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## The Measurement of Adult Problem and Pathological Gambling

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**ABSTRACT** *This paper presents a critical overview of measures used to assess adult problem gambling in clinical settings and general population research. Particular consideration is given to the challenges in transferring clinically derived measures into population research settings. Numerous screens developed for use in large population surveys as well as in non-specialist clinical settings are described in detail. Overall, the South Oaks Gambling Screen (SOGS) and its derivatives continue to be the most widely used measures in most contexts and parts of the world although the DSM-IV (Diagnostic and Statistical Manual of Psychiatric Disorders—IV) measures and the CPGI (Canadian Problem Gambling Index) are increasingly being used. While these measures are likely to continue in use, there are clear and growing indications that changes are needed to the official diagnosis of pathological gambling rather than to the measures that have been developed to assess gambling problems in population research and clinical settings. However, there is also room for improvement in these measures.*

### Introduction

In the first critical review of problem gambling instrumentation, published 16 years ago, only two measures of problem gambling could be identified (Volberg and Banks, 1990). There are now over 20 problem gambling measures that have been developed to serve a variety of purposes, including screening, assessment, diagnosis, treatment planning and treatment outcome monitoring as well as epidemiological and other types of population-based research.

There is a broad underlying assumption among clinicians and researchers that gambling-related difficulties are a robust phenomenon that exist in the community and can be measured. Despite agreement at this fundamental level, there is disagreement about how to conceptualise and measure gambling-related difficulties. Nevertheless, the pragmatic demands imposed by the rapid expansion of legalised gambling worldwide have meant that researchers and clinicians continue to seek out or develop relatively brief, easily administered measures to assess the extent and degree of problem gambling in a range of settings. For various reasons, including lack of funding for basic psychometric research as well as the importance of establishing and maintaining comparability over time and across jurisdictions, researchers and clinicians have continued to use only a few tools to serve sometimes disparate purposes (Thomas *et al.*, 2003).

This paper provides a critical overview of measures used to assess adult problem gambling. We have not attempted to present a detailed discussion of the psychometric properties of various problem gambling screens because much of

this information is available elsewhere (Neal *et al.*, 2005). We have also not attempted to address the many methodological issues related to the inclusion of problem gambling measures in clinical and population research, some of which have also been addressed elsewhere (e.g. Lesieur, 1994; Volberg, forthcoming). Our emphasis here is on 'broad band' instruments that have been developed to screen for problem and/or pathological gambling and assess problem gambling in a range of clinical, general population and other settings. Attention is given primarily to measures that have been most widely used or appear likely to be adopted in future rather than to more fine-grained, special purpose measures of specific aspects of problem gambling.

There are several ways that such a review could be organised. We have chosen to consider the various measures of problem gambling in the chronological order of their development. This choice is based on our view that there remain relatively few problem gambling measures that are used across a wide range of domains and for which there is adequate information about their performance characteristics. We begin by examining two early problem gambling measures that have never been widely adopted but with features that merit further consideration. We then turn to an extended discussion of the Diagnostic and Statistical Manual of Psychiatric Disorders (DSM) and several measures that have been based on the evolving diagnostic criteria for pathological gambling. This is followed by a review of two new measures that claim to be based on the emerging public health approach to problem gambling. We then turn our attention to several brief screens for problem gambling that are likely to have high utility in non-specialist clinical settings and in population research. We conclude with our views about preferred future directions for the development of problem gambling measures internationally.

### **Gamblers Anonymous 20 Questions**

The first problem gambling measure was the '20 Questions' developed by Gamblers Anonymous (GA) to provide a self-assessment of compulsive gambling. The 20 items reflect the GA conceptualisation of compulsive gambling as a progressive illness. Most of these questions concern adverse personal and interpersonal consequences. Because compulsive gambling has always been regarded by GA as a progressive illness, there is no requirement in the screen that these consequences have been experienced recently, e.g. during the past six or 12 months, or that they have clustered together at some particular time in the past. Each item is scored zero or one and a total of seven or more is claimed to indicate that an individual is probably a compulsive gambler. The measure has been widely used by GA in many countries as well as in clinical contexts.

Although the '20 Questions' screen was not developed by researchers or treatment professionals as a psychometric instrument, a Spanish study involving problem gamblers participating in mutual-help groups and social gamblers matched for age and gender reported that the screen performed well (Ursua and Uribe-larrea, 1998). In this context, the measure had high reliability, correlated strongly with the South Oaks Gambling Screen (SOGS), contained one factor that explained over half the total variance and had high diagnostic efficiency. While this measure appears to be suitable for screening and may serve other purposes, this has not been formally assessed with a variety of samples in different settings.

Although it has a long history, the '20 Questions' has been used infrequently in research.

### Cumulative Clinical Signs Method (CCSM)

This 23-item screen was developed by Culleton (1989) from earlier and much lengthier measures used at one of the early treatment programmes for pathological gamblers in the United States (Zimmerman *et al.*, 1985). Item selection was influenced by the DSM-III criteria but included a wide range of problem gambling correlates. Although having satisfactory reliability and effective in differentiating clinically assessed pathological gamblers from other groups, the CCSM has been little used other than in a few early state-level prevalence surveys in the USA. Volberg and Banks (1990) compared the performance of the CCSM with the original South Oaks Gambling Screen (SOGS) and concluded that the latter did as well or better in most regards and was easier to score and interpret.

The CCSM is mentioned here because it has some features that, in our view, warrant further consideration in the evolution of problem gambling measurement. In scoring the CCSM, the 23 items were not given equal weight. They were divided into five groups—personal, interpersonal, vocational, financial and 'hard signs'. Endorsement of one or more items in each grouping was scored one. Thus, the score range is from zero (no problem) to five (problems in all five areas). An odds-ratio method was used to determine the optimal cut score.

While not widely adopted as a problem gambling screen or measure, many studies have used or extended Culleton's categories of gambling-related problems, often with additional or somewhat different items. Examples include the New Zealand national surveys (Abbott, 2001; Abbott and Volberg, 1991, 1992, 1996, 2000) and the Australian 'four cities' (Dickerson *et al.*, 1996) and national surveys (Productivity Commission, 1999). However, truly multidimensional measures of problem gambling with factorally distinct domains have yet to be developed.

Consideration of multiple domains and the use of logistic regression in scoring draws attention to the relative importance of particular criteria and items in relation to the problem gambling construct, including problem severity, complexity and progression. Virtually all measures of problem gambling give criteria and items equal weighting although there appear to be important differences between items.<sup>1</sup> When these differences are better understood, they might be usefully reflected in the scoring and interpretation of measures of problem gambling.

### The DSM Criteria

The DSM-III criteria mirror GA notions of compulsive gambling as a chronic, progressive illness with escalating disruption and harm to personal, family and vocational pursuits (American Psychiatric Association, 1980). The criteria largely derive from retrospective accounts by people who participated in GA groups and early inpatient treatment programmes for compulsive gamblers in the USA during the 1960s and 1970s. These people were predominantly middle class, middle aged white males who had developed problems with track betting and card games.

Dissatisfaction with the DSM-III pathological gambling criteria led to significant changes being made when the DSM as a whole was revised in 1987 as the DSM-III-R. There was concern that an emphasis on consequences common to middle aged white men with families resulted in failure to adequately detect problems among other population sectors. This emphasis also failed to tap features of gambling behaviour *per se* that underlie problem development. Additionally, a number of clinicians questioned the exclusion of people with antisocial personality disorder that formed part of the DSM-III diagnosis. The DSM-III-R dropped this exclusion, reduced the emphasis on consequences and expanded the number of items covering gambling behaviours (American Psychiatric Association, 1987). This latter group of items closely followed then current notions of addiction, especially to alcohol, including cravings, tolerance and withdrawal.

