An empirical evaluation of proposed changes for gambling diagnosis in the DSM-5

Nancy M. Petry[a], **Carlos Blanco**[b], **Randy Stinchfield**[c], and **Rachel Volberg**[d]

[a]University of Connecticut Health Center

[b]Columbia University

[c]University of Minnesota

[d]Gemini Research

Abstract

Aims—Recommendations related to pathological gambling for the fifth edition of the Diagnostic and Statistic Manual for Mental Disorders (DSM) are to eliminate the criterion related to committing illegal acts and reduce the threshold for diagnosis from five to four criteria. This study evaluated the impact of these changes on prevalence rates and classification accuracy.

Design—Data were analyzed from five samples, varying in severity of gambling problems.

Settings and participants—Surveys of randomly-selected household residents in the US (n=2417), gambling patrons (n=450), individuals in brief intervention studies (n=375), patients in community-based gambling treatment programs (n=149), and participants in randomized intervention studies (n=319).

Measurements—The National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS) was administered to all participants. Internal consistency and factor structure were evaluated using both ten and nine criteria. Base rates, hit rates, sensitivity, specificity, and overall agreement were compared across classification systems, using DSM-IV classification as the standard.

Findings—Eliminating the illegal acts criterion did not impact internal consistency and modestly improved variance accounted for in the factor structure. In comparing a classification system using four of ten criteria versus one using four of nine, the four of nine system yielded equal or slightly better classification accuracy in all comparisons and across all samples.

Conclusions—These data suggest that inclusion of the illegal acts criterion does not appear necessary for diagnosis of pathological gambling, and, if it is eliminated, reducing the cutpoint to four results in more consistent diagnoses relative to the current classification system.

Keywords

pathological gambling; gambling; diagnoses; DSM-5

Pathological gambling is a devastating disorder, impacting gamblers, their families, and society. Although first classified as a mental disorder in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM), it has not received substantial empirical investigation until relatively recently. The fifth edition of the DSM (DSM-5) is scheduled for publication in 2013, in which the diagnosis of pathological gambling is likely to involve changes.

In the fourth and earlier editions of the DSM, pathological gambling was classified in the "Impulse-Control Disorders Not Elsewhere Classified" section. The Substance Use Disorders Workgroup of the DSM-5 [1,2] suggested moving the disorder to the chapter related to drug and alcohol use disorders because of consistently high rates of comorbidity [3,4], similar presentations of some symptoms [5,6], and genetic and physiological overlap [7–9]. It also aligns more closely to substance use disorders than other psychiatric conditions [10]. Further, moving pathological gambling to the substance use disorders section is likely to improve recognition of the disorder, especially among substance abusers who are at high risk for gambling problems, which in turn may improve treatment and prevention efforts [11].

The Workgroup has also proposed that its name be modified to "gambling disorder" to reduce stigma associated with the term "pathological." Other terms, including "compulsive gambling" and "problem gambling," were considered. However, the term "compulsive" is applied to disorders associated with anxiety. Because "problem gambling" is used to refer to a sub-diagnostic threshold condition [6,12], use of this term may minimize severity of the disorder.

Based on existing data, the DSM-5 Workgroup proposed changes to the diagnosis of this disorder as well. In DSM-IV, meeting five of ten criteria constituted a diagnosis. One proposed change relates to reducing the threshold for diagnosis to four criteria [2]. Researchers have argued for years that meeting four criteria constitutes an appropriate threshold for a diagnosis of pathological gambling [13]. Empirical data from the development phase of the most widely used screening instrument based on DSM-IV suggest that a cutoff of four (rather than five) yields an improvement in overall classification accuracy [14]. However, the most compelling rationale for this suggestion came from three independent published reports [15–17], each of which found that endorsement of four or more criteria improved diagnostic accuracy relative to a cut point of five.

