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Psychopathology and Personality Characteristics in Pathological Gamblers: Identifying Subgroups of Gamblers

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Abstract

We examined psychopathology and personality characteristics among 62 pathological gamblers (49 men and 13 women; mean age 37.8 years), measured by the Minnesota Multiphasic Personality Inventory-2 (MMPI-2). The mean MMPI-2 profile of the present sample of gamblers was characterized by elevated scores on depression and psychasthenia (anxiety/tension). Latent class analysis revealed 3 separate latent clusters: one with MMPI-2 profiles within the normal range, one with a moderately elevated profile, and one with elevations on most of the clinical scales. We conclude that pathological gamblers are a heterogeneous group with different degrees of pathology and personality configurations; thus, one cannot talk about a general "gambler personality" as such. Interventions for pathological gamblers should therefore take into consideration the pattern and the level of psychopathology of the patients.

Keywords: Pathological gambling, personality characteristics, psychopathology, subgroups, latent class analyses, MMPI-2

Résumé

Nous avons examiné les caractéristiques psychopathologiques et les traits de personnalité de 62 joueurs pathologiques (49 hommes et 13 femmes; âge moyen : 37,8 ans), selon une évaluation effectuée à l'aide de l'Inventaire multiphasique de la personnalité du Minnesota-2 (MMPI-2). Le profil moyen MMPI-2 du présent échantillon de joueurs se caractérisait par des scores élevés pour la dépression et la psychasthénie (anxiété-tension). L'analyse de structure latente a révélé trois groupes latents distincts : un dont les profils MMPI-2 se situent dans les limites normales, un présentant un profil modérément élevé et un ayant obtenu des scores élevés sur la plupart des échelles cliniques. Nous concluons que les joueurs pathologiques forment un groupe hétérogène dont la pathologie et la personnalité varient à différents degrés; par conséquent, on ne peut pas parler comme telle « d'une personnalité générale de

joueur pathologique ». Les interventions auprès des joueurs pathologiques devraient donc prendre en considération le type de psychopathologie des patients et leur gravité d'atteinte.

Introduction

Pathological gambling (PG) is associated with adverse financial consequences, psychological and social impairment, and poor health (Welte, Barnes, Wieczorek, Tidwell, & Parker, 2001). Lifetime prevalence rates of PG have been estimated to be 0.4% to 0.6% in the adult population of North America (Kessler et al., 2006; Petry, Stinson, & Grant, 2005). Increased rates of mood disorders; anxiety disorders; attention-deficit/hyperactivity disorder; substance abuse; other impulse-control disorders; and antisocial, narcissistic, and borderline personality disorders have been reported in pathological gamblers (American Psychiatric Association [APA], 2000; Petry, et al., 2005).

Vachon and Bagby (2009) underline that converging lines of evidence suggest that pathological gamblers can best be understood as a heterogeneous group comprising qualitatively unique subtypes. These authors emphasize that an empirically derived taxonomy of PG may enhance therapeutic outcomes by providing more specific guidelines on how to tailor treatment for different subtypes of pathological gamblers. Different taxonomies of PG have been offered, whereby some authors have subtyped gamblers on the basis of personality characteristics (e.g., Vachon & Bagby, 2009) and others have suggested subgroups on the basis of assumed etiology or motivations for engaging in gambling behavior (e.g., Stewart, Zack, Collins, Klein, & Fragopoulos, 2008). For a comprehensive review of subtypes of pathological gamblers, see Milosevic and Ledgerwood (2010).

Stewart et al. (2008) presented empirical evidence for the existence of subtypes of pathological gamblers and suggested subtyping gamblers into three clusters on the basis of their affective motivation to gamble: enhancement gamblers (who gamble purely for positive reinforcement), coping gamblers (who gamble primarily for negative reinforcement, but also for positive reinforcement), and low-emotion regulation gamblers (who gamble for reasons other than direct affect regulation).

Vachon and Bagby (2009) found further empirical support for three subtypes of pathological gamblers in a non-treatment-seeking sample with distinguishable personality structures on the basis of the five-factor model of personality. The simple PG cluster was characterized by low rates of comorbid psychopathology; gamblers in this cluster tended to have no elevated scores on the five personality factors. The hedonic PG cluster was in turn characterized by moderate rates of comorbid psychopathology. The third cluster, called the demoralized PG cluster, was

characterized by high rates of comorbidity with other Axis I and II disorders. These individuals were further characterized by extreme negative affect, low positive emotionality, poor motivation, and high levels of impulsivity.

One of the most comprehensive assessment tools of psychopathology and personality is the Minnesota Multiphasic Personality Inventory (MMPI). The MMPI has been applied in a wide array of settings and with diverse groups (Graham, 2006). The MMPI is a self-report measure and the revised version, MMPI-2, comprises 567 items that make up 10 standard scales, several validity scales, and a number of subscales (see Butcher, 2005, for a comprehensive overview). The most typical use of the MMPI is to evaluate the profile configuration defined by the 10 standard scales. The code-type descriptions are correlates of test results. Different code types are associated with different scale score configurations, which serve to generate hypotheses of other attributes that may apply to a given individual (but may not apply to all individuals with a particular code-type configuration).

