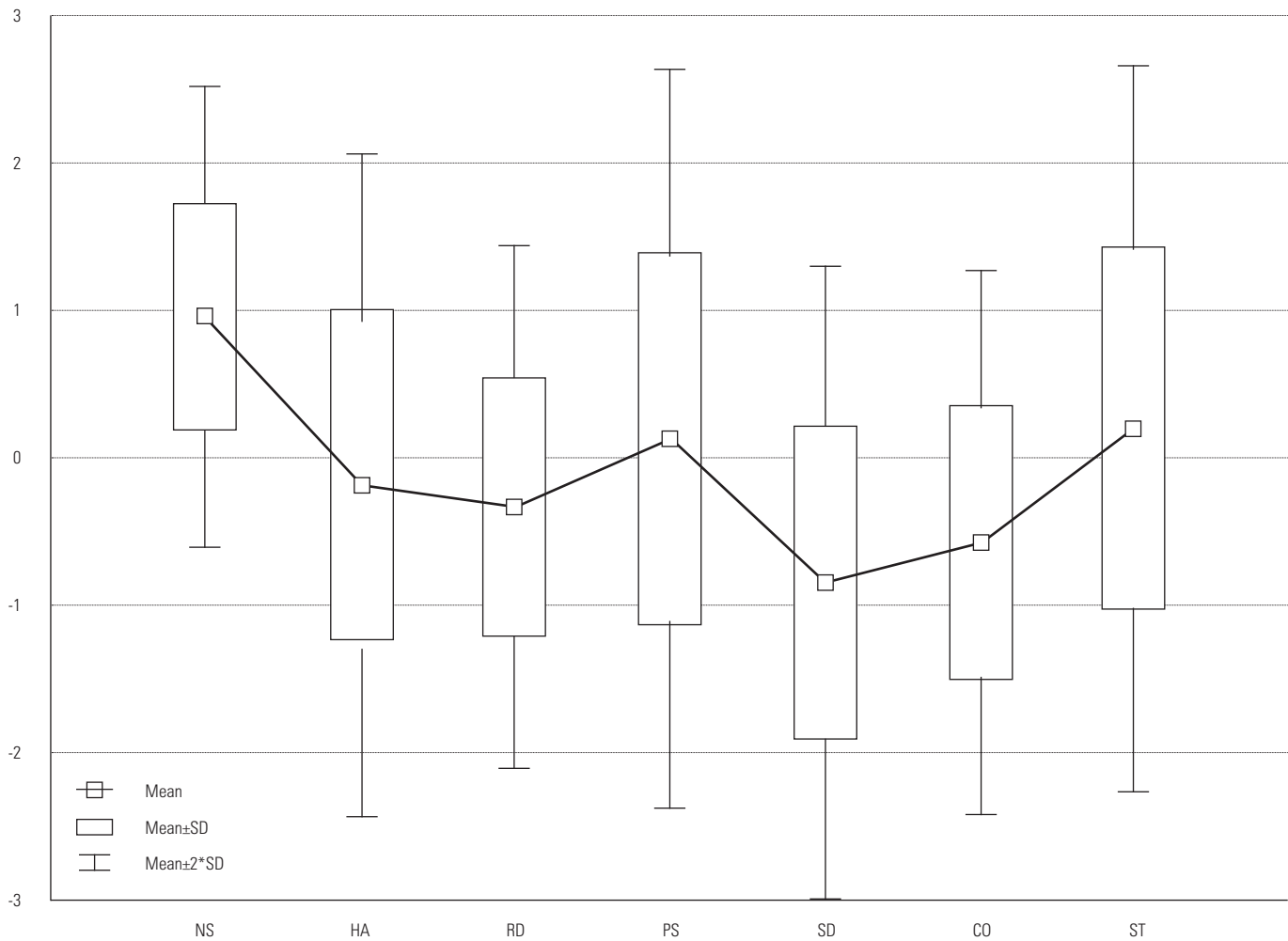


Figure 1 | Box and whisker plots of TCI-R scales comparing sample of GD and the norm

3.2 Occurrence of personality disorders in the group of gamblers who were monitored and its effect on treatment

On the basis of the results from the TCI-r described above, we compiled *Table 2*, in which we present a set divided into gamblers without personality disorders, gamblers with a tendency to personality disorders, and gamblers with personality disorders. This is based on confirmed theoretical assumptions that low values of Self-directedness (SD) predict personality disorders (Preiss & Klose, 2001). In our sample we find 47 respondents (37%) who have a tenden-

cy to personality disorders and 16 respondents (13%) who have personality disorders. Thus, the prevalence is higher than would be expected in the normal population, which corresponds to the theoretical assumptions and clinical experience in practice.