The DSM-5 workgroup also suggested removing "has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling" as a separate criterion because it appears to add little to diagnostic accuracy. In national epidemiological surveys in the United States (US) and United Kingdom [6,18–20], illegal acts related to gambling was rarely endorsed, and virtually never occurred in the absence of other criteria. Maximum likelihood factor analysis of tetrachoric correlations, Rasch modeling, and principal components analyses reveal that the diagnostic criteria form a single factor [17,18], and the illegal acts criterion is present only in individuals with the most severe form of the disorder [18]. Zimmerman et al. [21] likewise noted that this criterion was rarely present in individuals who scored at or near the diagnostic threshold, and it did not contribute to case versus non-case distinction; they recommended that it be considered for elimination in DSM-5. Decreasing the number of criteria for diagnosis reduces assessment burden.

To provide estimates of the impact of removal of the illegal acts criterion and reduction of the threshold for a diagnosis to four, Denis et al. [22] evaluated a sample of 161 gamblers seeking treatment for addictive disorders in France. They found that the prevalence rate using DSM-IV criteria (five of ten) in their sample was 20.5%. If the threshold was four of

nine criteria, the prevalence rate would be 25.5%. Using four of nine criteria as a cutpoint, correlations between number of criteria endorsed and measures of gambling severity (South Oaks Gambling Screen scores, days and dollars gambled in past month, and years of regular gambling) were significant and explained as much or more of the variance as the DSM-IV criteria currently in use.

To provide additional information about the recommendations for DSM-5, we analyzed data from five samples that involved individuals varying across the spectrum with respect to the severity of gambling problems. The samples ranged from respondents in a national randomly selected community sample, patrons at gambling establishments, individuals in a screening and brief gambling intervention study, and gambling treatment patients in community-based treatment programs as well as those initiating gambling treatment studies. The same instrument assessed DSM gambling criteria in each sample, allowing consistency in symptom assessment.

Internal consistency of the items and factor structures are presented using ten criteria and using only nine. Base rates were examined in the sample overall and each subset, using all of the potential classification permutations under consideration: five of ten criteria (DSM-IV system), four of ten criteria (i.e., retaining the illegal activities criterion but reducing the threshold for diagnosis), five of nine criteria (i.e., using the same threshold but eliminating the illegal acts criterion), and four of nine criteria (i.e., simultaneously reducing the threshold and eliminating the illegal acts criterion). Additionally, data are presented for hit rates, sensitivity, specificity, and overall agreement for each permutation of classification under consideration using the DSM-IV classification as the standard. Because the standard utilized was very similar to the alternate classification systems under investigation, hit rates, sensitivity, specificity, and overall agreement were expected to be high. Nevertheless, comparisons across classification permutations provide empirical data regarding the impact of the proposed changes in gambling diagnosis under consideration for DSM-5 relative to its predecessor.

Methods

Samples were drawn from publicly available datasets and clinical samples that used a common instrument to assess DSM-IV criteria for pathological gambling. In total, data were available from 3710 respondents. The majority of these (n=2417) were adults from randomly selected US households participating in a nationally-based epidemiological survey of gambling participation and problems, the national Gambling Impact and Behavior Study (GIBS). This sample has been described in detail [6,14]. Among respondents, 52.3% were women, and race/ethnicity was 73.4% Caucasian, 12.1% African American, 7.1% Hispanic, and 7.5% other.

The GIBS also included a survey of gambling patrons (n = 450) described elsewhere [14]. Of these respondents 41.8% were women, and 71.7% were Caucasian, 20.0% African American, 3.1% Hispanic, and 5.1% other.

The third sample (n = 375) consisted of individuals drawn from screening and brief intervention studies for gambling problems [23]. Participants were recruited via screening efforts, primarily at substance abuse treatment clinics and medical clinics that serve the underprivileged, as well as via flyers and advertisements. A brief screen containing the South Oaks Gambling Screen [24] was administered to individuals in waiting rooms or over the telephone for those who called in response to flyers. Those who endorsed at least 3 items on the SOGS, had spent at least $100 wagering and gambled on at least four days in the past 2 months, and were 18 years or older were invited to participate in the study. Exclusion

criteria were reading level below fifth grade, current suicidal intentions or psychotic symptoms, or interest in receiving more intensive gambling treatment than that provided in the brief intervention study. Average age was 42.5 years, 40.8% were women, and race/ethnicity was 50.3% Caucasian, 31.4% African American, 15.1% Hispanic, and 3.2% other.

