

# **PROBLEM GAMBLING RESEARCH GROUP**

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**UNIVERSITY OF WINDSOR**

## **A CRITICAL REVIEW OF SCREENING AND ASSESSMENT INSTRUMENTS FOR PROBLEM GAMBLING**

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# TABLE OF CONTENTS

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|  |           |
|--|-----------|
| <b>PROJECT TEAM</b> .....  | <b>4</b>  |
| <b>ACKNOWLEDGMENTS</b> .....   | <b>6</b>  |
| <b>ABSTRACT</b> .....  | <b>7</b>  |
| <b>A CRITICAL REVIEW OF SCREENING AND ASSESSMENT INSTRUMENTS FOR PROBLEM GAMBLING</b>      | <b>8</b>  |
| <b>ADULT INSTRUMENTS</b> .....   | <b>12</b> |
| 1975 U.S. NATIONAL SURVEY INSTRUMENT (INSTITUTE FOR SOCIAL RESEARCH; U. OF MICHIGAN) ..... | 12        |
| SOUTH OAKS GAMBLING SCREEN (SOGS) .....  | 13        |
| SOGS-MINNESOTA REVISION (SOGS-M OR MOGS) .....   | 15        |
| GAMBLERS ANONYMOUS 20 QUESTIONS (GA-20) .....  | 16        |
| INVENTORY OF GAMBLING BEHAVIOR (IGB) .....   | 17        |
| CUMULATIVE CLINICAL SIGNS METHOD (CCSM) .....  | 17        |
| MASSACHUSETTS GAMBLING SCREEN (MAGS) .....   | 18        |
| DSM-IV-MR (MR=MULTIPLE RESPONSE) .....   | 19        |
| DIAGNOSTIC INTERVIEW FOR GAMBLING SCHEDULE (DIGS) .....                                    | 19        |
| GAMBLING TREATMENT OUTCOME MONITORING SYSTEM (GAMTOMS) .....                               | 20        |
| NATIONAL OPINION RESEARCH CENTER DSM-IV SCREEN FOR GAMBLING PROBLEMS (NODS) .....          | 22        |
| LIE/BET QUESTIONNAIRE .....  | 23        |
| DIAGNOSTIC INTERVIEW SCHEDULE (DIS) PATHOLOGICAL GAMBLING MODULE (GAM-IV) .....            | 24        |
| CANADIAN PROBLEM GAMBLING INDEX (CPGI) .....   | 24        |
| GAMBLING BEHAVIOR INTERVIEW (GBI) .....  | 26        |
| <b>YOUTH INSTRUMENTS</b> .....   | <b>27</b> |
| SOUTH OAKS GAMBLING SCREEN-REVISED FOR ADOLESCENTS (SOGS-RA) .....                         | 27        |
| DSM-IV-J AND DSM-IV-MR-J (J=JUVENILE) (MR=MULTIPLE RESPONSE) .....                         | 29        |
| PATHOLOGICAL GAMBLING SIGNS INDEX (PGSI) .....   | 30        |
| <b>CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS</b> .....                                    | <b>31</b> |
| <b>REFERENCES</b> .....  | <b>34</b> |

**APPENDIX** ..... **40**

**Table 1 - Descriptions of Instruments** ..... 40

**Table 2 - Instruments with Insufficient Published Psychometric Data to Allow Evaluation** ..... 50

## PROJECT TEAM

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## ABSTRACT

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This report presents a critical review of screening and assessment instruments for problem gambling and Pathological Gambling. The objectives of this review are to provide information about instruments that will serve as a resource to research and mental health professionals regarding the issues involved in screening and assessment of problem gambling, to inventory the types of instruments that are available, and to make recommendations for further development. To this end, each instrument is described in terms of its development, content, intended purpose, administration method, psychometric properties, and interpretation. There are a number of existing instruments that serve as the backbone of case identification in clinical settings and of surveys of problem gambling among the general population. Existing instruments are used on a daily basis to make clinical, scientific, and public policy decisions, and therefore, it is critical that these instruments demonstrate evidence of their reliability and validity for these purposes. The rate of development of new gambling assessment instruments has outpaced the rate of rigorous psychometric research on existing and new instruments. As a result, many instruments have not been rigorously evaluated in terms of psychometric properties, beyond their development study. The SOGS has accumulated the most research to date on its psychometric properties, however, the current momentum in test development has focused on DSM-IV-based instruments. It is recommended that the field adopt the standards used in educational and psychological testing, and generate a body of rigorous psychometric research that demonstrates the reliability, validity, and classification accuracy of existing and new instruments. This research will justify the use of those instruments found to be reliable, valid, and accurate, and will serve to revise and refine these existing instruments to improve measurement precision.

# A CRITICAL REVIEW OF SCREENING AND ASSESSMENT INSTRUMENTS FOR PROBLEM GAMBLING

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Problem gambling has vexed humans for centuries, but it has only been within the last few decades that instruments have been developed to identify problem gamblers and Pathological Gamblers. Legalized gambling as an industry has experienced unprecedented growth and expansion over the past two decades, and along with this rapid growth have come concerns about problem gambling. There is a need to identify problem gamblers in the general population and population sub-groups in order to determine the extent of the problem in society and for public policy planning, e.g., the provision of treatment and prevention programs for problem gambling. Furthermore, mental health care agencies need to be able to accurately screen for Pathological Gambling in order to plan for and provide appropriate treatment services. In response to these needs, there has been a proliferation of problem gambling and Pathological Gambling screening and assessment instruments. Ten years ago, a published critical review of existing instruments included only two instruments (Volberg & Banks, 1990). There now exist over 20 problem gambling instruments that have been developed for a variety of purposes, including screening, assessment, diagnosis, epidemiological surveys, research, treatment planning, and treatment outcome monitoring. These instruments range from as few as two items to more than one hundred items. Since new instruments continue to be developed, this is an opportune time to examine what instruments are currently available, report on the psychometric properties of the instruments, and make recommendation for future instrument development and refinement. It should also be noted that there have been fairly large differences in reported prevalence rates in epidemiological studies of problem gambling, from as low as, less than 1%, to as high as 10%, and at least part of this disparity may be attributed to a lack of precision in current instrumentation and measurement efforts.

The objectives of this review are to inventory the types of instruments that are available and report on the psychometric properties of these instruments, provide a resource to research and mental

health professionals regarding the issues involved in screening and assessment of problem gambling, and to make recommendations for further development. Most problem gambling instruments are relatively new, have been developed within the last ten years, and have not undergone rigorous reliability, validity, and classification accuracy research (National Research Council, 1999). There is also a paucity of research on the measurement of problem gambling among special populations. At this point, the assessment of special populations has been conducted either by making revisions to instruments developed for adults, as in the case of youth gambling, or by assuming that existing adult instruments apply, as in the case of seniors' gambling. The clinical experience of those who work with special populations suggests that the signs and symptoms of problem gambling may be somewhat different in these segments of the population.

Pathological Gambling is a multidimensional problem and, as a result, a variety of approaches have been employed to define and describe it. The current diagnostic criteria for Pathological Gambling have been established by the American Psychiatric Association in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 1994). In general, the American Psychiatric Association has taken an objective, behavioral approach to diagnostic criteria. Although the American Psychiatric Association has placed Pathological Gambling in the impulse control disorder section, the diagnostic criteria suggest that Pathological Gambling is similar to substance use disorder and shares a number of the signs and symptoms found in alcohol and drug abuse/dependence, such as tolerance and withdrawal. Instruments that are based on DSM diagnostic criteria can be expected to inquire about consequences of gambling, attempts at controlling one's gambling, and changes in gambling behavior that may indicate tolerance and withdrawal symptoms. A number of assessment instruments included in this review are based upon DSM diagnostic criteria or include the diagnostic criteria as a component of the instrument.

Both researchers and clinicians are confronted with the challenge of selecting from among existing instruments, some of which have little, if any, reliability or validity information for the task at hand. The primary aim of this review is to describe the instruments currently available and to provide information to clinicians and researchers about the characteristics of each instrument including development, content, intended purpose of the instrument, administration methods, psychometric properties (reliability, validity, and classification accuracy), norms, and interpretation of scores. Each instrument is described and additional information is shown in Table 1. There are a some instruments i

the literature and in use that do not have sufficient psychometric data reported about them to allow for evaluation. Nevertheless, it was thought to be important to identify these instruments and they are described briefly below and in Table 2. Finally there are some instruments that exist, but little if any information has been published about them and these instruments are not included in the review.

The primary aim of evaluating any instrument is to determine whether it measures accurately the characteristics of interest (Allen & Yen, 1979). Therefore, the instrument is considered satisfactory if the scores are shown to reflect important features of gambling behavior. Instruments are evaluated on the adequacy of their psychometric properties, including reliability, validity, and classification accuracy. Reliability is often defined as consistency, repeatability, and stability (Nunnally, 1978). Reliability can be influenced by factors such as a number of items in the scale, number of subjects, and the type of subjects utilized in the development of the instrument. There are two types of reliability, temporal stability and internal consistency. Temporal stability is measured by test-retest procedures, that is, administering the test to the same individual at two points in time. It is assumed that the characteristics of interest have not changed over the time period. The measure of test-retest reliability is the correlation coefficient. This mathematical construct, usually shown as “r” expresses the extent of correspondence or magnitude of the relationship between two scores. It ranges from 0, no relationship to 1, perfect correspondence between the two scores or -1 a perfect inverse correlation between the two scores. In order to demonstrate satisfactory temporal stability, a test-retest correlation of  $r = .70$  or higher needs to be obtained.