Previous studies of MMPI characteristics of pathological gamblers have typically found elevated scores on Scales 4-*Pd* (Psychopathic Deviate) and 2-*D* (Depression; Ciarrocchi, Kirschner, & Fallik, 1991; Graham & Lowenfeld, 1986; Moravec & Munley, 1983). This profile type is associated with significant psychopathology, including depression, anxiety, acting out, and substance abuse. Ciarrocchi et al. (1991) compared MMPI profiles of pathological gamblers and alcoholics and found that both groups had an average profile, with the highest scores on Scales 4-*Pd* and 2-*D* and the next two highest scores on Scales 7-*Pt* (Psychasthenia) and 8-*Sc* (Schizophrenia). These findings were interpreted as support for a general model of addictions, implying that certain personality characteristics may represent a general predisposition to develop an addiction, whereas situation-specific factors are believed to influence the development of the specific addiction (Jacobs, 1986).

Graham and Lowenfeld (1986) conducted a cluster analysis of MMPI profiles among pathological gamblers and found four clusters, accounting for 89% of the sample. The most frequent profile type (comprising 35% of the sample) was a 4-9 profile, which is associated with antisocial behavior: being immature, hostile, rebellious, restless, and grandiose. The second cluster comprised 28% of the sample and showed elevations on Scales 8-*Sc*, 7-*Pt*, 2-*D*, and 4-*Pd*. Persons with this profile tend to be suspicious, jealous, rigid, and withdrawn and are often diagnosed with paranoid personality disorder or paranoid schizophrenia (Graham & Lowenfeld, 1986). The third cluster showed an elevated score on Scale 2-*D* and moderate elevations on Scales 3-*Hy* (Hysteria), 4-*Pd*, and 7-*Pt*. Common for this profile are anxiety, alcoholism, depression, and passive-aggressive personality traits. The last cluster type showed a marked elevation on Scale 4-*Pd* and moderate elevations on Scales 2-*D*, 7-*Pt*, and 9-*Ma* (Mania). These persons tend to be immature, irresponsible, demanding, and impulsive and are often diagnosed with passive-aggressive personality or emotionally unstable personality (Graham & Lowenfeld, 1986). On average, a 4-2-7 profile type was most characteristic for the sample. This profile is associated with impulsivity, inability to delay gratification of impulses, little respect for social standards and values, acting out, and excessive drinking (Butcher, 2005).

McCown and Chamberlain (2000) conducted a study of MMPI-2 profiles of pathological gamblers recruited from several treatment settings and identified three clusters. The first cluster (comprising 30% of the study sample) was characterized by elevations on Scales 1-*Hs* (Hypochondriasis), 2-*D*, and 3-*Hy*, whereas the second cluster (comprising 26% of the sample) was characterized by elevations on Scales 9-*Ma* and 4-*Pd*. A third cluster with elevations on Scales 6-*Pa* (Paranoia), 7-*Pt*, and 8-*Sc* was found in some treatment settings, but not in others (McCown & Chamberlain, 2000).

Because pathological gamblers probably do not constitute a homogeneous population, standard treatment models may not be effective when applied uniformly to all pathological gamblers, irrespective of type of gambling activity, gender, neurobiology, comorbidity, and personality types. Psychopathology and personality are among the many factors that have been hypothesized to contribute to the development and maintenance of excessive gambling and PG (Bagby et al., 2007). Still, the number of empirical studies focusing on personality characteristics of pathological gamblers is limited (Saez-Abad & Bertolin-Guillen, 2008). More knowledge about psychopathology and personality characteristics in different subgroups of gamblers could consequently be helpful in designing more effective prevention and intervention strategies.

MMPI-2 is a comprehensive tool for assessing both psychopathology and personality characteristics and has gained considerable psychometric support throughout the years (Butcher, 2005). Most studies in the field of gambling have, however, used the original version of MMPI, which is no longer recommended (Butcher, 2005). Furthermore, the research in this field has mainly been conducted in North America and there is a need for replication of the findings in different cultures and contexts. No study has yet investigated MMPI-2 profiles in a Norwegian sample of pathological gamblers. The purpose of the present study was therefore to explore psychopathology and personality characteristics among treatment-seeking pathological gamblers in Norway and to investigate whether pathological gamblers could be divided into subgroups on the basis of an assessment with the MMPI-2. The investigation of MMPI-2 profiles in a Norwegian context will further elaborate the existing knowledge base, which hitherto has mostly used the original version of the MMPI, primarily in North American settings.

Method

Participants

The study sample comprised 62 pathological gamblers (49 men and 13 women), with a mean age of 37.8 years (SD = 11.8). All participants fulfilled the diagnostic criteria for PG from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*; APA, 2000).

Procedure

Participants were recruited from two out-patient treatment studies of pathological gamblers conducted at the University of Bergen, Norway, one offering group treatment and one individual treatment in combination with pharmacological treatment with selective serotonin reuptake inhibitors (SSRIs). Exclusion criteria for both studies were (1) being under 18 years of age, (2) not fulfilling the diagnostic criteria for PG according to the *DSM-IV-TR* (APA, 2000), (3) showing evidence of psychosis or organic mental disorder, (4) having concurrent alcohol or drug dependency, and (5) having used SSRIs in the last 6 months (only for the second study). Of 113 referrals, 32 dropped out before the screening interview or before initiating treatment, and 12 were excluded for various reasons (not fulfilling diagnostic criteria [n = 3], drug dependency [n = 1], delusions or hallucinations [n = 4], already using an SSRI [n = 4]). Of the remaining 69 participants (55 men and 14 women), 60% were recruited to the cognitive behavioral group treatment program for pathological gamblers, and 40% were recruited to the treatment program offering individual cognitive behavioral therapy and pharmacological treatment. Patients were either referred by their general practitioner (n = 18) or were self-referred after being informed about the projects in the local mass media (n = 51).

