CLINICAL ASSESSMENT OF PROBLEM GAMBLERS IDENTIFIED USING THE CANADIAN PROBLEM GAMBLING INDEX

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Report prepared by the University of Sydney Gambling Treatment Clinic and Gambling Research Unit for the South Australian Independent Gambling Authority

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Executive Summary

Terms of Reference

The Independent Gambling Authority of South Australia invited tenders to conduct a comparative study of two approaches to the assessment of problem gamblers: The Canadian Problem Gambling Index (CPGI: Ferris & Wynne, 2001), and clinical interview based on Diagnostic and Statistical Manual IV (DSM-IV: American Psychiatric Association, 1994) criteria. The current study was carried out on two samples of gamblers (problem and non-problem) selected from the 2005 statewide South Australian Department of Families and Communities random population prevalence study of adults, and re-tested in 2008.

The primary objective of the terms of reference was to determine the degree to which problem gamblers identified according to CPGI-PGSI scores were similarly classified using clinical interview assessment methods applying DSM-IV-based criteria, and to discuss the implications of resulting findings in relation to the identification and treatment of individuals with gambling problems.

For purposes of the study, the Gambling Research Australia endorsed definition, that is gambling *"characterized by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community"* (Neal, Delfabbro, & O'Neil, 2005. p.125) was used to define the construct of problem gambling.

Background

Currently many of the multiple existing instruments that purport to measure problem gambling have not been fully evaluated for their reliability, validity, and classification accuracy (Stinchfield, Govoni, & Frisch, 2007). Although extensively utilised in early epidemiological and clinical studies, the South Oaks Gambling Screen (Lesieur & Blume, 1987) is increasingly being replaced by the Problem Gambling Severity Index (PGSI) of the Canadian Problem Gambling Index (CPGI) (Ferris & Wynne, 2001) as the instrument of choice.

Both the SOGS and CPGI-PGSI are based on DSM-IV criteria and therefore are highly correlated (Stinchfield et al., 2007). However, some recent studies have questioned the extent to which these instruments correlate with clinical assessments. For example, in their study, Ladouceur, Jacques, Chevalier, Sevigny and Hamel (2005) administered the SOGS and CPGI-PGSI each to a sample of 4,421 adults, respectively. Although results indicated that the two instruments obtained similar prevalence estimates of pathological gambling, results of a semi-structured clinical telephone interview failed to confirm the diagnostic classification of 82% of gamblers identified as probable pathological gamblers by the SOGS or CPGI-PGSI. These authors concluded that the discrepancy between the outcomes of psychometric measures and clinical assessment is significant and requires further evaluation.

Given that clinical assessments of problem gambling using DSM-IV criteria are regarded as the 'gold standard', it is important to ascertain the extent to which cases identified by the CPGI-PGSI are concordant with clinical assessments. A high discordant rate implies that prevalence estimates based on the CPGI-PGSI may overestimate or indeed underestimate the true rate of occurrence in population studies subject to which measure is more accurate.

Methodology

In 2005 the South Australian Department of Families and Communities conducted a statewide epidemiological study of problem gambling on a sample of 17,745 adults. A total of 2,486 individuals were identified as regular gamblers, that is, once per fortnight or more often. Using the CPGI-PGSI as the diagnostic measure, 251 individuals were classified moderate or high-risk gamblers (CPGI-PGSI = 3+) and labelled as '*problem gamblers*' to give a prevalence estimate of problem gambling in South Australia of 1.6%.

Of the 251 moderate and high-risk gamblers identified in the survey, 221 (88%) agreed to be re-contacted and to participate in future studies.

In 2008, the Population Research and Outcome Studies Unit of the South Australian Department of Health re-administered the CPGI-PGSI to 113 of the 178 moderate and high risk gamblers identified in the 2005 survey able to be contacted and/or agreeing to participate in this phase of the study. This sample represented an overall response rate of 74.8% of eligible participants. Of these 113 participants, 65 also agreed to complete the clinical interview assessment conducted by the University of Sydney.

Of the recreational (low-risk and non-problem) gamblers identified in the 2005 survey, 1,926 agreed to be re-contacted. Of these, 147 individuals matched for age and sex with the moderate and high-risk gamblers were subsequently approached for inclusion in the 2008 phase of the study. A total of 82 consented to participate and were assessed. The interviews were conducted between March and May 2009.

In respect to assessment, participants were initially administered a structured interview (Structured Clinical Interview for Pathological Gambling (SCIP; Walker, Anjoul, Milton, & Shannon, 2006) evaluating each participant's capacity to control expenditure of time and money gambling, and problems in everyday life. This was followed by a battery of instruments measuring aspects of pathological gambling, harm caused by gambling and the problem gambling status: National Opinion Research Centre DSM Screen (NODS) (National Opinion Research Centre, 1999), Gambling Effects Scale (GES) (Walker, unpublished), and CPGI-PGSI (Ferris & Wynne, 2001).

Current study sample

The final sample used in the current study consisted of n = 147 of 65 moderate and high risk, and 82 low-risk and non-problem gamblers. Seventy-eight participants completed the interview face-to-face and the remainder (n = 69), by telephone. From the sample of participants completing the face-to-face interview, 39 problem gamblers and 39 recreational gamblers matched on gender, age and type of gambling were selected for comparative purposes.

Ethical approval

Ethics approval for the conduct of the study was obtained from the University of Sydney Human Research Ethics Committee, and the South Australia Health Human Research Ethics Committee.

Summary of results

- CPGI-PGSI scores were comparable and highly correlated for the n = 113 problem gamblers obtained in the 2005 and 2008 surveys.
- Approximately a third of respondents identified by the CPGI-PGSI (3+ threshold) as problem gamblers in the 2005 survey did not meet criteria on re-testing in 2008.
- It is not possible from the data to determine if the failure to meet criteria on re-testing is explained by treatment received in the intervening period, spontaneous recovery, or inconsistencies in responding.
- Scores obtained on the CPGI-PGSI were positively correlated with DSM-IV criteria (SCIP: r = 0.841; NODS: r = 0.811). These high correlations were expected given CPGI-PGSI items are derived primarily from DSM-based measures.
- Sensitivity is defined as the proportion of problem gamblers diagnosed by clinical interview correctly classified by CPGI-PGSI scores. Using 2005 survey data, a CPGI-PGSI cut-off score of 3+correctly identified 33 of 34 problem gamblers to give a sensitivity score of 0.971.
- In contrast, when applying the CPGI manual recommended cut-off score of 8+, 18 of 34 problem gamblers were correctly identified, giving a sensitivity score of 0.529.
- Using the Gambling Research Australia definition of problem gambling, prevalence estimates using the CPGI scoring system of 8+ are likely to strongly under-estimate true rates.
- Specificity is defined as the proportion of non-problem gamblers accurately identified as non-problem gamblers by the CPGI-PGSI. With the CPGI-PGSI cut-off set at 3+, specificity was found to be 0.841. This suggested that approximately 16% of regular recreational gamblers were incorrectly classified as problem gamblers.
- With cut-off scores set at the recommended cut-off of 8+, specificity rises to 0.991.
- A CPGI-PGSI cut-off score of 4+ provides an optimal balance in correctly identifying problem (sensitivity = 0.941) and non-problem gambling cases (specificity = 0.929).
- Although CPGI-PGSI scores were found to be predictably higher for individuals with severe gambling problems (mean score = 12.25) compared to those with moderate (mean score = 10.71) and mild problems (mean score = 8.33), considerable overlap in scores across categories were observed.
- The overlap in severity rating scores suggests that CPGI-PGSI does not effectively classify gamblers into distinct and separate categories.
- Consistent with previous research, the CPGI-PGSI was found to have high internal consistency (Cronbach's alpha = 0.901).