Community-based treatment participants (n = 149) were recruited from seven clinical sites that treat gamblers in the US and Canada (range 5–35/site) [25]. Recruitment was through advertisements at the clinics for a "study evaluating life histories of gamblers." Study participants had to be enrolled in a gambling treatment program for at least 2 weeks (median = 1 month; interquartile range = 8 months) and consisted of both individuals "in recovery" as well as those currently experiencing gambling problems. The only exclusion criteria were current suicidality and active psychosis. Average age was 47.1 years, 51.7% were women, and race/ethnicity was 91.9% Caucasian, 4.0% African American, and 4.0% other.

Additional treatment-seeking gamblers (n = 319) were drawn from participants in treatment studies at the University of Connecticut Health Center Gambling Treatment Research Center. Individuals desiring gambling treatment were recruited through advertisements (newspapers, flyers, and radio advertisements) [26]. Inclusion criteria were age 18 years or older, DSM-IV diagnosis of pathological gambling, and at least 2 gambling episodes in the past 60 days. Exclusion criteria were inability to read English at the 5th grade level and active suicidal intention or psychosis. Average age was 45.4 years, 42.6% were women, and 82.1% were Caucasian, 8.5% African American, 3.8% Hispanic, and 5.6% other.

Assessments

After obtaining informed consent for study participation, the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS) assessed pathological gambling symptoms using 17 questions to address the 10 DSM-IV gambling criteria. Some criteria are assessed by more than one item, but diagnoses are derived with a maximum of one symptom count per criterion. The illegal acts criterion in the NODS is: "Have you ever written a bad check, or taken something that didn't belong to you from family members or anyone else in order to pay for your gambling?" The test-retest reliability of the past year version of the NODS, upon which these analyses are focused, is 0.98 [14]. The validity of this instrument is established in numerous samples [27–30].

Data analyses

Cronbach's coefficient alpha assessed internal consistency, and principal components analyses using varimax rotation evaluated factor structure of the criteria, in the full sample. Analyses are presented for all ten criteria and for nine (excluding the illegal acts criterion).

Base rates of the disorder were determined using each of the four possible classification systems: 5 of 10 criteria, 4 of 10 criteria, 5 of 9 criteria, and 4 of 9 criteria.

Using the current DSM-IV classification system (a cutpoint of 5 or more of 10 criteria), cross-tabulations with the other 3 classification systems under investigation were used to determine hit rates, sensitivity, specificity, and overall agreement. Hit rates were defined as the proportion of individuals classified as pathological gamblers or not by DSM-IV criteria and the alternate criteria. Sensitivity was the proportion of participants classified by the DSM-IV system who were also classified by the alternate classification system. Specificity was the proportion not classified by the DSM-IV system who were also not classified by the alternate approach. Overall agreement was the proportions classified both with and without the disorder by DSM-IV and alternative system.

Results

In the full sample of 3710 participants, internal consistency of the 10 past year criteria was excellent with a Cronbach's coefficient alpha of 0.95. When the illegal acts criterion was removed, Cronbach's alpha remained constant at 0.95. Inter-item correlations ranged from 0.60 to 0.79 between all items other than the illegal acts criterion. The illegal acts criterion correlated with other criteria between 0.50 and 0.61, and it had the lowest correlation with each individual criterion (data not shown; available from authors).

In terms of proportions of respondents who endorsed each criterion, 7.4% of the full sample and 41.1% of the Treatment research sample responded affirmatively to the committing illegal acts criterion. In contrast, all other criteria were endorsed by 11.5 to 20.2% of the full sample and 63.3% to 95.9% of the Treatment research sample (data available from authors).