Screening interviews were conducted by four psychologists. The National Opinion Research Center DSM Screen for Gambling Problems (Gerstein et al., 1999) was used to assess PG. Comorbidity was assessed with the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1995) and the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II; First, Gibbon, Spitzer, Williams, & Benjamin, 1996). The MMPI-2 was administered after the screening interview. Sixty-nine subjects completed it. Three subjects had too many missing items ($>10\%$) and were subsequently excluded from the analyses. Another four participants were excluded from the analyses because of high scores (T-score $>$ 100) on the Infrequency (F) scale, which measures exaggerated symptom endorsement. Two participants had a slightly elevated score either on the Variable Response Inconsistency (*VRIN*) scale or on the True Response Inconsistency (*TRIN*) scale (>80), indicating inconsistent response patterns, but because these two respondents did not display any other elevated validity indicators, they were included in the analyses. The study was approved by the Regional Committee for Medical and Health Research Ethics in Western Norway and by the Norwegian Social Science Data Services, and it complied with the tenets of the Helsinki Declaration.

Instruments

The MMPI-2 (Butcher et al., 1989) was used to measure symptoms and personality characteristics in the sample. This test comprises 567 items, which make up 10 standard scales and three validity scales. The 10 standard scales in the MMPI are as follows: Scale 1-*Hs* (Hypochondriasis), Scale 2-*D* (Depression), Scale 3-*Hy* (Hysteria), Scale 4-*Pd* (Psychopathic Deviate), Scale 5-*Mf* (Masculine-Feminine), Scale 6-*Pa* (Paranoia), Scale 7-*Pt* (Psychasthenia), Scale 8-*Sc* (Schizophrenia), Scale

9-*Ma* (Mania), and Scale 0-*Si* (Social Introversion). These scales, except for 5-*Mf* and 0-*Si*, comprise the eight clinical scales. The validity scales are as follows: the *L* (Lie) scale, the *F* (Infrequency) scale, and the *K* (Correction) scale. The *L* scale measures underreporting of symptoms and the tendency to present oneself in an unrealistic and favorable light. The *F* scale is used to assess test-taking approaches, such as inconsistent and random responses. The *K* scale was developed as an index of attempts to deny psychopathology; high scores on this scale are associated with a defensive approach to the test, whereas low scores reflect unusual frankness and self-critical attitudes. The Infrequency-Back scale (*F[b]* scale) is a measure of symptom aggregation in the later part of the test and is usually evaluated in tandem with the original *F* scale. The *VRIN* and the *TRIN* scales are both indicators of the tendency to respond inconsistently; the *VRIN* measures inconsistent answers to pairs of items with similar or opposite content, whereas the *TRIN* measures the tendency to answer either "true" or "false" regardless of the content of the items. For a more detailed description of the scales, see Butcher (2005).

T-scores are the most commonly reported output, in which the mean score derived from a norm group is set to a *T*-score of 50 for each scale and the standard deviation is 10 *T*-scores. For the MMPI-2, a *T*-score > 65 is considered elevated, indicating clinically significant problems (>1.5 *SD*s above the mean). Norwegian norms were used when calculating the MMPI-2 *T*-scores (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 2004).

The most typical use of the MMPI-2 is to interpret the profile configuration defined by the 10 standard scales or the eight clinical scales (excluding Scales 5-*Mf* and 0-*Si*), particularly the combination of the two or three clinical scales with the highest scores, into code types. Code types are summary indexes that include the most elevated scale scores of the eight clinical scales. Code-type interpretation is often more accurate and clinically useful than is the mere interpretation of individual scales, but it is more appropriate for populations with *T*-score elevations > 65 (Groth-Marnat, 2003). Code types should ideally be well defined (*T*-score difference > 5 points between the lowest scale in the code type and the next-highest clinical scale) to avoid the influence of measurement error (Graham, 2006).

Statistics

We coded and processed the data with SPSS, version 15.0 (Bellringer, 1999), and calculated *T*-scores for the MMPI-2 validity and standard scales. In order to identify subgroups in the present sample of pathological gamblers for psychopathology and personality, we explored different latent class (LC) clusters by using Latent GOLD 4.5 (Vermunt & Magidson, 2003). LC is a statistical method that classifies respondents into mutually exclusive groups with respect to a latent (not directly observed) trait (Notelaers, De Witte, Vermunt, & Einarsen, 2006). LC analysis starts with the assumption that there is only one class and subsequently estimates up to *n* different classes until an LC model is found that statistically fits the data (Goodman, 1974a, 1974b; McCutcheon, 1987). Magidson and Vermunt (2001) refer

to such models as LC cluster models because the *T*-nominal categories of the latent variable serve the same function as the *T* clusters desired in cluster analysis. An important difference from traditional cluster methods (such as *k*-means clustering) is that LC analysis is based on a statistical model that can be empirically tested (Magidson & Vermunt, 2002). As a consequence, determining the number of LCs is less arbitrary than when using traditional cluster methods. LC analysis was based on the eight clinical scales in MMPI-2.

