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Estimating the prevalence of adult problem gambling in Italy with SOGS and PGSI

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Abstract

Two assessment measures, the South Oaks Gambling Screen (SOGS), and the Problem Gambling Severity Index (PGSI), were administered to 1,979 participants (53% males, mean age 44.81 years). Results from exploratory and confirmatory factor analyses showed the presence of one single dimension underlying the SOGS and PGSI items. The 2 scales showed high levels of reliability. SOGS and PGSI results were highly correlated and showed positive and significant correlations with measures of gambling behaviour. Probable pathological gamblers identified by SOGS represented 2.05% (95% confidence interval [CI] [1.17, 2.93]) of the adult Italian population, and problem gamblers identified by PGSI represented 2.17% (95% CI [1.26, 3.07]) of the population. A more conservative estimate of the prevalence of problem gambling in Italy, corresponding to 1.01% (95% CI [0.39, 1.63]) of the adult population, was identified by considering only those participants for whom SOGS and PGSI were in perfect agreement concerning risk categories.

Résumé

Cet article présente des estimations de la prévalence du jeu compulsif provenant d'un important échantillon représentatif de joueurs italiens adultes. Deux échelles d'évaluation différentes – le South Oaks Gambling Screen (SOGS) et l'Indice de gravité du jeu problématique (IGJP) – ont été utilisées pour évaluer 1 979 participants (53 % d'hommes, âge moyen = 44,81 ans). Les résultats des analyses exploratoires et confirmatives des facteurs ont mis en évidence la présence d'une seule dimension à la base des items du SOGS et de l'IGJP respectivement. Les deux échelles ont montré des niveaux très élevés de fiabilité. Le SOGS et l'IGJP ont révélé des corrélations positives et significatives avec les instruments de mesure du comportement lié au jeu compulsif. L'utilisation conjointe des deux instruments a permis d'avoir une estimation plus exacte de la prévalence du jeu compulsif en Italie, qui correspond à 1,01 % de la population italienne adulte.

Introduction

In the last 2 decades, many studies have estimated the prevalence of adult problem gambling. Studies from the United States and Canada were first summarized by two meta-analyses that included studies conducted through June 1999 (Shaffer & Hall, 2001; Shaffer, Hall, & Vander Bilt, 1999). More recently, Stucki and Rhys-Middel (2007) updated research on the prevalence of problem gambling from papers published between January 2000 and June 2005, in which they also considered studies conducted in Europe. These authors concluded that "altogether, the prevalence rate for excessive gambling range, independent of the instrument used, was between 0.6% to 6.4% (weighted mean 3.0%), within which problem gambling ranges from 0.4% to 4.7% (weighted mean 1.4%) and pathological gambling from 0.15% to 3.5% (weighted mean 1.6%)" (Stucki & Rhis-Middel, 2007, p. 251).

A recent book examined problem gambling in Europe, with chapters considering national gambling markets, the prevalence of gambling participation and problem gambling, national policies to tackle the issue of problem gambling, and existing treatment options for problem gamblers and their relatives in each European country (Meyer, Hayer, & Griffiths, 2009). Excellent summaries of the status of European research on the prevalence of problem gambling have been also reported by Griffiths (2009, 2010), who classified European countries into three broad groups: (a) countries where national surveys on gambling and/or problem gambling have been carried out (e.g., Great Britain); (b) countries where research has been conducted mainly at a regional and/or local level (e.g., Italy); and (c) countries where no empirical research has been conducted (e.g., Portugal). Griffiths concludes his reviews by stating that rates of adult problem gambling in Europe are similar to what has been found elsewhere, typically from 0.5% to 2%. There are, however, some countries (e.g., Estonia, Finland, Switzerland) where the prevalence of problem gambling is rated as being above 3%. The author points out the existence of a major difficulty in comparing European studies in which different measurement instruments were used, with the South Oaks Gambling Screen (SOGS) tending to yield higher prevalence rates than measures based on the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*). He also remarks that, when studies were compared in which the same or similar scales were used, similar prevalence estimates appeared (Griffiths, 2009).

According to the classification criterion proposed by Griffiths (2009), Italy is a country where research on problem gambling has been conducted on a regional or local basis. Most Italian studies on problem gambling used ad hoc non-representative samples; to our knowledge, the only study that considered a representative sample was published in the fall of 2011, but refers to data gathered more than 4 years before. The main purpose of this paper is to present problem gambling prevalence estimates derived from a large representative sample of the adult Italian population of gamblers. In doing so, we adopted a *productive strategy* (see Gambino & Lesieur, 2006), integrating the use of two measurement instruments, the SOGS and the Problem Gambling Severity Index (PGSI). In the following pages, we first briefly address research on problem gambling in Italy, after which we describe the two instruments used, and finally we report the results of our empirical study.

Studies on Gambling Conducted in Italy

Research on problem gambling in Italy has been recently reviewed by Croce, Lavanco, Varveri, and Fiasco (2009), who noted a lack of large-scale epidemiological studies (see also Griffiths, 2009). The few studies on problem gambling performed in Italy did not include representative samples of the Italian population nor, for the most part, did they use validated measurement instruments. Lavanco and Lo Re (2001) surveyed 1,000 subjects in the Sicilian area (southern Italy); however, no statistics on the prevalence of problem gambling were reported. Biganzoli, Capelli, Capitanucci, Smaniotto, and Alippi (2004) conducted a telephone survey on gambling and the prevalence of problem gambling on about 1,000 adult subjects in the province of Pavia (a city in northern Italy). Prevalence estimates of problem gambling derived from SOGS indicated that 0.7% of the sample were problem gamblers and 0.4% were probable pathological gamblers. A study conducted by the Centro Sociale Papa Giovanni XXIII in 2006 (see Croce et al., 2009) included about 2,000 Italians in Reggio Emilia (a city in northern Italy). Although the number of subjects surveyed was large, this study did not include a validated instrument to assess problem gambling; therefore, the conclusions concerning the prevalence of problem gambling are highly questionable. In a study by Pini and colleagues (2006) in Livorno (a city in Tuscany, central Italy), they used the SOGS to examine about 700 high school students and found that the occurrence of problem and pathological gambling was about 3 times higher among male than among female students. They also found empirical evidence of positive correlations of problem gambling with the number of cigarettes smoked per day and with the amount of wine and beer consumed. Capitanucci, Biganzoli, and Smaniotto (2006) used the SOGS revised for adolescents (SOGS-RA) to examine problem gambling on a sample of about 600 high school students in northern Italy; they found that 6% of subjects could be considered problem gamblers. A recent study conducted in the province of Barletta (Apulia, southern Italy) on about 2,850 high school students (Villella et al., 2011) reported an overall prevalence for problem gambling of 7.0% as measured by the SOGS-RA.