Reliability is also measured by looking at the internal consistency of the test items. Internal consistency, reflects the extent to which a set of items all measure the same construct. One way of measuring internal consistency is by comparing the score on one half of items to the score on the other half of the items. This split-half reliability is measured in terms of the correlation coefficient  $r$ . Another approach of measuring internal consistency is to utilize statistical techniques that measure the homogeneity of the scale. Test item homogeneity is commonly measured by Cronbach's alpha (1951) a coefficient that ranges from 0 to 1. The higher the alpha, the better the internal consistency of the scale. As a criterion, Nunnally (1978) suggests that scales have an alpha of .70 or greater to be considered as having a minimal level of internal consistency for research purposes and .90 or greater for making important decisions.

Validity is defined as whether the instrument measures the construct it purports to measure (Allen & Yen, 1979). One type of validity is content validity, that is, do the scale items cover the various features of the construct being measured. Another type of validity is criterion-related validity. Criterion-related validity is commonly assessed by measuring correlations between the scale of interest and other scales that measure the same construct, that is, a criterion. In order to demonstrate validity, a new scale should be highly correlated with other direct and independent measures of the construct, for example, an independent clinical diagnosis. Existing scales of the same construct that have already demonstrated satisfactory psychometric properties are often used as criterion measures, however, they should not be the exclusive criterion. For example, a new scale to measure problem gambling may be correlated with the SOGS, an instrument with demonstrated satisfactory psychometric properties. Another validity indicator is how well the instrument is able to discriminate between two target samples. For example, a new measure of problem gambling should obtain high scores when administered to a sample of gambling treatment clients and low scores when administered to a sample from the general population.

Another measure of an instrument's utility and performance is classification accuracy (Baldessarini, Finklestein, & Arana, 1983; Fleiss, 1981), that is, how well does the instrument identify those with, and without, the disorder. Classification accuracy is typically assessed with a number of coefficients, including sensitivity, specificity, false positive rate, false negative rate, positive predictive power, and negative predictive power. Sensitivity is the true positive rate, that is, the rate of positive test results among those with the disorder, and specificity is the true negative rate, that is, the rate of negative test results among those without the disorder. False positive rate is the percent of positive test results among those without the disorder and false negative rate is the percent of negative test results among those with the disorder. Positive predictive power is the rate of true-positive results among all positive test results. Negative predictive power is the rate of true-negative results among all negative test results.

Each instrument will be described in terms of its development, author(s), year of development, number of items, administration method and time, intended use, scoring instructions, interpretation of scores, psychometric properties, as well as strengths and limitations. Instruments designed for adults are presented first and instruments designed for youth are presented after the adult instruments. Please see Table 1 for a description of each instrument.

## ADULT INSTRUMENTS

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### **1975 U.S. NATIONAL SURVEY INSTRUMENT (INSTITUTE FOR SOCIAL RESEARCH; U. OF MICHIGAN)**

The U.S. Commission on the Review of National Policy Toward Gambling directed the Institute for Social Research at the University of Michigan to conduct a national survey of gambling and compulsive gambling. Kallick, Suits, Dielman, and Hybels (1979) conducted this first U.S. national prevalence study of problem gambling which was called the Survey of American Gambling Attitudes and Behavior. Because no instrument existed for this task, the investigators developed a survey instrument specifically for this study. The lengthy survey, of approximately 70 pages, inquired about demographics, leisure time activities, attitudes about gambling, gambling behavior, and amounts of money spent gambling. The survey was conducted in 1975 and inquired about past year gambling behavior.

The survey included 18 items to measure compulsive gambling that were based upon personality characteristics reported in the literature that were related to compulsive gambling. The items were borrowed from eight existing instruments, such as Rotter's Internal-External Locus of Control Scale (Rotter, 1966) and MMPI Lie Scale (Hathaway & McKinley, 1951). The majority of the 18 items were not specific to gambling or compulsive gambling and included items such as "I do not always tell the truth". The 18 items were selected from an item pool of 119 items because they were the best discriminators between 274 self-identified compulsive gamblers and 239 church members and cross-validated on another sample of 154 compulsive gamblers and 119 church members. These 18 compulsive gambler predictor items correctly classified 95 percent of the church members and 90 percent of the compulsive gamblers. The report does not provide specific scoring instructions, such as a cut score, and does not provide estimates of reliability, validity and classification accuracy (other than the scale development data that showed the scale was able to discriminate between compulsive gamblers and church members). The report states that discriminant function weights were established with the comparison of church members and compulsive gamblers and these discriminant function weights were applied to the scores of the respondents in the national sample and the probability of

each respondent's membership in the compulsive gambler group was computed. The probability of being classified as a compulsive gambler was required to be .96 or higher, however, the discriminant function weights are not provided in the report. This approach to measuring compulsive gambling has been criticized in that the personality traits measured may also characterize social gamblers and other respondents who do not gamble at all (Culleton, 1989). This scale has not been commonly used beyond this study.

## **SOUTH OAKS GAMBLING SCREEN (SOGS)**

In the mid-1980s Lesieur and Blume (1987) developed the South Oaks Gambling Screen (SOGS), a 20-item paper-and-pencil instrument used to screen for Pathological Gambling among clinical populations. At the time, both the DSM-III (American Psychiatric Association, 1980) and DSM-III-R (American Psychiatric Association, 1987) diagnostic criteria were available to assist in the development and validation of the SOGS (Culleton, 1989; Lesieur & Blume, 1987). The SOGS has been used for both clinical and survey research purposes and has been used in numerous studies around the world, including the U.S., Canada, Europe, Australia, New Zealand, and Asia (National Research Council, 1999; Shaffer, Hall, & Vander Bilt, 1997; Volberg, 1994).

The SOGS is scored by summing the number of items endorsed out of 20 and a cut score of 5 or more indicates that the respondent is a probable Pathological Gambler. The content of the SOGS includes items that inquire about hiding evidence of gambling, spending more time or money gambling than intended, arguing with family members about gambling, and borrowing money from a variety of sources to gamble or to pay gambling debts.

The original development study found the SOGS to demonstrate satisfactory reliability and validity in four different samples, including Gamblers Anonymous members (n=213), university student (n=384), psychiatric hospital inpatients (n=867), and hospital employees (n=152). Reliability was estimated by combining the three samples of GA members, university students, and hospital employees and computing internal consistency (Cronbach's  $\alpha=.97$ ). One-month test-retest reliability was computed on the SOGS dichotomous classification of probable Pathological Gambler versus non-probable Pathological Gambler with 74 inpatients and 38 outpatients ( $r=.71$ , n=110). Validity was

examined by correlating the SOGS with counselors' and family members' independent assessments and DSM-III-R diagnosis for Pathological Gambling. The SOGS was found to be correlated with counselor independent assessments ( $r=.86$ ), family member assessment ( $r=.60$ ), and DSM-III-R Pathological Gambling diagnosis ( $r=.94$ ). In terms of classification accuracy, the SOGS was compared to DSM-III-R diagnosis of Pathological Gambling and demonstrated satisfactory hit rates among Gamblers Anonymous members (98.1%), university students (95.3%), and hospital employees (99.3%).

Since its development, the SOGS has been used for a variety of purposes and populations, but beyond the original development, little systematic research has been conducted on the psychometric properties of the SOGS under these varying conditions of use. Therefore, questions have been raised about the psychometric properties and classification accuracy of the SOGS under these new conditions. This is particularly true when the SOGS is used to estimate prevalence of Pathological Gambling in general population surveys. In a recent meta-analysis of Pathological Gambling prevalence studies, over half of the 152 prevalence studies used the SOGS as the measure of Pathological Gambling (Shaffer, Hall, & Vander Bilt, 1997). The original development data on the SOGS does not provide specific information about its psychometric properties for use in general population surveys. Also, the psychometric data obtained during the development of the SOGS are now over ten years old and the diagnostic criteria for Pathological Gambling have been revised from DSM-III-R (American Psychiatric Association, 1987) to DSM-IV (American Psychiatric Association, 1994). The changes from DSM-III-R to DSM-IV included significant revisions of the criteria, an increase from nine to ten criteria, and the cut score was raised from four to five.

Lesieur and Blume (1993) reviewed the various modifications of the SOGS and provide suggestions as to their suitability. They suggest that the initial questions, which ask about the type of gambling that subjects participate in, be modified to suit the gambling practices of the jurisdiction where the screen is being used. Such changes help the subjects define the concept of gambling before proceeding to the remainder of the screen. The original SOGS is based on lifetime gambling activity and does not differentiate Pathological Gamblers in remission from active Pathological Gamblers. Lesieur and Blume suggest that the SOGS may be modified to cover a six month or one year time frame to identify active Pathological Gamblers.

The SOGS has recently been validated for a one year time frame and was found to have satisfactory reliability and validity for this time frame (Stinchfield, in press). In this study, the SOGS as a measure of DSM-IV diagnostic criteria was administered to a general population sample (n=803) and a gambling treatment sample (n=1,589). The SOGS demonstrated satisfactory reliability with  $\alpha=.69$  in the general population sample and  $\alpha=.86$  in the gambling treatment sample. The SOGS demonstrated satisfactory validity in both samples with correlations between the SOGS and DSM-IV criteria of  $r=.77$  and  $r=.83$ , in the general population and treatment samples, respectively. Correlations with other gambling problem severity measures (e.g., DSM-IV diagnostic criteria, gambling frequency) in the gambling treatment sample were moderate to high, ranging from  $r=.33$  to  $r=.65$ . Using DSM-IV diagnostic criteria as the criterion, the SOGS showed satisfactory classification accuracy in the gambling treatment sample with a high hit rate (.96), high sensitivity (.99), modest specificity (.75), and low false positive (.04) and low false negative rates (.10). The SOGS showed poorer classification accuracy in the general population with a modest sensitivity rate of .67 and a high false positive rate of .50 (Stinchfield, in press). The SOGS overestimated the number of Pathological Gamblers in the general population, as compared to DSM-IV diagnostic criteria.

Ladouceur and colleagues (2000) have examined the accuracy of the SOGS in terms of how well children, adolescents, and adults understand the items and the effect of this misunderstanding on scores. The investigators found that most participants misunderstood some SOGS items and the misunderstanding led the respondent to endorse the misunderstood items and led to higher SOGS scores. The clarification of misunderstood items had the effect of reducing SOGS scores and reducing the number of respondents classified as probable Pathological Gambler.