Modeling an LC is an iterative procedure that determines the need for a certain number of clusters starting from one cluster model. The number of clusters needed to explain the associations in the data is determined by the Bayesian information criterion (BIC; Magidson & Vermunt, 2004; McCutcheon, 1987). Besides the BIC, it is also important that the latent variable, as in a traditional measurement model, explains the associations between the indicators. This can be inspected by using bivariate residuals (BVRs) in Latent GOLD output. These should be lower than or equal to 3.84, which corresponds to a nonsignificant χ^2 with one degree of freedom. This means that all bivariate associations are explained by the latent variable. In practice, with many indicators, the reduction in BVRs should be at least 85% (Notelaers et al., 2006) to prevent Latent GOLD from adding an additional cluster for each pair (or few pairs) of BVRs that is higher than 3.84.

Results

As shown in Table 1, of the total sample, over three quarters were men, only 27% had any education after high school, and 29% were unemployed or receiving social security benefits. Means and standard deviations for the MMPI-2 validity and clinical scales are reported in Table 2, along with the percentage of gamblers with a *T*-score above 65 for each clinical scale. Furthermore, four participants (6.5% of the total sample) had a *T*-score > 110 on the *Fb* scale, which may indicate symptom exaggeration. However, their corresponding *F* scores were < 90.

The mean profile for the total sample was a 2-7 two-point code type, and 21% of the sample had this code type. Scale 2-*D* was the only scale for which the mean *T*-score of the gamblers was above 65 ($M = 66.2$, $SD = 14.7$) On Scale 2-*D*, 50% of the sample had a *T*-score > 65. However, on each of the following clinical scales, at least 30% of the sample had a *T*-score > 65: 2-*D*, 3-*Hy*, 4-*Pd*, 7-*Pt*, and 8-*Sc*.

Scores on the eight clinical MMPI-2 scales were entered into the LC analyses. Hence, the indicators were treated as interval measures. In accordance with the BIC criterion, a model with three clusters best fit the data among the LC cluster models (Models 1 to 4). However, the three-cluster model was associated with three large BVRs, indicating that Scales 1-*Hs* and 3-*Hy*, Scales 2-*D* and 7-*Pt*, and Scales 7-*Pt* and 8-*Sc* had shared variance. Because these pairs of scales share common items (20 items, 13 items, and 17 items, respectively), it is not surprising that the BVRs are large.

Table 1
Demographic Characteristics of the Sample

	Total sample (N = 62)	Low psychopathology group (n = 23)	Moderate psychopathology group (n = 24)	High psychopathology group (n = 15)	Test of group differences
Age, *M* (*SD*)	37.8 (11.8)	34.2 (10.6)	36.5 (11.2)	45.5 (11.9)	F = 7.5, p = .001
Gender (Male), *n* (%)	49 (79.0)	21 (91.3)	21 (87.5)	7 (46.7)	χ^2 = 12.6, p = .002
Highest education level					
Elementary school, *n* (%)	9 (14.5)	0	7 (29.2)	2 (13.3)	
High school, *n* (%)	36 (58.1)	16 (69.6)	10 (41.7)	10 (66.7)	
University/College, *n* (%)	17 (27.4)	7 (30.4)	7 (29.2)	3 (20.0)	χ^2 = 15.6, p = .02
Employment status					
Unemployed, *n* (%)	8 (12.9)	2 (8.7)	4 (16.7)	2 (13.3)	
Employed, *n* (%)	38 (61.3)	16 (69.6)	16 (66.7)	6 (40.0)	
Student, *n* (%)	6 (9.7)	3 (13.0)	3 (12.5)	0	
Social security benefit, *n* (%)	10 (16.1)	2 (8.7)	1 (4.2)	7 (46.7)	χ^2 = 1.1, *ns*
Marital status					
Single, *n* (%)	32 (51.6)	13 (56.5)	13 (54.2)	6 (40.0)	
Partner, *n* (%)	30 (48.4)	10 (43.5)	11 (45.8)	9 (60.0)	
Current comorbidity					
0 Axis I disorders, *n* (%)	34 (54.9)	15 (65.2)	13 (53.2)	6 (40.0)	χ^2 = .2, *ns*
1 Axis I disorder, *n* (%)	20 (32.3)	7 (30.4)	7 (29.2)	6 (40.0)	χ^2 = .8, *ns*
>2 Axis I disorders, *n* (%)	8 (12.9)	1 (4.3)	4 (16.7)	3 (20.0)	χ^2 = .6, *ns*
0 Axis II disorders, *n* (%)	55 (88.7)	21 (91.3)	21 (87.5)	13 (86.7)	χ^2 = .9, *ns*
1 Axis II disorders, *n* (%)	6 (9.7)	2 (8.7)	2 (8.3)	2 (13.3)	χ^2 = 4.0, *ns*
>2 Axis II disorders, *n* (%)	1 (1.6)	0	1 (4.2)	0	χ^2 = 3.2, *ns*

There are several ways to deal with problematic BVRs (Magdison & Vermunt, 2004). The first consists of adding more clusters. However, the subsequent four-cluster model provided even higher BIC values (see Table 3).