A recent paper reported the results of a large prevalence study conducted in 2007–2008 by the Institute of Clinical Physiology of the National Research Council (IFC-CNR; Bastiani et al., 2011; see also http://www.epid.ifc.cnr.it/). This study used a sample of 4,494 gamblers drawn from the Italian Population Survey on Alcohol and other Drugs (IPSAD-Italia), a survey on the use of alcohol and other drugs. The investigation involved the use of an anonymous postal questionnaire, sent to a sample of about 11,000 subjects representative of the national population of 15–64 years of age. In this work, the prevalence of problem gambling was assessed by means of the PGSI referring to *lifetime* gambling behaviour. The PGSI was administered only to those participants who had gambled in the past 12 months (corresponding to 42.1% of the sample). Of the total sample, 33.8% were classified as no-risk gamblers, 6.1% as low-risk gamblers, and 2.2% as moderate-risk/problem gamblers. Among the sample of gamblers, 80.2%, 14.4%, and 5.4% were classified as no-risk, low-risk, and moderate-risk/problem gamblers, respectively. The estimated prevalence of problem gambling among adults was 0.8%, corresponding to those subjects who were classified in the 5.4% of problem gamblers according to PGSI scores (8 or higher).

A second study conducted by IFC-CNR, ESPAD-Italia, is a survey on the use of tobacco, alcohol, and legal and illegal drugs by high school students. The survey is carried out on a yearly basis and involves all students aged 15–19 years. In the 2007–2008 study, about 39,000 participants representative of this population were involved. The SOGS-RA was included in the questionnaire, with reference to the past 12 months of gambling behaviour. The estimated prevalence of participants assigned to the problem gambler category (scores of 4 or higher) was 0.4%. Unfortunately, this very interesting study has not yet been published in research journals and has only been partially published in CNR research reports (http://www.epid.ifc.cnr.it/).

Measures of Problem Gambling: The SOGS and the PGSI

As noted by Stinchfield, Govoni, and Frisch in their 2007 review of assessment instruments for problem gambling, many instruments for measuring problem gambling have been developed with different aims, such as "screening, assessment, diagnosis, epidemiological surveys, research, treatment planning, and treatment outcome monitoring" (p. 180). Not all instruments, however, have undergone a rigorous process of evaluation of their psychometric characteristics (reliability, validity, classification accuracy). Among self-report measures used in prevalence studies, SOGS and PGSI fulfil the criteria to be considered as valid and reliable instruments.

The SOGS is a paper-and-pencil scale developed on the basis of *DSM-III* criteria (3rd ed.; American Psychiatric Association, 1980) to screen for pathological gambling in clinical populations (Lesieur & Blume, 1987). Scale refinement and item selection produced a scale of 20 items that were validated on large groups of pathological gamblers and control groups. Authors of the SOGS defined as "probable pathological gamblers" those individuals with a score of 5 or more. Furthermore, two other categories were added: "occasional" or "non-problem gamblers," corresponding to scores of 2 or less, and "potential or problem gamblers,'' corresponding to a score of 3 or 4 (see Dubé, Freeston, & Ladouceur, 1996; Volberg & Steadman, 1988). SOGS was initially validated in clinical population samples, where it demonstrated adequate reliability and validity indices (see Abbot & Volberg, 1996; Lesieur & Blume, 1987; Stinchfield, 2002; Winters, Stinchfield, & Fulkerson, 1993). Further research has validated the SOGS in general population samples in a number of settings and cultures (see Abbott & Volberg, 1996; Stinchfield, 2002; Volberg, Abbott, Ronnberg, & Munck, 2001; Volberg & Vales, 1998). The main criticism advanced against SOGS is that it seems to show poor classification accuracy in the general population, overestimating the prevalence of pathological gambling (Gambino & Lesieur, 2006). Stinchfield (2002), however, in investigating the classification accuracy of SOGS in the general population on the basis of *DSM-IV* criteria (4th ed.; American Psychiatric Association, 1994), revealed a high hit rate (0.96), with high sensitivity (0.99), modest specificity (0.75), low false positive (0.04), and low false negative (0.11) rates.

The PGSI is a nine-item scale designed for problem gambling screening in a normal population. The rationale behind this scale was to develop a new and more meaningful instrument for assessing problem gambling in general population surveys (Ferris & Wynne, 2001). The PGSI is part of a larger assessment instrument, the Canadian Problem Gambling Index (CPGI), a 31-item questionnaire developed from a review of the literature and of existing problem gambling instruments. PGSI categorizes subjects into four groups according to their total score: (a) a score of 0 indicates non-gambling or non-problem gambling; (b) a score of 1 or 2 indicates low-risk gambling; (3) a score of 3 to 7 indicates moderate-risk gambling; and (d) a score of 8 or more indicates the presence of problem gambling. PGSI demonstrated satisfactory validity and reliability, as well as high correlations with gambling frequency and with the amount of time and money spent on gambling; classification accuracy against the *DSM-IV* resulted in high sensitivity (0.83) and perfect specificity (1.00) (see Stinchfield, Govini, & Frisch, 2007; also Holtgraves, 2009).

Although PGSI and SOGS have been derived from distinct conceptualizations of problem gambling (Svetieva & Walker, 2008), they contain substantial overlap in content (Holtgraves, 2009). The PGSI and SOGS have been administered together to 3,120 adult respondents in the Canadian national survey. The measures showed high concurrent validity, with the scores showing a correlation of .83 (Wynne, 2003).

Aims of the Study

The main aim of the study is to present prevalence estimates of problem gambling in the Italian adult population. Because few published data are available regarding the prevalence of problem gambling in Italy, the present study aims to fill this gap. However, since there are also no published data regarding the psychometric properties of SOGS and PGSI in Italy, a preliminary step is to investigate the internal validity (i.e., the dimensionality), the reliability, and the concurrent validity of these two measures of problem gambling. The use of two measures of problem gambling is widely justified by the observations of Gambino and Lesieur (2006), who stated that "a more productive strategy is to supplement the SOGS … with a second test. … This has a number of advantages, such as permitting the investigator to obtain estimates of test accuracy in the form of measures of sensitivity and specificity" (pp. 8–9). This statement is reinforced by Ladouceur, Jacques, Giroux, Ferland, and Leblond (2000), who pointed out that "ideally the presence of pathological gambling should be assessed by the convergence of estimates from a variety of different measures using a range of different approaches" (p. 2). This strategy has been used not only in the aforementioned Canadian national survey (Wynne, 2003), but also in other prevalence studies such as the 1999/2000 British Gambling Prevalence Survey (BGPS; Sproston, Erens, & Orford, 2000), in which the SOGS and a *DSM-IV*-based scale were considered conjointly; the 2007 BGPS (Wardle et al., 2007), in which the PGSI substituted for the SOGS to complement the *DSM-IV* scale; a 2003 survey in British Columbia in which both the SOGS and the PGSI were used (Ipsos Reid & Gemini Research, 2003); and the Swedish Longitudinal Gambling Study (http://www.fhi.se/en/Highlights/SWELOGS/).

