

Evaluation of Brief Screens for Gambling Disorder in the Substance Use Treatment Setting

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Background and Objectives: The goal of this study was to determine the diagnostic accuracy of brief screens for Gambling Disorder within a sample of people receiving outpatient treatment for substance use disorders.

Methods: Individuals ($n = 300$) recruited from intensive outpatient substance use treatment (23.67%) or methadone maintenance programs (76.34%) participated in the study. Four brief screens for Gambling Disorder were administered and compared to DSM-5 criteria. Receiver operator curves were created and an Area Under the Curve (AUC) analysis (an overall summary of the utility of the scale to correctly identify Gambling Disorder) was assessed for each.

Results: On average participants were aged 46.4 years ($SD = 10.2$), African American/Black (70.7%), with an income less than \$20,000/year (89.5%). Half the participants were female. Approximately 40% of participants (40.5%; $n = 121$) met DSM-5 criteria for Gambling Disorder. Accuracy of the brief screens as measured by hit rate were .88 for the BBGS, .77 for the Lie/Bet, .75 for NODS-PERC, and .73 for the NODS-CLiP. AUC analysis revealed that the NODS-PERC (AUC: .93 (95% CI: .91–.96)) and NODS-CLiP (AUC: .90 (95% CI: .86–.93)) had excellent accuracy.

Discussion and Conclusions: The NODS-PERC and NODS-CLiP had excellent accuracy at all cut-off points. However, the BBGS appeared to have the best accuracy at its specified cut-off point.

Scientific Significance: Commonly used brief screens for Gambling Disorder appear to be associated with good diagnostic accuracy when used in substance use treatment settings. The choice of which brief screen to use may best be decided by the needs of the clinical setting. (*Am J Addict* 2015;24:460–466)

INTRODUCTION

Disordered gambling is defined as a pattern of gambling behaviors that disrupt, compromise or damage personal, family, and vocational pursuits. Prevalence estimates for lifetime Gambling Disorder within the United States range from .4 to 4.2% for the general population.^{1,2} Among those with substance use disorders, the prevalence estimates of lifetime Gambling Disorder (formerly Pathological Gambling in DSM-III and IV) are substantially higher and range from 7% to 39%^{3–7} and in methadone maintenance treatment up to 52.7%.⁸ Given the high prevalence of disordered gambling among those with substance use disorders, screening for Gambling Disorder in the substance use treatment setting is strongly advisable.

Several brief screens (ie, screens that have 4 questions or fewer) have been developed to quickly assess (ie, less than 2 min) disordered gambling.^{9,10} Four of the most common screens are: (1) The Lie/Bet Questionnaire¹¹; (2) The National Opinion Research Center DSM Screen for Gambling Problems (NODS) Control, Lying and Preoccupation (NODS-CLiP) measure¹²; (3) The NODS Preoccupation, Escape, Chasing and Risked Relationships measure (NODS-PERC)¹³; and the (4) Brief Biosocial Gambling Screener (BBGS).¹⁴ While all four of these screens take less than one minute to administer and have been found to have good psychometrics^{9,11–15}, they all have important strengths and weaknesses.^{9,15} For example, the NODS-PERC was specifically evaluated in a population of substance users.¹³ Although the Lie/Bet, has been studied in more than one clinical sample^{11,16} the diagnostic accuracy of the Lie/Bet has been questioned due to the formulation of its questions.¹⁵ Finally, the BBGS is the only screen which assesses for

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Gambling Disorder in a 12-month time frame, which is the frame that the DSM-5 has established.

Although the Lie/Bet Questionnaire, NODS-CLiP, NODS-PERC and BBGS are intended to reflect DSM-IV criteria for Gambling Disorder (formerly Pathological Gambling), the diagnostic accuracy of these brief screens using DSM-5 criteria for Gambling Disorder are not known. In updating the DSM criteria for Gambling Disorder between versions four and five of the manual, two primary changes were made. First, one item was eliminated (“has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling”). This item was removed as it did not add to diagnostic accuracy.^{17,18} Second, the threshold for diagnosis was lowered from 5 criteria to 4 criteria.¹⁹ This decision was also made to achieve greater diagnostic accuracy.^{17,18} However, research suggests that the improvement in diagnostic accuracy gained by this approach may be achieved at the expense of increasing the overall base rate within the population.²⁰ In addition, given a growing body of research indicating that there are many similarities between gambling problems and substance use disorders, the DSM-5 committee chose to reclassify Gambling Disorder as a Substance-Related and Addictive Disorder.^{17–19,21} In light of these changes, an opportunity exists to re-evaluate the diagnostic accuracy of these brief screens relative to updates in DSM-5 within the substance use treatment setting where gambling disorders are more prevalent.^{3–7}