### **SOGS-MINNESOTA REVISION (SOGS-M OR MOGS)**

The SOGS is the most commonly used screening instrument for problem gambling and therefore it has been adapted for a variety of purposes and populations. Laundergan, Schaefer, Eckhoff, and Pirie (1990) revised the SOGS for a survey of the adult general population in Minnesota and this modified SOGS has been referred to as the SOGS-M (Emerson & Laundergan, 1996) and the MOGS (Laundergan, 1992). The revision involved using a past year time frame, administering the MOGS items to only those respondents who had gambled for money in the past year, deleting some

items, and modifying the wording of some items. No reliability, validity, or classification accuracy research has been reported on the MOGS (SOGS-M) beyond one study comparing the SOGS and MOGS in which Laudergeran (1992) stated that the original SOGS should be used and does not recommend further use of the MOGS (SOGS-M).

## **GAMBLERS ANONYMOUS 20 QUESTIONS (GA-20)**

Gamblers Anonymous (GA) disseminates 20 questions (GA-20) for the purpose of identifying compulsive gamblers. A score of 7 or higher indicates that the respondent is a compulsive gambler. The items address behaviors related to compulsive gambling, such as remorse over gambling, gambling to forget problems, borrowing money to gamble, difficulty sleeping, etc. Rosenthal (1989) found that six out of twelve professionals he surveyed used the GA-20 in their assessment work. Although the GA-20 is commonly used, there is little psychometric and classification accuracy information available. Ursua and Uribe Larrea (1998) note that there are no published reports describing the development of the GA-20 and only two studies that report any psychometric information. In terms of validity, Kuley and Jacobs (1988) report that the GA-20 yielded high correlations with frequency of gambling and with dissociative experiences. Derevensky and Gupta (2000) used the GA-20 as one of three instruments to classify 980 adolescents in a study on comparative diagnosis. They reported that the GA-20 was significantly correlated with the SOGS-RA ( $r=.61$ ) and DSM-IV-J ( $r=.68$ ). The GA-20 demonstrated satisfactory classification accuracy, using DSM-IV-J as the standard, with the following rates: true positive=96%; false negative=0.6%; and false positive=3.3%.

Ursua and Uribe Larrea (1998) conducted a study of the psychometric properties of the GA-20 in a sample of 127 problem gamblers who came for treatment at two self-help associations in Madrid, Spain and a normative sample of 142 non-problem social gamblers matched on age and gender with the problem gamblers. The internal consistency of the GA-20, using Cronbach's (1951) coefficient alpha was .94, indicating high internal consistency. In terms of validity, the GA-20 was highly correlated with the SOGS ( $r=.94$ ), and the authors noted that both instruments have a number of items that are virtually identical. A factor analysis revealed that the GA-20 is a unidimensional instrument with one factor accounting for over 50% of the variance. The GA-20 was found to clearly differentiate the problem gamblers from the social gamblers and the classification accuracy indices were high, with a

sensitivity of .98, specificity of .99, and a hit rate of .99. It should be noted that these classification accuracy indices are based upon a sample with a base rate of about 50% and this base rate tends to inflate classification accuracy indices. Typically, a screening instrument would be used in a prevalence survey, where the base rate would most likely be less than 5%, in which case, classification accuracy indices would be attenuated (Baldessarini, Finklestein, & Arana, 1983). Nevertheless, this is an informative first study of the psychometric properties of the GA-20.

## **INVENTORY OF GAMBLING BEHAVIOR (IGB)**

The IGB was developed in 1982 by the National Foundation for the Study and Treatment of Pathological Gambling in Washington, DC. The content of the IGB includes questions about home life adolescent gambling, legal difficulties, and psychological problems such as insomnia, and suicide attempts. Some of the items represent behaviors identified from clinical research conducted by Custer (1982), Custer and Custer (1978; 1981), and Moran (1979). The IGB was reduced from 122 items to 81 items with item and factor analyses by Zimmerman, Meeland, and Krug (1985). The IGB includes a list of diagnostic and indicative signs of Pathological Gambling, based on DSM-III diagnostic criteria and the GA-20 questions. The IGB yields 8 factors related to the development of gambling pathology, however, only five factors were found to discriminate between compulsive gamblers and non-gamblers (Zimmerman, Meeland, & Krug, 1985). The five factors are: neurotic gambling, psychopathic gambling, impulsive gambling, white collar crime, and employment problems. There is little information about the reliability and validity of the IGB.

## **CUMULATIVE CLINICAL SIGNS METHOD (CCSM)**

Culleton (1989) developed the Cumulative Clinical Signs Method (CCSM) as an alternative to the SOGS. The CCSM is based on the Inventory of Gambling Behavior (IGB) described above. Culleton (1989) reports that he selected 29 items from the IGB, however, a copy of the items in the original article only lists 23 items. These items were organized into five tests of similar content: (a) personal; (b) interpersonal; (c) vocational; (d) financial; and (e) "hard" signs test. These five "tests" comprise the CCSM. A positive endorsement any item within a test equals a score of one on that test. Therefore, the CCSM is scored by summing across these five tests and the score range is from 0 to 5.

A diagnosis of Pathological Gambling is estimated with an odds ratio and it appears that a score of 3 or more is indicative of Pathological Gambling. Culleton reports that the odds ratios and classification accuracy indices for the CCSM vary by the population that is being surveyed. Culleton reports applying the CCSM to estimate the prevalence rate of gambling in the Delaware Valley and Ohio (Culleton, 1989) and found the positive predictive value to be 96.7% in the Delaware sample and 96.6% in the Ohio sample. The prevalence rates were 3.25% probable Pathological Gamblers in the Delaware Valley, and 2.41% probable Pathological Gamblers in Ohio.

In comparing the CCSM to the SOGS, Culleton (1989) points out that the application of a screen to estimate the prevalence of a disease is the opposite of the standard epidemiological approach and he applies this criticism to the New York prevalence study that was based on the SOGS screen (Volberg & Steadman, 1988). Culleton criticizes prevalence studies based on the SOGS for failing to compensate for false positive misclassifications. He also suggests that the odds ratio methodology of the CCSM provides a method of predicting errors that is independent of the prevalence rate. The odds ratio is the probability of correctly identifying Pathological Gambling when the disorder is present divided by the probability of incorrectly identifying Pathological Gambling when the disorder is not present.

Volberg and Banks (1990) compared the CCSM and SOGS measures of Pathological Gambling. They point out that both the CCSM and SOGS were developed in the same manner and that the SOGS sensitivity and specificity rates are very high. As a result, the SOGS requires very little adjustment of estimated prevalence rates. Volberg and Banks (1990) also point out two flaws in Culleton's (1989) odds ratio approach to predicting errors. First, although the odds ratio itself is independent of the prevalence rate, the predicted number of errors is dependent on the prevalence rate. Second, the assumption of statistical independence of the test items, on which the odds ratios are calculated, is not valid for the CCSM items. They also point out that the SOGS has been selected as the best available method by a wide variety of researchers and has become the de facto standard for gambling prevalence measurement. The CCSM has found limited usage as a gambling screen and there is no published reliability and validity data.

## **MASSACHUSETTS GAMBLING SCREEN (MAGS)**

The Massachusetts Gambling Screen (MAGS), a brief screening instrument, was developed by Shaffer, LaBrie, Scanlon, and Cummings (1994). It was designed to measure the gambling problems of excessive gamblers and to obtain an estimate of the prevalence of Pathological Gambling. It was first used in a 1993 study of adolescents, however, it was developed for both adolescents and adults. The MAGS inquires about behavior during the past year. The MAGS includes 14 items adapted from the Short Michigan Alcoholism Screening Test (SMAST), an alcoholism screen developed by Selzer, Vonokur, and van Rooijen (1975). In the MAGS development study, a measure of DSM-IV diagnostic criteria for Pathological Gambling was also developed, consisting of 12 items. The MAGS classifies respondents into non-problem, in-transition, or Pathological Gamblers using a weighted scoring derived from a discriminant function analysis. The 7-item MAGS scale had an internal consistency reliability coefficient alpha of .84. In terms of validity, the MAGS total discriminant score obtained a high correlation ( $r=.83$ ) with total DSM-IV score.

### **DSM-IV-MR (MR=MULTIPLE RESPONSE)**

Fisher (2000a) developed a 10-item questionnaire to measure DSM-IV diagnostic criteria of Pathological Gambling in adults. There is one item for each criterion and the items are essentially paraphrased directly from the DSM-IV criteria. Most items have four response options: (1) never; (2) once or twice; (3) sometimes; and (4) often. Each item is scored as one point, and the score range is from 0 to 10. A score of 3 or 4, including at least one point from item/criteria 8, 9, or 10, is classified as a problem gambler and a score of 5 or more is classified as a severe problem gambler. The DSM-IV-MR was administered to 1105 casino patrons in the UK. Internal consistency reliability was satisfactory with an alpha=.79. In terms of validity, the DSM-IV-MR had significantly different mean scores between regular and non-regular gamblers and between self-identified problem and social gamblers. Regular gamblers were those who visited casinos once a week or more often and non-regular gamblers visited casinos less often.