The findings of the current study are interpreted as supporting the utility of the CPGI-PGSI in its present form as a scale for measuring problem gambling but that it has limited usefulness in a treatment context.

However, evidence does suggest that current cut-off score of 3+ tends to underestimate problem gambling rates in the community. Using the Gambling Research Australia definition as defining the construct of problem gambling, a cut-off set at 3+ results in the tendency to misclassify a small proportion of recreational gamblers as problem gamblers, while a cut-off set at 8+ incorrectly classifies a minority of problem gamblers as recreational gamblers. A CPGI-PGSI cut-off score of 4+ provides an optimal solution to the question of sensitivity and specificity.

It is recommended that in future research the 4+ cut-off as the threshold to classify problem gambling is applied.

1. Research Specification

This research, funded by the Independent Gambling Authority, involves a clinical psychological assessment of a sample of problem gamblers and non-problem gamblers selected from a random population survey and classified according to the Canadian Problem Gambling Index (CPGI: Ferris & Wynne, 2001). The central aim of the project was to determine whether the CPGI-PGSI accurately classified individuals meeting and not meeting criteria for problem gambling.

The CPGI-PGSI is used extensively across numerous jurisdictions including Canada, Denmark and Iceland and increasingly to estimate the prevalence of problem gambling in most Australian states (Table 1).

Table 1

The prevalence of problem gambling in Australian states based on the use of the Problem Gambling Severity Index of the Canadian Problem Gambling Index

State	Author	Date	Sample N	Prevalence
Queensland	Queensland Treasury	2006/7	30,000	0.47
New South Wales	ACNielson	2006	2,010	0.80
South Australia	Department of Health, S.A.	2006	17,000	0.40
Victoria	McMillen et al.	2003	8,479	0.97
Tasmania	Roy Morgan Research	2005	6,048	0.73
Northern Territory	Charles Darwin University	2005	5,264	0.64

Stinchfield and his colleagues have critically reviewed screening measures raising questions on the reliability, validity and classification accuracy of existing measures (Stinchfield, 2002; Stinchfield, 2003; Stinchfield, Govoni, & Frisch, 2005). In respect to construction of the CPGI, five of the CPGI-PGSI items are similar to those contained in the South Oaks Gambling Screen (Lesieur & Blume, 1987), two to DSM-IV diagnostic criteria (American Psychiatric Association, 1994) and one with both these instruments. As expected given the overlap in items, the CPGI-PGSI is highly correlated (in the range of r =0.8 – 0.9) with the SOGS and DSM-IV derived instruments (Stinchfield, Govoni, & Frisch, 2007; Wenzel, McMillen, Marshall, & Ahmed, 2004). Thus, although concurrent validity is supported by the consistently high correlation reported across several measures, the fact that most are based on and/or include DSM items weakens the strength of this finding.

The question whether or not the CPGI-PGSI accurately identifies problem gamblers is of central importance in determining the accuracy of population estimates of problem gambling prevalence rates. Although research suggests that the CPGI-PGSI is highly correlated with other similar measures, comparisons between the CPGI-PGSI and clinical interviews show only a modest or

poor correlation in the vicinity of r = 0.5 (Stinchfield et al., 2007; Ladouceur, Jacques, Chevalier, Sevigny & Hamel, 2005). For example, Ladouceur et al. (2005) used a clinical interview to confirm whether individuals classified as problem gamblers using psychometric screening instruments were in fact meeting diagnostic criteria for problem gambling. Of significance, Ladouceur and his colleagues reported that 82% of their sample failed to meet clinical criteria, an unacceptably high discordance rate between these two methodological approaches to assessment. If Ladouceur et al.'s results are accurate then it is likely that the CPGI-PGSI over-estimates the prevalence of problem gambling. The current research seeks to replicate the research published by Ladouceur et al. to establish whether or not the CPGI-PGSI is an appropriate measure for prevalence research conducted on Australian populations.

Between October and December 2005, the Independent Gambling Authority in collaboration with the Department of Families and Communities carried out a statewide telephone (CATI) survey to a randomly selected sample of more than 17,000 South Australians to determine the prevalence of problem gamblers in that state. In that survey, the CPGI-PGSI was administered to individuals identified as frequent gamblers (i.e., defined as having participated in some form of gambling at least fortnightly in the previous 12 months (n=2,486)).

Using the CPGI-PGSI data, 251 survey respondents were identified as moderate or high-risk problem gamblers. The current project was designed to (a) contact and re-administer the CPGI-PGSI to this sample of moderate or high-risk problem gamblers, and additionally to a matched sample of recreational gamblers, and (b) carry out a clinical interview of respondents in both samples to determine the degree of concordance between clinical assessment and CPGI-PGSI scores.

1.1 The Canadian Problem Gambling Index (CPGI: Ferris & Wynne, 2001)

The CPGI was constructed following an intensive literature review by the authors that aimed to conceptualize problem gambling and to develop a more meaningful measure of problem gambling for use in general population surveys. Following its construction, a pilot study was carried out on a sample of 143 individuals to determine the reliability and validity of the measure. This sample included members of the general population, regular gamblers and self-designated gamblers. The instrument was subsequently administered to a general population sample of 3,120 Canadians with adequate test-retest reliabilities in the range of 0.78 assessed on 417 respondents (Ferris & Wynne, 2001). In its development phase, the measure has been shown to adequately discriminate between groups of gamblers and to correlate with concurrent indices of gambling such as frequency and expenditure (Stinchfield et al., 2007).

In its final form, the CPGI is comprised of 31-items that provide an estimate of:
(a) Level of involvement in gambling;
(b) Extent of problem gambling;
(c) Correlates of problem gambling; and
(d) Demographic characteristics.

It also incorporates a 9-item subscale comprising the Problem Gambling Severity Index (PGSI). The PGSI is a subscale of the CPGI used to classify respondents as non-gamblers, low-risk, moderate-risk and problem gambling. Items comprising the Problem Gambling Severity Index (PGSI) are listed in Table 2. However, many researchers refer to this subscale as the CPGI instead of the PGSI causing some confusion in the literature. For purposes of this report, the

convention of using the term CPGI-PGSI will be retained when referring to the subscale, and CPGI when referring to the full instrument.

The CPGI-PGSI was developed specifically for use in estimating the prevalence of problem gambling at the population level and is now the preferred measure for prevalence studies in Australia (Neal, Delfabbro, & O'Neil, 2005) and possibly world-wide (Stucki & Rihs-Middel, 2007).

Table 2

Items comprising the Problem Gambling Severity Index of the Canadian Problem Gambling Index (Ferris & Wynne, 2001)

	In the last 12 months how often have you
1.	Bet more than you could really afford to lose?
2.	Needed to gamble with larger amounts of money to get the same feeling of excitement?
3.	Gone back another day to try and win back the money you lost?
4.	Borrowed money or sold anything to get money to gamble?
5.	Felt that you might have a problem with gambling?
6.	Felt that gambling has caused you health problems, including stress and anxiety?
7.	People criticized your betting or told you that you have a gambling problem, whether or not you thought it was true?
8.	Felt that your gambling has caused financial problems for you or your household?
9.	Felt guilty about the way you gamble or what happens when you gamble?