The primary goal of this study was to evaluate and compare the performance of these four brief screens (ie, Lie/Bet Questionnaire, NODS-CLiP, NODS-PERC and BBGS) among people receiving outpatient treatment for a substance use disorder using a receiver-operating characteristic (ROC) analysis. ROC analysis provides measurement of test accuracy (ie, sensitivity and specificity) and a summary measure of diagnostic accuracy (ie, area under the curve (AUC)) that can help identify the most efficient screening measure given a sample of interest. Our secondary goal was to determine the one year prevalence of Gambling Disorder using DSM-5 criteria and identify the frequency and amount of money spent on a range of gambling behaviors among those attending outpatient substance use treatment.

METHODS

Study Participants

Recruitment of participants occurred between January–June, 2014. Participants were recruited from an intensive outpatient addiction facility or a methadone maintenance program. Both clinics are part of a University hospital located in an urban, inner city area and mainly serve individuals of low socioeconomic status. All clinic patients were invited to participate in a study regarding gambling behaviors. To be eligible to participate in the study, potential participants needed to meet the following eligibility criteria: (1) be an established patient at the clinic, (2) be 18 or older, (3) be able to provide informed consent and (4) speak English. Participants

who agreed to take part in the study and provide informed consent were paid \$10 for completing the study.

Procedures

Assessments were conducted face-to-face with research assessors who were trained to provide all measures. The informed consent was read to participants in its entirety. The research assessment was also read aloud and assessors filled-in the measures as participants responded. Three hundred and five people were approached and five individuals declined to participate in the study. This study was approved by the University of Maryland, Baltimore Institutional Review Board.

Measures

Demographics and Feedback

Socio-demographic characteristics were assessed including questions regarding age, race, gender, marital status, employment, education, housing status and debt. In addition, we asked participants to provide feedback regarding their comfort level when responding to the questionnaire and whether they had previously spoken with a health care provider about their gambling behaviors.

Reference Standard: Assessment for Gambling Disorder

To assess the prevalence of disordered gambling we used the DSM-5 criteria for Gambling Disorder.²¹ For this study the criteria were re-written and phrased as *yes* or *no* questions (Appendix A). Participants were asked to think about the past 12 months when responding to the questions. The questionnaire was administered by a trained assessor who read questions aloud and recorded the participant’s responses to the items. Based on DSM-5 criteria individuals with a score of 4 or above were considered to have Gambling Disorder and were sub-classified as having mild (met 4–5 criteria out of a total of 9 criteria), moderate (met 6–7 criteria out of a total of 9 criteria) or severe (met 8–9 criteria out of a total of 9 criteria) problems with gambling. Those identified as meeting criteria for Gambling Disorder were given additional resources to help facilitate referral to local treatment programs.

Brief screens for disordered gambling

We used the following four brief screening instruments: *The Lie/Bet Questionnaire*¹¹. Is a 2-item screen that evaluates: (1) Lying and (2) increased Betting behavior. The Lie/Bet Questionnaire was found to have high sensitivity (99%) and high specificity (91%) in the original study which included individuals recruited from Gamblers Anonymous and VA employees as controls, identifying 92.3% of all pathological gamblers as assessed by the Gamblers Anonymous Twenty Questions.¹¹ Of note, while the Lie/Bet questionnaire was derived from DSM-IV criteria, in the original investigation and follow-up clinical study, individuals with gambling disorder were identified using the Gamblers Anonymous Twenty Questions not the DSM-IV.^{11,16}

NODS-CLiP¹². Is a 3-item instrument which evaluates: (1) loss of Control, (2) Lying and (3) Preoccupation (the“CLiP”). It was designed to be used in the general adult population. Compared to the NODS (a 17-item questionnaire based on DSM-IV criteria measuring lifetime and past-year gambling behaviors), it is reported to have excellent sensitivity and specificity.²² Specifically, the NODS-CLiP is reported to capture 94% of problem gamblers and 99% of pathological gamblers as identified by the full NODS measure.¹² In addition, the NODS-CLiP has been shown to have relatively high specificity (88.4%) in the form of negative predictive power when used with the general population.¹²