Principal components analysis indicated that the DSM criteria yielded a unidimensional scale. For the 10 criteria, the only Eigenvalue that exceeded 1.0 was 6.87, and this factor accounted for 68.7% of the variance. The factor loadings for all criteria other than the illegal acts criterion ranged from 0.80 (for the bailout criterion) to 0.88 (for the preoccupied criterion). The illegal acts criterion had the lowest, although still adequate, loading on the factor (0.69). When this criterion was eliminated, the Eigenvalue of the factor containing the nine remaining items was 6.43, and the proportion of variance explained increased to 71.5%.

Table 1 depicts base rates of the disorder for each of the four classification systems. Eliminating the illegal acts criterion (as shown in the "5 of 9" column) decreased prevalence rates only slightly when the number of criteria needed for diagnosis remained at five. Base rates rose relative to the five of ten DSM-IV classification system when the threshold was reduced to four criteria. The increased prevalence rate was always the same or lower when four of nine criteria were employed relative to when four of ten criteria were used.

Hit rates are also shown in Table 1. Within the samples, hit rates ranged from 86.7% to 100.0%, and using five of nine criteria resulted in the highest hit rates. Employing four of nine criteria resulted in equal or slightly higher hit rates than four of ten criteria in each of the samples.

Across samples, sensitivity was very high (>97%) when the illegal acts criterion was eliminated (Table 2). Specificity was very high in the full sample (>97%) when the cutpoint was reduced, with modest improvements when four of nine criteria was used relative to four of ten. In the treatment research sample, specificity was 0% when the threshold was reduced to four, but the denominator was very small (n = 2). Specificity was also fairly low using four criteria (75%–78%) in the Brief intervention sample, even though the denominator in that sample was larger.

Overall agreement showed similar patterns, exceeding 98% in the full sample, regardless of the alternate classification system used (Table 2). Although overall agreement was lowest in the Brief interventions sample, it was more than 86% even in that sample. Relative to the four of ten system, the four of nine system yielded similar or slightly better overall classification in each case.

Discussion

Studies in gambling treatment-seeking populations [e.g., 31,32], including this one, reveal relatively high rates of committing illegal activities. Nevertheless, committing illegal acts rarely occurs in the absence of multiple other criteria for pathological gambling [6,18–21,33]. Principal components analyses of these data, similar to analyses in other samples

[17,18,22], revealed that the pathological gambling criteria form a single dimension. Although the illegal activities item loaded more than adequately on the factor [34], it had the lowest factor loading. Eliminating it resulted in a small increase in the proportion of variance for which the remaining items accounted. Inclusion or exclusion of this criterion did not affect the internal consistency of the scale.

Further, these analyses demonstrate that eliminating this criterion does not substantially impact prevalence rates across a range of samples varying in severity of gambling problems. At most, past year prevalence rates decreased 1.3% in the Brief intervention and Community treatment samples when the illegal acts criterion was eliminated and the cut point remained at five. For the sample overall, the reduction in base rates was only 0.3% when this criterion was eliminated. Hit rates, sensitivity, specificity, and overall agreement were all greater than 97% for the sample overall and in each individual sample when this criterion was removed. Overall, these data indicate that eliminating this criterion will not substantially affect diagnosis of a gambling disorder relative to the DSM-IV classification system.

The other substantive recommendation for gambling diagnoses in DSM-5 relates to lowering the threshold needed for diagnosis from five to four criteria. This lower cutpoint was evaluated for all ten and only nine criteria. In every analysis, using four of nine criteria performed as well as or modestly better than four of ten criteria when the DSM-IV system was considered the standard. Hit rates and specificity were equal or higher in each sample without the illegal acts criterion included compared to when it was included. Further, base rates were less elevated (albeit modestly so) relative to the DSM-IV classification system when four of nine criteria were employed versus four of ten. These data demonstrate that if the cut point is reduced to four, diagnosis will be most congruent with DSM-IV if the illegal acts criterion is simultaneously eliminated.