Scoring: 0 = Never, 1 = Sometimes, 2 = Most of the time, 3 = Almost always.
Cut off scores: 1-2 = Low risk, 3-7 = Moderate risk, 8-27 = Problem gambler

1.2 Reliability and Validity of the PGSI of the CPGI: Previous Research

The characteristics of a successful scale include elements of unidimensionality, reliability and validity. A unidimensional scale is one that measures a single characteristic or construct (in this case, problem gambling). Reliability of a scale refers to the extent to which similar results are obtained following repeated administration of the scale under different conditions, and a valid scale is one that accurately measures the characteristic it was designed to measure. These characteristics will be discussed in the following sections.

1.2.1 Unidimensionality of the CPGI-PGSI

The results of Ferris and Wynne's (2001) analysis of the psychometric properties of the CPGI-PGSI, supported by the findings of Wenzel, McMillen, Marshall and Ahmed (2004), Brooker,

Clara and Cox (2009), and Rockloff and Dyer (2007), indicate the scale is unidimensional in nature with a Cronbach's alpha of 0.84; Cronbach's alpha is an index of internal consistency reflecting the degree to which items correlate with each other and hence accepted as measuring a single factor structure.

Table 3

Cronbach's Alpha index of internal consistency for the CPGI-PGSI

Country	Authors	Date	Sample	Alpha
Canada	Ferris & Wynne	2001	3,120	0.84
Australia	Wenzel et al.	2004	141	0.93
New Zealand	Bellringer et al.	2008	262	0.97
Canada	Brooker et al.	2009	36,984	0.86
Australia	Rockloff & Dyer	2006	2,577	0.89
Australia	Rockloff & Dyer	2007	395	0.87

The data from these studies provides the basis for accepting that the CPGI-PGSI provides a unidimensional and internally coherent scale for measuring problem gambling. This conclusion is confirmed by research using Rasch statistical analysis showing that each item is contributes to the overall score (Ward, 2008).

1.2.2 Content validity of the CPGI-PGSI

Content validity refers to whether the items of the scale actually measure the construct concerned. It is often referred to as "face validity" since the question is addressed by examining the theoretical relationship to the underlying concept. Ferris and Wynne asked twelve "experts" on problem gambling to examine the items and assess consistency with the concept of problem gambling. Problem gambling was defined as problem gambling behaviour (such as, chasing losses) and adverse consequences of the gambling (such as, falling into debt). The consensus of opinion was that the nine items were associated with either the gambling behaviour (five items) or the adverse consequences (four) and covered the construct of problem gambling extremely well. Given that the items focused on two aspects of problem gambling, the high levels of internal consistency achieved suggest that the items of the test measure a unitary concept very well.

1.2.3 Construct validity of the CPGI-PGSI

Construct validity refers to the ability of a scale to measure the construct as defined. Thus, a problem gambling scale has construct validity if items that compose the scale measure problem gambling and not constructs or factors outside the domain of problem gambling. Importantly, a problem gambling scale must measure not only whether or not problem gambling is present but also the severity of problem gambling.

Ferris and Wynne defined problem gambling as follows: '*Problem gambling is gambling behaviour that creates negative consequences for the gambler, others in his or her social network, or for the community*' (Ferris & Wynne, 2001, Introduction, pg. 1.2). They included five items concerning gambling behaviour (needed to gamble with larger amounts of money to get the same feeling of excitement, chasing losses, borrowing money or selling things to get money to gamble, betting more than could really afford to lose, and feeling like one might have a problem with gambling) and four items relating to negative consequences (problems with health and financial problems within the household, feeling guilty about one's gambling, and being criticized for one's betting or gambling).

Ferris and Wynne investigated the CPGI-PGSI's construct validity in a number of different ways. Principle among these approaches was the clinical interview. Ferris and Wynne employed ten clinicians to interview three groups of gamblers to determine whether their gambling fell in either the (1) problem gambling, (2) at-risk of problem gambling, or (3) no-risk of problem gambling categories. A total of 350 interviews were conducted with 20 pathological gamblers (DSM-IV≥5 or SOGS≥5), 21 individuals at risk of pathological gambling (DSM-IV=3-4 or SOGS=3-4) and the remainder considered not at risk (DSM-IV=0-2 or SOGS=0-2). The clinical judges were given a checklist of areas based on the CPGI-PGSI and required to ask relevant questions to ascertain the gambling status of the individual. The correlation of the clinical ratings with the CPGI-PGSI scores was 0.44. Ferris and Wynne comment that the reliability and validity of the clinical interview is not known.

Ladouceur, Jacques, Chevalier, Sevigny and Hamel (2005) used a similar approach in conducting a prevalence survey of problem gambling in Quebec using the CPGI-PGSI and the SOGS followed by a telephone-based clinical interview of 133 randomly selected participants drawn from the prevalence survey. The interviews used a semi-structured assessment of the extent to which the DSM-IV criteria for pathological gambling were met. Surprisingly, the results showed that 82% of the respondents scoring as a problem gambler on the CPGI-PGSI (CPGI-PGSI ≥ 8) did not meet the DSM-IV criteria for pathological gambling based on the telephone interview. Although pathological gambling criteria were used to evaluate a scale that seeks to measure problem gambling, this result raises the question of whether the CPGI-PGSI yields a classification of problem gambling and at-risk gambling that includes individuals who may not suffer negative consequences from their gambling behaviour (that is, are not problem gamblers by definition).

These results raise the question of whether the CPGI-PGSI is a valid measure of problem gambling. For this reason, the current research is designed with the primary aim of further investigating the CPGI-PGSI with the aim of establishing whether or not the scale is capable of assessing accurately problem gambling in Australia.

1.3 The Australian definition of problem gambling

For the purpose of research in Australia, Gambling Research Australia (GRA) has defined problem gambling as *'characterized by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community'* (Neal, Delfabbro, & O'Neil, 2005, p.125). This definition is similar to that used in the development of the CPGI. Problem gambling is excessive gambling that causes adverse consequences. In the work of Ferris and Wynne, excessive gambling is implied by problem

gambling behaviour such as chasing losses and betting more than one can afford to lose whereas, in the work of Neal, Delfabbro and O'Neil (2005). excessive gambling is marked by the failure to control the amount of time and money spent. The consequences of excessive gambling are problems in various areas of life. Thus, both the Canadian and Australian definitions of gambling involve two factors: excessive gambling behaviour and adverse consequences. A scale that validly measures problem gambling, as defined by the GRA, must accurately assess both the failure to limit time and money spent and the negative consequences to the individual, others and the community.

1.4 Aims of the research

The primary aim of the research is to determine whether or not the CPGI-PGSI identifies accurately, in the context of research on the prevalence of problem gambling, individuals who meet the definition of problem gambling as defined in Australia.

The secondary aim involves a discussion, based on the results of the research, of the usefulness of the CPGI-PGSI in the treatment of problem gambling.

2. Method

2.1 Participants

Participants for the present study were drawn from a general population problem gambling prevalence survey of 17,745 respondents conducted the South Australian Department of Families and Communities between October and December 2005. There were 2,486 respondents reporting that they gambled fortnightly or more often and who completed the PGSI section of the CPGI. Based on the CPGI-PGSI responses, 251 respondents were classified as moderate or high-risk gamblers (scoring 3+) and a further 2,392 were classified as low risk or non-problem gamblers (scoring 2 or less). All these participants were asked whether they were willing to be re-contacted to participate in future research. Of these, 221 moderate and high-risk gamblers and 1,926 low-risk and non-problem gamblers agreed to be contacted representing response rates of 88.0% and 80.5% respectively.