The DSM was revised in 1994 (American Psychiatric Association, 1994). Again changes occurred to the diagnostic criteria for pathological gambling. The additions focus was retained in the DSM-IV but some of the original DSM-III 'consequences' items were reintroduced. Criterion phrasing was tightened to reduce subjectivity and enhance reliability. A requirement was added excluding people whose gambling is better explained by a manic episode. In contrast to the case with the DSM-III and DSM-III-R, research was conducted to assist in criteria determination. Samples of independently diagnosed pathological gamblers were compared with drug abusing 'social gamblers' (Lesieur and Rosenthal, 1998). It is interesting to note that although clinician endorsement of any four criteria made the optimal separation between the two groups, the requirement for diagnosis was set at a score of five by the DSM committee to which the working group submitted its recommendations.

Although the number and nature of diagnostic criteria, as well as exclusion criteria, have changed with successive DSM revisions, pathological gambling continues to be regarded as a chronic or chronically relapsing disorder. Accordingly, and in contrast to most DSM-IV disorders, there is no requirement to establish that the requisite number of signs or symptoms are present currently (e.g. during the past month or year) or that they clustered together at some time in the past. Instead, the diagnosis is based on an individual's cumulative experience of gambling-related problems. In contrast to some other disorders prone to relapse, there is no provision for an 'in remission' qualifier to diagnosis. It also remains within the category of impulse control disorders, despite the increasing resemblance to addictive disorders.

While DSM-IV diagnoses are widely regarded as the current 'gold standard' for psychiatric disorders against which screening measures are validated, in few cases are they subject to objective verification. In the case of pathological gambling, the criteria and cut-off scores were arrived at predominantly by clinician opinion rather than empirical research. Indeed, as mentioned, when the process of determining the cut-score was assisted by research, the findings were disregarded. Consequently, it should not be assumed that psychiatric diagnoses are more valid than other measures of problem gambling. Furthermore, while clinical interviews typically yield much more information than a single screening or psychometric instrument, their interpretation is usually more subjective. While the DSM-IV criteria for pathological gambling are more explicit than in the DSM-III-R, there remains room for variation in clinician judgment. In other words, while interview-based diagnoses can be objective and highly reliable, this needs to be demonstrated rather than assumed. Similarly, while diagnoses based on

clinical interviews are often assumed to be more reliable than assessments from objective psychological tests, in many cases they probably are not.

#### *The Diagnostic Interview Schedule (DIS)*

The first screen to measure pathological gambling in terms of the DSM criteria was a component of the Diagnostic Interview Schedule (DIS). The original DIS was designed for use in the Epidemiological Catchment Area (ECA) surveys, the first large-scale psychiatric epidemiological studies in the USA (Robins *et al.*, 1985). The DIS has since been used for this purpose in a number of countries (Bebbington, 1992). It involves set lists of questions administered by trained interviewers and yields computer generated DSM-III diagnoses. The criterion validity of the DIS has been reported as moderate to good (Hasin and Skodol, 1989). There is little information regarding its reliability. The DIS was updated and developed further following publication of the DSM-IV.

To meet DIS criteria for pathological gambling, people must have gambled at least twice in their lives and thought they gambled too much. In addition, they are required to acknowledge having experienced at least two of the following because of gambling: (1) inability to pay bills, (2) trouble at home or work, and (3) borrowing or stealing money. The pathological gambling component of the DIS appears to have been used in only a few studies, including one in Christchurch, New Zealand, in 1986 (Wells *et al.*, 1989, 1992) and the St Louis Epidemiological Catchment Area study (Cunningham-Williams *et al.*, 1998). The questions were also included in an early survey of gambling and gambling problems carried out in Connecticut in 1986 (Laventhol and Horwath, 1986).

The early version of the DIS pathological gambling measure has not been adequately validated or assessed as a psychometric instrument. The small number of items and need for self recognition of excessive gambling suggest that it would lack sensitivity in general population contexts and have low reliability. The most recent revision of the DIS pathological gambling module uses 12 items to assess the ten DSM-IV criteria separately for 11 different gambling activities and obtains age of onset for each criterion (Cunningham-Williams *et al.*, 2003). The latter addition is an advance on other lifetime measures and, in this particular respect, departs from DSM definitions of pathological gambling. While potentially enabling symptom clustering to be assessed over time, prospective research by Abbott *et al.* (1999, 2004b) suggests that this information, obtained retrospectively, will be highly unreliable. With 132 items, the overall length of the DSM-IV DIS makes this measure unsuitable for screening in non-specialist clinical settings although it is likely to have value in population research.

#### *The South Oaks Gambling Screen (SOGS/SOGS-R)*

The South Oaks Gambling Screen (SOGS) and South Oaks Gambling Screen—Revised (SOGS-R) are by far the most commonly used measures of problem gambling throughout the world (Abbott *et al.*, 2004a; Neal *et al.*, 2005; Volberg *et al.*, 1996). They have been translated into many languages and used in a wide variety of contexts, including clinical settings and population studies. Throughout the 1990s they became, *de facto*, the problem gambling ‘gold standard’.

1. *The South Oaks Gambling Screen*. Development of the SOGS commenced with administration of a large number of items to independently diagnosed psychiatric inpatients. A revised list was pre-tested with groups of inpatient substance abusers and pathological gamblers. After cross-validation interviews with counsellors and spouses, low performing items were culled and the remaining items subjected to discriminant function analysis. Twenty items were identified that optimally separated diagnosed pathological gamblers from non-pathological gamblers. These 20 items were then administered to validation samples including GA members, university students and hospital staff. Among these groups, the SOGS was demonstrated to have extremely high internal consistency and satisfactory test–retest reliability. Using a cut-off score of five, it had very high correspondence with DSM-III-R diagnoses and made few classification errors (1.2% false positives; 1.9% false negatives) (Lesieur and Blume, 1987).

Although based on DSM-III criteria and validated against the DSM-III-R, the SOGS is distinct from earlier DSM-based measures because it was developed empirically and the items making up the scale were not intended to assess each of the DSM diagnostic criteria separately. A quarter of SOGS items refer to gambling behaviour *per se* or the respondent's feelings about gambling (e.g. having a problem, unable to stop gambling, guilt), approximately a third refer to consequences of gambling and the remainder are concerned with borrowing money. The content of the SOGS (with emphases on consequences and borrowing) most closely resembles the DSM-III criteria. The SOGS has far less focus on gambling-related behaviour than the DSM-III-R and DSM-IV, including those elements adopted from substance misuse/dependence diagnoses. Overall, the SOGS taps a broader array of problem gambling behaviours, symptoms and consequences than do any of the three DSM categorisations.

Given the instrument's impressive psychometric properties, ease of administration and scoring, and lack of competition, it is not surprising that it was subsequently widely adopted by clinicians and researchers during the 1990s. Although developed as a diagnostic screen in clinical settings, like many other psychiatric screening instruments the SOGS was quickly adopted for use in epidemiological research. The first study of this type was in New York State (Volberg and Steadman, 1988). Since then the SOGS and SOGS variants have been used in general population surveys in more than 45 jurisdictions in all major regions of the world (Abbott *et al.*, 2004a). Another reason why the SOGS and SOGS variants have been so widely used in both clinical and epidemiological research is that their use as standard measures facilitates comparisons across different populations and over time within the same population or setting. Walker and Dickerson (1996) note that, even by the mid 1990s, the SOGS was the only validated measure available for these purposes.