We decided to use the SOGS for two reasons, despite the criticism to which this instrument has been subjected. First, it is still one of the most frequently used instruments to assess problem gambling. Second, because there are no prevalence studies in the Italian population, the inclusion of SOGS may facilitate comparison of results from the Italian population with those from other countries. We decided to complement SOGS with PGSI because the latter has emerged as one of the more promising successors to SOGS for the measurement of problem gambling. In fact, the PGSI provides "a more continuous (rather than dichotomous) and more socially oriented (rather than clinical) measure of problem gambling" (Orford, Wardle, Griffiths, Sposton, & Erens, 2010, p. 32).

Method

Participants

The sample consisted of 1,979 participants, representative of the total population of adult Italian gamblers (18 to 74 years old) who gambled at least once for money in the last 12 months. This population was estimated at about 26,000,000 in June 2010, when the data were collected, which amounts to 59% of the Italian adult population. This percentage is derived from the "Osservatorio del Mercato dei Giochi" (Gambling Market Tracker) conducted since 2007 by Eurisko-GFK (one of the leading market research organizations operating in Italy). This monitoring service keeps track of the gambling market by using (a) a panel of 4,000 Italian families, for a total of about 8,300 Italian adults, whose behaviours are recorded by means of micro-computer technologies devised by Eurisko-GFK for this purpose; and (b) continuative tracking based on independent weekly samples totalling 22,0000 Italian adults per year, to whom an omnibus questionnaire is administered personally. Both samples are representative of the adult Italian population.

One may question whether the use of a sample of gamblers is appropriate to generalize the results to the entire Italian population. It is worth noting that the BGPS is among the surveys adopting this approach, where only those respondents who report gambling of any kind during the past 12 months are asked to complete problem gambling measures (see Orford et al., 2010). As in the BGPS, population estimates for the total Italian population (see the Results section) were derived by weighting the data appropriately, considering that the population of Italian adult gamblers is estimated at about 59% of the total population of adult gamblers. Table 1 presents the principal demographic variables of the sample.

Table 1
Demographic Characteristics of the Sample

Characteristic	*n*	%
Gender		
Male	1075	54.3
Female	904	45.7
Age, y (M = 44.81, SD =14.6)		
18 to 24	164	8.3
25 to 34	396	20.0
35 to 44	453	22.9
45 to 54	408	20.6
55 to 64	329	16.6
65 to 74	229	11.6
Education		
No studies	8	.4
Elementary studies	171	8.6
Primary studies	604	30.5
Secondary studies	958	48.4
University studies	238	12.0
Marital status		
Single	595	30.1
Married	1185	59.9
Separated/divorced	130	6.6
Widowed	69	3.5
Occupation		
Supervisory	43	2.2
Professional	123	6.2
Tradesman	211	10.7
Executive	28	1.4
Teacher	49	2.5
Employer/office worker	445	22.5
Manual worker	357	18.0
Housewife; not otherwise employed	221	11.2
Student	133	6.7
Retired	299	15.1
Unemployed	70	3.5

Measures

A self-report questionnaire consisting of about 300 items was administered to each participant. In addition, two measures of problem gambling were used. The Italian version of SOGS developed by Guerreschi and Gander (2002) was used to compare Italian prevalence rates of problem gambling with those so far reported in the international literature (SOGS being the most widespread instrument in prevalence studies). In addition, we administered the PGSI to provide a more socially oriented (rather than clinical) measure of problem gambling. The combined use of the two measures may reduce the misclassification of participants into risk categories. Since there is no Italian version of the PGSI, the scale was translated into Italian by the authors. The items were back-translated into English by an English native speaker and eventually revised until an adequate translation was obtained.

South Oaks Gambling Screen. The SOGS is a dichotomous 20-item scale that evaluates the presence of problem gambling. It has largely been used in epidemiological studies (see Abbott & Volberg, 2006; Stinchfield et al., 2007). The total score on the SOGS is the sum of all 20 items, which ranges from 0 to 20 and can be used to classify subjects into the three categories, as described earlier.

Problem Gambling Severity Index. The PGSI is a nine-item scale included in the CPGI, which was devised to obtain a more meaningful measure of problem gambling and to be used in general population surveys (Ferris & Wynne, 2001). The CPGI includes 31 items, nine of which compose the PGSI, the measure of problem gambling. These nine problem gambling items have four response options: never = 0, sometimes = 1, most of the time = 2, and almost always = 3. The PGSI total score is the sum of all nine items; this score, ranging from 0 to 27, can be used to classify subjects into the four categories described earlier.

Measures of gambling behaviours. These measures concern gambling frequency, time, and amount of money spent in gambling activities, as well as other variables related to gambling, the frequency of which is presented in the Results section.

Procedure

Data were collected by GFK Eurisko between June 2010 (pilot) and July 2010 (study). A quota sample, balanced by geographical area (four areas), city size (five groups), and age by gender (12 groups), was used. Participants were contacted by an interviewer, and then invited to fill out a questionnaire. The questionnaire was individually administered to participants at their own house. Individuals received a reimbursement of about 20 euros for their participation. About 5% of the persons who were first contacted later declined to participate and were replaced by other participants with homogeneous characteristics. After data collection was complete, participants were weighted in order to maximize the representativeness of the sample of the target population. Weights have been defined by considering level of education (four levels), occupation (nine categories), penetration/diffusion into the Italian population of the games considered in the survey (12 categories), geographical area (four zones) by size of city (five levels), and gender (two categories) by age (six categories) (note: frequencies used for the weighting procedure are available from the first author).