The second way is to increase the number of latent variables in the model by using LC factor models. Models 5 to 10 showed that adding a second and third latent variable with sufficient classes provided a better fit, as indicated by lower BIC values (see Table 3). Inspection of the factors in the three-factor model yielded a solution

Table 2
Means, Standard Deviations, and Minimum and Maximum Values for Validity and Clinical MMPI-2 Scales (Total Sample, N = 62)

Scale	Mean	*SD*	Min	Max	% of *T*-scores > 65
L	51.8	8.1	37	66	
F	65.9	12.8	42	91	
K	43.9	9.6	30	69	
VRIN	58.5	11.9	35	85	
TRIN	42.2	49.9	-76	118	
1-*Hs*	61.3	16.1	34	105	27.4
2-*D*	66.2	14.3	42	92	50.0
3-*Hy*	59.8	15.1	35	97	35.5
4-*Pd*	59.8	13.6	38	92	35.5
6-*Pa*	56.6	12.1	30	102	17.7
7-*Pt*	63.2	14.2	36	99	45.2
8-*Sc*	58.9	14.3	33	95	35.5
9-*Ma*	53.0	10.6	30	76	19.4

Note. Scales: *L* = Lie, *F* = Infrequency, *K* = Correction; *VRIN* = Variable Response Inconsistency; *TRIN* = True Response Inconsistency; 1-*Hs* = Hypochondriasis; 2-*D* = Depression; 3-*Hy* = Hysteria; 4-*Pd* = Psychopathic Deviate; 6-*Pa* = Paranoia; 7-*Pt* = Psychasthenia; 8-*Sc* = Schizophrenia; 9-*Ma* = Mania; min = minimum; max = maximum.

that was similar to the three-cluster model. Two of the factors had loadings on Scales 1-*Hs* and 3-*Hy*, 2-*D*, 7-*Pt*, and 8-*Sc*. Because these pairs of scales (1-*Hs* and 3-*Hy*, 2-*D* and 7-*Pt*, and 7-*Pt* and 8-*Sc*) share common items, they are normally positively correlated (e.g., Graham & Lowenfeld, 1986; McCown & Chamberlain, 2000). Apparently, the LC factor models extracted method factors in addition to content factors, that is, the first factor. Moreover, adding classes to the method factors was rewarded with a decreasing BIC. Still, these models portrayed large BVRs.

Table 3
Fit Statistics in Latent Gold

Model		LL	BIC (LL)	Npar	Class.Err.
1	1-Cluster	-1997, 1	4060, 239	16	0
2	2-Cluster	-1881, 65	3899, 491	33	0.0073
3	3-Cluster	-1849, 4	3905, 151	50	0.0354
4	4-Cluster	-1828, 66	3933, 828	67	0.0433
5	2-D Factor (2, 2)	-1848, 62	3841, 683	35	0.0097
6	2-D Factor (3, 3)	-1835, 78	3824, 267	37	0.0883
7	3-D Factor (2, 2, 2)	-1827, 83	3845, 499	46	0.0172
8	3-D Factor (3, 2, 2)	-1818, 53	3831, 026	47	0.0614
9	3-D Factor (3, 3, 2)	-1814, 96	3828, 017	48	0.1058
10	3-D Factor (3, 3, 3)	-1811, 92	3817, 82	47	0.0717
11	3-Cluster, local dependencies	-1800, 71	3832, 534	56	0.0159

Note. LL, log likelihood; BIC, Bayesian criterion information; Npar, number of parameters; Class.Err., classification error.

The third alternative to deal with the initial problematic BVRs is to relax the local independence assumption (i.e., allowing some of the indicators to covary). This approach is extremely useful when an external factor that is not really related to the LC variable is responsible for creating an "irrelevant" association between indicators. Allowing such a direct-effect parameter (Hagenaars, 1998) may be advisable if, for example, symptoms are strongly related (Uebersax, 2009). Because the high BVRs in the three-cluster model were related to three pairs of scales that share common items, and elevations on these pairs of scales often occur together (e.g., Graham & Lowenfeld, 1986; McCown & Chamberlain, 2000), we relaxed the assumption of local dependency. In a subsequent model, we therefore allowed Scales 1-*Hs* and 3-*Hy* and Scales 7-*Pt* and 8-*Sc* to covary. The results portrayed a lower BIC. However, the total rate of adjacent error classification (erroneously classified subjects in adjacent LCs) was lower in the LC factor models. In contrast to these models, however, no BVR was larger than 3.84 in the current solution. Hence, this solution was considered to represent the best fit. The latent profile shown in Table 3 explains how the indicators were related to the latent clusters.

Results from the LC analysis hence suggested that there were three distinct latent clusters of gamblers in the sample: one that had a profile within the normal range, scoring low on psychopathology, and two with elevated profiles (see Figure 1).

Latent Cluster 1 (n = 23), labeled "the low psychopathology group," comprised 37.10% of the sample and had all mean scores of the eight clinical scales in the MMPI-2 profile within the normal range ($T < 65$). Latent Cluster 2 (n = 24), which comprised 38.71% of the sample, had elevated mean scores ($T > 65$) on two of the eight clinical scales. This cluster was characterized by a 2-7 profile type. This cluster was labeled "the moderate psychopathology group." Approximately 42% of the individuals in this group displayed the mean code type (2-7/7-2 code). In this group, 71% had Scale 2-*D* as one of the two highest scales, and 63% had Scale 7-*Pt* as one of