Three studies [15–17] have concluded that lowering the threshold for diagnosis to four improves classification accuracy when seeking gambling treatment is used as the standard. In contrast, the present report compared permutations using DSM-IV diagnosis as the standard. Because only small minorities of individuals with the disorder seek treatment [35], using treatment seeking as the standard does not assess how well the classification systems differentiate those with problems that have not risen to the level requiring treatment, and it does not appropriately consider individuals with severe problems who were unable or unwilling to access treatment services. Although hit rates were generally high across samples in the present analyses, they were lower in the Brief intervention sample when the threshold was reduced to four criteria. This group was comprised of individuals who had not sought formal gambling treatment on their own (i.e., they screened positive for gambling problems and were offered the possibility of a brief gambling intervention). One could argue that these individuals may have higher rates of gambling diagnoses than classified by the current DSM-IV system, and prior studies suggest that classification accuracy is most impacted among those with moderate problems [16,36].

No diagnostic classification system is perfect, and classification accuracy differs depending on the samples studied and standard utilized. No "gold standard" exists for diagnoses of many mental health disorders. Relative to studies utilizing other standards for a gambling disorder [15–17], hit rates, sensitivity and specificity were all high in this study because the same instrument was used as the comparator and test, with only number of criteria included and cut points differing. Thus, these data do not speak to the validity of the DSM system in classifying a gambling disorder. Instead, these analyses were undertaken with the explicit intent of evaluating potential changes to gambling diagnosis for DSM-5 relative to DSM-IV. Concerns that the changes will greatly impact prevalence rates or diagnostic accuracy relative to DSM-IV should be abated by these results.

A limitation of these findings relates to the use of the NODS to assess DSM criteria. To decrease respondent burden in the GIBS survey, a gateway question was utilized so that individuals who did not endorse losing $100 or more in gambling in a single year were not asked NODS items, and their responses were assumed negative. Some persons may have endorsed particular criteria without losing this amount of money, although it is unlikely such persons would have a gambling disorder. Some NODS items specify time periods and frequencies (e.g., "past two weeks" and "three or more times") that are not part of DSM-IV diagnostic criteria. Results might differ if other instruments, and perhaps timeframes and frequencies, had been used to evaluate classification permutations.

The lifetime version of the NODS was also administered to each sample described in this report. Parallel analyses to those presented were conducted for lifetime criteria (available from authors) with results very similar to those presented with the past-year timeframe.

These analyses were conducted in a large sample, comprised of unique datasets encompassing individuals with a range of gambling participation and problems and treatment-seeking histories. Results were generally similar across samples, with the exception of specificity, which was low in some intervention samples. Each study administered the NODS, which despite its limitations, has established psychometric properties and has been used in epidemiological and treatment-seeking populations [14,27–30]. However, results may differ if alternate instruments were employed. The present analyses did not focus on classification accuracy across age or racial/ethnic groups or between genders, and it was limited to adults. Results may differ in youth and other subgroups, as well as in other cultures.

In sum, these data suggest that the DSM-5 workgroup's recommendations will not have substantial impact on prevalence rates or classification accuracy for gambling diagnoses. The primary concern of lowering the cutpoint relates to a potential increase in prevalence rates of the disorder, but the present analyses reveal these increases will be modest, and particularly if the illegal acts criterion is also eliminated. Some clinicians consider the illegal acts criterion to be essential to diagnosis, because some pathological gamblers are involved in the legal system and stealing represents the desperation that can occur as part of this disorder. Although response and social desirability biases can clearly impact endorsement rates, data from this study, along with a previous report [21], suggest that this criterion, at least when asked in the context of the NODS, adds little to diagnosis. Further, hit rates, sensitivity and specificity are improved, albeit modestly, when it is eliminated and the threshold for diagnosis is reduced to four criteria.