Results

Measures of Gambling Behaviour

We first present results regarding the measures of gambling behaviour in the last 12 months (past year) in the sample (Table 2). The most played games were lotteries, instant lotteries, and traditional lotteries, whereas the percentage of people who played at least once online was much more limited (note: lotteries defined here refer to *Lotto* and *Superenalotto* games that have weekly or biweekly draws; traditional lotteries, on the other hand, refer to the *Lotteria Italia* and any other national lotteries, which are drawn and give prizes only once annually). On average, participants played about two to three different games in the last 12 months (M = 2.53, SD = 1.53). A rough estimate of the money spent on gambling during the whole year ranged from 0.5 to 2,300 euros (M = 27.2, SD = 72). Participants *started to play* on average when they were 27 years old (M = 27.53, SD = 10.8). However, it is noteworthy that 8% of the sample started to play when they were under 18 years old and that 48% started to play between the ages of 18 and 25. Regarding *parental gambling behaviour*, 25% of participants had at least one parent who regularly gambled, and 6% had at least one parent who was or used to be an excessive gambler. Finally, 48% of participants had other family members who gambled regularly.

Factor Structure of SOGS and PGSI

The dimensionality of SOGS and PGSI has been investigated by means of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Since no previous studies have investigated the factorial structure of these two scales in Italy, we decided to do a preliminary EFA as a necessary first step to investigate the dimensionality of SOGS and PGSI. Accordingly, two EFAs were conducted: one on the SOGS items and the other on the PGSI items. Since items were dichotomous (SOGS) or had highly skewed distributions (PGSI), we used the WLS-MV method for parameter estimation included in MPLUS 6.11 software (Muthén & Muthén, 1998–2010). WLS-MV involves "weighted least square parameter estimates using a diagonal weight matrix with standard errors and mean- and variance adjusted chi-square test statistic that use a full weight matrix" (Muthén & Muthén, 1998–2010, p. 533). Flora and Curran (2004) highly recommend this method for applied researchers. Following a cross-validation approach (Cudek & Browne, 1983), two sets of two random samples of approximately the same number of subjects were generated from the total sample: one was used for SOGS, the other for PGSI. For

Table 2
Measures of Gaming Behaviours in the Last 12 Months

Gaming Behaviour	Percentage (%)
Frequency	
Instant lotteries	
Gratta & Vinci	65
Win for Life	33
Lotteries	
Superenalotto	68
Lotto	45
Traditional lotteries	24
Betting games	
Sports	8
Horses	2
Bingo	5
Cards for money at home or in private clubs	16
Casino	5
Pool games	
Totocalcio	15
Totogol	8
Online	
Poker	2
Betting	2
Slots/Video lottery terminal	6
Number of games played	
1 game played	19
2 games played	24
3 games played	19
4 games played	13
5 or more games played	25
Amount of money spent in a single day	
<1 €	5
1 to 10 €	60
10 to 100 €	30
100 to 1,000 €	4
>1,000 €	0.5
Average time per day spent playing	
<30 min	79
30 min to <1 hr	9
1 to 2 hr	6
2 to 3 hr	3
>3 hr	2

Note. Percentage refers to: for "Frequency" variables, the percentage of people playing the specified game at least once in the last 12 mos; for other variables, it represents the percentage of people exhibiting the characteristic specified in the corresponding row.

each scale, one of the two random samples was used for EFA, the other for CFA, using the same WLS-MV estimation method described above. Within each scale, no overlap of subjects occurred in the two random samples.

SOGS. Item 16G ("cashed in stocks") was excluded from the analyses because of its zero variance (see Stinchfield, 2002). The first eigenvalue of the tetrachoric correlation matrix was 12.82, the second 1.95, and all the other eigenvalues were lower than 1, suggesting the presence of two factors. In addition, the application of parallel analysis (Horn, 1965) suggested the extraction of two factors, corresponding to the only eigenvalues higher than those of random data. We then explored a two-factor exploratory solution. The extraction of a second factor (with subsequent oblique Geomin and Promax rotations) gave rise to solutions where five items presented secondary loadings higher than .30. The second factor was loaded mainly by the borrowing items (with the exception of item 16D and 16H presenting their primary loading on the first factor, but showing non-negligible cross-loadings on the second factor), and the two factors presented a substantial correlation (.62). The more parsimonious and simple one-factor solution was then preferred. This solution was supported by adequate fit indices: $\chi^2(152, N = 982) = 182.28$, $p = .05$, root mean square error of approximation (RMSEA) = 0.014 (0.002–0.021), $p(\text{RMSEA} \leq 0.05)$

Table 3
Parameter Estimates for the EFA and CFA for SOGS Items

SOGS Item	EFA	CFA Raw	CFA Stand.[a]
4. Go back another day to win back money	0.817	1.000[b]	0.743
5. Claimed to be winning money gambling but weren't really	0.723	1.034	0.769
6. Feel you have a problem	0.753	1.063	0.790
7. Gamble more than you intended to	0.767	1.114	0.828
8. People criticized your gambling	0.872	1.144	0.850
9. Felt guilty	0.797	1.174	0.872
10. Felt like you would like to stop gambling but didn't think you could	0.796	1.220	0.907
11. Hidden betting slips	0.840	1.156	0.859
13. Money arguments centered on gambling	0.928	1.294	0.962
14. Borrowed money and not paid them back	0.990	1.124	0.835
15. Lost time from work	0.880	0.967	0.719
16a. Borrowed household money	0.902	1.195	0.888
16b. Borrowed from spouse	0.735	1.075	0.799
16c. Borrowed from relatives or in-laws	0.974	1.270	0.944
16d. Borrowed from banks	0.930	1.091	0.811
16e. Borrowed from credit cards	0.808	0.855	0.635
16f. Borrowed from loan sharks	0.838	1.131	0.841
16g. Cashed in stocks[c]	-----	-----	-----
16h. Sold personal or family property	0.844	1.149	0.854
16i. Borrowed from checking account	0.814	0.908	0.675

Note. EFA = exploratory factor analysis; CFA = confirmatory factor analysis; SOGS = South Oaks Gambling Screen; Stand. = standardized.
[a] Results for the CFA in the second column are taken from the standardized solution.
[b] Parameter fixed at 1 for identification purposes.
[c] Item excluded because of zero variance.

= 1, comparative fit index (CFI) = 0.99, Tucker-Lewis index (TLI) = 0.99. As can be seen in Table 3, all factor loadings were far beyond .50, thus suggesting that much of the variance is accounted for by the common factor. This factor, in fact, explained about 72% of total item variance. CFA on SOGS yielded similar adequate fit indices: $\chi^2(152, N = 989) = 218.68$, $p < .001$, RMSEA = 0.021 (0.014, 0.027), $p(\text{RMSEA} \leq 0.05) = 1$, CFI = 0.98, TLI = 0.98. Table 3 presents the raw and standardized parameter estimates of EFA and CFA models (the "lambdas", using MPLUS jargon). All estimated parameters were statistically significant ($p < .001$).