We followed the relationship between the presence of PDs and whether the gamblers completed the treatment properly. Of the total number of 128 gamblers who validly filled in all the data, 101 (79%) completed the treatment properly and 27 (21%) did not. The frequencies that were observed are shown in *Table 3*. There is a certain tendency for gam-

	z-score of Self-directedness	Absolute frequency	Relative frequency
GD without PD	above-1 SD	65	51%
GD with tendency towards PD	from-1 SD to-2 SD	47	37%
GD with PD	less than-2 SD	16	13%

Table 2 | Overview of the sample in terms of personality disorders (N = 128)

Note: GD = Gambling disorder, PD = Personality disorder, SD = Standard deviation

	Successfully completed treatment	Drop-out from treatment	Row totals
GD without PD	54 (83%)	11 (17%)	65
GD with tendency towards PD	37 (79%)	10 (21%)	47
GD with PD	10 (62.5%)	6 (37.5%)	16
Column Totals:	101	27	128

Table 3 | Observed Frequencies of PD and drop-outs from treatment (N = 128)

blers with a disorder to discontinue treatment more often, but the Chi-square test ($\chi^2 = 3.268, df = 2, p = .195$) did not demonstrate the significance of this relationship.

However, the overall severity of gambling problems (i.e. the SOGS results) seems to be higher in the group of patients who did not complete the treatment ($N = 27, M = 15.22, SD = 2.67$) than in those who did ($N = 101, M = 13.68, SD = 2.84$). This was confirmed by a two-tailed t-test ($t = 2.289, df = 126,$

$p = .024, d = 0.55$). This difference, nonetheless, is not related to the diagnosis of a personality disorder.

We also used the distribution of PG according to PDs to test the relationships with other possible complications or comorbidities. The complications that were observed and their distribution in the file are shown in *Figure 2*.