Since the SOGS was introduced in 1987, numerous modifications and revisions have been made to item wording, response categories and item scoring (Abbott and Volberg, 1999; Lesieur, 1994). Few of these changes have been examined for their impact on the performance of the instrument and use of these variants, which are often not adequately described in published reports, has confused interpretation of research findings.

2. *The South Oaks Gambling Screen—Revised (SOGS-R)*. The SOGS-R was developed for the 1991 New Zealand National Survey of Problem and Pathological Gambling to produce a measure of both current (past 6 months)

and lifetime problem and probable pathological gambling (Abbott and Volberg, 1991, 1992, 1996). Individuals who responded positively to original SOGS (lifetime) questions were asked if this also applied during the past six months. In addition to identifying lifetime and current probable pathological gamblers (scores of five or more on the respective scales), people who scored three or four were considered to experience gambling problems of less severity and in some analyses, the full scale range was treated as a continuous measure. The preliminary, non-scored section of the SOGS was also expanded to collect more detailed information about gambling frequency and expenditure.

The addition of a current measure arose from the researchers' concern to bring the investigation of problem gambling into line with the epidemiological investigation of most other mental health disorders. While there is interest in how many people have ever experienced a particular disorder, information about how many are currently symptomatic has more relevance to prevention, treatment planning and treatment outcome assessment. From population research on alcohol-related problems, Abbott and Volberg considered it likely that less serious problem gamblers could be at heightened risk for the future development of more serious problems and, because of their larger number, in aggregate would be responsible for more adverse gambling-related harm than pathological gamblers. This addition and the use of the full score range reflected the investigators' belief that while serious problem gambling can usefully be regarded as a discrete mental disorder for some purposes, problems also exist on one or more severity continua.

Both the modification to score interpretation and the addition of a current measure are at variance with the conceptualisation of pathological gambling that underlies the DSM and SOGS. This conceptualisation is grounded in the assumption that, like death or pregnancy, pathological gambling is something you either do or do not have—you cannot have a bit of it. This conceptualisation also rests on the belief that pathological gambling is a one-way street, namely a progressive, chronic or chronically relapsing mental disorder that might be arrested by abstinence but not cured.

Someone once said that to a hammer, everything looks like a nail. This is also the case for psychological tools. For the original SOGS, the world consists of probable (lifetime) pathological gamblers and non-pathological gamblers. The instrument indicates whether or not a person is likely to be a pathological gambler, as defined by the DSM-III-R. That is what it was designed to do and that is what it has been shown to be very good at doing, at least in clinical situations. The SOGS-R can also do this, but it can do other things. It can identify people who currently experience gambling problems that resemble those of pathological gamblers. It can also provide an indication of the severity of gambling problems, both currently and in the past, and the extent to which people who report problems in the past still experience them. It cannot, unless used in longitudinal studies, assess the emergence of more serious problems over time or fluctuations over time in the clustering and severity of component behaviours and consequences. However, the shorter timeframe is likely to make the SOGS-R more responsive to the detection of change and thus better equipped to assess response to treatment or other interventions and track problem status in prospective studies.

The SOGS-R has been widely used, largely replacing the SOGS in some fields including population prevalence research. Apart from the New Zealand national prevalence and prospective studies (Abbott, 2001; Abbott and Volberg, 1991, 1992, 1996, 2000; Abbott *et al.*, 1999, 2004b; Volberg and Abbott, 1994) and a few early

Australian and North American studies, a 12 months frame has been used instead of the original six months. Further adaptations have included shortening the current frame to three months (mainly in treatment monitoring contexts) and dropping the lifetime component altogether, most notably in Australian studies but also in the British Gambling Prevalence Study (Orford *et al.*, 2003).

The six and 12 months SOGS derivatives are both typically referred to as the SOGS-R. While they probably perform similarly in most situations, it would be clearer if they were differentiated, e.g. as the SOGS-R (six months) and SOGS-R (12 months). There is considerable information about the psychometric performance of the SOGS-R, especially the SOGS-R (six months). As for the SOGS, its use in hundreds of studies throughout the world has extended its construct validation. A great deal is known about how both the SOGS and the SOGS-R perform relative to other indicators and correlates of problem gambling. Much less is known about the performance of other variants.

3. *Shortcomings of the SOGS/SOGS-R.* While retrofitted rather than purpose built, the SOGS-R performs reasonably well with respect to its extended brief. Its wider lens has played an important role in helping advance understanding of problem gambling and its measurement. However, both the SOGS and SOGS-R have significant shortcomings.

The first SOGS-R study found that many people classified as lifetime probable pathological or problem gamblers did not report any problems during the six months prior to assessment (Abbott and Volberg, 1991, 1992, 1996). In this and subsequent general population studies conducted throughout the world, current rates are typically approximately half as high as lifetime rates (Abbott *et al.*, 2004a), suggesting that problems are transitory for many problem gamblers. This interpretation has been supported by more recent prospective research (Abbott *et al.*, 2004b; Abbott and Clarke, 2006). In addition to finding significant reductions in current gambling problems over time, most people who report 'lifetime' problems on the SOGS-R (and presumably other 'lifetime' problem gambling measures) do not do likewise when reassessed some years later. Lifetime scores should not change in this way. From the foregoing, it is evident that SOGS/SOGS-R 'lifetime' scores provide highly conservative accounts of past problems and that problem remission is greater than it appears from comparison of current with 'lifetime' scores in cross sectional surveys.

Earlier, reference was made to the impressive performance of the SOGS when used in clinical contexts to screen for pathological gambling. Against DSM-III-R diagnoses, the SOGS made very few classification errors, either false positives (classifying someone as having a problem when they do not) or false negatives (failing to detect problems when they are present). This is typical of screening measures generally that have been developed for and used in clinical contexts where moderate to large numbers of people experience the problem they are designed to detect. However, when deployed in general population or other settings where few people have the problem, clinically derived measures typically produce large numbers of false positives. This is an important consideration given the widespread use of the SOGS-R in general population studies and the importance of these findings for social policy and service provision.

Many critics have argued that the use of the SOGS and SOGS-R in non-clinical situations is likely to produce high false positive rates and generate systematically biased (inflated) prevalence estimates (e.g. Culleton, 1989; Dickerson, 1993;

Ladouceur *et al.*, 2000; Thompson *et al.*, 2005; Walker and Dickerson, 1996). Surprisingly, only a few general population studies (Abbott, 2001; Abbott and Volberg, 1996) have assessed this assertion empirically. Employing double blind second phase DSM assessments, these investigators found in two separate studies (1991 and 1999) that while false positive rates were moderately high, so too were false negative rates (Abbott, 2001; Abbott and Volberg, 1991, 2000). In determining the accuracy of prevalence estimates, it is the relative frequency of false positives and false negatives that is important, not false positive rates *per se*. Increased false negatives in these studies generally counterbalanced the false positive effect. This suggests that SOGS-R estimates are not inflated and, indeed, might often be lower than actual problem levels in the community (Abbott, 2001; Abbott and Volberg, 1999, 2000; Lesieur, 1994). One implication of these findings is that the widespread practice in Australia of using a much higher cut score of 10 on the SOGS and SOGS-R to identify problem gamblers is without empirical foundation and gives rise to significant underestimates of problem gambling prevalence (Abbott, 2002).