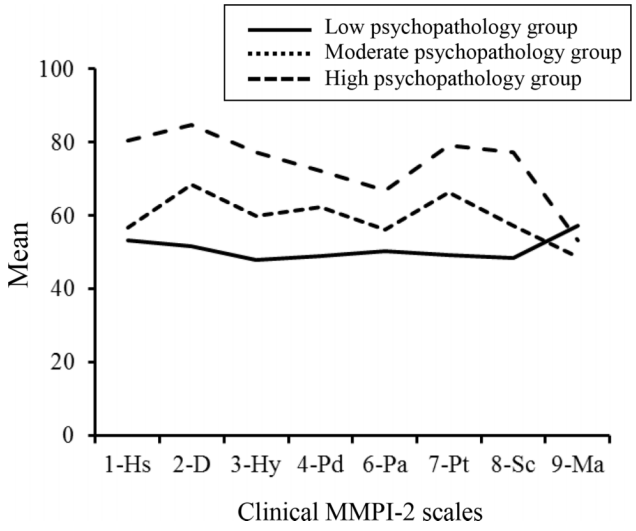

Figure 1. Mean MMPI-2 profiles for each latent cluster.

the two highest scales. Latent Cluster 3 (n = 15), comprising 24.19% of the sample, had a profile with elevations on seven of the eight clinical scales and was therefore named "the high psychopathology group." This group was characterized by a 2-1 two point code type. The 2-1 code type was found in 27% of the individual code types in the high psychopathology group; 53% of this group had Scale 1-*Hs* as one of the two highest scales and 47% had Scale 2-*D* as one of the two highest scales (see Table 4).

Demographic characteristics also differed between the latent clusters (see Table 1). The high psychopathology group had a significantly higher mean age (45.5 years) than did the low psychopathology group or the moderate psychopathology group (34.2 and 36.5 years, respectively; p = .001). The moderate psychopathology group and the high psychopathology group had a larger percentage of gamblers with low education (29% and 13%, respectively, with elementary school only) than did the low psychopathology group (0%). In addition, a larger percentage of gamblers in the moderate and high psychopathology groups were unemployed or receiving social security payments (21% and 66%, respectively) than was the case in the low psychopathology group (17%).

Discussion

This study showed that pathological gamblers in a treatment-seeking setting on average tended to score highest on Scales 2-*D* and 7-*Pt*. Scale 2-*D* was the only scale with a mean *T*-score above 65 in the total sample. The results showed that half of the gamblers seeking treatment showed symptoms of depression and 45% showed symptoms of anxiety. Elevations on Scale 2-*D* may reflect dissatisfaction with current life circumstances rather than clinical depression (Graham, 2006). High scores on Scale 2-*D* are further associated with lack of hope for the future and a pessimistic view on the likelihood of overcoming one's problems and making a better adjustment. It has been proposed that escaping from negative feelings such as depression, anxiety, hopelessness, and guilt may be the primary reasons that some

Table 4
MMPI-2 Code Types Within Each Subgroup

	Low psychopathology group (n = 23)	Moderate psychopathology group (n = 24)	High psychopathology group (n = 15)
2-7/7-2 code type	1 (4.3%)	10 (41.7%)	2 (13.3%)
1-2/2-1 code type	2 (8.7%)	0	4 (26.7%)
1-*Hs* as one of the 2 highest scales	7 (30.4%)	2 (8.3%)	8 (53.3%)
2-*D* as one of the 2 highest scales	7 (30.4%)	17 (70.8%)	7 (46.7%)
7-*Pt* as one of the 2 highest scales	2 (8.7%)	15 (62.5%)	4 (26.7%)

Note. Scales: 1-*Hs* = Hypochondriasis; 2-*D* = Depression; 7-*Pt* = Psychasthenia. The table shows number of individuals within each subgroup who are characterized by the mean code types and number of individuals whose highest score is on one of the code-type scales.

people gamble (Blaszczynski & McConaghy, 1989; Jacobs, 1986). An alternative interpretation is that these people became worried, anxious, tense, and depressed because of the negative consequences of their gambling. Both interpretations are supported by high rates of comorbidity of depression and anxiety among pathological gamblers (Petry et al., 2005). Elevations on Scale 7-*Pt* typically reflect excessive doubts, compulsions, obsessions, and unreasonable fears (Graham, 2006). Pathological gamblers are often obsessed with gambling and experience a strong urge to gamble, followed by the experience of relief after engaging in gambling activities, which may be reflected in high scores on compulsions or obsessions.

The present study showed that pathological gamblers do not comprise a homogenous group, but can be divided into several distinct latent clusters. In line with the results reported by Vachon and Bagby (2009), we found three separate clusters characterized by low, moderate, and high levels of psychopathology. We identified one group with average MMPI-2 profiles and all clinical scales within the normal range and two groups with elevated profiles. More than one third (37%) of the sample (the low psychopathology group) scored within the normal range. This group seems to resemble previously suggested subtypes of gamblers who gamble for reasons other than coping with psychopathology and seem not to be predisposed to certain personality traits, resembling the "low emotion regulation gamblers" (Stewart et al., 2008) and the "simple PG cluster" (Vachon & Bagby, 2009).