These data lend support to the changes for diagnosis proposed for DSM-5, but they do not speak to the other modifications suggested. Although altering the name of the disorder is a long-overdue change, the movement of gambling disorder to a substance use and related disorders section may be considered somewhat controversial [37]. No other disorders were considered to have sufficient empirical support to be included in this section at this time, but this change opens the doors for other "behavioral addictions" in future versions of the DSM. Empirical data should guide decision-making processes about the inclusion of and diagnostic criteria for new psychiatric disorders as they are considered for future versions of the DSM.

References

1. O'Brien C. Addiction and dependence in DSM-V. Addiction. 2011; 106:866–867. [PubMed: 21477226]

2. Petry NM. Pathological gambling and the DSM-V. International Gambling Studies. 2010; 10:113–115.

3. Petry NM, Stinson FS, Grant BF. Comorbidity of DSM-IV pathological gambling and psychiatric disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry. 2005; 66:564–574. [PubMed: 15889941]

4. Kessler RC, Hwang I, LaBrie R, Petukhova M, Sampson NA, Winters KC, et al. DSM-IV pathological gambling in the National Comorbidity Survey Replication. Psychol Med. 2008; 38:1351–1360. [PubMed: 18257941]

5. Petry NM. Should the scope of addictive behaviors be broadened to include pathological gambling? Addiction. 2006; 101:152–160. [PubMed: 16930172]

6. Toce-Gerstein M, Gerstein DR, Volberg RA. A hierarchy of gambling disorders in the community. Addiction. 2003; 98:1661–72. [PubMed: 14651495]

7. Blanco C, Myers J, Kendler KS. Gambling, disordered gambling and their association with major depression and substance use: a web-based cohort and twin-sibling study. Psychol Med. 2012; 42:497–508. [PubMed: 21835089]

8. Potenza MN, Leung HC, Blumberg HP, Peterson BS, Fulbright RK, Lacadie CM, et al. An fMRI Stroop task study of ventromedial prefrontal cortical function in pathological gamblers. Am J Psychiatry. 2003; 160:1990–1994. [PubMed: 14594746]

9. Slutske WS, Eisen S, True WR, Lyons MJ, Goldberg J, Tsuang M. Common genetic vulnerability for pathological gambling and alcohol dependence in men. Arch Gen Psychiatry. 2000; 57:666–673. [PubMed: 10891037]

10. Blanco C, Krueger RF, Hasin DS, Liu SM, Wang S, Kerridge BT, Saha T, Olfson M. Mapping common psychiatric disorders: Structure and predictive validity in the National Epidemiologic Survey on Alcohol and Related Conditions. Arch Gen Psychiatry. in press.

11. Petry NM, Blanco C. National gambling experiences in the US: Will history repeat itself? Addiction. in press.

12. Petry, NM. Pathological Gambling: Etiology, Comorbidity and Treatments. Washington DC: American Psychological Association Press; 2005.

13. Lesieur HR, Rosenthal RJ. Pathological gambling: A review of the literature (prepared for the American Psychiatric Association Task Force on DSM-IV Committee on Disorders of Impulse Control Not Elsewhere Classified). J Gambl Studies. 1991; 7:5–39.

14. Gerstein, DR.; Volberg, RA.; Toce, MT.; Harwood, H.; Johnson, RA.; Buie, T., et al. Gambling Impact and Behavior Study: Report to the National Gambling Impact Study Commission. Chicago IL: National Opinion Research Center; 1999.

15. Jiménez-Murcia S, Stinchfield R, Alvarez-Moya E, Jaurrieta N, Bueno B, Granero R, et al. Reliability, validity, and classification accuracy of a Spanish translation of a measure of DSM-IV diagnostic criteria for pathological gambling. J Gambl Stud. 2009; 25:93–104. [PubMed: 18592357]

16. Stinchfield R. Reliability, validity, and classification accuracy of a measure of DSM-IV diagnostic criteria for pathological gambling. Am J Psychiatry. 2003; 160:180–182. [PubMed: 12505822]

17. Stinchfield R, Govoni R, Frisch GR. DSM-IV diagnostic criteria for pathological gambling: reliability, validity, and classification accuracy. Am J Addict. 2005; 14:73–82. [PubMed: 15804879]

18. Strong DR, Kahler CW. Evaluation of the continuum of gambling problems using the DSM-IV. Addiction. 2007; 102:713–721. [PubMed: 17493106]

19. Orford J, Sposton K, Erens B. SOGS and DSMIV in the British Gambling Prevalence Survey: reliability and facture structure. International Gambling Studies. 2003; 3:53–65.