2.1.1 Moderate and high-risk sample

The Population Research and Outcome Studies Unit of the South Australian Department of Health was engaged to re-contact and re-administer the CPGI-PGSI to the moderate and high-risk gamblers. Re-administration took place between August and November 2008 with a total of 113 respondents successfully re-tested. The mean age of the sample was 51.3 years (SD = 13.5; range = 22 to 88). The gender distribution was almost identical with 50.4% (n = 57) males and 49.6% (n = 56) females. There was no significant gender difference in age (mean age: males = 51.4 (SD = 14.9, range = 22-88); females = 51.2 (SD = 12.3; range = 25-76)).

2.1.2 Low-risk and non-problem sample

From the 1,926 low risk and non-problem gamblers, a sample of 147 was drawn matched as much as possible on age and sex with the moderate and high-risk gambling group. This group was also matched, as far as possible, on type of gambling with over-sampling conducted to provide replacements.

The mean age of this sample was 50.4 years (SD = 13.3; range = 23 to 86). The mean age of the low risk and non-problem gambling sample compared to the moderate and high-risk gambling sample did not differ significantly.

The gender distribution was almost identical with 51.7% (n = 76) males and 48.3% (n = 70) females. There was no significant gender difference in age (mean age: males = 51.5 (SD = 13.8, range = 23-86); females = 49.2 (SD = 12.7; range = 25-76)).

2.1.3 Current study samples

The research team from the University of Sydney undertook to contact participants from the above two samples to participate in a more intensive one-hour clinical interview. To maintain consistency with the 2005 prevalence survey, participants with CPGI-PGSI scores of 3+ (groups 1 and 2) were labelled ‘problem gamblers’, and those with scores two or less, ‘recreational gamblers’: these terms will be used to refer to these groups through the remainder of this report.

In this phase of The University of Sydney study, all potential participants were contacted by posted mail, email and telephone, with Table 4 showing a breakdown of outcomes.

Table 4

Numbers of eligible participants agreeing, declining or unable to be participate in the University of Sydney phase of the study

	Recreational group N	Problem group N
Total N	147	113
Participated	82	65
Declined	44	33
Uncontactable	20	15
Not contacted	1	0

In total, 147 of the eligible pool of 260 moderate and high-risk and low-risk and non-problem gamblers successfully completed both the CPGI-PGSI and either the face-to-face or telephone clinical interviews.

For purposes of the comparative analyses, we selected a subsample of 78 participants (39 problem, and 39 recreational gamblers) on whom 2005 and 2008 CPGI-PGSI scores were available and who completed the face-to-face interview. There were comparable numbers of males (n = 13) and females (n = 26) in each sample. There was no significant gender difference for age for the recreational (mean = 49.03, SD = 11.77) or problem (mean = 48.87, SD = 12.57) gambler subsamples.

Participants were subsequently allocated to one of four groups according to CPGI-PGSI scores obtained at the Population Research and Outcomes Studies 2008 re-administration of the measure:

Group 1: N = 18 Problem gamblers with a CPGI-PGSI score of 8+;
Group 2: N = 21 Moderate risk gamblers with a CPGI-PGSI score of 3 -7;
Group 3: N = 18 Low-risk and no-risk gamblers with a CPGI-PGSI score of 0-2;
Group 4: N = 21 Low-risk and no-risk gamblers with a CPGI-PGSI score of 0-2.

To maximize the likelihood of valid comparisons, participants in groups 1 and 2 were matched as much as possible with groups 3 and 4 on relevant variables of age, gender and types of gambling variables.

In respect to statistical analyses, data from the full sample of N = 147 (face-to-face and telephone interviews) were analysed to determine psychometric properties of the CPGI-PGSI.

Data from the N = 78 subsample completing the face-to-face interview was used to evaluate the extent to which the CPGI-PGSI discriminated between problem and non-problem gamblers.

Data from the N = 39 in the problem gambling sample (group 1) was used to measure severity of problem gambling.

2.2 Measures

Participants were administered a semi-structured interview either face-to-face or via telephone interview, and a battery of psychometric measures assessing various aspects of gambling harm and status.

The rationale for justifying the use of the clinical interview as the standard is based on the argument that the interview provides a detailed and comprehensive assessment of expenditure of time and money gambling, and consequent harms. Problem gambling screens, in contrast, estimate severity through the use of limited questions that summarise complex indicators; for example, the CPGI-PGSI uses only five questions to measure gambling behaviour and four questions to measure adverse consequences.

2.2.1 The Structured Clinical Interview for Pathological Gambling (SCIP: Walker, Anjoul, Milton, & Shannon, 2006)

The Structured Clinical Interview for Pathological Gambling (SCIP) was administered to assess for the presence of DSM-IV criteria among participants (Walker, Anjoul, Milton, & Shannon, 2006). The Diagnostic and Statistical Manual (DSM-IV) of the American Psychiatric Association (1994) provides a list of ten criteria for pathological gambling that have been widely applied in pathological gambling research. However, participants are often asked to endorse relevant criteria in checklist format without necessarily ensuring that they fully understand the exact meaning of technical terms or the context in which the items apply. This has the potential for wide variations in interpretation of responses. By setting qualifying sub-criteria to make sure responses meet DSM-IV criterion thresholds, the SCIP interview minimises such potential variations in the interpretation of criteria. The SCIP has an acceptable internal reliability co-efficient of 0.73.

The clinical interview also included a component that assessed two predominant aspects of problem gambling:
(1) Difficulty limiting the expenditure of time and money while gambling;
(2) Extent of problems caused by gambling.

Failure to limit expenditure was treated as a binary variable with the presence of any difficulty associated with exceeding limits considered a necessary but not sufficient indicator of problem gambling.

The Global Functioning Index (GFI) of the Structured Clinical Interview for Pathological Gambling (SCIP) was used to assess problem severity (Walker, Anjoul, Milton, & Shannon, 2006) as mild, moderate, severe or extreme (see Table 5):

- Mild problems: occasional, manageable and not associated with distress.
- Moderate problems: problems found to be frequent and associated with some distress but remaining manageable.
- Severe problems: problems enduring through time, difficult to manage and causing a significant distress.
- Extreme problems: problems considered unmanageable and contributing to extreme levels of distress.

Table 5

Illustrative examples of the operational criteria used by the Global Functioning Index to measure severity of harm