The moderate and high psychopathology groups showed different profiles and differed in degrees of psychopathology. The moderate psychopathology group (comprising 38% of the sample) had elevations on two scales and was characterized by a 2-7 code type. However, as this code type is not well defined, its interpretation should be taken with some caution. Individuals with a 2-7 code type are typically characterized by depression, anxiety, and tension. They tend to be passive and dependent in relationships, are often viewed as rigid in their thinking and problem-solving styles, and often have high and unrealistic expectations of themselves (Butcher, 2005). Rigid thinking and problem-solving style may be reflected in the wide range of cognitive distortions that typically characterize pathological gamblers. Such cognitive distortions have been suggested to contribute to the inability to control gambling behavior (Ladouceur & Walker, 1996; Toneatto, 1999). Gamblers have also been shown to overestimate their chances of winning, which may be reflected in the high and unrealistic expectations that characterize this profile type. This group partly resembles the third cluster in the study of Graham and Lowenfeld (1986), as well as the first cluster in McCown and Chamberlain (2000), which was characterized by elevations on Scales 1-*Hs*, 2-*D*, and 3-*Hy*. McCown and Chamberlain (2000) further found that women and video gamblers were over-represented in this group and suggested that they gambled primarily to escape from depression.

The high psychopathology group showed on average the most extensive elevations on all scales, indicating more severe psychopathology and maladjustment. The only mean *T*-score below 65 for this group was on the 9-*Ma* scale. The 9-*Ma* scale had, however,

the lowest discriminative power of all eight clinical scales. Although no statistically significant differences in the number of Axis I disorders between the groups were detected, a greater proportion of the high psychopathology group reported one or more Axis I disorders in addition to their gambling problem. This finding further illustrates the differences in degree of pathology observed between the groups. The high psychopathology group was characterized by a 2-1 profile, which is not well defined; hence, one should be careful in interpreting the code type. The 2-1 profile is associated with somatic discomfort and complaints. Individuals with this code type are often overly concerned about health and bodily functions and tend to be anxious, tense, and nervous. They typically tend to be passive-dependent in their relationships and use repression and somatization when encountering problems. The passive style make these persons tolerate high levels of discomfort before becoming motivated to change. In addition, they often lack insight and self-understanding and have difficulties accepting responsibility for their own behavior. Long-term changes after psychotherapy are therefore less likely with this group (Graham, 2006). These individuals may gamble in order to escape from reality and to cope with their psychopathology, and they may lack the necessary motivation and skills to stop gambling. One may expect poor treatment outcomes for this group because of the low initiative, lack of insight, and difficulties in accepting responsibility for their own behavior.

The high psychopathology group resembles the second cluster type in Graham and Lowenfeld's study (1986) and the third cluster type in McCown and Chamberlain's study (2000), with elevations on Scales 6-*Pa*, 7-*Pt*, and 8-*Sc*. The high psychopathology group in the present study also showed elevations on Scales 7-*Pt* and 8-*Sc*, but showed more elevations on Scales 1-*Hs*, 2-*D*, 3-*Hy*, and 4-*Pd* relative to Scale 6-*Pa*, indicating less paranoid ideation and more anxiety and depressive symptoms. McCown and Chamberlain (2000) related the basic pathology of their third cluster to misconceptions about the world and a failure to understand the basic laws of probability, and they suggested that these problems were largely culturally based and more likely to appear among the poor or other socially deprived groups.

The mean code type for the high psychopathology cluster was representative for only one quarter of the individuals in this group. Given that most of the means of the clinical scales were elevated in this group, this finding may simply reflect the fact that this group is not homogenous but a group with a wide range of psychopathology.

Significantly higher mean age was also found in the high psychopathology group than in the two other groups, which may indicate that the level of psychopathology increases with age. It may be further assumed that older gamblers are likely to have gambled longer, and greater gambling severity may be related to higher levels of psychopathology.

The 4-9 profile that was reported in the two previous studies (Graham & Lowenfeld, 1986; McCown & Chamberlain, 2000) was not found in the present sample, and previous findings indicating that Scale 4-*Pd* is the most elevated scale among pathological gamblers were not supported. Graham and Lowenfeld (1986) found in

their study that the mean profile for pathological gamblers was a 4-2-7 code type, which is often reported by alcohol and other substance abusers (Owen & Butcher, 1979). Graham and Lowenfeld (1986) also found elevated scores on Scale 4-*Pd* in all four clusters. In the present study, the high psychopathology group had elevated scores on Scale 4-*Pd*, but this scale was not among the most elevated scales. This discrepancy may be due to the small sample size of the present study. If this subtype of gamblers is relatively rare (only 26% in McCown and Chamberlain's sample), a sample size of 62 gamblers may not be sufficient to detect this subtype.

Furthermore, PG has been shown to have high comorbidity with substance abuse, and people with substance abuse typically also score high on the 4-*Pd* scale (Owen & Butcher, 1979). Because participants with substance abuse were excluded from the present study, this might partly explain why previous findings of elevated Scale 4 scores were not fully supported here. Another possible explanation is that participants in the present study may be higher functioning than patients in in-patient treatment settings, who are typically included in other studies. Most of the patients in the present study were self-referred, which may have caused a selection bias. One may speculate that self-referred patients are higher functioning and encompass more resources to cope with their problems than do referred patients.

Another possible explanation for why previous findings were not confirmed in the present study is that the gambling market has gone through dramatic changes over the last decades; gambling opportunities have expanded and new types of games have been introduced. Most of the previous MMPI studies of gamblers were conducted in the late 1980s and early 1990s, and the typical gambler today may not be the same type as the typical gambler in the 1980s. As gambling has become more common, the gambling population has probably also become more heterogeneous.