While it appears that the SOGS-R does not necessarily yield inflated prevalence estimates when used in general population studies, SOGS-R rates are usually somewhat higher than those obtained using other DSM-derived problem gambling measures (Shaffer *et al.*, 1997). A recent example is provided from the British Gambling Prevalence Survey (Sproston *et al.*, 2000), which used a version of the SOGS-R (12 months) and a past-year DSM-IV screen with multiple response options similar but not identical to the measure developed by Fisher (1996, 2000). The respective past year estimates were 0.8% and 0.6%. While the DSM-IV prevalence estimate in the British survey is somewhat lower than the estimate based on the SOGS-R, the difference would have been even greater if Sproston *et al.*, (2000) had used the conventional cut-off of five rather than a cut score of three to classify respondents as pathological gamblers based on their DSM-IV measure. If the conventional cut score had been used, the past year DSM-IV prevalence estimate in Britain would have been 0.2% rather than 0.6%.

Psychometric findings from the British study (Orford *et al.*, 2003) and earlier research by Stinchfield (2002, 2003) using the SOGS and a different DSM-IV based scale suggest that both types of measure are assessing two or more underlying factors rather than a single problem gambling construct. A number of items appear to reflect a gambling dependence dimension whereas others reflect gambling-related consequences. In the case of the SOGS and SOGS-R, the latter are predominantly financial. This is not surprising given the large number of financial items included in these instruments.

Some deficiencies and perceived deficiencies of the SOGS have been mentioned. The SOGS-R adaptation was an attempt to address some of these shortcomings. Beginning in the early 1990s, dissatisfaction with the SOGS and SOGS-R grew, particularly among Australian and Canadian researchers. An early criticism was that the screen was developed and tested in clinical situations and that its performance in community settings was unknown (Walker and Dickerson, 1996; Wiebe *et al.*, 2001). As mentioned, this included the belief that prevalence estimates based on these measures are significantly inflated. This criticism, however, ignores studies that did assess the SOGS and SOGS-R in general population contexts (Abbott and Volberg, 1991, 1992, 1996). Indeed, the initial SOGS-R validation was with a general population sample.

Various additional concerns were voiced by a number of investigators (e.g. Abbott and Volberg, 1996; Battersby *et al.*, 2002; Dickerson *et al.*, 1997; Gerstein

*et al.*, 1999; Thomas *et al.*, 2003). These included the possibility, given that regular non-problem gamblers were not included in the original SOGS validation studies, that the measure might not separate problem gamblers from regular non-problem gamblers in community settings. Again, however, this was addressed by Abbott and Volberg (1991, 1992, 1996), as well as more recently (Abbott, 2001). Another concern is that some of the items may be dated and not sufficiently sensitive to electronic gaming machine-related problems or to gambling problems in women. While probably the case, if so, this deficiency is also likely to apply to the now decade old DSM-IV criteria. There are also indications that some items are inappropriate in different cultures (e.g. Duvarci *et al.*, 1997). Investigators and clinicians who regard the DSM-IV criteria as the current gold standard consider the SOGS/SOGS-R to be outdated because these screens are based on superseded DSM versions.

While the SOGS and its variants continue to be widely used in clinical, community and other research contexts, the rising chorus of criticism and the publication of the DSM-IV in 1994 increasingly led researchers and clinicians to seek or develop alternative problem gambling measures. In some instances these new measures have been used in conjunction with the SOGS or SOGS-R, enabling them to be benchmarked against these more established measures and more readily compared with previous research. An analysis of data from the recent British Gambling Prevalence Survey indicates that while there is overlap between SOGS and DSM-IV measures and some resemblance between their underlying factor structures, they are clearly not mapping exactly the same psychological terrain (Orford *et al.*, 2003).

#### *DSM-IV-Based Measures*

A variety of measures based on the DSM-IV diagnostic criteria have been developed since 1994. These include the Massachusetts Gambling Screen (MAGS) (Shaffer *et al.*, 1994), the Diagnostic Interview for Gambling Severity (DIGS) (Winters *et al.*, 1997), the Gambling Treatment Outcome Monitoring System (GAMTOMS) (Stinchfield and Winters, 2001), the Diagnostic Interview Schedule for Pathological Gambling Module (GAM-IV) (Cunningham-Williams *et al.*, 2003), the Fisher DSM-IV-MR (Fisher, 2000), the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS) (Gerstein *et al.*, 1999), and the Structured Clinical Interview for Pathological Gambling (SCI-PG) (Grant *et al.*, 2004).

Most of the DSM-IV based questionnaires and structured interviews referred to in the preceding paragraph have acceptable or good psychometric properties and may potentially provide acceptable proxy assessments for DSM-IV clinical diagnoses in clinical and/or general population contexts. Where they have been examined in relation to the SOGS or SOGS-R, correlation with these measures is generally high. Some measures are phrased in a 'lifetime' format whereas others use a past year time frame. Few of these measures, however, have been used in more than a handful of published studies. This means that, relative to the SOGS/SOGS-R, their construct validation is rudimentary. Further consideration of these measures is confined to the two that have been most widely used and the one that appears to be the most thoroughly validated.

The *Gambling Treatment Outcome Monitoring System (GAMTOMS)* was developed to assess clients entering treatment (Stinchfield and Winters, 1996,

2001). In contrast to the 20-item *DIGS* developed by the same research team, the *GAMTOMS* includes a ten-item psychometric assessment of pathological gambling. Each of the 10 DSM-IV criteria is assessed by single question with 'yes/no' response options. A cut-off score of five is used and both current and 'lifetime' classifications are made. While a score of five is used, when applied to a community sample the measure generated a large number of false negatives and the investigators determined that the optimal cut-score was four. A recent validation study of this measure, using data from large clinical and community samples, also found support for the lower cut-off score of four (Strong *et al.*, 2003). This study also found that some DSM items were much better than others in differentiating pathological and non-pathological gamblers and that items could be ranked in order of severity.

Other components of the *GAMTOMS*, additional to the 10-item DSM measure, include gambling frequency, debt, financial problems, arrests and legal status, gambling problem recognition, substance use, psychosocial functioning, work absenteeism, satisfaction with treatment, ratings of the helpfulness of treatment and post-treatment service utilisation. The *GAMTOMS* was developed to provide a comprehensive clinical monitoring assessment battery. Although not widely used, the 10-item DSM component has good internal consistency and test-retest reliability. It also has good sensitivity and specificity when comparing a large clinical sample with non-clinical cases and its performance is highly correlated (0.83) with the *SOGS*. These and other data suggest that both measures, to a significant degree, are assessing the same underlying construct.

Between 1994 and 1998, Fisher (1996, 2000) also developed a 10-item version of the DSM-IV criteria, the Fisher DSM-IV-MR intended for use in population research. As with the DSM component of the *GAMTOMS*, each question corresponds closely to a diagnostic criterion. Questions are framed in the past 12 months. In contrast to the *GAMTOMS* and *SOGS/SOGS-R*, all of the items have four response options. Although having multiple options (MR in the instrument's name refers to 'multiple response'), each is scored zero or one. A total score of five is used as the cut-off to identify 'severe problem gamblers'. People scoring three or four including at least one affirmative response to DSM-IV criteria eight, nine or ten are classified as 'problem gamblers'. The measure was originally administered to casino patrons in the UK and found to have satisfactory internal consistency and concurrent validity.