	MILD	MODERATE	SEVERE	EXTREME
RELATIONSHIPS	Temporary negative changes in relationships (e.g. no lasting withdrawal of interest or time spent with family). Occasionally irritated or easily angered by significant others, family and friends. Disagreements resolved. Majority of relationships continue to be rewarding. Minimal attempts to conceal behaviours associated with gambling. Trust in relationships is maintained as prior to excessive gambling.	Noticeable negative changes in relationships (e.g. withdrawal of interest or time spent with family). Regularly irritated or easily angered by significant others, family members and friends. Verbal conflict occurs, however most disagreements are resolved. Denial of behaviours associated with gambling. Significant others, family members or friends express doubt over trustworthiness of the individual.	Stable negative changes in relationships across time (e.g. continual conflict, secrecy and concealment). Disagreements occur frequently and most are not resolved. Frequently irritated or easily angered by significant others, family members and friends. Trust deteriorates and significant others begin to engage in investigative behaviours and questioning of the individual involved in gambling.	Permanent negative changes in relationship occur due to ongoing conflict. Permanent changes include divorce, separation, dissolution of friendship, disinheritance and estrangement from family. Confidence and trust in the other person is no longer present to any significant degree and hope for change is lost.
VOCATIONAL	Temporary and not noticeable changes in work performance. More forgetful, easily distracted, and mild changes in productivity: e.g. tardiness, loss of motivation, loss of concentration and loss of interest.	Temporary and noticeable changes in work performance. Co-workers/supervisors commenting on any recent changes in appearance, quality of work, or relationships. Deadlines missed and work place opportunities lost.	Stable and noticeable changes in work. Warnings are given and threats of dismissal are made	Permanent negative changes in work. Dismissal or demotion.
PERSONAL	Slight and temporary impairment or difficulty in a single area of functioning. Transient, expectable reactions to psychosocial stressors. Mild severity of symptoms. Difficulty concentrating after an argument. Mild disturbance in mood. Mild insomnia.	Moderate difficulty in functioning. Flat affect, circumstantial speech, occasional panic attacks, fleeting suicidal ideation.	Serious impairment in functioning. Serious symptoms, suicidal ideation or suicidal ideation with a vague plan, severe obsessional rituals. Some impairment in reality testing or communication e.g. illogical, obscure or irrelevant speech. Diminished ability to maintain hygiene or self-care. Perceived self as failure. Presence of feelings of hopelessness.	Significant and lasting distress. Inability to function in almost all areas e.g. stays in bed, no employment, no home or friends. Some abnormality in perception and cognition. Demonstrates incoherence and impairment in communication and judgment. Acts grossly inappropriately. Suicide attempts, gestures or plans. Deliberate self-harm. Stable and lasting feelings of hopelessness. Frequently violent. Manic excitement.
EDUCATION	Temporary and not noticeable negative changes in educational performance. Low value missed opportunities. Missed some classes. Late assignments.	Temporary and noticeable changes in educational performance. Medium value missed opportunities. Failed to hand in work. Missed many classes.	Stable negative changed in educational performance. Significant educational opportunities missed. Failed parts of course.	Permanent negative changes in educational performance. Crucial educational opportunities missed. Expulsion. Failed course.
LEGAL	Temporary negative changes in legal situation. Late payments.	Noticeable negative changes in legal situation. Default on debts/fees/rent. Threats of legal action.	Stable negative changes in legal situation. Conviction without incarceration	Permanent negative changes to legal situation. Period of incarceration. Physical harm to others for financial gain.

FINANCIAL	Temporary negative changes in financial situation. Late payments. Putting off minor or luxury purchases	Noticeable impact on ability to manage finance- bills constantly late, unable to purchase many essential items, unable to perform necessary car or home maintenance. Require bail-out from others on one or two occasions.	Stable negative changes in financial situation. Reported to credit agencies, rental arrears, threatened with mortgage foreclosure. Frequently needing to borrow money from friends and family.	Permanent and severe changes in financial situation. Bankruptcy, mortgage foreclosure, relying entirely on others for financial support.

The extent of problems caused by gambling was treated as a continuous variable measured using the following eight-point anchor scale:

0 = no problems caused by gambling
1 = one mild problem caused by gambling
2 = two or more mild problems caused by gambling
3 = one moderate problem caused by gambling
4 = two or more moderate problems caused by gambling
5 = one severe problem caused by gambling
6 = two or more severe problems caused by gambling
7 = one or more extreme problems caused by gambling.

A consensus on severity ratings was achieved through discussions between the interviewer and participant with a Likert-type scale used to quantify problem severity ratings of problems.

2.2.2 The National Opinion DSM Screen for Pathological Gambling (NODS; National Opinion Research Centre, 1999)

The National Opinion Research Centre (NORC), University of Chicago, developed the 34-item NORC DSM Screen (NODS) to measure the prevalence of lifetime and past twelve month pathological gambling in the context of a national study of gambling in the United States in 1999. The scale items were developed to simplify the wording of the DSM-IV criteria and to reduce ambiguity and require *'yes/no'* responses (see Table 6). The twelve month NODS has a test-retest reliability of 0.98.

Table 6

NODS items assessing past twelve months problems

Criterion	DSM-IV label	Item	Question asked
1	Pre-occupation	1.	In the last 12 months, have there been periods lasting two weeks or longer when you spent a lot of time thinking about your gambling experiences or planning out future gambling ventures or bets?
		2.	In the last 12 months, have there been periods lasting two weeks or longer when you spent a lot of time thinking about ways of getting money to gamble with?
2.	Tolerance	3.	In the last 12 months, have there been periods when you needed to gamble with increasing amounts of money or with larger bets than before in order to get the same feeling of excitement?
3.	Loss of control	4.	In the last 12 months, have you tried but not succeeded in stopping, cutting down, or controlling your gambling?
		5.	Has this happened three or more times?
4.	Withdrawal	6.	In the last 12 months, have you tried to stop, cut down, or control your gambling?
		7.	On one or more of the times when you tried to stop, cut down, or control your gambling, were you restless or irritable?
5.	Escape	8.	In the last 12 months, have you gambled as a way to escape from personal problems?
		9.	In the last 12 months, have you gambled to relieve uncomfortable feelings such as guilt, anxiety, helplessness, or depression?
6.	Chasing Losses	10.	In the last 12 months, has there been a period when, if you lost money gambling one day, you would return another day to get even?
7.	Lying	11.	In the last 12 months, have you ever lied to family members, friends, or others about how much you gamble or how much money you lost on gambling?
		12.	Has this happened three or more times?
8.	Illegal Activities	13.	In the last 12 months, have you written a bad check or taken something that didn't belong to you from family members or anyone else in order to pay for your gambling?
9.	Jeopardised Relationship, Job or Educational Opportunity	14.	In the last 12 months, has your gambling ever caused serious or repeated problems in your relationships with any of your family members or friends?
		15.	ANSWER ONLY IF YOU ARE IN SCHOOL In the last 12 months, has your gambling caused you any problems in school, such as missing classes or days of school or your grades dropping?
		16.	In the last 12 months, has your gambling caused you to lose a job, have trouble with your job, or miss out on an important job or career opportunity?
10.	Borrowing	17.	In the last 12 months, have you needed to ask family members or anyone else to loan you money or otherwise bail you out of a desperate money situation that was largely caused by your gambling?

2.2.3 The Gambling Effects Scale (GES) (Walker, unpublished)

The Gambling Effects Scale is an unpublished scale developed at the University of Sydney Gambling Treatment Clinic that is designed to measure the extent of lifetime gambling-related problems. The scale measures problems in seven domains of life. In a report to the Responsible Gambling Fund of New South Wales, the GES was found to have an internal reliability of 0.8

based on a sample of 120 problem gamblers seeking treatment for excessive gambling.

2.2.4 Problem Gambling Severity Index of the Canadian Problem Gambling Index (CPGI-PGSI: Ferris & Wynne, 2001)

The 9-item CPGI-PGSI described earlier was used to classify problem gamblers and against which comparative analyses were undertaken to determine concordance rates with clinical interviews. The CPGI-PGSI provides a range of possible scores from 0 to 27. Two cut-offs are relevant for estimating the sensitivity and specificity of the CPGI-PGSI: 3+ (used in the South Australian prevalence survey) and 8+ (defined in the CPGI manual).

2.3 Procedure

2.3.1 Human ethics approval

The Human Ethics Committee of the University of Sydney and the South Australian Health Human Ethics Committees approved the research.

Interviewers were provided with a helpline number in case the participant required help for gambling or became distressed during the call. This proved to be an important aspect of the procedure since a small number of participants did request and were directed to telephone numbers to obtain assistance as required.