NODS-PERC¹³. Is a 4-item screen developed from the NODS that evaluates: (1) Preoccupation, (2) Escape, (3) Risked Relationships and (4) Chasing (the“PERC”). It was designed to be used in patients attending substance use treatment. The NODS-PERC has been found to have high sensitivity (99.7%), identifying 99% of all problem gamblers and 100% of all pathological gamblers as assessed by the full NODS within a sample of individuals recruited from addiction programs and inner-city medical centers.¹³ Given that the Preoccupation item is also included in the NODS-CLiP this item was only asked once and the response was used in scale score calculations for both the NODS-CLiP and NODS-PERC.

BBGS¹⁴. Is a 3-item screen that evaluates: (1) Withdrawal, (2) Lying and (3) Borrowing Money. The BBGS has shown to be highly sensitive (96%) and to have high specificity (99%) using data collected from a large household survey of US adults.¹⁴

Gambling Behaviors

We assessed frequency of gambling behaviors and average monthly amount spent on gambling using questions adjusted from a 9-item measure previously developed by Williams and Volberg.²³ Additionally, we added two items: (1) we requested participants to identify any “other” gambling behaviors engaged in over the past 12 months; and (2) we asked whether participants gambled on the Internet and if so how they accessed these websites.

Analysis

Gambling Disorder was identified using a cutoff of 4 or greater as designated by the DSM-5. Based on this we conducted bivariate analyses to evaluate associations between the outcomes of interest—Gambling Disorder versus not and (1) demographic characteristics; and (2) gambling behaviors. Means were compared using *t*-tests or Wilcoxon rank-sum test. Comparisons of percentages were made with chi square tests or Fisher exact tests. For each of the brief measures we calculated the sensitivity, specificity, positive predictive value, negative predictive value and hit rate (diagnostic efficiency). ROC curves were created for each of the screening instruments (SAS, PROC Logistic). For each possible cutoff point on a scale, the sensitivity (the proportion of true positives correctly identified by the test as meeting a certain condition, in this case Gambling Disorder)

and specificity (the proportion of true negatives correctly identified by the test as not meeting a certain condition) are calculated and plotted to create the curves. The Area Under the Curve (AUC) is a measure that provides an overall summary of the utility of the scale to correctly identify gambling disorder. A measure that had no ability to discriminate would have an AUC of 0.5. An AUC of .8–.89 represents good accuracy. An AUC of .9–1.0 represents excellent accuracy.²⁴ As the AUC of a measure gets closer to 1.0 it has increasing ability to discriminate between groups. We used a chi-square test for differences in the AUC to compare the screen specific curves to each other using the NODS-PERC as the reference group.^{25–27} When we conducted a sensitivity analysis with and without participants from the intensive outpatient addiction facility we found no differences in the ROC results. Thus we elected to present the results of the entire sample.

RESULTS

Participants

In total, 300 individuals were recruited and assessed. The majority of participants were recruited from a methadone maintenance program (76.34%) and the remainder were recruited from an intensive outpatient addiction facility (23.66%). The average age of participants was 46.4 years (*SD* = 10.2). Half the participants were female. The majority self-reported their race as being African American or Black (70.7%). With respect to socioeconomic status, most participants reported that their average income was less than \$20,000 per year (89.5%). Over ninety percent were unemployed. The majority indicated they had received a high school diploma (52.3%). Most participants (73.9%) reported having less than \$10,000 in debt.

Prevalence of Gambling Disorder

Forty point five percent of participants met DSM-5 criteria for Gambling Disorder. Of those individuals meeting a DSM-5 diagnosis for Gambling Disorder, 22.3% were in the mild range, 41.3% were in the moderate range and 36.4% were in the severe range. Stratified analyses based on Gambling Disorder status did not find any significant differences with respect to demographic factors with the exception that those identified as having a Gambling Disorder were significantly more likely to have \$10,000 or more in debt compared to those without Gambling Disorder (Fisher exact test; *p*-value = .029) (Table 1). With respect to gambling behaviors, those with disordered gambling were significantly more likely to report engaging in most gambling behaviors compared to participants without disordered gambling.