A recent review of problem gambling measures asserts that there has been no validation of the Fisher DSM-IV-MR against other measures or in other populations (Neal *et al.*, 2005). This is incorrect. While the measure has not, as far as we are aware, been validated against independently determined DSM-IV psychiatric diagnoses, it has been included in a variety of studies and quite a lot is known about its performance relative to other measures. In addition to a number of North American community studies (Abbott and Volberg, 1999) and the New Zealand prison surveys (Abbott and McKenna, 2000; Abbott *et al.*, 2000), this screen has been used in national prevalence surveys in New Zealand (Abbott, 2001) and Sweden (Volberg *et al.*, 2001).

The studies referred to above generally found moderate to strong relationships between the *SOGS-R* and Fisher DSM-IV-MR with correlation coefficients between 0.55 and 0.75. For example, in phase two of the New Zealand 1999 National Prevalence Survey, nine of 11 current *SOGS-R* probable pathological gamblers similarly scored five or more on the Fisher screen (Abbott, 2001). The remaining

two scored in the Fisher problem gambling range. This suggests moderately high agreement in the detection of serious problem gambling. However, of the 20 severe problem gamblers identified by the Fisher screen, nine were assessed as probable pathological gamblers by the SOGS-R, five as problem gamblers and six as non-problematic. More modest agreement is evident and it appears that in this study, in contrast to most others, the SOGS-R is more conservative than the DSM-IV based measure. While the overall difference in the numbers of people identified with problems is not great when the problem and probable pathological/severe problem groups are combined (SOGS-R = 33; Fisher = 37) only about half of these people score three or more on both measures. Very similar findings were evident in male (Abbott *et al.*, 2000) and female (Abbott and McKenna, 2000) prison studies in New Zealand.

In 1998 the National Gambling Impact Study Commission contracted the National Opinion Research Center (NORC) and partner organisations to undertake a national survey of problem gambling in the USA. The Commission specified the use of DSM-IV criteria, which meant that the SOGS-R could not be employed. After reviewing the available DSM-IV screens, the research team elected to develop a new measure designed specifically for administration in large population surveys. This instrument, the *National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS)*, has 17 lifetime and 17 past 12 months' items.<sup>2</sup> Several items are only administered if a preliminary screening question is endorsed and, as with the SOGS-R, current (past year) items are only administered if the corresponding lifetime item is endorsed. Each criterion is scored zero or one, to produce maximum scores of ten for each of the 'lifetime' and 'current' frames. Scores of zero were interpreted as indicating low risk, one or two as 'at-risk', three to four as 'problem gambling', and five or more as 'pathological gambling'.

Using a cut point of five, the lifetime NODS correctly identified 38 of 40 pathological gamblers in an initial clinical validation study. The remaining two scored four. While the sample was small relative to that used in developing the GAMTOMS DSM-IV screen, these two DSM-IV based measures appear to perform almost identically in this regard. However, the past-year NODS performed less well, correctly identifying only 30 of the 40 pathological gamblers in treatment. The NODS has excellent internal consistency and test-retest reliability (Gerstein *et al.*, 1999). In addition to the US national survey the NODS has been used in several state level prevalence surveys and an older persons study in the USA (Shapira *et al.*, 2002; Volberg, 2001a, 2001b, 2002, 2003; Volberg and McNeilly, 2003). It has also been used in a Norwegian national survey (Lund and Nordlund, 2003) and in a Spanish provincial study (Becoña, 2004). The NODS is increasingly being used in North American clinical settings as an assessment and outcome measure (Hodgins, 2002, 2004) and its use is mandatory for all clients entering drug and alcohol treatment programs in Michigan (Herrif, J. personal communication to Dr Volberg, 11 March 2004).

Gerstein *et al.* (1999) indicate that one of their intentions in developing the NODS was to construct a measure that would produce fewer false positives than the SOGS when used in low base rate general population settings. However, until recently, this had not been assessed by conducting independent DSM psychiatric diagnoses with NODS identified problem and pathological gamblers from community samples. Murray *et al.* (2005) examined 200 French-speaking Quebec City residents recruited from the general population. Of 71 NODS identified

current pathological gamblers, 50 were independently diagnosed as pathological gamblers using clinical interviews. Of the remaining 21 (false positives), 18 were deemed to be at risk (judged to meet one to four DSM-IV criteria) and three were classified non-problematic. Three people diagnosed as pathological gamblers from their clinical interview had not scored five or more on the NODS (false negatives), although all were in the at-risk or problem range. None of the 63 people who were assessed as low risk by the NODS were found to be problem gamblers at interview.

Although Murray *et al.* (2005) interpret their findings as showing 'these two modes of evaluation provide different classifications and therefore are not comparable' (pp. 59–60), it appears that agreement is in fact quite good in the case of the serious problem and non-problem groups. As with the UK and New Zealand studies referred to earlier, where the SOGS/SOGS-R and DSM performance was compared, more divergence was evident in the intermediate groups. In the case of the NODS, of the 66 at-risk or problem gamblers, 26 were identified as non-problematic by the clinical interview and, as mentioned, three were diagnosed as pathological gamblers. While suggesting that the NODS might produce higher prevalence estimates than clinical interviews in general population settings, this study does not demonstrate that this is necessarily the case.

In prevalence estimation, very small rates of false negatives can have a significant impact, counteracting much larger rates of false positives (Abbott, 2001). In this regard, it appears that the SOGS-R and NODS may perform similarly. This, however, requires further examination. With respect to measurement, the degree of overlap between the NODS and DSM-IV clinical assessments (both with past year time frames) also appears to be similar to that between the SOGS-R and Fisher DSM-IV-MR. Indeed, the concordance between the SOGS-R and DSM-IV clinical assessments may actually be somewhat greater than that for the NODS (Ladouceur *et al.*, 2000). This is interesting, given that the latter was based directly on the DSM-IV criteria whereas the SOGS was based on DSM-III criteria and validated against DSM-III-R diagnostic interviews.

### **Canadian Problem Gambling Index (CPGI) and Problem Gambling Severity Index (PGSI)**

In 1997, an inter-provincial group of Canadian government agencies with responsibility for addressing problem gambling commissioned the Canadian Centre on Substance Abuse to conduct a major study to clarify the concept of problem gambling in the general population. The brief included development of an operational definition to guide research, treatment and prevention, and the design of a new instrument to measure problem gambling in non-clinical settings. This work was initiated because of a growing dissatisfaction in Canada with the clinically derived SOGS and DSM-IV based measures. The object was to develop an assessment tool specifically for use in general population surveys; one that could provide a prevalence estimate but also indicate severity gradations and more adequately assess adverse economic and social consequences.

The Canadian research team developed an instrument called the Canadian Problem Gambling Index (CPGI) (Ferris and Wynne, 2001). Development of the CPGI involved a large general population sample, re-tested sub-samples and clinical validation interviews. Many potential items were assembled from various sources, including extant problem gambling measures. The nine items that were

most effective in differentiating between members of the general population, non-problem regular gamblers and problem gamblers were retained and constitute the Problem Gambling Severity Index (PGSI), a subset of the larger CPGI. Each of the nine PGSI items, framed in the past 12 months, is scored on a four-point scale (never = 1, sometimes = 2, most of the time = 3, almost always = 4). People scoring eight or more are classified as problem gamblers. Scores of three to seven indicate 'moderate risk' and one or two 'low risk.' 'Non-problem gamblers' score zero. The full 33 item CPGI, in addition to the PGSI, assesses various aspects of gambling involvement and problem gambling correlates such as faulty cognitions, drug use/problems, suicidal ideation and depression.