### **DIAGNOSTIC INTERVIEW FOR GAMBLING SCHEDULE (DIGS)**

The Diagnostic Interview for Gambling Schedule (DIGS) is a structured clinical interview developed by Winters, Specker and Stinchfield (1997). The DIGS was developed to assist with

diagnosing Pathological Gambling and determining need for more assessment and for treatment planning. The DIGS includes demographics, gambling involvement, treatment history, onset of gambling, gambling frequency, amounts of money bet and lost, sources of borrowed money, financial problems, legal problems, mental health screen, other impulse disorders, medical status, family and social functioning, and diagnostic symptoms (lifetime and past year). The DIGS includes 20 diagnostic symptom items to measure the ten DSM-IV diagnostic criteria. There are two items per criterion and the items were paraphrased from the criteria. The DIGS has undergone some preliminary psychometric analyses including internal consistency and validity estimates. The DSM-IV diagnostic criteria items demonstrated good internal consistency ( $\alpha=.92$ ). The total diagnostic score (range 0-10) exhibited moderate and statistically significant correlations with the following measures of gambling problem severity: gambling frequency  $r=.39$ ; highest amount gambled in one day  $r=.42$ ; current gambling debt  $r=.47$ ; number of financial problems  $r=.40$ ; number of borrowing sources  $r=.31$ ; and legal problems  $r=.50$ .

## **GAMBLING TREATMENT OUTCOME MONITORING SYSTEM (GAMTOMS)**

The Gambling Treatment Outcome Monitoring System (GAMTOMS) was developed in 1992 by Stinchfield and Winters (1996; in press) to evaluate the effectiveness of state-funded gambling treatment programs in Minnesota. The GAMTOMS is a multi-instrument and multidimensional assessment system that is made up of the following instruments: (a) Gambling Treatment Admission Questionnaire; (b) Primary Discharge Questionnaire; (c) Client Follow-up Questionnaire; (d) Staff Discharge Form; (e) Significant Other Intake Questionnaire; and (f) Significant Other Follow-up Questionnaire. The Gambling Treatment Admission Questionnaire includes a ten-item measure of DSM-IV diagnostic criteria for Pathological Gambling, as well as other measures of gambling problem severity, including the SOGS, gambling frequency, gambling-related financial problems, and legal problems. Stinchfield (1999a; 1999b) reported on the reliability and validity of the GAMTOMS with the original treatment sample of over 1,000 clients from the Minnesota gambling treatment outcome study (Stinchfield & Winters, 1996). Internal consistency reliability was measured with Cronbach's alpha for the following scales from the Gambling Treatment Admission Questionnaire: DSM-IV diagnostic criteria ( $\alpha=.89$ ), SOGS ( $\alpha=.85$ ), and financial problems ( $\alpha=.78$ ). Convergent

validity of the DSM-IV diagnostic criteria was measured by correlations with the following measures of gambling problem severity: SOGS ( $r=.83$ ); gambling frequency ( $r=.43$ ); and number of financial problems ( $r=.40$ ). Discriminant validity of the DSM-IV was examined by measuring correlations between the DSM-IV diagnostic criteria and variables that should not be related to gambling problem severity, such as client age ( $r=.02$ ); gender ( $r=.15$ ); and education ( $r=.14$ ).

The GAMTOMS was recently evaluated for reliability, validity, classification accuracy, and validity of client self-report with a sample of 74 gambling treatment clients (Stinchfield, Winters, Botz & Jerstad, 2001). Two types of reliability were examined: temporal stability and internal consistency. Temporal stability of the Gambling Treatment Admission Questionnaire was examined with a one-week test-retest procedure. The Gambling Treatment Admission Questionnaire was administered at admission to treatment and re-administered one week later. Gambling frequency for 14 different games showed satisfactory one-week test-retest reliability with correlations ranging from  $r=.52$  to  $r=.97$  with an average test-retest correlation of  $r=.83$ . The test-retest coefficients for DSM-IV diagnostic criteria score was  $r=.74$ , SOGS was  $r=.90$ , financial problems was  $r=.93$ , and legal problems was  $r=.91$ . The results indicate good to excellent temporal stability. Estimates of internal consistency were as follows: gambling frequency ( $\alpha=.72$ ), DSM-IV diagnostic criteria ( $\alpha=.61$ ), SOGS ( $\alpha=.79$ ), financial problems ( $\alpha=.76$ ), and legal problems ( $\alpha=.61$ ).

In terms of validity, the GAMTOMS gambling frequency section demonstrated modest correlations with a version of the Time-Line Follow-Back (Sobell, Sobell, Maisto, & Cooper, 1985) adapted to measure gambling frequency ( $r=.53$ ), SOGS ( $r=.47$ ), and DSM-IV ( $r=.36$ ). The DSM-IV diagnostic criteria score was correlated with the SOGS ( $r=.63$ ). Scales, including gambling frequency, DSM-IV diagnostic criteria, SOGS, financial problems and legal problems, were also found to discriminate well between a clinical and non-clinical sample. The DSM-IV diagnosis of Pathological Gambling yielded the following classification accuracy indices using group membership as the criterion (clinical versus non-clinical): base rate=.20; hit rate=.96; sensitivity=.96; specificity=.95; false positive rate=.01; and false negative rate=.14. The DSM-IV diagnosis of Pathological Gambling yielded the following classification accuracy indices using SOGS classification as the criterion: base rate=.79; hit rate=.98; sensitivity=.97; specificity=1.00; false positive rate=.00; and false negative rate=.10.

The validity of client self-report on the GAMTOMS has also been reported, including inter-

item consistency, comparison of client report to public bankruptcy records, public criminal records, and significant other reports. There was a high degree of consistency in client answers between similar items and this consistency ranged from 77% agreement to 96% agreement. There was a high degree of concordance between client self-report of bankruptcy and the public bankruptcy records with 84% agreement and between client self-report of arrests and public criminal records with 89% agreement. Most correlations between client and significant other were in the range from  $r=.32$  to  $r=.63$ . Overall, there was consistent agreement between client self-report and other sources of information lending evidence for the validity of client self-report (Stinchfield, Winters, Botzet, & Jerstad, 2001).

### **NATIONAL OPINION RESEARCH CENTER DSM-IV SCREEN FOR GAMBLING PROBLEMS (NODS)**

The most recent U.S. national survey was conducted in 1998 by the National Opinion Research Center (1999) of the University of Chicago. This study was contracted for by the National Gambling Impact Study Commission. After reviewing existing instruments, the research team developed a diagnostic measure based on DSM-IV diagnostic criteria. The 17 questions matched the DSM-IV diagnostic criteria for diagnosing Pathological Gambling (American Psychiatric Association, 1994) and are referred to as the NORC DSM-IV Screen for Gambling Problems (NODS).

The 17-item NODS matches the ten DSM-IV criteria and some criteria are measured with two items and some are measured with one item. The NODS includes both a lifetime and past year time frame. The past year item is asked only if the lifetime item is answered with a positive response. The NODS score ranges from 0 to 10. The diagnostic portion of the survey was administered if the respondent reported gambling losses greater than \$100 in one day or over the past year.

Little is known about the psychometric properties of the NODS. The authors reported that field testing was conducted with a clinical sample prior to its use in the national survey. In terms of validity, the NODS was administered to 40 individuals in outpatient problem gambling treatment programs. Of these 40, 38 scored 5 or more on the lifetime NODS and two obtained scores of 4. For past year NODS, 30 scored 5 or more, five scored 3 or 4, and five scored 2 or less. In terms of reliability, the authors do not report internal consistency coefficients. The authors report test-retest

coefficients of  $r=.99$  and  $r=.98$  for lifetime and past year, respectively. The test-retest period was between 2 to 4 weeks and the sample size was 44 subjects, some of whom were from the treatment sample used for validity analyses and the other subjects are not described. Interpretation of NODS scores, for respondents who have gambled and lost more than \$100, is as follows: a score of 0 is considered a Low-Risk Gambler; scores of 1 or 2 is an At-Risk Gambler; scores of 3 or 4 is a Problem Gambler; and scores of 5 or more is a Pathological Gambler.

There are two concerns about the NODS divergence from DSM-IV criteria. First, the filtering question of losing \$100 or more was used because pretesting suggested that respondents who were “non-gamblers and very infrequent gamblers grew impatient with repeated questions about gambling related problems”. However, the loss of a certain dollar amount is not part of the DSM-IV criteria and it would seem that a more appropriate filtering question is whether the respondent has gambled at all in the past year. Second, the use of time period and frequency parameters added to the criteria, such as “past two weeks” and “three or more times” are not present in the DSM-IV and therefore need to be explained or justified.

## **LIE/BET QUESTIONNAIRE**

The Lie/Bet Questionnaire is a 2-item screen for Pathological Gambling developed by Johnson, Hamer, Nora, Tan, Eisenstein, and Engelhart (1997). The 2 items were selected from a 12-item questionnaire based upon DSM-IV diagnostic criteria for Pathological Gambling (American Psychiatric Association, 1994). The following two items were found to be the best discriminators between problem gamblers and controls: (1) “Have you ever had to lie to people important to you about how much you gambled?” and (2) “Have you ever felt the need to bet more and more money?”. The investigators found that this two-item screen had a sensitivity of .99, specificity of .91, positive predictive power was .92, and negative predictive power was .99 in comparing 191 male GA members and 171 male non-problem gambling controls who were Department of Veterans Affairs employees. Additional classification accuracy data was computed on a new sample that included 295 men (116 problem gamblers and 179 controls) and 128 women (30 problem gamblers and 98 controls) (Johnson, Hamer, & Nora, 1998), and sensitivity was 1.00, specificity was .85, positive predictive power was .78, and negative predictive power was 1.00. The authors acknowledge that the

classification accuracy is maximized by this comparison where the base rate is close to 50% and that the test will not be as accurate in screening for Pathological Gambling among the general population because of the differences in baseline rates of Pathological Gambling between the development sample and the general population where the base rate may be close to only 1%. No reliability or other types of validity information are provided.

The authors state that the items are based upon DSM-IV diagnostic criteria for Pathological Gambling, however, the items are not exact paraphrases of the criteria and appear to add and delete content that may affect item response. The first question, “Have you ever had to lie to people important to you about how much you gambled?” (underline added) is purported to represent the DSM-IV criterion, “lies to family members, therapist, or others to conceal the extent of involvement with gambling”, however, the addition of the words “had to” would appear to change the content of question and add a notion of “force” or “required” or “compelled” that is not present in the criterion. There are likely to be respondents who lie about their gambling, but may not feel they “had to” lie. The second question has dropped the portion of the criterion that indicates the reason for betting more money, that is, “. . . in order to achieve the desired excitement” (American Psychiatric Association, 1994). This addition and deletion of content may, at first glance, appear to be minor syntax issues, however, the items diverge from the criteria and this raises a concern of their accuracy as measures of DSM-IV diagnostic criteria.