Gambling Behaviors

Participants reported a range of gambling behaviors in the last 12 months. The most common behaviors were: the purchase of lottery tickets (76.6%; mean spending of \$153.7/

TABLE 1. Demographics stratified by disordered gambling status

	All participants <i>n</i> = 300	Gambling disorder - No <i>n</i> = 178	Gambling disorder -Yes <i>n</i> = 121
Age (M ± (SD))	46.4 (10.2)	46.0 (11.1)	47.0 (8.9)
Gender – Male	50.0%	46.1%	55.4%
Married or living with a partner	23.0%	24.7%	20.7%
Complete HS and/or some college	52.3%	51.1%	54.5%
Full or part-time student	2.0%	1.7%	2.5%
Employed full or part-time	9.3%	9.6%	9.1%
Approximate income <\$20,000 last year	89.5%	89.7%	89.2%
Estimated debt less than \$10,000	73.9%	80.2% ^a	64.5%
Race – Black or African American	70.7%	71.9%	68.6%
Spoken with health care provider about gambling (<i>n</i> = 255)	6.3%	1.4% ^b	12.4%
Felt “very comfortable” answering these questions (<i>n</i> = 255)	74.6%	84.5% ^b	61.9%

^adenotes significance at $p < 0.05$ as determined by a Fisher exact test.; ^bdenotes significance at $p < 0.05$ as determined by a Chi-Square test.

month); the purchase of instant win tickets (69.5%; mean spending of \$112.8/month); and games of skill played for money (38.2%; mean spending of \$183.9/month). Few reported playing casino table games (9.4%; mean spending of \$47.7/month). In addition, few people participated in gambling via the internet with only 1.7% of participants indicating they gambled over the Internet on their laptops, 1.3% via a smartphone, .7% via a desktop computer and .3% via a gaming console.

Indices of Classification Accuracy and Receiver Operator Curve Analysis

Sensitivity was high for all screeners, ranging from .909 for the BBGS to 1 for the NODS-PERC and NODS-CLiP. Specificity was more variable ranging from a low of .539 for the NODS-CLiP and a high of .865 for the BBGS. Positive predictive values and negative predictive values are also presented in Table 2. Area under the curve (AUC) analysis (Figure 1) revealed that the NODS-PERC had the greatest

TABLE 2. Accuracy indices

	Reference Standard (Gambling Disorder)				Indices		
	Yes	No	Total				
Lie/Bet				Sensitivity	.942	Hit rate	0.773
Yes	114	61	175	Specificity	.657		
No	7	117	124	Positive Predictive Value	.651		
Total	121	178		Negative Predictive Value	.944		
NODS-PERC				Sensitivity	1	Hit rate	0.746
Yes	121	76	175	Specificity	.573		
No	0	102	124	Positive Predictive Value	.614		
Total	121	178		Negative Predictive Value	1		
NODS-CLiP				Sensitivity	1	Hit rate	0.726
Yes	121	82	175	Specificity	.539		
No	0	96	124	Positive Predictive Value	.596		
Total	121	178		Negative Predictive Value	1		
BBGS				Sensitivity	.909	Hit rate	0.883
Yes	110	24	175	Specificity	.865		
No	11	154	124	Positive Predictive Value	.821		
Total	121	178		Negative Predictive Value	.933		

Base Rate = .40

ability to discriminate disordered gamblers versus non-disordered gamblers (AUC: .93 (95% CI: .91–.96)). The AUC for the NODS-PERC was significantly different from the NODS-CLiP ((AUC: .90 (.86–.93); $X^2 = 8.83$; $p = .003$), the Brief Biosocial Gambling Screener ((AUC: .89 (.85–.92); ($X^2 = 5.40$; $p = .020$) and Lie/Bet Questionnaire ((AUC: .86 (.82–.90); ($X^2 = 18.8$; $p = .001$).

Feedback Regarding Using Brief Screens

Over 90% (90.6%) of participants felt either very comfortable or comfortable answering questions associated with the brief screens. Few participants (6.3%) reported that they had previously talked to a health care provider about their gambling behavior. Compared to those without Gambling Disorder, those with Gambling Disorder were significantly more likely to have spoken with a health care provider about their gambling (Fisher exact test; p -value = .001), but were significantly less comfortable answering questions about their gambling behaviors as compared to those without a gambling disorder ($X^2 = 10.1$; $p = .001$).

CONCLUSION

Our study sought to evaluate the diagnostic accuracy of four brief screens for Gambling Disorder within a sample of people receiving outpatient treatment for substance use disorders. In order to demonstrate satisfactory classification accuracy, the hit rate (diagnostic efficiency), sensitivity and specificity are recommended to be greater or equal to .80.^{28,29} Of the four brief screens that were evaluated, only the BBGS succeeded in meeting all these criteria.