PGSI items include chasing losses, escalating gambling to maintain excitement, borrowing or selling to obtain money to gamble, betting more than one can afford, feeling guilty, being criticised by others, harm to health, financial difficulties to one's household and feeling that one might have a problem with gambling. While three items are new (gambling more than one can afford to lose, harm to health and financial difficulties to one's household) the remaining items are all drawn from the SOGS-R and DSM-IV criteria for pathological gambling. As the developers of the CPGI point out, this screen is an evolution from older measures rather than something entirely new (Ferris and Wynne, 2001; Wynne, 2003). The PGSI has good internal consistency, test-retest reliability and criterion validity. Although consisting of separate groups of 'problem gambling' and 'adverse consequences' items, all nine items loaded significantly on a single 'problem gambling' factor. Earlier, reference was made to more complex SOGS and DSM-IV factor structures.

While the PGSI appears to have a simpler structure, the three measures (SOGS/SOGS-R, DSM-IV and PGSI) have similar internal consistency. Overall performance on each of these measures is also highly correlated, with the PGSI correlating 0.83 with both the SOGS and DSM-IV (Wynne, 2003). It also appears to perform similarly to the SOGS and DSM-IV measures in identifying (correctly classifying) independently interviewer-assessed pathological gamblers (Neal *et al.*, 2005). Further examination of the performance of the PGSI in relation to other measures (SOGS-R and Victorian Gambling Screen [VGS]) has recently been carried out in Australia (McMillen and Wenzel, 2006; McMillen *et al.*, 2004). While many similarities were again apparent, on balance the PGSI was considered to be the better instrument for use in general population studies.

The full CPGI has been used in general population surveys in seven Canadian provinces as well as in Iceland (Abbott *et al.*, 2004a; Wynne, H.J., personal communication to Dr Volberg, 21 September 2003). The nine-item PGSI has been used in a national Canadian survey as well as in general population surveys in Queensland and Victoria (Marshall and Wynne, 2004; McMillen *et al.*, 2004; Queensland Policy Directorate, 2001). This screen is mandatory for all clients entering drug, alcohol and problem gambling treatment in Ontario (Goering, 2003). In prevalence studies that used both the SOGS-R and PGSI, the latter measure generally produced lower prevalence estimates, in some cases less than half the SOGS-R estimate.

### Victorian Gambling Screen (VGS)

In Australia, as in Canada, there has been longstanding concern about over-emphasis on gambling problems as a psychiatric disorder and interest in the

development of definitions and measures that frame problem gambling in a population health context and reflect wider adverse social impacts. In 1997, the Victorian Casino and Gaming Authority commissioned two related studies, one to develop a definition of problem gambling, the other to produce a measure for use in population surveys. Problem gambling was defined broadly as a situation when a person's gambling activity gives rise to harm that may impact on the individual player and/or his/her family, and may extend to the community (Dickerson *et al.*, 1997). It intentionally avoided causal or theoretical assumptions and is claimed to contrast with mental disorder based definitions and measures by being grounded on 'observable outcomes 'outside' the individual' (Dickerson, 2003, p. 34).

In developing a scale to measure problem gambling as defined above, similar methods were used to those employed with the SOGS and PGSI (Ben-Tovim *et al.*, 2001). A large pool of items was selected from existing instruments and focus groups. Through pilot studies, the items were reduced to a scale of 21 that was found to consist of three factors—harm to individual, harm to partner, and harm to respondent gambling enjoyment. Each item, phrased in a past 12 months frame, has five response options (never = 0, rarely = 1, sometimes = 2, often = 3, always = 4). The reduced set of 21 items was administered to a second sample of 261 gamblers and problem gamblers, 71 of whom were also administered the SOGS-R, the DSM-IV criteria and underwent a clinical interview. The new measure was shown to have very good internal consistency and test–retest reliability.

Although having three factors, only the dominant 'gambling-related harm' factor (15 of the 21 items) was effective in differentiating problem and non-problem gamblers. The score range for the 15-item sub-scale is 0–60. The optimal cut-off score for identifying interviewer assessed problem gamblers is 21. The optimal score with respect to DSM-IV criteria was 14. The VGS has very high correlation with the SOGS-R (0.86), suggesting these instruments are measuring essentially the same underlying construct. Consistent with this, examination of the VGS 'gambling-related harm' items indicates that most do not relate to harm but rather concern respondents' gambling behaviours and attitudes. While there is some variation in content between the SOGS-R and VGS, and while the latter measure appears to be better at detecting differences at the higher end of the problem range, both measures have much in common including an individual focus. There is little to suggest that the VGS is an alternative measure with an emphasis on harm and 'outcomes outside the individual'.

While having some positive features, the VGS has been very little used outside of Victoria and not much is known about how it performs in general population or clinical contexts. As indicated, McMillen *et al.*, (2004) and McMillen and Wenzel (2006) have recently compared the VGS, SOGS-R and PGSI in community samples and concluded that, while having many similarities, the PGSI out-performs the other two screens.

### Brief Screens

A critical challenge of general population studies of problem gambling is the relative infrequency of the disorder. This means surveys must either administer problem gambling measures to very large numbers of respondents to identify adequate numbers of problem gamblers or use one of a variety of strategies to pre-

screen or filter to reduce the number of people assessed. In Australia, measures are typically only administered to regular (i.e. weekly) non-lottery gamblers. Reported gambling expenditure is also often used as a filter. 'Dual frame' sampling has been used in the USA (Gerstein *et al.*, 1999) and multiple interviews per household in the UK (Orford *et al.*, 2003). None of these 'solutions' is entirely satisfactory; some are distinctly problematic.

Investigators, including the present authors, have often faced resistance when seeking to include problem gambling measures in general health, addictions or other specialist prevalence surveys, both new studies and established prospective investigations. This is particularly frustrating because the inclusion of a problem gambling measure in these contexts could generate enormous amounts of information at relatively low cost. This challenge is not confined to research; reluctance to include full problem gambling screens within mental health or addictions assessment is also widespread in primary health care settings.

The foregoing difficulties have generated interest in the development of very brief problem gambling screens or measures. The earliest of these, the Eight Screen, was developed as a quick checklist for screening in primary care and other applied settings (Sullivan, 1999). The Eight Screen was intended to serve as a filter for further screening or a clinical interview. Items were selected from existing measures and those included in the screen were the items that best differentiated problem gamblers in treatment from non-problem gamblers. Using a sample of approximately 1000 patients in primary care settings in conjunction with the SOGS, a cut score of four was found to provide the optimal classification of SOGS defined probable pathological gamblers. The measure has good internal consistency and test-retest reliability.

The Eight Screen has a simple 'yes'/'no' scoring format and has been shown to be easy to use in primary health care, prisons and some other settings in New Zealand (Delfabbro and LeCouteur, 2003). As a screen, it is designed to reduce false negatives at the cost of increasing false positives. For this reason it is not appropriate to use the measure to assess the prevalence of problem gambling in community or other settings. Furthermore, given that it is almost as long as the PGSI and some DSM-IV based measures, it might be more appropriate to use one of these rather than the Eight Screen for this purpose. While the Eight Screen may have value in identifying people with less serious problems in applied settings, it has yet to be shown how the screen performs in this regard relative to other more widely used measures. If it is not an advance on the PGSI or shorter DSM-IV measures, it may be better to use these measures from the outset rather than as a second stage assessment.

The shortest of the brief screens, the Lie-Bet Screen, consists of only two questions related to DSM-III-R and DSM-IV criteria—'Have you ever felt the need to bet more and more money?' and 'Have you ever had to lie to people important to you about how much you gambled?' Each is scored either no (0) or yes (1). These two items provided the best differentiation between problem gamblers and non-problem gamblers. In both the initial study and a subsequent validation study, these items were highly effective in differentiating between clinical samples of problem gamblers (variously defined) and non-problem gamblers (Johnson *et al.*, 1997; Johnson *et al.*, 1998).