## **DIAGNOSTIC INTERVIEW SCHEDULE (DIS) PATHOLOGICAL GAMBLING MODULE (GAM-IV)**

The GAM-IV module of the DIS is in the early stage of pilot testing and no psychometric information is available at this time. An earlier DSM-III based DIS included a gambling module, however, not all of the DIS questions matched DSM-III criteria and not all criteria were assessed (Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998). Furthermore, this secondary analysis of data collected in 1981, did not report any psychometric information. To satisfy DIS criteria for Pathological Gambling, respondents had to have gambled at least twice in their lives; thought they gambled too much; and reported two or more of the following problems due to their gambling: (a) inability to pay bills; (b) trouble at home or work; and (c) borrowing or stealing money.

## CANADIAN PROBLEM GAMBLING INDEX (CPGI)

The rationale of the development of the CPGI was to develop a new, more meaningful measure of problem gambling for use in general population surveys with more indicators of the social and environmental context of gambling and problem gambling (Ferris & Wynne, 2001). Problem gambling was defined as gambling behavior that creates negative consequences for the gambler, others in his or her social network, or for the community. The CPGI was developed after a review of the literature and existing problem gambling instruments. The CPGI includes 31 items, nine of which can be scored to a measure of problem gambling. The nine problem gambling items have four response options: never=0; sometimes=1; most of the time=2; and almost always=3. The CPGI problem gambling total score is the sum of all nine items and the score ranges from 0-27. The CPGI problem gambling scale yields five categories: (1) no gambling and score of 0 indicates Non-Gambling; (2) gambling and score of 0 indicates non-problem gambling; (3) score of 1-2 indicates Low Risk Gambling; (4) score of 3-7 indicates Moderate Risk Gambling; and (5) a score of 8 or more indicates problem gambling. The cut scores and categories were determined “with respect to the distribution of scores on the problem gambling continuum . . . and more research is necessary in order to provide a strongly supported division between low and moderate risk groups” (p. 42, Ferris & Wynne, 2001). The other CPGI items measure gambling involvement (types of gambling activity, frequency, spending), and correlates problem gambling that can be used to develop profiles of different types of gamblers or problem gamblers, the social and environmental context of the gambler (e.g. family background of gambling, alcohol or drug problems, exposure to stimulus from which individual wishes to escape), and predispositions of the gambler (co-morbidity, distorted cognitions).

The CPGI was pilot tested on 143 people who represented three distinct groups: general population, regular gamblers, and self-designated problem gamblers in treatment. The CPGI was then further tested as a general population survey of 3,120 Canadian adults, and this included a test-retest reliability component of 417 respondents from the general population survey and clinical validation interviews with 143 respondents from general population survey. The CPGI nine-item problem gambling scale demonstrated satisfactory reliability with estimates of internal consistency of Cronbach  $\alpha$  = .84 and a four-week test-retest correlation of  $r$  = .78. The CPGI demonstrated satisfactory validity by discriminating between different groups and strong correlations with other concurrent

measures of gambling behaviors such as gambling frequency, time spent gambling, and amount of money spent gambling. The CPGI was highly correlated with the SOGS ( $r=.83$ ), DSM-IV ( $r=.83$ ), and modestly correlated with the results of clinical interviews ( $r=.48$ ). The correlations of the CPGI with the SOGS and DSM-IV diagnostic criteria should be interpreted with caution, because of the overlap in content between the CPGI and the DSM and SOGS. Specifically, five of the CPGI items are identical or similar to SOGS items and two CPGI items are identical or similar to DSM-IV Pathological Gambling diagnostic criteria, and one CPGI item overlaps both the SOGS and DSM-IV. Therefore, eight of the nine CPGI problem gambling items share content with the SOGS and DSM-IV. The CPGI problem gambling items overlap with SOGS and DSM-IV and therefore this overlap in content must be considered when interpreting the validity coefficients between the CPGI and SOGS and DSM-IV. The CPGI classification accuracy was measured against DSM-IV and sensitivity was .83 and specificity was 1.00. Again, these estimates of classification accuracy should be interpreted with caution, due to the overlap in content between the CPGI and DSM Pathological Gambling diagnostic criteria. The CPGI prevalence rate for problem gambling among the Canadian general population survey was 0.9% and this fell between the SOGS probable Pathological Gambler rate of 1.3% and the DSM-IV Pathological Gambling rate of 0.7% for the same sample.

## **GAMBLING BEHAVIOR INTERVIEW (GBI)**

The Gambling Behavior Interview (GBI) is a 76-item instrument to measure signs and symptoms of Pathological Gambling. It was first designed in 1995 as an instrument to collect reliability, validity, and classification accuracy data on the SOGS and DSM-IV diagnostic criteria (Stinchfield, in press). It is in the process of being further revised in a study to examine the reliability, validity, and classification accuracy of the DSM-IV diagnostic criteria. This study involved an examination of signs and symptoms of problem gambling that were generated from both a literature review and focus groups of problem gamblers and family members of problem gamblers. The goal was to determine if there are additional signs and symptoms of Pathological Gambling beyond those listed in the DSM-IV that are useful for diagnosis, clinical assessment, and treatment planning. The GBI includes measures of demographics, attitudes about gambling, gambling frequency, amount of time and money spent gambling, SOGS, DSM-IV diagnostic criteria, as well as DSM-III and III-R diagnostic criteria that are not redundant with the SOGS or DSM-IV. The GBI includes 32 research items, seven items were

generated from a literature review and 25 items were generated from focus groups.

The GBI uses standard scoring of the SOGS and DSM-IV diagnostic criteria and these scales serve as “gold” standards for comparison of research items. The GBI was pilot tested on a sample from a gambling treatment program and a sample from the general population and the research items were found to be good discriminators between the gambling treatment sample and general population sample. Preliminary results suggest that these research items improved the reliability, validity and classification accuracy of the DSM-IV diagnostic criteria when discriminating the gambling treatment sample from the general populations sample. The report on this recent study will be available before the end of 2001. The scale is still under development and further assessment of its psychometric properties and refinement of its items is planned.

## **YOUTH INSTRUMENTS**

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### **SOUTH OAKS GAMBLING SCREEN-REVISED FOR ADOLESCENTS (SOGS-RA)**

Winters, Stinchfield, and Fulkerson (1990; 1993a) revised the SOGS for an adolescent sample. At the time (i.e., 1990), there was no well-researched instrument to identify adolescent problem gamblers. Jacobs (1989) had used Gamblers Anonymous 20 questions in a youth study and Lesieur and Klein (1987) used DSM-III based questions for their youth survey, but neither study reported detailed psychometric information on either instrument. Therefore, Winters, Stinchfield and Fulkerson revised the most commonly used adult instrument of the day, the SOGS, for adolescents and it is called the SOGS-Revised Adolescents or SOGS-RA. The investigators revised the SOGS by using a past 12-months time frame, changing the wording of items and response options to better reflect adolescent gambling behavior and youth reading levels, eliminating two items that were viewed as having poor content validity for adolescents, and giving only one point for any source of borrowed money rather than the nine possible points for nine separate sources of borrowed money as is done with the SOGS. The SOGS-RA consists of 12 items and a copy of the SOGS-RA can be found in

Winters, Stinchfield, & Fulkerson (1993a). Reliability and validity coefficients were computed on 46 males aged 15-18. The SOGS-RA internal consistency reliability was  $\alpha=.80$ . In terms of validity, the SOGS-RA was correlated with gambling activity ( $r=.39$ ), gambling frequency ( $r=.54$ ) and amount of money gambled in past year ( $r=.42$ ) (Winters, Stinchfield, & Fulkerson, 1993a). Since its development, the SOGS-RA has been used in a number of youth gambling surveys, including Ontario (Govoni, Rupcich, & Frisch, 1996), Louisiana (Westphal, Rush, Stevens, & Johnson, 2000), Manitoba (Wiebe, 1999; Wiebe, Cox, & Mehmel, 2000), Atlantic provinces of Canada (Poulin, 2000), and Oregon (Carlson & Moore, 1998).

For measuring problem gambling among youth, the research community has tended to be more lenient with diagnostic criteria and cut scores than they are with adults. Two scoring procedures have been used with the SOGS-RA, however, neither system has received extensive psychometric and classification accuracy analyses. These two scoring systems that have come to be referred to as the SOGS-RA “broad” and “narrow” criteria (Winters, Stinchfield, & Fulkerson, 1990; 1993b; Winters, Stinchfield, & Kim, 1995). The broad criteria is based on a combination of gambling frequency and SOGS-RA score. To be classified as a problem gambler under the broad criteria, the respondent has to gamble at least weekly and obtain a SOGS-RA score of two or more; or gamble daily, regardless of SOGS-RA score (Winters, Stinchfield, & Fulkerson, 1993b). Under the SOGS-RA narrow criteria, a cut score of four or more indicates a problem gambler, a score of 2-3 indicates an at-risk gambler, and a score of 0-1 is no problem gambler (Winters, Stinchfield, & Kim, 1995).