20. McBride O, Adamson G, Shevlin M. A latent class analysis of DSM-IV pathological gambling criteria in a nationally representative British sample. Psychiatry Res. 2010; 178:401–407. [PubMed: 20488550]

21. Zimmerman M, Chelminski I, Young D. A psychometric evaluation of the DSM-IV pathological gambling diagnostic criteria. J Gambl Stud. 2006; 22:329–37. [PubMed: 17009124]

22. Denis C, Fatséas M, Auriacombe M. Analyses related to the development of DSM-5 criteria for substance use related disorders: 3. An assessment of Pathological Gambling criteria. Drug Alcohol Depend. 2012; 122:22–7. [PubMed: 21962725]

23. Petry NM, Weinstock J, Ledgerwood D, Morasco B. A randomized trial of brief interventions for problem and pathological gamblers. J Consult Clin Psychol. 2008; 76:318–328. [PubMed: 18377127]

24. Lesieur HR, Blume SB. The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. Am J Psychiatry. 1987; 144:1184–8. [PubMed: 3631315]

25. Petry NM, Steinberg K. The Women's Problem Gambling Research Group. Childhood trauma and abuse histories in male and female pathological gamblers. Psychol Addict Behav. 2005; 19:226–29. [PubMed: 16011396]

26. Petry NM, Ammerman Y, Bohl J, Doersch A, Gay H, Kadden R, et al. Cognitive-behavioral therapy for pathological gamblers. J Consult Clin Psychol. 2006; 74:555–567. [PubMed: 16822112]

27. Hodgins DC. Using the NORC DSM Screen for Gambling Problems as an outcome measure for pathological gambling: psychometric evaluation. Addict Behav. 2004; 29:1685–90. [PubMed: 15451138]

28. Petry NM. Concurrent and predictive validity of the Addiction Severity Index in pathological gamblers. Am J Addictions. 2007; 16:272–82.

29. Wickwire EM Jr, Burke RS, Brown SA, Parker JD, May RK. Psychometric evaluation of the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS). Am J Addict. 2008; 17:392–5. [PubMed: 18770081]

30. Wulfert E, Hartley J, Lee M, Wang N, Franco C, Sodano R. Gambling screens: does shortening the time frame affect their psychometric properties? J Gambl Stud. 2005; 21:521–36. [PubMed: 16311880]

31. Meyer G, Fabian T. Delinquency among pathological gamblers: A causal approach. J Gambl Stud. 1992; 8:61–77.

32. Blaszczynski A, McConaghy N, Frankova A. Crime, antisocial personality and pathological gambling. J Gambl Behav. 1989; 5:35–42.

33. Blanco C, Hasin DS, Petry N, Stinson FS, Grant BF. Sex differences in subclinical and DSM-IV pathological gambling: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Psychol Med. 2006; 36:943–953. [PubMed: 16650342]

34. Tabachnick, BG.; Fidell, LS. Using Multivariate Statistics. 4. Needham Heights MA: Allyn & Bacon; 2001.

35. Slutske WS. Natural recovery and treatment-seeking in pathological gambling: results of two U.S. national surveys. Am J Psychiatry. 2006 Feb; 163(2):297–302. [PubMed: 16449485]

36. Stinchfield, R.; Govoni, R.; Frisch, GR. A review of screening and assessment instruments for problem and pathological gambling. In: Smith, G.; Hodgins, DC.; Williams, R., editors. Research and Measurement Issues in Gambling Studies. New York: Academic Press; 2007. p. 179-213.