Götestam *et al.* (2004) recently examined the performance of the Lie-Bet Screen in large adult and adolescent general population samples in Norway. While it performed poorly as a screen for pathological gambling, a positive response to

either or both items did perform well with respect to the detection of adults and adolescents with DSM-IV scores of three or more (problem and pathological gamblers combined). The Lie–Bet Screen correctly detected over 90% of DSM-IV defined problem and pathological gamblers (11 of 12 adults; 180 of 194 adolescents). This means 15 people with problems were not detected (false negatives). There were also 146 people incorrectly classified as having problems (false positives). With respect to screening, if administration of the full screen was confined to people who scored positive on the Lie–Bet Scale, only 196 people would need to be assessed instead of 5251 at the cost of missing 15 people with problems.

Interestingly, when the two-item screen is considered in its own right rather than as a filter for additional assessment, it produces population prevalence estimates that are not significantly different from those derived from the entire DSM-IV measure (adults' Lie–Bet Screen 0.54%; DSM-IV 0.45%; adolescent's Lie–Bet Screen 5.56%; DSM-IV 5.22%). This similarity occurs as a consequence of the relative proportions of false positives and false negatives. These findings suggest that, in addition to providing a very effective filter, this short screen does as well if not better than a number of longer, established problem measures as a proxy for DSM-IV defined lifetime problem and pathological gambling (but not pathological gambling *per se*). Further investigation in other settings and in relation to other measures is clearly warranted.

Toce-Gerstein and Volberg (2003) have also developed a short DSM-IV based screen from the NODS. The name of this three-item screen, the *NODS-CLiP*, refers to the criteria included in this subset of the DSM-IV based NODS (Control, Lying and Preoccupation). While these were not the lifetime NODS items most frequently endorsed by NODS-defined lifetime pathological and problem gamblers, Toce-Gerstein and Volberg (2003) analysed a large data set of just under 9000 adults—including the US national survey, patron survey and six state level surveys to identify the subset of NODS items that were most likely to be endorsed by NODS-classified problem and pathological gamblers. Ninety-nine per cent of NODS-classified pathological gamblers and 94% of problem gamblers answered at least one of the three items in the affirmative.

Recent analysis indicates that the lifetime NODS consists of three sub-factors and that the three items included in the NODS-CLiP each load significantly on one of these factors (Toce-Gerstein and Gerstein, 2005). Currently arrangements are being made to incorporate the NODS-CLiP in an assessment battery that will be administered to all people who are assessed for mental health or addiction problems in the State of Connecticut. Individuals who endorse one or more of the three items will be administered the remainder of the NODS lifetime items. This will enable the performance of the CLiP and full NODS to be examined in a large clinical population. Further assessment of this brief screen is also warranted in additional general population settings, perhaps in conjunction with the Lie–Bet Screen.

### Other Measures

This paper has focussed on measures designed to screen for or assess problem or probable pathological gambling as an identifiable disorder or spectrum of problems. It does not examine instruments developed to measure more specific aspects of gambling behaviour and problem gambling. This latter category of measures is important, however, and warrants detailed consideration in its own right. Extant and emerging measures of this type may, in future, contribute significantly to the

advancement of measurement and understanding of gambling and gambling-related problems. Examples of potentially relevant measures include the Addiction Severity Index for Gambling (ASI-G) (Lesieur and Blume, 1991, 1993), the Yale–Brown Obsessive Compulsive Scale for Pathological Gambling (YBOCS-PG) (Hollander *et al.*, 1998), the Gambling Attitudes and Beliefs Scale (GABS) (Breen and Zuckerman, 1999), the Scale of Gambling Choices (SGC) (O'Connor and Dickerson, 2003), the Gambling Urge Scale (Raylu and Oei, 2004), the Information Biases Scale (Jefferson and Nicki, 2003), the Gambling Passion Scale (Rousseau *et al.*, 2002), the Gambling Self-Efficacy Scale (May *et al.*, 2003) and the Gambling Readiness to Change scale (GRTC) (Neighbors *et al.*, 2002). Neal *et al.* (2005) provide further information about several of these measures.

Problem gambling, particularly serious problem gambling, is often accompanied by other mental disorders to which it interrelates in complex and varied ways (Westphal and Johnson, 2006). As Blaszczynski and Nower (2002) among others have argued, there are a variety of pathways into problem gambling and clinically meaningful differences between sub-groups of serious problem gamblers. To identify these differences and obtain a fuller understanding of individuals' problems, it will be necessary to augment the types of problem gambling measures discussed in this article with a variety of other measures, including measures of other mental disorders. This will assist in advancing knowledge about the nature of problem gambling, including its progression and relationships with other disorders. Research of this type will probably also lead to further developments in the measurement of problem gambling.

### The Usage of Problem Gambling Measures

Neal *et al.* (2005) undertook a comprehensive search of the usage of problem gambling measures worldwide, drawing on published sources as well as reports held by government agencies, conference proceedings and other grey literature. They found that the SOGS, SOGS-R or other SOGS derivatives were the principal measure used in half of the studies located. They were used in conjunction with other measures (mainly DSM-IV based) in a further 10% of studies. DSM-IV diagnoses and measures were also widely used (primary measure in 44%; included with the SOGS/SOGS-R in a further 8%). The CPGI (or PGSI) was the primary measure in 4% and accompanied the SOGS/SOGS-R in another 2%. A variety of other problem gambling measures were used infrequently (7%). In clinical and treatment settings, DSM-IV diagnoses/measures were favoured over the SOGS/SOGS-R (54% and 43% respectively). In other contexts including studies of students, community surveys and gamblers recruited for research studies, the SOGS/SOGS-R were most frequently used.

In disciplinary terms, the SOGS/SOGS-R were by far the most commonly used measures in psychology, addictions and gambling studies whereas in psychiatry DSM-IV measures were used slightly more often than the SOGS/SOGS-R. The SOGS/SOGS-R were used in 85% of Australian and New Zealand studies, occasionally in combination with DSM-IV measures and once with the CPGI. The SOGS/SOGS-R were also the most frequently used measures in Canada (62%) and the USA (56%). The CPGI/PGSI and DSM-IV based measures were each used in 24% of Canadian studies whereas in the USA the CPGI/PGSI was not used at all<sup>3</sup> while DSM-IV measures were used in 37% of the studies. In Europe (excluding the UK), DSM-IV measures were favoured (66%), followed by the SOGS/SOGS-R

(35%) and CPGI/PGSI (8%). The SOGS/SOGS-R and DSM-IV measures were the only ones used in the small number of studies conducted in the UK, Asia/Middle East and South America.

It appears that, overall, the SOGS and its derivatives are the most widely used measure in most contexts and parts of the world, perhaps due to its longevity. However, in clinical settings, DSM-IV diagnoses and measures are used somewhat more often. With respect to prevalence studies, until relatively recently, the SOGS/SOGS-R has been by far the most frequently used measure. In the USA, it appears that the NODS, a psychometric version of the DSM-IV, is now on a par with the SOGS/SOGS-R. In Canada the SOGS/SOGS-R has been largely superceded by the CPGI. The CPGI is also being adopted in Australia and New Zealand, typically in conjunction with the SOGS-R. This screen will be used in the forthcoming 2006/2007 New Zealand National Health Survey and also incorporated into an ongoing prospective cohort study of 1200 mothers, fathers and children in New Zealand.