Because these two sets of SOGS-RA scoring criteria have caused some confusion, it is important to address the problems associated with the broad criteria. The SOGS-RA broad criteria is problematic for a number of reasons. First, Winters and Stinchfield moved from the broad criteria in 1993 to the narrow criteria in 1995 because of dissatisfaction with the broad criteria; and re-analyzed the original 1990 Minnesota data using the narrow criteria. Second, the broad criteria are not exhaustive of all patterns of gambling problem severity. This is due to the fact that not all patterns were present in the original Winters, Stinchfield and Fulkerson (1990; 1993b) data, and, to the fact, that the response options for gambling frequency items were limited to daily, weekly, monthly, less than monthly, and not at all. Gambling more often than weekly and less often than daily is missing from the broad criteria, such as gambling between two and six days per week. Third, most recent studies that have used the SOGS-RA have used the narrow criteria and there appears to be a consensus among

most users of the SOGS-RA that the narrow criteria are preferred over the broad criteria. Fourth, the broad criteria are probably “too broad”. The SOGS-RA broad criteria define problem gambling as daily gambling and this is a questionable criterion for problem gambling and is not found in either the SOGS or DSM. For example, does buying one lottery ticket per day (i.e., daily gambling) indicate problem or Pathological Gambling? The broad criteria considers a score of 2 as problem gambling and given that it is fairly easy to endorse two SOGS-RA items, particularly the subjective items, this also seems to be too low a threshold for problem gambling. The narrow criteria cut-score of 4 is similar to the SOGS and DSM-IV cut-scores of five. Fifth, the SOGS was originally intended to correlate with diagnostic criteria for Pathological Gambling and this is how most SOGS users interpret a SOGS cut-score, whereas, the SOGS-RA broad criteria are not close to that level of problem severity. Sixth, although some convergent validity information was reported for the broad criteria in the original SOGS RA study, it did not provide any classification accuracy information. Seventh, a minor additional point about the SOGS-RA broad criteria is that the category “no problem gambling” is misleading because it suggests that all cases in this category are gamblers when in fact this category includes non-gamblers. For these reasons, it is recommended that the SOGS-RA narrow criteria be used rather than the broad criteria for identifying adolescent problem gamblers.

### **DSM-IV-J AND DSM-IV-MR-J (J=JUVENILE) (MR=MULTIPLE RESPONSE)**

Fisher (1992) developed a 9-item questionnaire to measure DSM-IV diagnostic criteria of Pathological Gambling in juveniles and it was the first adaptation of DSM-IV criteria for youth. The DSM-IV-J has been used in a number of studies around the world to measure Pathological Gambling among youth, including Britain (Fisher, 1993, 1995, 1999; Wood & Griffiths, 1998), Spain (Becona, 1997), and Canada (Derevensky & Gupta, 2000; Gupta & Derevensky, 1998). The DSM-IV-J has yes/no response options and it has recently been revised by using multiple response options and is now called the DSM-IV-MR-J (Fisher, 2000b). There is one item for each DSM-IV criteria and the items are adapted from the DSM-IV criteria to reflect the developmental stage of youth. Fisher simplified the language and omitted details that were less relevant for youth. Fisher excluded criterion 10, because “young problem gamblers tend to resolve desperate financial situations caused by gambling by illegal methods (incorporated in item 8)” (Fisher, 2000b, p. 258). Eight of the nine items have four response

options: (1) never; (2) once or twice; (3) sometimes; and (4) often. Each item is scored as one point, and Fisher (2000b) has a scoring system for the set of response options for each item. The score range is from 0 to 9 and a score of 4 or more is classified as a problem gambler. A factor analysis indicated a unidimensional scale with satisfactory internal consistency reliability ( $\alpha=.75$ ). In terms of validity the DSM-IV-MR-J had significantly different mean scores between regular and non-regular gamblers and between problem and social gamblers. Respondents classified as problem gamblers by the DSM-IV-MR-J also tended to play more games regularly, spend more money, borrow to fund their gambling, and sell their possessions to fund their gambling. The readability level of the DSM-IV-MR-J test questions are reported to be at the 5<sup>th</sup> grade level.

There are two concerns about the DSM-IV-MR-J. First, item #3, “In the past year have you ever spent much more than you planned to on gambling?”, does not appear to match or concur with the DSM-IV criterion it is intended to measure. The criterion is “Made repeated unsuccessful efforts to control, cut back, or stop gambling”, however, there is nothing in item #3 about attempting to control or stop gambling. Second, the exclusion of DSM-IV criterion #10 seems premature at this point. Granted, it is likely a small number of youth who will rely on others to pay their gambling debts, however, it is known that parents have paid the gambling debts of their children. Criterion #10 seems relevant for youth, and until proven otherwise, it should not be excluded from an instrument intended to measure DSM-IV diagnostic criteria. Therefore, the DSM-IV-MR-J appears to measure eight of the ten DSM-IV criteria and lacks items to measure criteria #3 and #10.

## **PATHOLOGICAL GAMBLING SIGNS INDEX (PGSI)**

Although this instrument appears to have been used in at least two studies of high school students (Lesieur & Klein, 1987), one of which was a french version of the instrument (Ladouceur & Mireault, 1988), there is no description of the instrument’s psychometric properties and therefore it cannot be evaluated.

# CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

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In response to a clear need for instruments to detect and measure problem gambling a variety of instruments have been developed. The SOGS continues to be a commonly used instrument and has accumulated the largest volume of psychometric research to date, but new DSM-based instruments are generating a good deal of research momentum. For example, the DSM criteria have been operationalized into diagnostic instruments that are used to diagnose clients in gambling treatment programs (DIGS), used to measure gambling treatment outcome (GAMTOMS), and used to measure prevalence rates of Pathological Gambling in epidemiological surveys (e.g., NODS and DIS).

As this review has shown, many instruments have little information on their psychometric properties and, in particular, there has been a lack of rigorous research on the classification accuracy of these instruments. This may, in part, explain the wide range of prevalence estimates reported in the meta-analysis of gambling surveys reported by Shaffer, Hall, and Vander Bilt (1997). Most instruments described above have been developed for clinical purposes but have often been used for other purposes and populations. The psychometric properties of an instrument need to be investigated for the different settings and populations for which it is applied. The classification accuracy of an instrument is affected by the base rate of the disorder within the population, and therefore an instrument developed to measure Pathological Gambling in a clinical sample will likely have different rates of classification accuracy when applied to the general population. The current state of affairs makes it difficult for a clinician or researcher to select a psychometrically sound instrument that will measure problem gambling in a population of interest. A variety of steps need to be taken to address these issues. Specific recommendations are provided below.

First, existing instruments need to be put to rigorous psychometric evaluation and this research will build a body of evidence for (or against) the reliability, validity, and classification accuracy of existing instruments. Research on the psychometric properties of these instruments needs to be conducted for the settings and populations in which they are used. This research will justify the continued use of those instruments found to be reliable, valid, and accurate, and will serve to revise and

refine those instruments found lacking.

Second, new instruments need to be developed for the assessment of problem gambling among specific populations, such as youth and seniors. For example, it would be important to develop a youth problem gambling screening instrument that takes into account the developmental issues of youth. Fisher (2000b) has called for a concerted effort to develop and evaluate problem gambling instruments specifically for youth.

Third, investigators need to be methodical and use scientific standards for test development. It is recommended that investigators and test users follow the standards for testing set forth by the American Educational Research Association, American Psychological Association, and National Council on Measurement in Education (1999). These guidelines describe technical standards for test construction and evaluation, including reliability and validity. The use of these guidelines will facilitate the development of psychometrically sound instruments that will be recognized as standards in the field.

Fourth, DSM-IV diagnostic criteria for Pathological Gambling are used to make clinical, scientific, and public policy decisions without adequate evidence of the reliability, validity, and accuracy of these criteria. The DSM-IV diagnostic criteria is the accepted standard for the identification of Pathological Gambling, but it is based primarily on clinical experience and expert group consensus. There continues to be debate about the adequacy of definitions and diagnostic criteria of Pathological Gambling (National Research Council, 1999; Rosenthal, 1989; Shaffer, Hall, & Vander Bilt, 1997). In spite of the fact that the DSM diagnostic criteria are the primary tool for diagnosing Pathological Gambling, and the fact that the criteria are regularly revised with each new edition of the DSM, there is little empirical data on the reliability and validity of the DSM diagnostic criteria for Pathological Gambling. Lesieur and Rosenthal (1991) conducted a comprehensive literature review of Pathological Gambling for the DSM-IV committee and found little data other than clinician opinions and anecdotal reports about the diagnostic criteria. They did not report on any psychometric studies measuring the reliability or validity of the diagnostic criteria, presumably because no such studies existed. In the recent meta-analysis of disordered gambling prevalence in the U.S. and Canada by Shaffer, Hall, & Vander Bilt (1997), it was reported that the DSM diagnostic criteria have been used to measure the prevalence of Pathological Gambling in different samples, however, no studies reported the reliability or validity of the diagnostic criteria. In contrast, other disorders in the DSM, for example, substance use disorders,

have extensive reliability and validity information from a number of studies. Therefore, two of the most pressing questions in the field of Pathological Gambling are: What diagnostic criteria should be used to diagnose Pathological Gambling and are the criteria reliable, valid, and accurate?

There continues to be debate about what DSM cut score yields the most accurate classification. The cut score was raised from four to five between DSM-III-R and DSM-IV. A recommended research direction is to explore if there are other signs and symptoms of Pathological Gambling, that if added to the current diagnostic criteria, would improve reliability, validity, and classification accuracy. DSM-IV diagnostic criteria includes the condition to rule out a manic episode. This condition should be put to empirical test to determine how often a manic episode is a better explanation for gambling behavior and if the condition is an important criterion for the diagnosis of Pathological Gambling.

The debate about DSM cut scores also raises the issue of those individuals who exhibit signs and symptoms of Pathological Gambling, but who do not satisfy the requirement of five diagnostic criteria. Research needs to be conducted on those individuals who show gambling problems but do not meet diagnostic criteria for Pathological Gambling. Lesieur and Rosenthal (1993) have suggested lowering the cut score to four, and exploring the creation of another category for individuals who show symptoms of Pathological Gambling but are sub-threshold for Pathological Gambling, similar to the “abuse” category in substance use disorders. Shaffer, Hall, & Vander Bilt (1997) have also suggested a multilevel classification system for disordered gambling. More information is needed to specifically define and operationalize this subclinical category and determine the appropriate criteria and cut score.