PGSI. The first eigenvalue of the polychoric correlation matrix was 6.505; all the other eigenvalues were lower than 1. The application of parallel analysis suggested the extraction of one factor, corresponding to the only resulting eigenvalue higher than those of random data. The one-factor EFA solution is supported by adequate fit indices: $\chi^2(27, N = 991) = 104.81$, $p < .001$, RMSEA = 0.054 (0.043, 0.065), $p(\text{RMSEA} \leq 0.05) = 0.26$, CFI = 0.99, TLI = 0.98. As can be seen in Table 4, all factor loadings were far beyond .50. This factor explained about 71% of total item variance. Table 4 presents parameter estimates for the one-factor model for the PGSI items. In addition, CFA on PGSI yielded adequate fit indices: $\chi^2(27, N = 993) = 106.72$, $p < .001$, RMSEA = 0.055 (0.044, 0.066), $p(\text{RMSEA} \leq 0.05) = 0.23$, CFI = 0.99, TLI = 0.99. Table 4 presents the raw and standardized lambdas of the measurement models. All estimated parameters were statistically significant ($p < .001$).

Reliability of SOGS and PGSI

The reliability of SOGS and PGSI was estimated by means of the Kuder-Richardson reliability index (*KR20*) and Cronbach's alpha coefficients, respectively, the former

Table 4
Parameter Estimates for the EFA and CFA for PGSI Items

		CFA	
PGSI Item	EFA	Raw	Stand.[a]
1. Bet	0.778	1.000[b]	0.858
2. Tolerance	0.863	0.999	0.856
3. Chasing	0.753	0.968	0.830
4. Borrow	0.901	1.027	0.881
5. Felt problem	0.829	0.982	0.842
6. Health problem	0.81	1.021	0.876
7. Criticized	0.896	1.041	0.893
8. Financial problem	0.825	1.011	0.867
9. Felt guilty	0.904	1.062	0.911

Note. EFA = exploratory factor analysis; CFA = confirmatory factor analysis; PGSI = Problem Gambling Severity Index; Stand. = standardized.
[a] Results for the CFA in the second column are taken from the standardized solution.
[b] Parameter fixed at 1 for identification purposes.

Table 5
Correlates of SOGS and PGSI With Measures of Gambling Behaviour

	SOGS		PGSI	
Gambling Behaviour	*r*	*n*	*r*	*n*
Number of games played (past 12 months)	.24***	1979	.14***	1979
Single games				
Lotteries	.26***	859	.23***	859
Instant lottery	.20***	1241	.25***	1241
Sport betting	.33***	131	.27***	131
Horse betting	.52***	38	.42**	38
Slots/VLT	.41***	110		*ns*
Playing in casinos	.31**	92		*ns*
Amount of money spent in a single day	.38***	1979	.30***	1979
Money played during the whole year	.22***	1979	.14***	1979
Average time per day spent playing	.35***	1979	.32***	1979
Estimated average time spent playing (past 12 months)	.29***	1979	.22***	1979
Having both parents who are or used to be excessive gamblers	.30***	1979	.30***	1979

Note. SOGS = South Oaks Gambling Screen; PGSI = Problem Gambling Severity Index; VLT = video lottery terminal; *ns* = statistically non-significant.
$^{**}p < .01$. $^{***}p < .001$.

being the version of the latter for dichotomous items. It is important to stress that these coefficients may give evidence of reliability in the form of internal consistency or coherence. Unfortunately, the research design did not allow us to assess reliability in the form of temporal stability by the use of a test-retest estimate; this is one of the limitations of the study. The *KR20* internal consistency coefficient was .80 for the SOGS: This level of internal reliability was higher than that reported by Stinchfield (2002) for the general population (.69) in the United States and similar to that reported by Orford, Sproston, and Erens (2003) in the United Kingdom (.78). The Cronbach's alpha coefficient of internal consistency was .89 for PGSI: This level of internal reliability is comparable to those obtained by Orford and colleagues (2010) in the United Kingdom (.90) and by Holtgraves (2009) in Canada (.86).

Correlation Among Measures of Gambling Behaviour

As can be seen in Table 5, SOGS and PGSI show positive correlations with the number of games played during the past 12 months, with many single games played, with the *amount of money spent in a single day* over the last 12 months, with the estimated money played during the whole year, with the *average time per day* spent playing, with the estimated average time spent playing during the past 12 months, and with having both parents who are or used to be excessive gamblers. The pattern

Table 6
Responses to SOGS Items

SOGS Item	Yes Response (%)
4. Go back another day to win back money	4.42
5. Claimed to be winning money gambling but weren't really	6.66
6. Feel you have a problem	4.13
7. Gamble more than you intended to	13.87
8. People criticized your gambling	7.14
9. Felt guilty	6.00
10. Felt like you would like to stop gambling but didn't think you could	4.33
11. Hidden betting slips	4.93
13. Money arguments centered on gambling	2.17
14. Borrowed money and not paid them back	0.53
15. Lost time from work	1.01
16a. Borrowed household money	0.98
16b. Borrowed from spouse	0.25
16c. Borrowed from relatives or in-laws	0.61
16d. Borrowed from banks	0.69
16e. Borrowed from credit cards	0.46
16f. Borrowed from loan sharks	0.01
16g. Cashed in stocks	0.00
16h. Sold personal or family property	0.08
16i. Borrowed from checking account	0.18

Note. SOGS = South Oaks Gambling Screen.

of correlations is very similar across the two measures of problem gambling, with SOGS generally showing slightly higher correlations than PGSI.

Item Endorsement Rates

Tables 6 and 7 show the SOGS and PGSI item endorsement rates. In general, endorsement of any given item on either screen is very low, with most respondents indicating "no" or "never" in response to the associated problem gambling-related behavior. The SOGS items "Gambled more than you intended to," "People criticized your gambling," "Claimed to be winning money gambling but weren't really," and " Felt guilty" had the highest rates of endorsement. The SOGS items "Sold personal or family property," "Borrowed money from loan sharks," and "Cashed in stocks," as well as, in general, all items in the borrowing domain, had the lowest endorsement rates. The PGSI items "Chasing," "Bet," and "Tolerance" had the highest rates of endorsement. The items "Borrow," "Felt guilty," and "Criticized" had the lowest endorsement rates. Although it is clear that there is coherence between the two distributions of item scores (e.g., the borrowing items), there are also some discrepancies: "Felt guilty" is one of the SOGS items with a higher response rate, but it is also one of the PGSI items with a lower response rate.