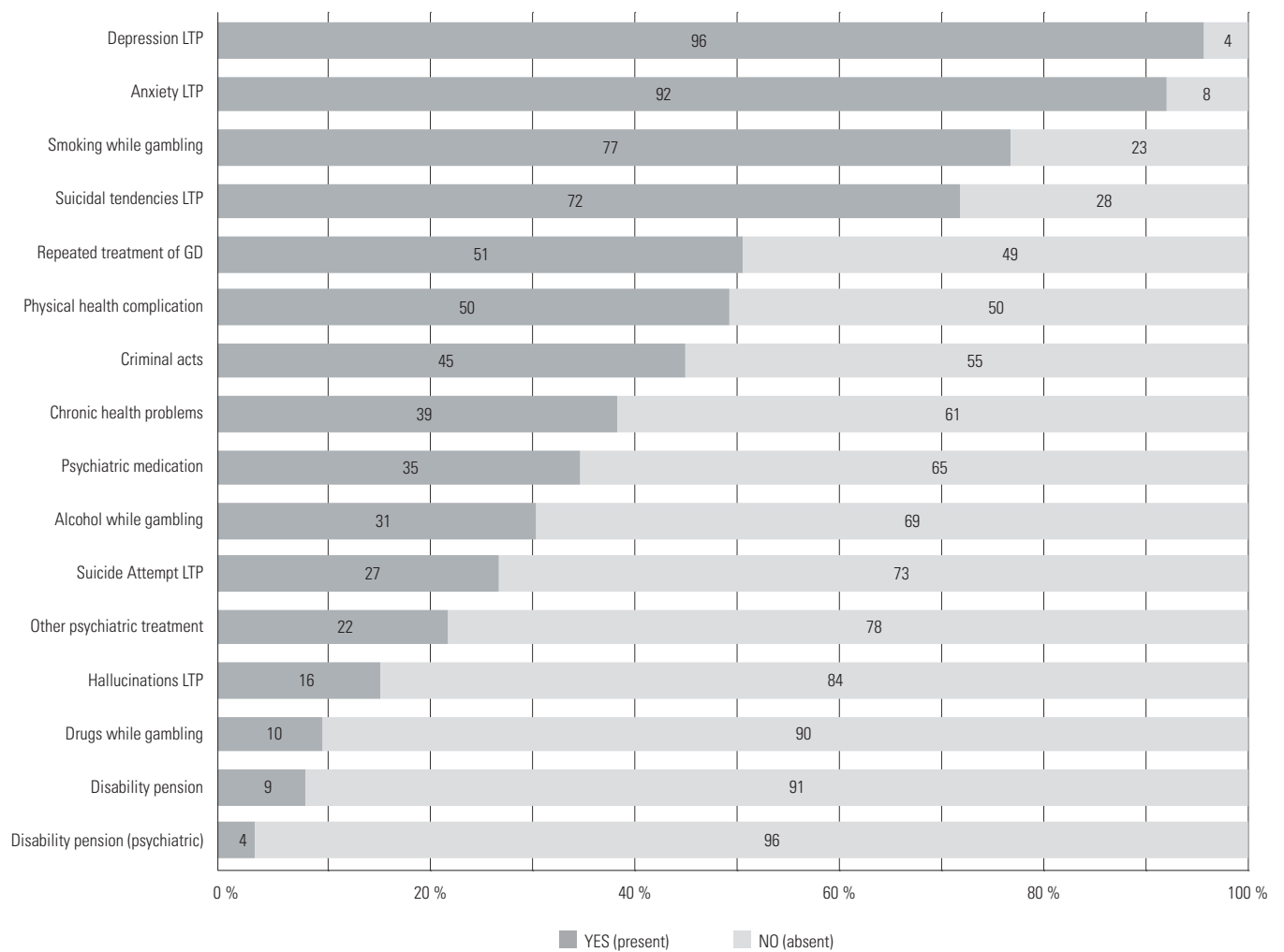


Figure 2 | Relative frequencies of psychiatric problems and comorbidities in the sample of PG (N = 139)
 Note: LTP = lifetime prevalence, GD = gambling disorder

	Suicidal tendencies (thoughts) absent	Suicidal tendencies (thoughts) present	Row totals
GD without PD	22 (36%)	39 (64%)	61
GD with tendency towards PD	8 (18%)	37 (82%)	45
GD with PD	2 (13%)	13 (87%)	15
Column totals:	32	89	121

Table 4 | Observed Frequencies of PD and LTP of suicidal tendencies (thoughts) (N = 121)

However, none of the variables that were monitored showed a significant relationship with the incidence of personality disorders. The closest significance was the occurrence of suicidal thoughts, which are slightly more common in patients with PDs (Chi-square = 5.966, $df = 2$ $p = .051$), as shown in Table 4.

3.3 Analysis of the relationship between the personality scales of TCI-r and the severity of problems associated with GD according to the SOGS questionnaire

Table 5 shows the Pearson's correlation of the raw questionnaire scores of the TCI-R scales and the total score for the SOGS questionnaire. The total number of 128 respondents is determined by the number of all validly completed questionnaires. In the table we used asterisks to mark a statistically significant correlation at the level of $\alpha = 0.05$ and $\alpha = 0.01$; this applies to the Novelty Seeking, Persistence, Self-directedness, and Self-transcendence scales. We stated that the SOGS correlates slightly with the scales of the TCI-r questionnaire. The scales that were observed explain only a small part of the variance of the SOGS results, e.g. for the Novelty Seeking scale 12.4%, for the Persistence scale 3.6% of the sample, and for the Self-transcendence scale only 3.1% of the variance. For the Self-directedness scale there is a negative correlation, i.e. the lower the Self-directedness of a gambler, the higher the values of the SOGS. This correlation is again slight and explains only 6.4% of the variance in the SOGS. We emphasised that the observed correlations are calculated only from the sample of GDs and not from the total population, and therefore are likely to be affected by the limited range of the data (restriction of range), especially on the SOGS scale.

Scale of TCI-R	r (X, Y)	r ²	p
Novelty Seeking	.352	.124	< .000**
Harm Avoidance	-.083	.007	.349
Reward Dependence	.097	.009	.274
Persistence	.191	.036	.031*
Self-directedness	-.253	.064	.004**
Cooperativeness	-.100	.010	.260
Self-transcendence	.177	.031	.046*

Table 5 | Results of the Pearson's correlations TCI-r and SOGS (N = 128)
Note: ** $p < 0.01$; * $p < 0.05$

To use all the options of Cloninger's diagnosis in relation to GD, we tried to further explore the relationships of the scales of the TCI-R questionnaire to other observed complications or comorbidities using point-biserial correlations (and two sample t-tests). The results that are significant at the level of $\alpha = 0.01$ and 0.05 are summarised in Table 6. However, we must interpret them with caution, since these are relationships that we did not expect in advance and do not necessarily relate to the main topic of the article, i.e. personality disorders. In addition, the resulting correlations are rather weak, and the variables explain little of the variance. The frequencies of some problems are also often very low or, conversely, very high because of the total number of participants in the analysis ($N = 121$). These results can, however, serve as inspiration or as a springboard for further research.