Psychometric research on measures of Pathological Gambling will lead to refinement of measurement tools and greater precision, which is the mark of good science. After a body of research has been generated, the goal of a “gold standard” instrument(s) to measure Pathological Gambling, or at least one that receives favorable consensus, will be achieved.

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## APPENDIX

| <b>Table 1 - Descriptions of Instruments</b>   |   |  |   |   |
|--|---|--|---|---|
| <b>Name of Instrument (year)</b>               | <b>Content Areas</b>  | <b>Number of items</b>                 | <b>Administration Time and Method</b>     | <b>Scoring instructions, score range, cut-scores, and interpretation of scores</b>  |
| 1. South Oaks Gambling Screen (SOGS) (1987)    | Games played; signs and symptoms of problem gambling; negative consequences; sources of money to gamble   | 20 scored items                        | 10-20 minute paper & pencil questionnaire | One point for each item; score range 0-20; score of 5 or more indicates probable Pathological Gambler   |
| 2. Gamblers Anonymous 20 questions (GA-20)     | Signs and symptoms of compulsive gambling; negative consequences  | 20                                     | 10 minute paper-pencil or interview       | One point for each item; score of 7 or more indicates compulsive gambler  |
| 3. Massachusetts Gambling Screen (MAGS) (1994) | signs and symptoms of Pathological Gambling; psychological and social problems associated with gambling; this study also included a 12-item measure of DSM-IV diagnostic criteria | 14-item MAGS (7 MAGS items are scored) | 5-10 minute paper-pencil questionnaire    | 7 MAGS items are scored by multiplying each item times a discriminant function coefficient; then sum and add a constant; Score between 0-2 = Transitional or Potential Pathological Gambler; score >2 = Pathological Gambling |

| <b>Table 1 - Descriptions of Instruments</b> (Continued)    |  |  |                                       |   |
|---|--|--|---------------------------------------|---|
| <b>Name of Instrument (year)</b>                            | <b>Content Areas</b>   | <b>Number of items</b>   | <b>Administration Time and Method</b> | <b>Scoring instructions, score range, cut-scores, and interpretation of scores</b>  |
| 4. DSM-IV-MR (2000)   | DSM-IV diagnostic criteria   | 10 items, one item for each criterion, four-point response options for most items                        | 5 minute questionnaire                | One point for each item; score range is 0-10; score of 3-4 (including at least one point from criteria 8, 9, or 10) is a problem gambler; score of 5 or more is severe problem gambler                              |
| 5. Diagnostic Interview for Gambling Schedule (DIGS) (1997) | Demographics, gambling involvement, treatment history, onset of gambling, gambling frequency, amounts of money bet and lost, sources of borrowed money, financial problems, legal problems, mental health screen, other impulse disorders, medical status, family and social functioning, and diagnostic symptoms (lifetime and past year) | 20 diagnostic symptom items to measure the ten DSM-IV diagnostic criteria. Two items for each criterion. | 30 minute interview                   | If respondent endorses either of the two items per criterion, the criterion is considered endorsed. One point for each of the 10 criteria. Score range 0-10; cut score of 5 or more indicates Pathological Gambling |

| <b>Table 1 - Descriptions of Instruments (Continued)</b>                              |  |   |   |   |
|---|--|---|---|---|
| <b>Name of Instrument (year)</b>  | <b>Content Areas</b>   | <b>Number of items</b>  | <b>Administration Time and Method</b>       | <b>Scoring instructions, score range, cut-scores, and interpretation of scores</b>  |
| 6. Gambling Treatment Outcome Monitoring System (GAMTOMS) (1996)                      | The Gambling Treatment Admission Questionnaire includes a ten-item measure of DSM-IV diagnostic criteria for Pathological Gambling, as well as other measures of gambling problem severity, including the SOGS, gambling frequency, gambling-related financial problems, and legal problems. | 142-item Gambling Treatment Admission Questionnaire has a ten-item measure of DSM-IV diagnostic criteria. | 30-45 minute paper and pencil questionnaire | The DSM-IV diagnostic criteria items are one point each and are summed. Score range is 0-10; cut score of 5 or more indicates Pathological Gambling   |
| 7. National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS) (1999) | DSM-IV diagnostic criteria for diagnosing Pathological Gambling including lifetime and past year time frames. A filtering question of losing \$100 or more was used prior to administration of NODS.   | 17 items  | 5-10 minute interview for NODS              | NODS is scored one point for each DSM criterion. Score range is 0-10. Score of 0 = Low-Risk Gambler; 1 or 2 = At-Risk Gambler; 3 or 4 = Problem Gambler; and 5 or more = Pathological Gambler |

| <b>Table 1 - Descriptions of Instruments (Continued)</b> |   |  |                                       |  |
|--|---|--|---------------------------------------|--|
| <b>Name of Instrument (year)</b>                         | <b>Content Areas</b>  | <b>Number of items</b>   | <b>Administration Time and Method</b> | <b>Scoring instructions, score range, cut-scores, and interpretation of scores</b>   |
| 8. Lie/bet (1997)  | Lie to people about your gambling; bet more and more money  | 2 items  | 1 minute interview                    | Answering yes to one or both items indicates Pathological Gambling   |
| 9. Canadian Problem Gambling Index (CPGI) (2001)         | Gambling involvement, problem gambling, adverse consequences, family history of gambling, comorbid disorders, and distorted cognitions.   | 31 total; 9- item problem gambling scale   | 15 minute interview                   | Each item is one point and score range is 0-9. score of 0 indicates non-problem gambling; score of 1-2 indicates low risk gambling; score of 3-7 indicates moderate risk gambling; and score of 8 or more indicates problem gambling |
| 10. Gambling Behavior Interview (GBI) (2001)             | Clinical interview to measure signs and symptoms of Pathological Gambling, including gambling frequency, amount of time and money spent gambling, the SOGS, DSM-IV, and 32 research items with a past year time frame | 76 items, including 20 SOGS, 10 DSM-IV diagnostic criteria and 32 research items | 30-60 minute interview                | SOGS score of 5 or more indicates Probable Pathological Gambling; DSM score of 5 or more indicates Pathological Gambling; Research scale cut score of 5 or more  |

| <b>Table 1 - Descriptions of Instruments (Continued)</b>               |   |                        |  |  |
|--|---|------------------------|--|--|
| <b>Name of Instrument (year)</b>                                       | <b>Content Areas</b>  | <b>Number of items</b> | <b>Administration Time and Method</b>      | <b>Scoring instructions, score range, cut-scores, and interpretation of scores</b>   |
| <b>Youth Instruments</b>   |   |                        |  |  |
| 1. DSM-IV-J and DSM-IV-J (1992; 2000)                                  | DSM-IV diagnostic criteria                                    | 9                      | 5-10 minute paper and pencil questionnaire | each item is one point; score range is 0-9; score of 4 or more is classified as a problem gambler                                  |
| 2. South Oaks Gambling Screen-Revised for Adolescents (SOGS-RA) (1990) | Signs and symptoms of problem gambling, negative consequences | 12                     | 10 minute paper and pencil questionnaire   | Each item is one point; score range 0-12; 0-1 indicates no problem; 2-3 indicates at risk gambling; 4+ indicates problem gambling; |

| <b>Table 1 - Psychometric Properties of the Instruments (Continued)</b> |  |  |  |
|---|--|--|--|
|   | <b>Psychometrics</b>                                     |  | <b>Classification Accuracy Indices</b>   |
| <b>Name of Instrument</b>   | <b>Reliability</b>                                       | <b>Validity</b>  | <b>Sample characteristics, criterion, base rate, sensitivity, specificity, and hit rate</b>  |
| 1. SOGS   | $\alpha=.97$ ; One-month test-retest reliability $r=.71$ | Correlations with counselor assessments ( $r=.86$ ), family member assessment ( $r=.60$ ), and DSM-III-R Pathological Gambling diagnosis ( $r=.94$ )   | GA members (n=213), university students (n=384), and hospital employees (n=152); Criterion was DSM-III-R diagnosis of Pathological Gambling. Hit rates among GA members (98.1%), university students (95.3%), and hospital employees (99.3%);  |
| 2. GA-20  | $\alpha=.94$ (Ursua & Uribe Larrea, 1998)                | Kuley and Jacobs (1988) report that the GA-20 yielded high correlations with frequency of gambling and with dissociative experiences; Derevensky and Gupta (2000) reported correlations with SOGS-RA ( $r=.61$ ) and DSM-IV-J ( $r=.68$ ); GA-20 was highly correlated with the SOGS ( $r=.94$ ) Ursua and Uribe Larrea (1998) | 980 youth from a school population (Derevensky & Gupta, 2000) using DSM-IV-J as the criterion<br>true positive=96%<br>false negative=0.6%<br>false positive=3.3%<br><br>Ursua and Uribe Larrea (1998):<br>Criterion is group membership<br>127 problem gamblers<br>142 non-problem social gamblers;<br>base rate=.47<br>sensitivity=.98<br>specificity=.99<br>hit rate=.99.<br><br>It should be noted that these classification accuracy indices are based upon a sample with a base rate of about 50% which inflates classification accuracy indices. |

|         |   |  |    |
|---------|---|--|----|
| 3. MAGS | MAGS 7-item scale<br>$\alpha=.84$ ;<br>DSM-IV 12-item scale<br>$\alpha=.89$ | MAGS total discriminant score was correlated with total DSM-IV score $r=.83$ | NA |
|---------|---|--|----|