With respect to the Area under the curve (AUC) analysis (Fig. 1) the NODS-PERC had the greatest ability to discriminate disordered gamblers versus non-disordered gamblers (AUC: .93 (95% CI: .91–.96)). Although the AUC for the NODS-PERC was significantly different from the NODS-CLiP, the BBGS and Lie/Bet Questionnaire, it is important to note that both the NODS-CLiP and the NODS-PERC were in the excellent range. It should also be recognized that the significantly larger AUC associated with the NODS-PERC may be due to the fact that the NODS-PERC has more response options than the other screens rather than to actual greater accuracy.

When choosing a brief screen other considerations may apply including: fit with clinic population, number of questions asked, time to complete the screen as well as the time frame for the questionnaire. For example, if one was interested in a 12-month time frame the BBGS may be an appropriate brief screening tool. Alternatively, if time constraints require a very rapid screen the Lie/Bet (which is 2 items) may be a viable alternative.

With respect to the questionnaire content, participants reported feeling comfortable filling out the brief screens. This is important as it suggests that brief screens can be used in the

substance use setting without fear of possible client discontent, which has been found to be an issue in past research.³⁰ However, a small but significant minority of participants (15%) who were identified as having Gambling Disorder felt either somewhat or very uncomfortable answering these questions. Additionally, it is important to note that in the present study the administration of the screening instruments was conducted by researchers not connected to the treatment program with patients who, for the majority, were already established in the clinic. In contrast, in most substance use disorder programs brief screens are administered (if at all) at the time of admission (when patients often have more acute issues such as active withdrawal, etc.) by clinic staff or counselors. Furthermore, in a non-research setting patients may feel less comfortable sharing their behaviors as their responses can be shared with the entire treatment team as well as other agencies such as probation officers, courts, etc. The implications of these issues need further study in order to determine the optimal process for screening clinic patients with the goal of improving patient outcomes through identification and early intervention.

Among the most common types of gambling behaviors reported by participants in this study were buying scratch off tickets and lottery tickets. This is consistent with previous reports conducted with similar populations.^{31,32}

Finally, our study found that few participants reported ever discussing their gambling behaviors with their health providers. Individuals in substance use treatment who have

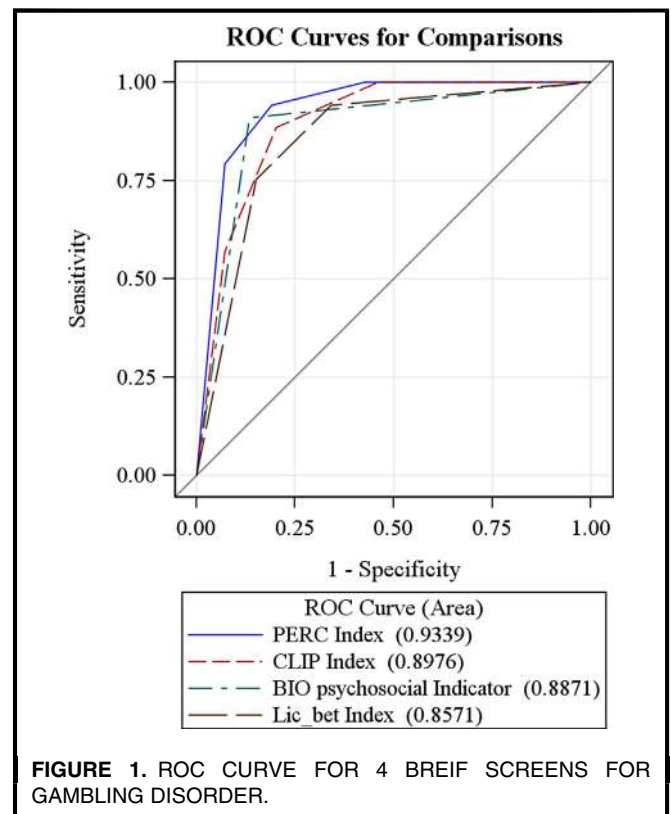


FIGURE 1. ROC CURVE FOR 4 BREIF SCREENS FOR GAMBLING DISORDER.

co-occurring Gambling Disorder are significantly more likely to be actively using drugs, be engaged in criminal activity to pay for gambling debts, report conflict with others and have significantly worse scores on the Addiction Severity Index.^{7,31,33,34} As a result, a client's gambling may negatively affect a his/her ability to engage in substance use treatment making gambling screening at intake an important factor in a client's treatment plan. Clearly clinician involvement in screening may help improve patient outcomes and their engagement in treatment.