There are probably many different reasons for selecting one or another problem gambling measure to use in clinical settings and/or population research. In our experience, policymakers, regulators and gambling operators tend to prefer whatever problem gambling measure yields the lowest prevalence rates, while treatment providers and problem gambling advocacy groups tend to prefer problem gambling measures that yield higher estimates—with little consideration or understanding of the specific performance characteristics of different problem gambling screens.

As we noted above, DSM-IV measures tend to be used in clinical settings. In population research, the SOGS/SOGS-R is being superceded by the DSM-IV-based measures in the USA and by the CPGI elsewhere. In the USA, DSM-IV-based measures tend to be preferred in both clinical settings and in population research because of the continued strength of psychiatry in the treatment and investigation of mental disorders in the USA and because of the continued importance of the DSM in obtaining insurance coverage for such treatment. Elsewhere in the world, the PGSI has been widely adopted in population research because of the brevity of the screen and broader acceptance of a public health and harm minimisation perspective, both of which reduce the salience of clinical diagnoses in treatment settings or in population research. The *relative* merits of these different screens depend, in large part, on the larger cultural, social and political contexts within which problem gambling researchers and clinicians operate.

## Conclusion

It is evident that the various measures examined here reflect prevailing conceptualisations of problem gambling. Early measures including the SOGS were predicated on the belief, stemming from GA and subsequently embedded in the DSM-III-R and ICD-10, that pathological gambling is a chronic or chronically relapsing mental disorder. Although the DSM criteria for pathological gambling have changed in successive revisions, increasingly resembling those of addictive disorders, the assumption of chronicity remains.

Based on the foregoing review, we have arrived at several conclusions in relation to measuring problem gambling. First, we believe that there are good reasons to continue the development of psychometrically sound DSM-derived instruments. Second, the transience of gambling problems suggests that it will be

important to continue to incorporate current timeframes in problem gambling measures. Third, there is good reason to continue the use of lifetime frameworks in clinical settings. Finally, while there are good reasons to continue to include the two major aspects of the problem gambling construct in our measures (loss of control and adverse consequences), it is also very important to develop measures and indicators of the broader societal harms and costs associated with excessive gambling. However, it remains to be seen whether such instruments will perform as well as a number of existing measures when it comes to identifying and assessing individual problem gamblers.

Development and use of a variety of measures in different research contexts has generated findings that contradict the GA/DSM notion of pathological gambling as a chronic disorder. It now appears that problems are transient for most problem gamblers, especially those with less serious problems and a lack of co-morbid addictive disorders (Abbott *et al.*, 1999, 2004a,b). While some DSM-IV based measures retain a lifetime frame, others have adopted a current focus, as have more recently developed measures such as the VGS and PGSI. The NODS, like the original SOGS-R, has a dual frame. Exceptions include the very brief screens, which retain a lifetime frame.

While incorporating a pathological or serious problem gambling category, most recent measures, including those based on the DSM-IV, include one or more less serious gradations. This implies dual notions of problem gambling as a diagnostic entity and continuum. It has been claimed that some new measures including the VGS and PGSI reflect a public health rather than a mental disorder perspective and assess harm rather than individual psychopathology. However this is more evident in rhetoric than reality. While the content of these measures differ somewhat, many of the items are taken from earlier measures and are behaviourally focussed. Furthermore, the degree of correlation between them is such that an impartial observer would conclude that they are measuring essentially the same thing.

Ideally measures of problem gambling should rest on explicitly stated theories that have solid research backing. While some recent problem gambling measures reflect more refined understanding of the nature of problem gambling, fundamental questions remain and debate continues. Future research and conceptual advances will no doubt lead to improvements in the measurement of problem and pathological gambling. Some issues discussed in this article have relevance to these endeavours. However, it is unlikely that all of these fundamental questions will ever be answered to everyone's satisfaction. While there may be improvements in measuring problem and pathological gambling, it is unlikely that there will ever be a single 'gold standard' (such as a blood test or a genetic marker) that everyone agrees upon. In the meantime, our immediate needs to measure, prevent and treat gambling problems cannot be put on hold. Hence researchers and clinicians must choose among the various measures that are available and whose performance characteristics are well understood.

Apart from various important psychometric attributes, the merits of one instrument over another are highly dependent on the purpose of its use and context. The major purposes of the instruments considered in this article include screening for various degrees of problem severity and assessing problem gambling and/or pathological gambling. Although the DSM conceptualisation of problem gambling has some significant shortcomings, in geopolitical or clinical contexts where DSM assessment is required there are at least three extant

measures that perform adequately, namely the SOGS/SOGS-R, the PGSI and one or another of the DSM-IV measures. These measures may also be suitable, using lower cut points, to identify people with less severe problems. There is also mounting evidence suggesting that a lower cut score of four for DSM-IV-based measures is more appropriate than five to identify pathological gamblers.

There are a variety of reasons for using current rather than lifetime measures, apart from the finding that the latter provide a very poor indication of actual past problems (Abbott *et al.*, 1999; 2004b). However, a 'lifetime' format might be more appropriate for clinical screening where initial assessment is followed by more extensive examination. In this situation, it is important to minimise false negatives and, while further investigation is required, it is likely that 'lifetime' measures will perform better than current measures in this respect. We would therefore argue that use of lifetime measures in clinical settings is entirely appropriate while their use in population research may be less so.

Examination of the factor structure of a number of existing instruments suggests that there are two major aspects of the problem gambling construct, one concerning loss of control and dependency, the other concerning adverse consequences that result from dependency. It would be helpful if future measures could more adequately differentiate between these two dimensions. Consideration could also be given to the relative importance of different items and their weighting in scoring to reflect this.

At this stage it appears that the PGSI and one or more DSM-IV based measures may be emerging as successors to the SOGS/SOGS-R. However, given their high correlation with the SOGS/SOGS-R, it could be argued that these are essentially measuring the same thing. For this reason, and the very large amount that is known about the performance of the SOGS/SOGS-R in many different contexts, serious consideration should be given to further refinement of this measure. This could include retention of the better performing items and removal of those that have become obsolete or fail to reflect problems in some groups. Irrespective of which of these measures emerge as the new *de facto* 'gold standard' or 'gold standards', it is important that further basic research is done to enhance their psychometric properties and ensure that they are appropriate for use in different settings with a variety of sociocultural groups.

Given the importance of the DSM diagnostic system in clinical and research situations, and its widespread adoption in many parts of the world, there will remain strong reasons to have sound psychometric versions of DSM pathological gambling diagnosis. However, it is evident that the underlying conceptual and empirical basis for the present DSM-IV criteria is not particularly strong. This includes its failure to provide a current frame for problems or require that symptoms cluster together within a given time interval (currently and/or in the past). Interestingly, some DSM-IV based measures of pathological gambling do incorporate these features. This means that they are not, in fact, assessing pathological gambling as it is currently officially defined. In our view, the best 'solution' to this incongruity would appear to be to modify the official diagnosis rather than the measures.

## Notes

1. One early exception is the Massachusetts Gambling Screen, each of whose seven items are differentially weighted to produce a final score (Shaffer *et al.*, 1994).

2. Recent surveys including the NODS have used a 16-item version. An item assessing whether gambling had caused respondents to experience problems in school was only asked in the original study of individuals who were attending school fulltime. This item has been folded into a subsequent question assessing whether gambling has caused respondents to lose a job, have trouble with a job, or miss out on an important career opportunity.
3. The 9-item PGSI was included as a secondary measure of problem gambling in a recent prevalence survey in New Mexico (Volberg, 2006).

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