**Table 1 - Psychometric Properties of the Instruments (Continued)**

|                    | Psychometrics |   | Classification Accuracy Indices  |
|--------------------|---------------|---|--|
| Name of Instrument | Reliability   | Validity  | Sample characteristics, criterion, base rate, sensitivity, specificity, and hit rate |
| 4. DSM-IV-MR       | $\alpha=.79$  | discriminated between regular and non-regular gamblers and between problem and social gamblers  | NA   |
| 5. DIGS            | $\alpha=.92$  | The total diagnostic score (0-10) exhibited significant correlations with the following measures of gambling problem severity: gambling frequency $r=.39$ ; highest amount gambled in one day $r=.42$ ; current gambling debt $r=.47$ ; number of financial problems $r=.40$ ; number of borrowing sources $r=.31$ ; and legal problems $r=.50$ . | NA   |

| <b>Table 1 - Psychometric Properties of the Instruments (Continued)</b> |   |  |  |
|---|---|--|--|
|   | <b>Psychometrics</b>  |  | <b>Classification Accuracy Indices</b>   |
| <b>Name of Instrument</b>   | <b>Reliability</b>  | <b>Validity</b>  | <b>Sample characteristics, criterion, base rate, sensitivity, specificity, and hit rate</b>  |
| 6. GAM-TOMS   | Internal consistency reliability: DSM-IV diagnostic criteria ( $\alpha=.89$ ), SOGS ( $\alpha=.85$ ), and financial problems ( $\alpha=.78$ )   | Validity of the DSM-IV diagnostic criteria was measured by correlations with the following measures of gambling problem severity: SOGS ( $r=.83$ ); gambling frequency ( $r=.43$ ); and number of financial problems ( $r=.40$ ).                                      | DSM-IV diagnosis of Pathological Gambling was used to classify clinical versus non-clinical cases: Base rate=.20; Hit Rate=.96; Sensitivity=.96; Specificity=.95; False Positive Rate=.01; and False Negative Rate=.14.<br>DSM-IV diagnosis of Pathological Gambling was used to classify SOGS probable Pathological Gambler versus non-probable Pathological Gambler cases: Base rate=.79; Hit Rate=.98; Sensitivity=.97; Specificity=1.00; False Positive Rate=.00; and False Negative Rate=.10. |
| 7. NODS   | 2-4 week test-retest coefficients of individuals in outpatient problem gambling treatment programs. Of these 40, 38 scored 5 or more on the lifetime NODS and two obtained scores of 4. For past year NODS, 30 scored 5 or more, five scored 3 or 4, and five scored 2 or less. | NODS was administered to 40 individuals in outpatient problem gambling treatment programs. Of these 40, 38 scored 5 or more on the lifetime NODS and two obtained scores of 4. For past year NODS, 30 scored 5 or more, five scored 3 or 4, and five scored 2 or less. | NA   |

| <b>Table 1 - Psychometric Properties of the Instruments (Continued)</b> |  |   |  |
|---|--|---|--|
|   | <b>Psychometrics</b>   |   | <b>Classification Accuracy Indices</b>   |
| <b>Name of Instrument</b>   | <b>Reliability</b>   | <b>Validity</b>   | <b>Sample characteristics, criterion, base rate, sensitivity, specificity, and hit rate</b>  |
| 8. Lie-Bet  | NA   | NA  | Classification accuracy indices were computed on 191 male GA members and 171 male non-problem gambling controls; sensitivity=.99, specificity=.91, positive predictive power=.92, and negative predictive power=.99. A second study that included females reported sensitivity=1.00, specificity=.85, positive predictive power=.78, and negative predictive power=1.00. |
| 9. CPGI   | 9-item problem gambling scale<br>$\alpha$ =.84; four-week test-retest correlation of $r$ =.78. | Discriminating between different groups; correlated with the SOGS ( $r$ =.83), DSM-IV ( $r$ =.83), and results of clinical interviews ( $r$ =.48)                                     | DSM-IV was the criterion; sensitivity was .83 and specificity was 1.00.  |
| 10. GBI   | SOGS $\alpha$ =.96; DSM-IV $\alpha$ =.95; research scale $\alpha$ =.98                         | Research scale correlations with DSM-IV diagnostic criteria scale ( $r$ =.97), SOGS score ( $r$ =.96), gambling frequency ( $r$ =.59), and amount of money lost gambling ( $r$ =.54). | The research scale, using a cut score of five or more, yielded the following accuracy indices when discriminating a gambling treatment sample from a general population sample: base rate=.26; hit rate=.93, sensitivity=.93; specificity=.91; false positive rate=.21; and false negative rate=.01.   |

| <b>Table 1 - Psychometric Properties of the Instruments (Continued)</b> |  |   |   |
|---|--|---|---|
|   | <b>Psychometrics</b>                     |   | <b>Classification Accuracy Indices</b>  |
| <b>Name of Instrument</b>   | <b>Reliability</b>                       | <b>Validity</b>   | <b>Sample characteristics, criterion, base rate, sensitivity, specificity, and hit rate</b> |
| <b>Youth Instruments</b>  |  |   |   |
| 1. SOGS-RA  | 460 males aged 15-18; <u>alpha</u> =.80. | Gambling activity ( $r=.39$ ), gambling frequency ( $r=.54$ ) and amount of money gambled in past year ( $r=.42$ )  | NA  |
| 2. DSM-IV-J and DSM-IV-MR-J   | <u>alpha</u> =.75                        | Significantly different mean scores between regular and non-regular gamblers and between problem and social gamblers. DSM-IV-MR-J problem gamblers also tended to play more games regularly, spend more money, borrow to fund their gambling, and sell their possessions to fund their gambling | NA  |

Note. NA means Not Available, not provided, or unknown.

| <b>Table 2 - Instruments with Insufficient Published Psychometric Data to Allow Evaluation</b> |   |   |                                       |   |
|--|---|---|---------------------------------------|---|
| <b>Name of Instrument (year)</b>   | <b>Content Areas</b>  | <b>Number of items</b>                            | <b>Administration Time and Method</b> | <b>Scoring instructions, score range, cut-scores, and interpretation of scores</b>  |
| 1. Institute for Social Research (ISR) (1975)  | Demographics, leisure time activities, attitudes about gambling, gambling behavior, and amounts of money spent gambling | 70-page survey; 18-item compulsive gambling scale | 60-90 minute interview                | The 18 items are used as predictors of compulsive gambling, however no specific scoring instructions and no cut score(s) were provided.   |
| 2. MOGS (SOGS-M) (1990)  | Revised SOGS items of signs and symptoms of problem gambling  | 12  | 5-10 minute interview                 | One point for each item. Score range of 0-12. Scores of: 0 = non-problem gambler; 1-2 = gamblers with some difficulties; 3-4 = gamblers with increasing negative consequences; 5+ = Probable Pathological Gambler |

| <b>Table 2 - Instruments with Insufficient Published Psychometric Data to Allow Evaluation (Continued)</b> |  |   |                                       |  |
|--|--|---|---------------------------------------|--|
| <b>Name of Instrument (year)</b>   | <b>Content Areas</b>   | <b>Number of items</b>  | <b>Administration Time and Method</b> | <b>Scoring instructions, score range, cut-scores, and interpretation of scores</b>   |
| 3. Inventory of Gambling Behaviors (IGB) (1982)  | Home life, adolescent gambling, legal difficulties, and psychological problems such as insomnia, and suicide attempts; diagnostic and indicative signs of Pathological Gambling, based on DSM-III diagnostic criteria and the GA-20 questions    | 122 items; reduced to 81 items by Zimmerman, Meeland, and Krug (1985) |                                       | five factors are: neurotic gambling, psychopathic gambling, impulsive gambling, white collar crime, and employment problems  |
| 4. Cumulative Clinical Signs Method (CCSM) (1989)  | clinical signs of problem gambling derived from IGB items organized into five tests:<br>(a) personal (4 items);<br>(b) interpersonal (4 items);<br>(c) vocational (4 items);<br>(d) financial (3 items); and<br>(e) "hard" signs test (8 items). | 23 items (appendix of Culleton, 1989)                                 | paper and pencil                      | A positive response to any item within a test equals a score of one on that test. CCSM is scored by summing five tests. Score range is 0 to 5. Pathological Gambling is estimated with an odds ratio. It appears that a score of 3 or more is indicative of Pathological Gambling. |

| <b>Table 2 - Instruments with Insufficient Published Psychometric Data to Allow Evaluation (Continued)</b> |   |                        |                                       |  |
|--|---|------------------------|---------------------------------------|--|
| <b>Name of Instrument (year)</b>   | <b>Content Areas</b>                              | <b>Number of items</b> | <b>Administration Time and Method</b> | <b>Scoring instructions, score range, cut-scores, and interpretation of scores</b> |
| 5. Pathological Gambling Signs Index (PGSI)  |   |                        |                                       |  |
| 6. Diagnostic Interview Schedule (DIS) Gambling Module (GAM-IV)  | Gambling frequency and DSM-IV diagnostic criteria |                        |                                       | A score of 5 or more indicates Pathological Gambling                               |

| <b>Table 2 - Instruments with Insufficient Published Psychometric Data to Allow Evaluation</b><br>(Continued) |                      |   |  |
|---|----------------------|---|--|
|   | <b>Psychometrics</b> |   | <b>Classification Accuracy Indices</b>   |
| <b>Name of Instrument</b>   | <b>Reliability</b>   | <b>Validity</b>   | <b>Sample characteristics, criterion, base rate, sensitivity, specificity, and hit rate</b>          |
| 1. ISR  | NA                   | NA  | 274 self-identified compulsive gamblers;<br>239 church members<br>Sensitivity=.95<br>Specificity=.90 |
| 2. MOGS or SOGS-M   | NA                   | NA  | NA   |
| 3. IGB  | NA                   | discriminated between compulsive gamblers and nongamblers | NA   |
| 4. CCSM   | NA                   | discriminated problem gamblers from non-problem gamblers  | Positive predictive value=.96-.98<br>False positive rate=.01   |
| 5. PGSI   | NA                   | NA  | NA   |
| 6. DIS GAM-IV   | NA                   | NA  | NA   |

Note. NA means Not Available, not provided, or unknown.