J Gambl Stud
DOI 10.1007/s10899-012-9331-z

ORIGINAL PAPER

An Assessment of the Psychometric Properties of Italian Version of CPGI

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Abstract The aim of this study was to adapt to the Italian context a very commonly used international instrument to detect problem gambling, the canadian problem gambling index (CPGI), and assess its psychometric properties. Cross-cultural adaptation of CPGI was performed in several steps and the questionnaire was administered as a survey among Italian general population (n = 5,292). Cronbach's alpha reliability coefficient was 0.87 and can be considered to be highly reliable. Construct validity was assessed first by means of a principal component analysis and then by means of confirmatory factor analysis, showing that only one factor, problem gambling, was extracted from the CPGI questionnaire (an eigenvalues of 4,684 with percentage of variance 52 %). As far as convergent validity is concerned, CPGI was compared with Lie/Bet questionnaire, a two-item screening tool for detecting problem gamblers, and with both depression and stress scales. A short form DSM-IV CIDI questionnaire was used for depression and VRS scale, a rating scale, was used for rapid stress evaluation. A strong convergent validity with these instruments was found and these findings are consistent with past research on problem gambling, where another way to confirm the validity is to determine the extent to which it correlates with other qualities or measures known to be directly related to problem gambling. In sum, despite the lack of a direct comparison with a classic gold-standard such as DSM-IV, the Italian version of CPGI exhibits good psychometric properties and can be used among the Italian general population to identify at-risk problem gamblers.

Keywords Problem gambling · Survey · Psychometric properties · CPGI

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Published online: 28 August 2012

Introduction

Gambling appears to be innocuous, socially well accepted and a popular activity with deep traditions. As long as its practice is transparent in terms of attendance, it can result in positive entertainment. Problems arise when, for a deep and complex set of causes, the pleasure of the game becomes an uncontrollable impulse, which negatively impacts family relationships, including social and financial ones (Bolen and Boyd 1968).

Researchers refer to this as *problem gambling*, i.e. a gambling behaviour that creates negative consequences for the gambler, and their family and social network (Brooker et al. 2009; Raylu and Oei 2002; Lesieur and Blume 1987). The term *pathological gambling* defines the situation that meets the diagnostic criteria in the diagnostic and statistical manual, fourth edition, text revision (DSM-IV-TR; American Psychiatric Association 2000). Pathological gambling is considered more serious and extreme than problem gambling.

Several evidence-based instruments such as DSM criteria (American Psychiatric Association 2000), canadian problem gambling index (CPGI), (Ferris and Wynne 2001b), the Lie/Bet questionnaire (Johnson et al. 1997), and the South Oaks Gambling Screen (Lesieur and Blume 1987) have been developed to measure both problem and pathological gambling. Among these, the CPGI, has been implemented developed to assess prevalence of problem gambling in the general population, including groups typically underrepresented in clinical samples and less typical problem gamblers. It has been demonstrated as most valid and reliable in measuring problem gambling prevalence in Western populations (McMillen and Wenzel 2006; Neal et al. 2004). Rosenthal said that DSM criteria would be more suitable in a clinical contest (Rosenthal 2003). Despite the fact that in Italy the one widespread questionnaire used to assess the gambling problem is the SOGS questionnaire, we chose to use CPGI for several reasons. First of all because it revealed a factor structure that is one dimensional (De Oliveira et al. 2009; Orford et al. 2003) instead of the multidimensional result of the SOGS. The SOGS also presents an unacceptably high rate of false positive observations in non-clinical samples (Stinchfield 2002).

CPGI is the preferred scale in Canada, and in Australian community prevalence research in Queensland (Queensland Treasury 2006), Tasmania (Roy Morgan Research 2006) and Victoria (McMillen et al. 2004). Moreover, it has been adapted for use in Singapore (Arthur et al. 2008) and in China (Loo et al. 2011).

Gambling in Italy is a fundamental issue. In recent years, public gambling has grown passing from 3 authorized gambling opportunities each week in the early 90s (e.g. football pools, lottery and horse betting) to unlimited opportunities in the present day (e.g. instant lottery, video poker, online casino) (Amministrazione Autonoma dei Monopoli di Stato 2011).

The variety of existing games, the widespread distribution of gambling venues and enhanced accessibility because of reduced amounts required to start playing, resulted in an increased number of players. As a result of this, the Italian gambling business has been developing very rapidly: in 2008 the public gaming industry has collected 47.4 billion euros (about 3 % of Italian GDP), in 2009 54.4 (3.7 % of GDP) and 61.4 in 2010 (almost 4 % of GDP), with an increase of almost 30 % compared to 2008. Moreover, a recent study (Bastiani et al. 2011) highlighted that about 40 % of Italian have gambled and about 8 % are at risk for problem gambling.