Clinical Implications

Generally, individuals in more distress are more receptive to therapeutic interventions and may be willing to tolerate the effort and discomfort of therapy in order to feel better (Graham, 2006). Because gamblers are often characterized by discomfort and tension, they may have a high motivation for treatment. The existence of different subgroups may have implications for designing effective and targeted treatment interventions. It has been hypothesized that the presence of additional psychopathology and gambling severity may be related to relapse and poorer treatment outcomes (Ledgerwood & Petry, 2005). However, gambling severity has been found to be positively related to treatment outcome, and the severity of the problem has been suggested as a motivating factor for treatment (Hodgins & El-Guebaly, 2010).

Subtyping on the basis of personality and underlying motivations for substance use has led to the development of effective motivation-matched treatment programs (Conrod et al., 2000). Similarly, motivation-matched treatment programs for pathological gamblers could be developed and presumably enhance treatment efficacy. Gamblers who engage in gambling activities to cope with stress or other

negative emotions may benefit from training of coping skills and learning how to deal with their underlying pathology. Those who, on the other hand, gamble primarily for the thrill or for sensation seeking may be encouraged to find other less harmful ways of fulfilling their need for stimulation.

Approximately one third of the sample in the present study showed personality profiles within the normal range, and one may assume that subjects belonging to this group have adequate resources to help them benefit from minimal intervention programs or standard short-term cognitive behavioral therapy, which seems to be effective on both a short- and long-term basis (Pallesen, Mitsem, Kvale, Johnsen, & Molde, 2005).The rest of the sample, having elevated profiles, was characterized by considerable psychopathology. Hodgins and El-Guebaly (2010) suggested that comorbid disorders complicate the treatment process; several studies have found that higher levels of psychopathology are related to relapse and dropout (Echeburúa & Fernández-Montalvo, 2005; Echeburúa, Fernández-Montalvo, & Báes, 2001; Jiménez-Murcia et al., 2007) and that the presence of comorbid disorders is associated with the need for longer treatment to achieve abstinence (Hodgins & El-Guebaly, 2010; Hodgins, Peden, & Cassidy, 2005). Hence, gamblers with elevated levels of psychopathology may need longer and more supportive treatment and may have other comorbid disorders that should also be addressed in therapy.

One may speculate that tailoring treatment for pathological gamblers and taking the general level of psychopathology of the patients into consideration may enhance treatment efficacy. However, little evidence exists concerning differential treatment outcomes for different subgroups of pathological gamblers (Milosevic & Ledgerwood, 2010). Because general therapeutic factors, such as alliance, have been found to correlate more strongly with therapy outcome in comparison with specific treatment interventions (e.g., Lambert & Barley, 2001), it is possible that these general factors may override patient differences in subgroups of gamblers in terms of outcome.

Limitations of the Study and Future Directions

The pathological gamblers in this study represented a convenience sample; accordingly, they may not be representative for the general population of pathological gamblers. One should therefore be careful about generalizing the results from the present study to the non-treatment-seeking population of gamblers. There are reasons to believe that treatment-seeking populations experience more distress and negative consequences of their gambling; they may hence show more elevated profiles compared with non-treatment-seeking gamblers.

LC analysis is usually performed with larger sample sizes. Hence, the size of the sample may be conceived as a limitation of the present study. The number of parameters is relatively high for such a small sample, and ideally the ratio between the number of indicators (MMPI-2 scales) and the number of subjects should be greater than 10. Such a rules of thumb imply that the current study did not have enough power to arrive at a stable solution. Recently, however, Gudicha, Tekle, and

Vermunt (in press) investigated the issue of power and sample size computations for LC models. Their work shows that if entropy (r^2) is above .80, small samples do not threaten the stability of LC analysis. In our case, entropy was .948, or 95%.

Some gamblers had high scores on the validity scales measuring malingering and defensiveness, and future studies should accordingly investigate the level, correlates, and treatment implications of impression management and social desirability in gamblers.

High scores on Scale 2-*D* are commonly found in treatment-seeking samples. Although the scores of the MMPI-2 are relatively stable over time (Graham, 2006), the 2-*D* scale has been criticized for being too sensitive to temporary and situation-specific states and thus one might expect these scores to decline after treatment. Future studies should therefore attempt to investigate how the MMPI-2 scores change following successful treatment of PG.

The present study did not have a patient contrast group (e.g., alcohol abusers); hence, some findings from this study may not be specific to pathological gamblers, but may rather be representative for patients with mental disorders or addictions in general. Future studies should therefore include contrast groups with both healthy controls and other patient contrast groups.

Another possible limitation is that we did not differentiate between different forms of gambling. Former studies have found a relationship between gaming preference (skill vs. luck based) and MMPI personality variables (Adkins, Kreudelbach, Toohig, & Rugle, 1987); hence, gamblers preferring poker or sports betting (which involve elements of skill) may be characterized by different psychopathology and personality traits than gamblers who participate primarily in games in which the outcome is purely based on chance. Future studies should therefore investigate whether a preference for different types of gambling may be related to differences in personality and psychopathology.

Conclusions

Pathological gamblers are a heterogeneous group with different personality configurations and degrees of pathology; the notion of a general "gambler personality" is not supported by the present findings. The data indicate three separate latent clusters of pathological gamblers, one (approximately half of the sample) with normal personality profiles and two with elevated profiles characterized by considerable psychopathology. The two clusters with highest psychopathology to a certain degree resemble previous findings in the field, but a previously observed 4/9 subtype was not replicated by the present study. The moderate psychopathology group showed a 2-7 profile type, whereas the high psychopathology group displayed a 2-1 profile type.

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