Table 7
Responses to PGSI Items

PGSI Item	*M*	SD	Response Categories (%)			
			0	1	2	3
1. Bet	0.17	0.42	84.68	14.06	0.97	0.29
2. Tolerance	0.15	0.40	86.97	11.52	1.33	0.19
3. Chasing	0.23	0.49	79.91	17.80	1.87	0.42
4. Borrow	0.06	0.29	95.33	3.78	0.62	0.26
5. Felt problem	0.14	0.43	88.67	9.42	1.32	0.59
6. Health problem	0.14	0.41	88.14	10.32	1.06	0.48
7. Criticized	0.08	0.32	93.62	5.48	0.55	0.36
8. Financial problem	0.14	0.40	87.86	10.88	0.90	0.35
9. Felt guilty	0.06	0.31	94.93	3.98	0.77	0.32

Note. PGSI = Problem Gambling Severity Index. Response categories: never = 0, sometimes = 1, most of the time = 2, almost always = 3.

However, the difference in this item can be considered more apparent than real, since the percentage of ''No'' responses in SOGS and of ''Never'' responses in PGSI is almost equal, being about 94%.

SOGS/PGSI Agreement

Participants were classified into the three categories of SOGS and into the four categories of PGSI by using cut-off criteria derived from the literature. Table 8 presents the results of this classification: Marginal column frequencies are related to SOGS classification, marginal row frequencies are related to PGSI classification, and frequencies in the cells are related to the conjoint cross-classification. Percentages in parentheses are the population estimates based on the Italian adult population aged 18 to 74 (N = 44,000,000).

From a strict definition of agreement, only 34 participants were classified as problem gamblers according to both instruments, with PGSI failing to classify as ''problem gambling'' 35 participants classified by SOGS as ''probable pathological gamblers,'' and SOGS failing to classify as ''probable pathological gamblers'' 39 participants classified by PGSI as problem gambling. The k-statistic was 0.46, showing a moderate agreement between the two instruments, similar to the 0.52 reported between SOGS and *DSM-IV* by Orford and colleagues (2003), but lower than the 0.68 reported between PGSI and *DSM-IV* by Orford and colleagues (2010).

As can be seen in Table 8, a substantial percentage of participants are classified in the extreme category of one instrument, but are in the non-extreme categories, or even in the lowest one, when considering the other instrument. In particular, 1.16%

Table 8
Prevalence Rates of Problem Gambling in Italy Considering Both SOGS and PGSI (2010)

	SOGS (score)			
PGSI (score)	Non-problem gamblers (0–2)	Problem gamblers (3–4)	Probable pathological gamblers (⩾5)	Total PGSI
Non-problem gambling (0)	1292 (38.42%)	11 (0.33%)	0 (0.00%)	1303 (38.75%)
Low-risk gambling (1–2)	352 (10.47%)	24 (0.71%)	2 (0.06%)	378 (11.24%)
Moderate-risk gambling (3–7)	175 (5.20%)	25 (0.74%)	33 (0.98%)	233 (6.93%)
Problem gambling (⩾8)	35 (1.04%)	4 (0.12%)	34 (1.01%)	73 (2.17%)
Total SOGS	1854 (55.14%)	64 (1.90%)	69 (2.05%)	

Note. SOGS = South Oaks Gambling Screen; PGSI = Problem Gambling Severity Index; Numbers in each category represent absolute frequency; % = estimates based on the Italian adult population aged 18–74 years (N = 44,000,000).

of participants who are classified as problem gamblers (Category 4) by PGSI are not in Category 3 of SOGS (probable pathological gamblers). Similarly, 1.04% of participants who are classified as probable pathological gamblers (Category 3) by SOGS are not in Category 4 of PGSI (problem gamblers). Thus, 2.20% of participants are misclassified by one instrument. Both instruments had low sensitivity (SOGS = 0.47, PGSI = 0.49) and thus a high percentage of false positives, the false-positive probability being 0.53 for SOGS and 0.51 for PGSI. Both instruments, however, had a very high specificity (0.98 for both SOGS and PGSI), thus reducing Type I error, the false-negative probability being 0.02 for both OGS and PGSI.

When considering the two measures of problem gambling as continuous, more favourable evidence of convergence between them appears (see Orford et al., 2010) because SOGS and PGSI showed a correlation of .63 (n = 1985, $p < .001$). The estimated correlation after correction for attenuation due to the unreliability of the scales, using the estimates for reliability presented in the previous paragraph, yielded a corrected correlation of .75. These correlations also show a large overlap between the two scales in Italy, although it is less than the value of .83 reported by Ferris and Wynne (2001). However, considering the high skewness of both scales, the non-parametric correlation (Spearman's $\rho = 0.48$, $p < .001$) provides a more realistic but still highly significant measure of association, a measure similar to that reported by Orford and colleagues (2010) in considering PGSI and *DSM-IV* (ρ = .51).

Prevalence Rates of Problem Gambling

Probable pathological gamblers identified by SOGS represent 2.05% (95% confidence interval [CI] 1.17, 2.93) of the adult Italian population, whereas problem gamblers identified by PGSI represent 2.17% (95% CI 1.26, 3.07) of the population.

On the basis of the evidence described in the previous paragraph, we can conclude that 1.01% (95% CI 0.39, 1.63) can be considered as a correct, albeit conservative, estimate of the prevalence of problem gambling in Italy: This percentage corresponds to the cell in Table 8 where a perfect agreement of SOGS and PGSI classifications is reached regarding the risk categories of the two measures concerned.

Discussion

The main purpose of this study was to estimate the prevalence of problem gambling in a representative sample of Italian adult gamblers by using the SOGS and PGSI. Our results preliminarily demonstrated that the psychometric properties of the SOGS and PGSI can be confirmed in the Italian population. The unidimensional factor structure of both scales, as well as their high internal consistency, emerged clearly with EFAs and CFAs, as well as from reliability analysis. Both scales showed substantial overlap, although their correlation turned out to be lower than expected on the basis of previous research in which both scales were conjointly administered to the same participants. Both scales were positively correlated with different behaviours related to past-year gambling (number of games played, amount of money spent, and the like). In conclusion, it is clear that both scales can be used to screen for problem gambling in Italy.

The percentage of problem gamblers identified in Italy is in line with that reported by Griffiths (2009, 2010) in his recent reviews on European studies of problem gambling. In particular, the percentage is similar to those obtained in Belgium, Germany, Norway, and the Netherlands; lower than those from Estonia and Finland; and higher than those from the United Kingdom.