37. Shaffer HJ, Martin R. Disordered gambling: etiology, trajectory, and clinical considerations. Annu Rev Clin Psychol. 2011; 7:483–510. [PubMed: 21219194]

Table 1

Past year base and hit rates using different classification criteria

Sample	n	Base rates				Hit rates		
		5 of 10 criteria	4 of 10 criteria	5 of 9 criteria	4 of 9 criteria	4 of 10 criteria	5 of 9 criteria	4 of 9 criteria
Full	3710	16.2 (600)	18.1 (670)	15.9 (591)	17.9 (664)	98.11 (3640)	99.76 (3701)	98.27 (3646)
Gambling Impact and Behavior Study- random sample	2417	0.1 (3)	0.2 (5)	0.1 (3)	0.2 (5)	99.92 (2415)	100.0 (2417)	99.92 (2415)
Gambling Impact and Behavior Study- patron sample	450	5.3 (24)	8.0 (36)	5.3 (24)	8.0 (36)	97.33 (438)	100.0 (450)	97.33 (438)
Brief interventions	375	46.4 (174)	59.7 (224)	45.1 (169)	58.1 (218)	86.67 (331)	98.67 (370)	88.27 (325)
Community treatment	149	55.0 (82)	57.7 (86)	53.7 (80)	57.7 (86)	97.32 (145)	98.66 (147)	97.32 (145)
Treatment research	319	99.4 (317)	100.0 (319)	98.7 (315)	100.0 (319)	99.37 (317)	99.37 (317)	99.37 (317)

Values represent proportions, with the denominators being the n in the second column to the left. For base rates, the number in parentheses indicates the number of participants who were classified with the disorder, and for hit rates the number in parentheses indicates those who were classified with and without the disorder using the alternate classification system relative to the 5 of 10 criteria in the Diagnostic and Statistical Manual for Mental Disorders, revision IV.

Table 2

Sensitivity, specificity, and overall agreement using different classification systems relative to the Diagnostic and Statistical Manual for Mental Disorders (DSM), edition IV (5 of 10 criteria)

Sample	n	Sensitivity			Specificity			Overall agreement		
		4 of 10	5 of 9	4 of 9	4 of 10	5 of 9	4 of 9	4 of 10	5 of 9	4 of 9
Full sample	3710	100.0 (600/600)	98.50 (591/600)	100.0 (600/600)	97.75 (3040/3110)	100.0 (3110/3110)	97.94 (3046/3110)	98.11 (3640/3710)	99.76 (3701/3710)	98.27 (3646/3710)
GIBS-R	2417	100.0 (3/3)	100.0 (3/3)	100.0 (3/3)	99.92 (2412/2414)	100.0 (2414/2414)	99.92 (2412/2414)	99.92 (2415/2417)	100.0 (2417/2417)	99.92 (2415/2417)
GIBS-P	450	100.0 (24/24)	100.0 (24/24)	100.0 (24/24)	97.18 (414/426)	100.0 (426/426)	97.18 (414/426)	97.33 (438/450)	100.0 (450/450)	97.33 (438/450)
Brief interventions	375	100.0 (174/174)	97.13 (169/174)	100.0 (174/174)	75.12 (151/201)	100.0 (201/201)	78.11 (157/201)	86.67 (325/375)	98.67 (370/375)	88.27 (331/375)
Community treatment	149	100.0 (82/82)	97.62 (80/82)	100.0 (82/82)	94.03 (63/67)	100.0 (67/67)	94.03 (63/67)	97.32 (145/149)	98.66 (147/149)	97.32 (145/149)
Treatment research	319	100.0 (317/317)	99.37 (315/317)	100.0 (317/317)	0.0 (0/2)	100.0 (2/2)	0.0 (0/2)	99.37 (317/319)	99.37 (317/319)	99.37 (317/319)

Values represent proportions, and numbers in parentheses indicate *n*s included in the proportions. GIBS-R = Gambling Impact and Behavior Study- Random sample survey; GIBS-P = Gambling Impact and Behavior Study- Patron at gambling establishment survey.