Although gambling is a key issue in Italy, no Italian instrument focuses specifically on the measurement of pathological gambling in general population. Development of a screening scale would be very useful to help identify at risk individuals and prevent

gambling-related problems before they appear. Thus the aim of this study is to adapt the CPGI, a commonly used international instrument, and assess its psychometric properties when it is translated for use in the Italian population.

Method

Design and Sample

Data for this study were drawn from IPSAD–Italia®2010–2011(Italian Population Survey on Alcohol and other Drugs), a survey among the Italian general population conducted by the Institute of Clinical Physiology of the Italian National Research Council, with a total sample size of 11845. It is a cross-sectional study of a representative randomized sample of the Italian population between 15 and 64 years, extracted randomly from the registry lists of selected municipalities in the sample design.

The survey uses an anonymous postal questionnaire and collects socio-cultural information (e.g. gender, age, marital status, etc.), information about the use of drugs and information about gambling habits. Partecipation in the study is anonymous and voluntary. The response rate of participants in the study is about 35 % of the selected sample.

The CPGI questionnaire (Ferris and Wynne 2001a, 2001b; Zheng et al. 2010) and Lie/Bet questionnaire (Johnson et al. 1997) were used to specifically test about gambling habits.

Moreover complementary information on stress and depression are collected on a subset using two scales: a short form DSM-IV CIDI questionnaire for depression (Patten 1997) and VRS scale, a rating scale for rapid stress evaluation (Tarsitani and Biondi 1999). A detailed description of the methodology is published elsewhere (Dipartimento per le Politiche Antidroga (DPA) and (2008); Bastiani et al. 2011), while the present analysis was restricted to those who completed the CPGI questionnaire (5,292 questionnaires).

Instruments

The CPGI is a well-developed tool specifically created for assessing problem gambling in general population samples. This questionnaire in its complete form is a long instrument, but only the second section on the assessment of problem gambling produces a prevalence rate. This section contains nine items (bet more than could be lost; wagered larger amounts to get the same feeling of excitement; tried to win back losses; borrowed money or sold something to get money for gambling; felt a gambling problem existed; gambling caused health problems including stress and anxiety; been criticized for betting or told a gambling problem exists; gambling caused financial problems; felt guilty about gambling) that are scored on a four point Likert scale. The response categories are the same for each item: "never," "sometimes," "most of the time," and "almost always," scoring 0, 1, 2, and 3, respectively.

A composite score equaling 0 identifies no problem gambling, 1–2 indicates low problem gambling, 3–7 indicates moderate problem gambling, and 8–27 indicates severe problem gambling.

CPGI has been subject to extensive psychometric testing and was determined to have high reliability (Cronbach's alpha = 0.84) and high correlation (r = 0.78) with the test retest method. The criterion-related validity determined that the CPGI was highly correlated with the DSM-IV criteria (r = 0.81) and with the South Oaks Gambling Screen

($r = 0.80$), indicating that the CPGI classification of respondents is consistent with classification using other scales.

The Lie/Bet questionnaire is a two-item screening tool for detecting pathological gamblers. Two items, selected from 10 DSM-IV criteria for pathological gambling, maximally differentiated the groups of problem gamblers and non-problem gambling controls in terms of sensitivity and specificity and in positive and negative predictive value. They are:

Have you ever had to lie to people important to you about how much you gambled?

Have you ever felt the need to bet more and more money?

Johnson et al. assessed that the Lie/Bet has high sensitivity, specificity, and positive and negative predictive values in both the initial (Johnson et al. 1997) and follow-up (Johnson et al. 1998) studies. The significantly high accuracy with which the two items differentiated problem from non-problem gamblers indicated that the Lie/Bet questionnaire is a useful tool for screening problem gamblers.

Moreover, as McMillen et al. (2004) point out, we decided to determine the extent to which problem gambling correlates with other qualities or measures known to be related to it. It is well known, for example, that problem gambling gives rise to significant psychological and social harm (Kerber et al. 2008; Petry 2005). Thus, one would have greater faith in the assessment if scores or ratings were positively correlated with stress, depression, or other general measures of social functioning. Therefore, scales of depression and stress have been used because stress and depression have been found to be positively related to problem gambling (Petry 2005).