2.3.2 Clinical interview ratings

Three registered clinical psychologists were recruited to conduct interviews. These clinicians were employed as problem gambling counsellors and had from two to seven years experience in treating problem gambling. They were familiar with the measures included in this study and had regularly administered the SCIP and GES in their routine clinical assessment of problem gambling.

2.3.3 Inter-rater reliability

A pilot study prior to the commencement of the study was undertaken to maximize and assess for inter-rater reliability between the three clinicians conducting interviews. Four scripts were prepared based on the lives of actual problem gamblers attending the Gambling Treatment Clinic for counselling. Names, dates and gambling venues were changed to preserve confidentiality.

Four additional scripts were prepared based on recreational gamblers known to the staff of the GTC. Three of the four 'recreational' gambling scripts were modified to include minor problems. Scripts were then allocated into four pairs with four actors hired to learn their respective scripts (one pair of scripts per actor). These actors were requested to participate in an interview with each of the three interviewers. Actors were permitted to embellish the script in order to answer the questions asked with the interviewer subsequently rating problem gambling severity on an 8-point Likert scale (see Table 7).

Table 7

Scores for problem gambling severity rated by three interviewers for each of the eight scripts used by actors

Actor	Script	Interviewer 1 Rating	Interviewer 2 Rating	Interviewer 3 Rating
1	Problem	6	6	5
	Recreational	2	1	2
2	Problem	7	7	7
	Recreational	2	2	2
3	Problem	5	6	5
	Recreational	2	2	2
4	Problem	7	7	6
	Recreational	0	0	0

The results obtained in the pilot testing of the interview method showed a satisfactory level of consensus across the three interviewers with an average inter-rater reliability of r = 0.983.

The research interviews were conducted either face-to-face or by telephone. Face-to-face interviews were conducted at the Mercure-Grosvenor Hotel in North Terrace, Adelaide and at the participants' homes for those residing in rural South Australia. Interviews followed a similar structure for both face-to-face and telephone methods. The interview commenced with the semi-structured interview that typically took from five to twenty minutes to complete followed by the SCIP and CPGI-PGSI. To minimize the duration of the interview, participants completed the GES and NODS in written form, either prior to the interview or at home following the interview.

3. Results

Responses to the 2008 CATI interview on whom data on the variables of interest was available indicated that the majority of recreational (95.2%, n = 140) and problem gamblers (97.3%, n = 110) had engaged in some form of gambling activity in the past twelve months. As expected 93% (n = 131) of recreational compared to 58% (n = 64) problem gamblers reported *never* or *rarely* gambling more than they could afford, a difference that is highly significant (Chi-square = 34.9, df = 1,3, p = .001).

Similarly, significantly more recreational (95.7%, n = 134) compared to problem gamblers (73.6%, n = 81) never or rarely returned to win back money lost (chasing losses) Chi-square = 4.02, df = 1,3, p < .05). Interestingly, despite chasing losses being considered a predominant feature of problem gambling, less than 10% of the present sample of problem gamblers reporting engaging in this form of behaviour.

Table 8 lists the types of activities undertaken most often by respondents in the two samples.

Table 8

Frequency and percentage of activities most often undertaken by recreational n= 147 and n = 113 problem gamblers

Gambling activity	Recreational Gamblers		Problem Gamblers	
	N of cases	%	N of cases	%
Lotto/lotteries	59	42.1	25	22.7
Instant scratch tickets	6	4.3	3	2.7
Keno	5	3.6	5	4.6
Bingo	4	2.9	2	1.8
Card games at home	1	0.7	1	0.9
Sports betting	1	0.7	1	0.9
Gaming machines	39	27.9	52	47.3
Wagering	23	16.4	19	17.3
Internet	1	0.7	1	0.9
Other (sweeps, raffles)	1	0.7	1	0.9
Total	140	100	110	100

A one-way analysis of variance was carried out to determine if scores differed across the two surveys for the subsample of 39 problem gamblers completing the two CPGI-PGSI surveys and 2008 face-to-face interview. Results showed that the mean scores for the 2005 CPGI-PGSI were comparable to those obtained in the 2008 re-testing with scores showing a significant test-retest correlation (Pearson's r = 0.77, p < 0.001, two-tailed).

The descriptive statistics for responses to the two CPGI-PGSI, NODS and SCIP scores are displayed in Table 9.

Table 9

Descriptive statistics for 39 problem and 39 recreational gamblers

Variable	Recreational N=39 Mean (SD)	Problem N = 39 Mean (SD)	Significance
2005 CPGI-PGSI score	0.56 (0.72)	7.90 (3.96)	F=129.13, p<0.0001
2008 CPGI-PGSI score	0.51 (1.21)	7.76 (5.07)	F=75.15, p<0.0001
NODS score	0.20 (0.53)	4.00 (2.42)	F=79.40, p<0.0001
SCIP score	0.10 (0.38)	2.03 (2.15)	F=30.02, p<0.0001

However, an examination of the larger sample of 113 respondents meeting the 2005 survey 3+ criteria for classification as problem gamblers revealed that 36.3% (n = 40) failed to meet the relevant criteria in the 2008 survey. There is no data available to determine whether or not the reduction in CPGI-PGSI scores for these respondents occurred as a result of (a) treatment received between 2005 and 2008, (b) spontaneous recovery, or (c) inconsistencies in responding to items. Although the rate is smaller, it is nevertheless consistent with the seven-year follow-up findings reported by Abbott, Williams and Volberg (1999) that approximately 70% of problem gamblers cease meeting criteria in the absence of formal treatment.

The descriptive statistics for the Structured Clinical Interview, NODS, and Gambling Effects Scale are given in Table 10.

Table 10

Descriptive statistics for the Structured Clinical Interview (SCIP), National Opinion DSM Screen (NODS), and Gambling Effects Scale (GRS) for n = 39 problem and n = 39 recreational gamblers

Scale	Recreational Gamblers Mean (SD)	Problem Gamblers Mean (SD)	Significance
SCIP	0.01 (0.38)	2.03 (2.15)	F=30.02, p < 0.0001
NODS	0.21 (0.54)	4.00 (2.42	F=79.40, p < 0.0001
GES	0.09 (0.43)	5.28 (7.32)	F=17.54, p < 0.0001

3.1 The construct validity of the CPGI-PGSI: classification of problem gambling

To determine the construct validity of the CPGI-PGSI for measuring problems, we analysed the distribution and concordance rates of cases classified as problem and recreational gamblers by both the telephone administered CPGI-PGSI and clinical interviews.

Classification by the CPGI-PGSI was compared against the 'gold standard' of the clinical interview.

The number of participants classified by both CPGI-PGSI and clinical interviews are listed in Table 11 below. There are four possible resulting combinations; two of which represent correctly and two, incorrectly classified participants. These are:

1. True positive: both the interview and CPGI-PGSI correctly classify the individual as a problem gambler (concordance). This reflects the *sensitivity* of the measure, that is, the proportion of problem gamblers correctly classified as problem gamblers.
2. False positive: the interview classifies the individual as a problem gambler but the CPGI-PGSI does not (discordance).
3. True negative: both the interview and CPGI-PGSI correctly classify the individual as not a problem gambler (concordance). This reflects the *specificity* of the measure, that is, the proportion of non-problem gamblers correctly classified as non-gamblers.
4. False negative: the CPGI-PGSI classifies the individual as a problem gambler but the interview does not (discordance).