Our study also found that among people receiving outpatient treatment for substance use disorders the prevalence of a DSM-5 diagnosis of Gambling Disorder was nearly 40%. This is strikingly higher than the reported lifetime prevalence of Gambling Disorder in the State of Maryland, found to be approximately 3.5% as assessed by the 17-item, full NODS.³⁵ Compared to previous reports of Gambling Disorder in substance using samples where the rates generally range from 7 to 39%, the prevalence rate in the present study is at the higher end of the range.³⁻⁷ However, one study using the South Oaks Gambling Screeners did find a lifetime rate of 52.7% among individuals in methadone maintenance treatment.⁸ It is important to note that the majority of the sample (76.34%) was recruited from a methadone maintenance program and, in light of that, the 40.5% prevalence rate is relatively consistent with prior studies. Alternate reasons that may have contributed to the high prevalence rate found in the present study include that secular and cultural trends that change over time have provided a wider variety of legalized forms of gambling that are increasingly accepted in our society. Alternatively, our sampling frame, which a-priori focused on people in treatment for substance use disorders rather than on broader samples in either clinical or non-clinical settings, may have artificially inflated the rate. In addition, we used a face-to-face assessment format and prior research has shown that the highest rates of gambling are found during face-to-face assessments acknowledged to be "gambling surveys" as opposed to those conducted via phone and described as "health and recreation surveys".²³ Finally, it may be related to use of DSM-5 criteria to establish the diagnosis of Gambling Disorder which may be more accurate at identifying problem gambling behaviors in general as compared to DSM-IV assessments.

Our study has limitations. First, this study was based on cross-sectional data and as such cannot provide information regarding possible causal pathways. Second, our participant sample, although large and likely representative of those attending substance use treatment clinics within an urban, inner city University hospital, was a sample of convenience and therefore may not be generalizable. Third, this is one of the first studies to use DSM-5 criteria to identify disordered gambling. As such we are not able to directly compare our results to other samples using similar methodologies. Fourth, given that a standardized diagnostic assessment for DSM-5 Gambling Disorder was not available at the time

the study began we used the diagnostic criteria for Gambling Disorder as written in the DSM-5. As a result, psychometric properties for the diagnostic assessment are not known. Additionally, the assessment was not conducted using two raters and as such inter-rater reliability cannot be calculated. Fifth, generalizability of our findings beyond the scope of individuals in substance use treatment is not known. Clearly an opportunity to evaluate the best brief screen in a non-substance use sample is desirable and should be the focus of future research. Finally, as noted previously, given that the assessments were administered by research staff that were not affiliated with the treatment clinics additional research is needed to better understand how responses may vary based on who is administering the assessment.

In conclusion, our study found that 4 out of 10 people in outpatient substance use treatment had a DSM-5 diagnosis of Gambling Disorder. Brief screening for gambling disorders in the substance use setting appears to be associated with good diagnostic accuracy. This is particularly true for the BBGS at its specified cut off point as well as the NODS-PERC and NODS-CLiP across the range of cut off points. Given that the screens included in the present study have different strengths and weaknesses, the choice of which brief screen to use may best be decided by the needs of the clinical setting.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

Appendix A. Assessment of DSM-5 Gambling Disorder

Instructions: Now I have a few questions about your gambling over the last 12 months. Please respond *yes* or *no*.

1. *Over the last year* do you need to gamble with increasing amounts of money in order to achieve the desired excitement?
2. *Over the last year* are you restless or irritable when attempting to cut down or stop gambling?
3. *Over the last year* have you made repeated unsuccessful efforts to control, cut back, or stop gambling?
4. *Over the last year* are you often preoccupied with gambling (eg, having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble)?
5. *Over the last year* do you often gamble when feeling distressed (eg, helpless, guilty, anxious, depressed)?
6. *Over the last year* after losing money gambling, do you often return another day to get even (ie, "chasing" losses)?
7. *Over the last year* do you lie to conceal the extent of involvement with gambling?

8. *Over the last year* have you jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling?
9. *Over the last year* do you rely on others to provide money to relieve desperate financial situations caused by gambling?

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