Our results highlight that both SOGS and PGSI have a low sensitivity and hence tend to give rise to a high rate of false positives, thus overestimating problem gambling. This fact is widely acknowledged regarding SOGS. However, in our study, SOGS does not overestimate the prevalence of problem gambling in comparison with PGSI, but both instruments tend to have approximately the same probability of misclassifying subjects when one scale is used as a criterion against the other. Although both instruments identify about the same number of participants as problem gamblers, thus giving rise to a similar rate of problem gambling (2.05 for SOGS and 2.17 for PGSI for the Italian adult population), subjects who are identified as problem gamblers are not exactly the same. In fact, only 34 participants were classified as problem gamblers by both instruments, and this corresponds to an estimated prevalence rate of 1.01% for the Italian adult population.

The tendency toward misclassification is particularly striking for PGSI: Although 33 participants who were classified as probable pathological gamblers by SOGS are in Category 3 (moderate-risk gambling) of PGSI, 35 of the 73 participants who were problem gamblers for PGSI obtained a score of 0 to 2 in SOGS (28 of them obtained exactly 0 in SOGS), thus being classified as non-problem gamblers. One may wonder why there are these striking differences in the two instruments, despite the large overlap between SOGS and PGSI, with six of nine PGSI items being very similar to SOGS items. As noted by Holtgraves (2009), one reason may be found in the different response formats used for the items: Although SOGS uses a dichotomous (Yes-No) format, PGSI uses a 4-point response format, thus providing respondents with a more fine-grained differentiation to describe their gambling behaviour. This may explain why many participants who were classified as non-problem gamblers by SOGS were classified as problem gamblers by PGSI: Perhaps a higher score in PGSI can be obtained by summing the scores of one or two items in PGSI (in fact, 23 of the PGSI problem gamblers classified as non-problem gamblers by SOGS obtained scores of 8 or 9 in the PGSI). Another potential source for these differences in classification is the fact that SOGS contains a large number of items that are related to ways of acquiring money, mainly by borrowing them from various sources, whereas PGSI contains only one item related to this domain. As noted by Holtgraves (2009), although these items may be important for practical purposes, it is not clear how they can be useful in a research context.

Several limitations of this study should be considered. First, only self-report measures have been included. Although this is common in prevalence studies, we acknowledge that using only self-report measures may bias the results because of the presence of social desirability and self-presentational concerns that can reduce the reporting of behaviours linked to excessive gambling. To partially control for this in our study, a social desirability scale was included in the questionnaire (the "Lie scale" of the Big Five Questionnaire; Caprara, Barbaranelli, Borgogni, & Vecchione, 2008). No significant correlations were, however, obtained between the Lie scale and both PGSI and SOGS.

In addition, the use of quota sampling may have introduced some biases in the results (see Volberg, 2007). However, the evidence obtained in this study is not too different from that reported for Italy by Bastiani and colleagues (2011), who used a random sampling approach with postal questionnaires. Conversely, an advantage of the approach used in this study is the reduction of attrition and refusal (in comparison to postal questionnaires and telephone interviews) and therefore a much lower impact of self-selection.

Sample size was relatively small in comparison to sample size of other national-based research. However, it was enough to guarantee an adequate level of statistical confidence (95%) regarding prevalence rates for the Italian population because we were not interested in prevalence estimates for specific subgroups of this population (see Volberg, 2007).

A final consideration may be the use of raw total scores and a cut-off score. Reliability of the scales is very high, but not perfect. This introduces some indeterminacy in the scores obtained by simply summing item scores because each observed item score contains not only a reliable part, but also an unreliable part due to random measurement error. The use of a confidence interval based on standard measurement error, instead of raw punctual estimates for total scores, may reduce classification errors that are due to the not-perfectly-reliable total scores because it incorporates the information regarding test unreliability. This observation is particularly relevant for a correct classification of those subjects who obtained scores near the cut-off point of 5 for SOGS and 8 for PGSI. Another alternative for maximizing the correct classification of subjects is to use scores derived from the application of item response theory (IRT) models. It is well-known that these scores capitalize on the properties of IRT mathematical models: In particular, by using the IRT approach, it is possible to optimally select items to measure a given trait level in a given individual with maximal precision. Interval estimates based on IRT scores can further reduce misclassification and the impact of measurement error.

Further research is necessary to investigate this last point, as well as to assess the usefulness of cut-off criteria in the form in which they were originally defined by the authors of SOGS and PGSI. Further research is also needed to evaluate the applicability of these cut-off scores when the scales are administered in different cultural contexts. In this regard, a thorough study aimed at comparing the properties of measurement models underlying SOGS and PGSI across countries and cultures is still missing. Although the results we obtained make evident the very good psychometric properties of the Italian versions of both SOGS and PGSI, nothing can be said about score comparability for Italy, the United States, and Canada. A different approach, based on the simultaneous comparison of data gathered in different countries, should be used. Such an approach would allow for testing measurement invariance within the framework of multiple-group CFA (Millsap, 2011).

References

Abbott, M. W., & Volberg, R. A. (1996). The New Zealand National Survey of Problem and Pathological Gambling. *Journal of Gambling Studies*, *12*, 143–160.

Abbott, M. W., & Volberg, R. A. (2006). The measurement of adult problem and pathological gambling. *International Gambling Studies*, *6*, 175-200.

American Psychiatric Association (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: Author.

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Bastiani, L., Gori, M., Colasante, E., Siciliano, V., Capitanucci, D., Jarre, P., & Molinaro, S. (2011). Complex factors and behaviors in the gambling population of Italy. *Journal of Gambling Studies*, *29*, 1–13.

Biganzoli, A., Capelli, M., Capitanucci, D., Smaniotto, R., & Alippi, M. (2004). *Indagine sui comportamenti di Gioco d'Azzardo in provincia di Pavia* [Survey on gambling behaviours in the Pavia province]. Gavirate, Italy: Dream.

Capitanucci, D., Biganzoli, A., & Smaniotto, R. (Eds.). (2006). *Reti d'azzardo* [Gambling networks]. Varese, Italy: Edizioni And-In-Carta.

Caprara, G. V., Barbaranelli, C., Borgogni, L., & Vecchione, M. (2008). *Big Five Questionnaire 2: Manuale*. Firenze, Italy: Organizzazioni Speciali.

Croce, M., Lavanco, G., Varveri, L., & Fiasco, M. (2009). Gambling in Italy. In G. Meyer, T. Hayer, & M. D. Griffiths (Eds.), *Problem gaming in Europe: Challenges, prevention, and interventions*. New York, NY: Springer.

Cudeck, R., & Browne, M. W. (1983). Cross-validation of covariance structures. *Multivariate Behavioral Research*, *18*, 147–167.