Table 11

PGSI scores and correct classification using clinical interview methods for N = 147 individuals

CPGI-PGSI Score	Interview (face-to-face or telephone)		
	Non-problem Gambler	Problem Gambler	Number correctly classified for each CPGI-PGSI score
0	68	0	68
1	18	1	18
2	9	0	9
3	10	1	1
4	4	2	2
5	1	4	4
6	2	4	4
7	0	4	4
8	1	1	1
9	0	4	4
10	0	4	4
11	0	1	1
12	0	0	0
13	0	2	2
14	0	1	1
15	0	2	2
16	0	1	1
17	0	0	0
18	0	0	0
19	0	1	1
20	0	1	1
Total N	**113**	**34**	**128**

Table 12 shows the respective sensitivity and specificity coefficients for the CPGI-PGSI scoring system.

Table 12

Sensitivity and specificity of the CPGI-PGSI based on the scores of 147 gamblers

CPGI-PGSI Cut-off score	Sensitivity	Specificity	Sensitivity + Specificity	Area	1-Specificity
1+	1.000	0.602	1.602	0.602	0.398
2+	0.971	0.761	1.732	0.157	0.239
3+	0.971	0.841	1.811	0.077	0.159
4+	0.941	0.929	1.870	0.085	0.071
5+	0.882	0.965	1.847	0.032	0.035
6+	0.765	0.973	1.738	0.007	0.027
7+	0.647	0.991	1.638	0.012	0.009
8+	0.529	0.991	1.521	0.000	0.009
9+	0.500	1.000	1.500	0.005	0.000
10+	0.382	1.000	1.382	0.000	0.000
11+	0.265	1.000	1.265	0.000	0.000
12+	0.235	1.000	1.235	0.000	0.000
13+	0.235	1.000	1.235	0.000	0.000
14+	0.176	1.000	1.176	0.000	0.000
15+	0.147	1.000	1.147	0.000	0.000
16+	0.088	1.000	1.088	0.000	0.000
17+	0.059	1.000	1.059	0.000	0.000
18+	0.059	1.000	1.059	0.000	0.000
19+	0.059	1.000	1.059	0.000	0.000
20+	0.029	1.000	1.029	0.000	0.000

The overall sensitivity of the CPGI-PGSI was found to be 0.529 utilising the manual's recommended 8+ cut-off threshold. This figure represents a low level of sensitivity given the relatively large number of problem gamblers misclassified as non-problem gamblers.

The specificity was found to be high at 0.991 indicating a high degree of accuracy in correctly classifying non-problem gamblers.

Sensitivity is increased to 0.971 when the CPGI-PGSI cut-off for problem gambling is adjusted to the lower threshold of 3+ as applied in the 2005 prevalence survey indicating that virtually all problem gamblers are correctly classified. Conversely, specificity drops to 0.841, that is, there is an increase in the number of non-gamblers incorrectly classified.

From Table 12, it appears that a CPGI-PGSI cut-off of 4+ provides the optimal balance giving a sensitivity of 0.941 and specificity of 0.929.

Under ideal conditions, sensitivity would remain 0 until the appropriate cut-off threshold score for problem gambling is reached at which point sensitivity would change to 1. In contrast, specificity would remain 1 until the cut-off threshold was reached before reverting to 0.

A receiver-operating curve (ROC) is a graphical representation of the sensitivity (true positives) by specificity (false positives). If the CPGI-PGSI is unrelated to problem gambling then the ROC would show a diagonal rising from (0,0) to (1,1). The more that the ROC lies above the diagonal the more that the CPGI-PGSI is related to problem gambling. Thus, the area under the curve gives a statistical measure of the quality of the CPGI-PGSI in accurately measuring problem gambling. From Table 12, the area under the curve is calculated as the sum of the areas at each CPGI-PGSI scale value. This figure is 0.977 ($p<0.001$) with a 95% confidence interval of 0.954 to 1.000. The ROC is shown in Figure 1.

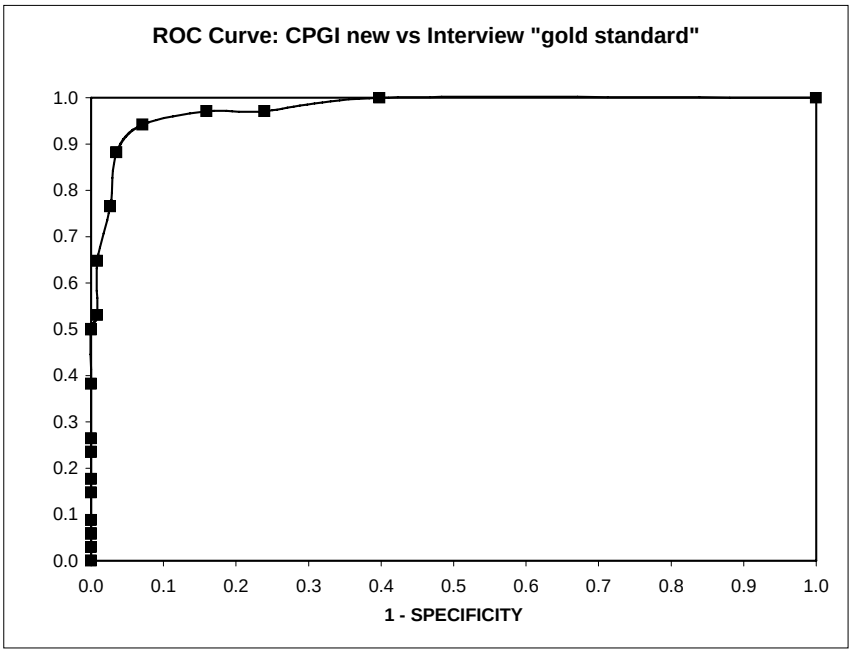

Figure 1: Sensitivity plotted against (1- Specificity). A scale that fails to discriminate problem from non-problem gamblers would plot along the diagonal from lower left to upper right. The more the curve lies above the diagonal, the better the discrimination.

3.2 The construct validity of the CPGI-PGSI: severity of problem gambling

At the second survey timeframe, the clinical interview assessed severity of problem gambling on a seven-point scale from mild to extreme. Using these ratings, 39 problem gamblers classified as such in the first survey were categorised as non-problem (n =12), mild problem (n = 12), moderate problem (n = 7), and severe problem (n = 8) gamblers. Table 13 displays the mean CPGI-PGSI score for each category of gambling problem severity.

Table 13

Mean CPGI-PGSI score for three levels of problem gambling severity

Severity	N	Mean CPGI-PGSI	$F_{2,26}$	Significance
Non-problems	12	2.75		
Mild problems	12	8.33	2.31	p=0.12 ns
Moderate problems	7	10.71		
Severe problems	8	12.25		
TOTAL	39	10.11		

A comparison of mean scores found no significant differences between CPGI-PGSI scores and severity ratings suggesting that CPGI-PGSI does not categorical distinguish severe from mild problems. This is consistent with the extent of overlap found across scores as shown in Table 14.

Table 14

Range and overlap of CPGI-PGSI scores for three levels of problem gambling severity

Severity	N	Range low	Range high	N of overlapping cases
Mild problems	12	3	19	11
Moderate problems	7	6	15	7
Severe problems	8	5	20	7
TOTAL	27	3	20	25

In total, 25 of the 27 CPGI-PGSI scores overlap boundaries defining mild and moderate, or moderate and severe.