4 DISCUSSION AND CONCLUSION

The estimate of the incidence of gambling disorders reaches up to 1.2%, which is an above-average incidence compared to the level in other European countries (Mravčik et al., 2015). Because of the low representation of women in the treatment of GD we worked only with men. In studies carried out in North America it has been proved that men gamble more than women (Nower, Derevensky, & Gupta 2004). It was important to build on available, good-quality prevalence data so that we could compare this data. The influence of male gender, the degree of problematic gambling, and age may interact (Gupta & Derevensky, 1998; Stinchfield, 2000). The prevalence of gambling among young men is approximately three times higher than among women (Earl & Lee, 1996). There is a significant role for the "telescopic effect", which can make a difference between men and women as regards gambling. For women, there is a shorter period between the start of gambling and the realisation of the seriousness of the problems connected with gambling (Grant & Kim, 2002; Ladd & Petry, 2003; Tavares et al., 2001). As evidenced by a Spanish study, women gamble excessively and fall into problems with gambling faster (Ibanez et al., 2003). Unfortunately, we have no data for women gamblers. From the description of the clusters, it is obvious that the therapist should work with the individual gamblers' dynamics of personality. These predictors can lead to the interruption of abstinence and problems for the therapist during the therapy. The different groups of gamblers identified by the TCI-r method certainly match their image in practice. It is obvious from the descriptions that certain types of groups may have a bigger problem with

Variable X (problem 0/1) & variable Y (z-score of TCI-R scale)	M	SD	r(X,Y)	r2	t	p
Drugs while gambling	0.09	0.29				
Reward Dependence	-0.35	0.89	.266	.071	3.01	.003
Smoking while gambling	0.76	0.43				
Reward Dependence	-0.35	0.89	.211	.044	2.35	.020
Chronic health problems	0.39	0.49				
Harm Avoidance	-0.16	1.13	.206	.042	2.30	.023
Disability pension	0.07	0.25				
Harm Avoidance	-0.16	1.13	.181	.033	2.01	.047
Other psychiatric treatment	0.22	0.42				
Harm Avoidance	-0.16	1.13	.226	.051	2.54	.012
Other psychiatric treatment	0.22	0.42				
Self-directedness	-0.85	1.07	-.247	.061	-2.78	.006
Other psychiatric treatment	0.22	0.42				
Self-transcendence	0.17	1.20	.189	.036	2.09	.038
Depression LTP	0.97	0.18				
Harm Avoidance	-0.16	1.13	.239	.057	2.69	.008
Hallucinations LTP	0.16	0.37				
Self-directedness	-0.85	1.07	-.236	.056	-2.65	.009
Hallucinations LTP	0.16	0.37				
Self-transcendence	0.17	1.20	.242	.058	2.72	.008
Psychiatric medication	0.36	0.48				
Harm Avoidance	-0.16	1.13	.310	.096	3.56	.001
Psychiatric medication	0.36	0.48				
Cooperativeness	-0.58	0.94	.194	.038	2.16	.033
Suicidal tendencies (thoughts) LTP	0.74	0.44				
Harm Avoidance	-0.16	1.13	.276	.076	3.13	.002
Suicidal tendencies (thoughts) LTP	0.74	0.44				
Self-directedness	-0.85	1.07	-.221	.049	-2.47	.015
Suicide Attempt LTP	0.28	0.45				
Harm Avoidance	-0.16	1.13	.195	.038	2.17	.032

Table 6 | Point-biserial correlations (and t-tests) of TCI-R subscales and other problems and comorbidities (N = 121)

submitting to the treatment, collaboration with a therapist, or cohabitation with a group of gamblers. These are mainly accented personalities of gamblers and gamblers with a personality disorder. A different approach may be used to support a group of gamblers characterised by impatience and impulsivity. From the results it is obviously important to examine the dynamics of the personality of gamblers and respond appropriately to these therapeutically, i.e., for example, to work sensitively with those gamblers who shun group psychotherapy and who are not involved in the group, as well as with gamblers who demand attention within groups. Therefore, it is advisable to use an approach or treatment programme which will consider the heterogeneity of the subpopulation of gamblers being treated.

Our results highlight the importance of measuring the temperament and character of the gamblers. However, within the statistical analysis we were unable to confirm the rela-

tionship between membership of the identified subgroups in treatment and drop-out rates. Nevertheless, if the treatment corresponded to gamblers' specific personality problems, then drop-outs could decrease in all groups. Treatment should focus more on the possible causes of the problem and not only on the symptoms, which are represented by gambling.