Dubé, D., Freeston, M. H., & Ladouceur, R. (1996). Potential and probable pathological gamblers: Where do the differences lie? *Journal of Gambling Studies*, *12*, 419–430.

Ferris, J., & Wynne, H. (2001). *The Canadian Problem Gambling Index: Final report*. Ottawa, ON: Canadian Centre on Substance Abuse.

Flora, D., & Curran, P. (2004). An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. *Psychological Methods*, *9*, 466–491.

Gambino, B., & Lesieur, H. (2006). The South Oaks Gambling Screen (SOGS): A rebuttal to critics. *Journal of Gambling Issues*, *17*. doi:10.4309/jgi.2006.17.10

Griffiths, M. D. (2009). *Problem gambling in Europe: An overview*. Report prepared for Apex Communications. Nottingham, UK: Nottingham Trent University.

Griffiths, M. D. (2010). Problem gambling in Europe: What do we know? *Casino and Gaming International*, 6, 81–84.

Guerreschi, C., & Gander, S. (2002). *Versione italiana del South Oaks Gambling Screen (SOGS) di H.R. Lesieur e S.B. Blume* [Italian version of the South Oaks Gambling Screen (SOGS) of H. R. Lesieur and S. B. Blume]. Unpublished manuscript.

Holtgraves, T. (2009). Evaluating the Problem Gambling Severity Index. *Journal of Gambling Studies*, *25*, 105–120.

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, *32*, 179–185.

Ipsos Reid & Gemini Research. (2003). *British Columbia problem gambling prevalence study*. Victoria, BC: Ministry of Public Safety and Solicitor General.

Ladouceur, R., Jacques, C., Giroux, I., Ferland, F., & Leblond, J. (2000). Analysis of a casino's self-exclusion program. *Journal of Gambling Studies*, *16*, 453–460.

Lavanco, G., & Lo Re, T. (2001). Scommettitori autorizzati e bisogno d'identità [Authorized betters and identity need]. In M. Croce & R. Zerbetto (Eds.), *Il gioco e l'azzardo. Il fenomeno, la clinica, le possibilità di intervento* [*Game and gambling game: Phenomenon, treatment and intervention possibilities*]. Milan, Italy: Franco Angeli.

Lesieur, H. R., & Blume, S. B. (1987). The South Oaks Gambling Screen (SOGS): A new instrument for the identification of pathological gamblers. *American Journal of Psychiatry*, *144*, 1184–1188.

Meyer, G., Hayer, T., & Griffiths, M. D. (2009). *Problem gaming in Europe: Challenges, prevention, and interventions*. New York, NY: Springer.

Millsap, R. E. (2011). *Statistical approaches to measurement invariance*. New York, NY: Routledge Academic.

Muthén, B., & Muthén, L. (1998–2010). *Mplus user's guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.

Orford, J., Sproston, K., & Erens, B. (2003). SOGS and DSM-IV in the British Gambling Prevalence Survey: Reliability and factor structure. *International Gambling Studies*, *3*, 53–65.

Orford, J., Wardle, H., Griffiths, M. D., Sposton, K., & Erens, B. (2010). PGSI and DSM-IV in the 2007 British Gambling Prevalence Survey: Reliability, item response, factor structure and inter-scale agreement. *International Gambling Studies*, *10*, 31–44.

Pini, M., Calamari, E., De Filpo, M., Marinari, M., Mengheri, L., & Margaron, H. (2006). Bacco, tabacco, gioco d'azzardo: nuove figure del disagio giovanile o stili di vita? Una ricerca su studenti di scuola superiore [Bacchus, tobacco, gambling: New aspects of young people's uneasiness or life styles? Research on secondary school students]. *Medicina delle Tossicodipendenze*, *52/3*, 57–72.

Shaffer, H. J., & Hall, M. N. (2001). Updating and refining prevalence estimates of disordered gambling behaviour in the United States and Canada. *Canadian Journal of Public Health*, *92*, 168–172.

Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (1999). Estimating the prevalence of disordered gambling behavior in the United States and Canada: A research synthesis. *American Journal of Public Health*, *89*, 1369–1376.

Sproston, K., Erens, B., & Orford, J. (2000). *Gambling behaviour in Britain: Results from the British Prevalence Survey*. London, UK: National Centre for Social Research.

Stinchfield, R. (2002). Reliability, validity, and classification accuracy of the South Oaks Gambling Screen (SOGS). *Addictive Behaviors*, *27*, 1–19.

Stinchfield, R., Govoni, R., & Frisch, G. (2007). A review of screening instruments for problem and pathological gambling. In G. Smith, D. Hodgins, & R. Williams (Eds.). *Research and measurement issues in gambling research* (pp. 179–213). Burlington, MA: Elsevier Press.

Stucki, S., & Rhys-Middel, M. (2007). Prevalence of adult problem and pathological gambling between 2000 and 2005: An update. *Journal of Gambling Studies*, *23*, 245–257.

Svetieva, E., & Walker, M. (2008). Inconsistency between concept and measurement: The Canadian Problem Gambling Index (CPGI). *Journal of Gambling Issues*, *22*, 157–173.

Villella, C., Martinotti, G., Di Nicola, M., Cassano, M., La Torre, G., Gliubizzi, M. D., … Conte, G. (2011). Behavioural addictions in adolescents and young adults: Results from a prevalence study. *Journal of Gambling Studies*, *27*, 203–214.

Volberg, R. A. (2007). Population surveys. In G. Smith, D. Hodgins, & R. Williams (Eds.), *Research and measurement issues in gambling research* (pp. 33–54). Burlington, MA: Elsevier Press.

Volberg, R. A., Abbott, M. W., Rönnberg, S., & Munck, I. M. E. (2001). Prevalence and risks of pathological gambling in Sweden. *Acta Psychiatrica Scandinavica*, *104*, 250–256.

Volberg, R. A., & Steadman, H. J. (1988). Refining prevalence estimates of pathological gambling. *American Journal of Psychiatry*, *145*, 502–505.

Volberg, R. A., & Vales, P. A. (1998). *Gambling and problem gambling in Puerto Rico*. Report to the Puerto Rico Treasury Department.

Wardle, H., Sproston, K., Orford, J., Erens, B., Griffiths, M. D., Constantine, R., & Pigott, S. (2007). *The British Gambling Prevalence Survey 2007*. London, UK: The Stationery Office.

Winters, K. C., Stinchfield, R. D., & Fulkerson, J. (1993). Toward the development of an adolescent gambling problem severity scale. *Journal of Gambling Studies*, *9*, 371–386.

Wynne, H. (2003). *Introducing the Canadian Problem Gambling Index*. Edmonton, AB: Wynne Resources.

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