3.2.1 Convergent validity of the CPGI-PGSI

As noted earlier, nine items of the CPGI-PGSI are drawn primarily from two scales that measure pathological gambling: DSM-IV and SOGS. Thus, it is expected that the CPGI-PGSI, DSM-IV and SOGS should be highly inter-correlated. However, the cut-points for pathological gambling should be more conservative than the cut-points for problem gambling. We compared CPGI-PGSI scores with DSM-IV criteria based on the NODS and the SCIP. Comparisons were made based on the 78 participants who received a face-to-face interview and on the full sample of 147 participants who received either the face-to-face interview or a telephone interview (Table 15).

Table 15

Correlation of the CPGI-PGSI with two DSM-IV measures (NODS and SCIP)

Sample	SCIP	Sample size	NODS	Sample size
Face-to-face	0.843	78	0.803	69
Full sample	0.841	147	0.811	118

The DSM-IV cut-off for pathological gambling is 5 and, for problem gambling, is 3 (Stucki & Rihs-Middel, 2007). It is interesting to note the disparity of rates of pathological and problem gambling obtained by the CPGI-PGSI, NODS and SCIP with the interview-based measure of problem gambling (Table 16).

Table 16

Comparison of problem gambling and pathological gambling: percentage of cases in the full sample (N=147)

Measure used	Problem gambling	Pathological gambling
Interview	23.6	n/a
CPGI-PGSI	12.9	n/a
NODS	23.7	15.3
SCIP	10.2	3.7

3.2 Internal consistency of the CPGI-PGSI

The internal consistency of the CPGI-PGSI, measured by Cronbach's alpha over the full sample of 147 participants was 0.901. The first five items of the CPGI-PGSI measure gambling behaviour and the final four items measure adverse effects. The correlation between these two factors is 0.861.

4. Discussion

Two questions were addressed by this research (1) whether the CPGI-PGSI validly measures problem gambling as defined by the Gambling Research Australia (GRA), and (2) whether the CPGI-PGSI is useful in the diagnosis of problem gambling in reference to treatment.

A comparison of a subsample of respondents meeting CPGI-PGSI criteria for problem gambling in the 2005 found that approximately a third failed to meet criteria in the 2008 re-testing. The data did not permit an investigation of the reasons accounting for this change in status. However, this finding is consistent with that reported by Abbott, Williams and Volberg (1999) and provides further support for the argument that problem gambling is not necessarily a chronic progressive condition.

The assumption was made that a clinical interview based on the GRA definition of problem gambling would provide the best estimate of problem gambling status for each member of the full sample of 147 participants. The clinical interviews showed that 34 (23.1%) of this sample were classified problem gamblers according to GRA definitions.

The CPGI-PGSI items were included in the interview followed then by the administration of the structured interview (SCIP). It is argued that the period of time between the clinical interview and the CPGI-PGSI was insufficient to shift the nature and status of gambling of participants. Results showed that only 18 individuals (12.2%) met the CPGI-PGSI cut-off for problem gambling (CPGI-PGSI = 8+). This result suggests that the CPGI-PGSI with cut-off of 8+, as specified by the manual, tends to underestimate prevalence rates of problem gambling as defined by the GRA.

In the 2005 prevalence survey, the cut-off for problem gambling using the CPGI-PGSI was set at 3+. Using this approach, participants classified as at moderate risk of problem gambling were categorised as problem gamblers. In the present study, a similar cut-off resulted in 33 individuals (22.4%) being classified as problem gamblers. This suggests that the prevalence rate in the 2005 survey tended to over-estimate the true prevalence rate of problem gambling.

The evidence available from this study suggests that a more accurate estimate of the prevalence of problem gambling, as defined by the GRA, corresponds to a CPGI-PGSI cut-off higher than 3, but less than, 8. Since all but 1 individuals classified as problem gamblers by the clinical interview were also classified as problem gamblers by the CPGI-PGSI with a cut-off set at 3+, there is substantial evidence that the CPGI-PGSI measures problem gambling accurately. However, a question remains over the optimal cut-off threshold for use in Australia. A cut-off set at 3+ includes too many false negatives whereas a cut-off set at 8+ misses too many true positives.

The design of this study is not sufficient to determine the best cut-off using the CPGI-PGSI and a population sample. The reason for this is that the sample included in this study was not a random sample of the population and nor is it representative of the proportion of problem gamblers and non-problem gamblers found in the population. Nevertheless, an analysis of findings suggests consideration should be given to the use of a score of 4+ as providing an optimal balance between specificity and sensitivity.

The CPGI-PGSI performed well in relation to measures of pathological gambling. In particular, a high correlation was found between CPGI-PGSI scores and DSM-IV scores using the SCIP. However, only five individuals were classified as pathological gamblers by the SCIP suggesting that the criteria for pathological gambling using this instrument is more restrictive than the CPGI-PGSI.

Some researchers regard meeting three or more of the DSM-IV criteria as defining problem gambling (Stucki & Rihs-Middel, 2007). If this threshold were used, then 15 individuals (10.2%) would be classified as problem gamblers. This figure, although lower, is reasonably similar to the figures obtained with the CPGI-PGSI using a cut-off set at 8+. This suggests that the CPGI-PGSI is measuring problem gambling similarly to DSM-IV but with a lower threshold than for pathological gambling.

If this is the case then the implication is that the GRA definition of problem gambling is too inclusive. This result may follow from the fact that the GRA have not established how severe a problem caused by gambling must be in order to meet the criterion for problem gambling. All problems including those classified as mild were used to define problem gambling in the sample studied. A mild problem is one that is not enduring and one with which the individual can cope with little difficulty. For example, in the domain of relationships, an individual may spend so much time and money on poker machines that arguments arise at home concerning the length of time or the amount of money lost. If the arguments are occasional and are generally resolved, the problem would be classified as mild and the individual would be classified as a problem gambler. Thus, the issue is one of the severity of problems caused by gambling that are sufficient to classify an individual as a problem gambler. Any individual for whom gambling causes only mild problems is unlikely to seek help with their gambling problems.

Until the GRA further clarifies the meaning of the category 'problem gambling', it is likely that use of the CPGI-PGSI will underestimate the prevalence of problem gambling unless a cut-off is set at less than 8+.

The potential use of the CPGI-PGSI in treating problem gambling

A scale that measures problem gambling can be useful in treatment studies in one of several ways:

1. The CPGI-PGSI may function as an assessment of problem gambling prior to commencement of treatment;
2. The CPGI-PGSI may function as a guide to the severity of problem gambling thereby indicating appropriate treatment;
3. The CPGI-PGSI may be used to measure improvement in the individual following treatment; and,
4. The CPGI-PGSI may be used to measure change of status following treatment from problem gambler to non-problem gambler.

An individual who seeks help for problem gambling from a treatment agency does so because gambling is causing problems in his or her life. The individual seeks help in order to ameliorate these problems. For this reason, seeking help for one's own problem gambling necessarily implies that the individual meets the criteria for problem gambling. Thus the use of the CPGI-PGSI to diagnose problem gambling in a treatment setting is unnecessary.

However, the CPGI-PGSI can be used for important other purposes. Perhaps the most important of these other uses in a treatment setting is the fact that successful treatment implies a clinical change represented by the status as a non-problem gambling individual at follow-up assessment. Thus the CPGI-PGSI can function as an important measure of the effectiveness of treatment provided. The CPGI-PGSI may function as an index of severity of problem gambling. However, the evidence from this study implies that a clinical interview should be used to establish the complexity and adverse impacts of excessive gambling on the individual prior to treatment. It is likely that all treatment services for problem gamblers use a structured or semi-structured clinical interview as a guide to the treatment plan. In such a context the CPGI-PGSI would add little or nothing.

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