The group of GD patients being treated showed a statistically significant positive correlation between the raw scores from the SOGS and the Novelty Seeking and Self-transcendence scales and negative correlations with the Harm Avoidance and Self-directedness scales. According to Cloninger, the relationship between personality characteristics and the seriousness of gambling problems was relatively weak. Only the Novelty Seeking scale reached a significant percentage of the explained variance of the severity of gambling problems from that of the SOGS scale. It should also be taken into ac-

count that the correlations that were observed are calculated only for the group of GD patients that was researched and not for the total population; the results are therefore affected by the limited variability of the sample. In our study, the group that was researched proved to be significantly different from the norm both statistically and clinically in terms of the comorbidity of personality disorders.

As opposed to the norm for the total population, the patients in treatment for GDs showed low levels of Cooperativeness and Self-directedness. In the foreign literature that was examined, there is an obvious tendency to seek and prove a relationship between personality disorders and GD (Petry, Stinson, & Grant, 2005). Bergen et al. (2012) proved the relationship between Self-directedness and the seriousness of the gambling problem. We can confirm this comorbidity. On the basis of the individual results of the TCI-r we used, the sample can be divided into the following groups: i) gamblers without comorbidity with a personality disorder (65; 51%); ii) gamblers with a tendency to a personality disorder (47 respondents; 37%), and iii) gamblers suspected of a personality disorder (16 respondents; 13%). On the basis of our theoretical assumptions, it was confirmed that low levels of SD and CO predict personality disorders (Preiss & Klose, 2001). This confirms a slightly higher prevalence of PD and accented personalities in the sample than we would expect to find in an average population. The number of gamblers with a disorder could possibly have been even higher if we had included invalidly completed questionnaires. The distortion of results caused by biased self-evaluation and disregard for the rules is often a sign of personality disorders.

We are aware of the fact that the diagnosis of personality disorders is a complicated clinical examination, and consequently a suitable clinical assessment of personality disorders should involve methods such as structured interviews (IPDE) and/or projective methods (ROR), and not only the self-evaluation scales which we chose to use in our research. Despite these limitations, however, our study notes that personality disorders are likely to occur among gamblers at a higher rate than is normal and they can be a cause of the development of problems with gambling and possible complications during treatment (drop-outs and recidivism). Comorbidity is a significant problem in the population of methamphetamine users, involving, for example, depression, anxiety disorders, psychosis, personality disorders, ADHD, and, to a lesser extent, eating disorders (Orlíková & Csémy, 2016).

Other personality temperament features that were observed include sensation seeking (Johansson et al., 2009) and novelty seeking (McCormick et al., 2012). Both studies show that gamblers have a higher prevalence of these characteristics. Another study, by González-Ibáñez et al. (2003), identified three types of gamblers in a sample of 110 GDs. A typical feature of all these groups was seeking excitement.

This difference was also confirmed in our study; the sample of gamblers that was monitored shows, as a whole, much higher Novelty Seeking when compared to the norm. All five identified subtypes of gamblers also showed high values on the Novelty Seeking scale, which is their common feature. However, for the other scales they differ, so we assume that the individual subtypes of gamblers may have a different mechanism which leads them into problems with gambling. They can also differ in the dynamics of the development of these problems connected with gambling. The problem is often comorbidity of usage of other substances such as alcohol or drugs. Nordin and Nylander (2007) described gamblers who scored high for NS and HA and low for SD and CO. They describe the same profile for people who abuse addictive substances. Likewise, the individual groups can, according to the TCI-r, react in various ways during the treatment. Therefore, it is important to match the therapeutic approach in the treatment.

Gamblers seeking treatment have frequently suicidal ideation or have already attempted suicide. Population surveys suggest that the risk of suicide occurs more among gamblers than any other group (Rossow & Hansen, 2008). And our study confirms that. The addiction itself and the effects of it, as well as the personality setting of the individual, play a role here. The diagnosis of a personality disorder in gamblers can significantly affect the genesis and impact of a gambler's career. Therefore, it is very important to work with this phenomenon of dual diagnoses in gamblers in clinical practice. Comorbidity in gamblers affects entry into treatment, the course of treatment, and dropout. We have identified several sub-types of pathological gamblers on the basis of personality traits, to which professionals could adapt the treatment programme or individualise psychotherapeutic procedures in matching their needs. We therefore believe that the results of the study can be applied in both the outpatient and inpatient treatment of pathological gamblers.

Authors' contributions: Eva Aigelová, Miroslav Charvát, and Michal Miovský designed this study. Eva Aigelová collected the data and, together with Miroslav Charvát, conducted the analyses and interpreted the data. They also prepared the manuscript and drafted its initial version. Michal Miovský supervised all the analyses and participated in the preparation of the manuscript. All three authors contributed to the creation of this paper and approved the final version of the manuscript.

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