Depression was assessed by asking whether, during the past 12 months, the participant had felt sad, blue, or depressed for 2 weeks or more in a row, and if yes, graded by a set of seven no-yes questions—lose interest in other things, feel tired or low on energy, gain or lose weight, trouble falling asleep, trouble concentrating, think of death, feeling worthless—of which five or more positive responses were defined as clinical depression. This questionnaire is an adaptation of the short form DSM-IV CIDI questionnaire for depression (Patten 1997; Patten et al. 2000).

Stress was assessed using VRS scale, a rating scale for rapid stress evaluation (Tarsitani and Biondi 1999). This scale consists of 15 items: 9 of these are referred to the state of the person at the time of questionnaire completion, 6 measure longitudinal variables related to the last six months. The response categories are the same for each item: "not at all", "slightly", "enough", and "very much", scoring 0, 1, 2, and 3, respectively.

It was proven to be sufficiently reliable and valid, with satisfactory concurrent validity (Tarsitani and Biondi 1999; Pancheri et al. 2002).

Translation

Cross-cultural adaptation of the CPGI was performed following the guidelines proposed by Beaton et al. (2000). Briefly, this comprised of: (1) Initial forward translations from the English language version to target language by two bilingual translators, native to the language; (2) synthesis of the translations to resolve discrepancies between translators; (3) backward translations of the new target language CPGI scale to English by two lay translators working independently of stage one; (4) expert committee review to reach consensus and produce the pre-final version; and (5) field testing in the target population to test face and content validity for the new scale. This translation method is very useful for this kind of study because it considers not only language translation but also cultural context of the second language.

Statistical Analysis

Data were analysed using SPSS17 for Windows. Reliability was assessed as internal consistency using Cronbach's alpha coefficient and item-total correlation (Pearson correlation coefficients). The higher the coefficients, the more reliable the scale. In order to examine construct validity, principal component analysis (PCA) was used to search for the highest percentage of variance. Following the Kaiser–Guttman rule, factors with an eigenvalue >1 were extracted and factor loadings were reported. The ideal number of factors extracted from the questionnaire should be one, which is problem gambling, with percentage of variance more than 50 %.

Bartlett's test of sphericity and the Kaiser–Meyer–Olkin measure of sampling adequacy were calculated to assess the adequacy of correlation matrix for factor analysis.

Bartlett's test of sphericity was used to examine the hypothesis that the variables are uncorrelated. A significant value indicates that a set of data do not produce an identity matrix and is thus acceptable for factor analysis.

Kaiser–Meyer–Olkin (KMO) is a measure of sampling adequacy that provides an index (between 0 and 1) that should be greater than 0.5 for a satisfactory factor analysis to proceed. A KMO index $\leq$ 0.5 indicates that the correlation matrix is not suitable for factor analysis.

The results of PCA were evaluated by confirmatory factor analysis (CFA) performed using AMOS 16. CFA was conducted to determine whether the assumed model fits the data well. Hong et al. (2003) suggested that independent goodness-of-fit indexes of sample size are the comparative fit index (CFI) and root mean square error of approximation (RMSEA). The criteria of each fit index were that CFI was more than 0.90 and RMSEA was smaller than 0.08, according to Loo et al. (2011). Then CFA was conducted on all eligible people.

Finally, a Chi-squared test has been used to investigate the association between CPGI and Lie/Bet and between CPGI and depression scale, whereas analysis of variance (ANOVA) was conducted to assess differences between mean scores from the stress scale in different level of problem gambling. The Spearman correlation coefficient has been also calculated to check the correlation between CPGI and Stress scale.

Results

In total, 5,292 people completed the CPGI questionnaire. 53.4 % males, mean age 38.8, 70.5 % secondary school educational level or less, 64.9 %, employed, 17.0 % students.

Using the CPGI cut-offs (Ferris and Wynne 2001b), 83.2 % of participants were classified as nongamblers, 11.2 % were low-risk gamblers, 4.3 % were moderate-risk gamblers, and 1.3 % were problem gamblers.

Cronbach's alpha reliability coefficient was calculated to assess the internal consistency. Pearson correlation coefficients were calculated to find the item-total correlation coefficient values.

Cronbach's alpha estimate was 0.87 and can be considered a good reliability score according to Nunnally (1978). Table 1 shows that all items had high item-total correlation and alpha did not increase when each item was removed.

As far as internal validity is concerned, CPGI displays a very good dimensional quality. PCA applied to the standardized data revealed unidimensionality of the CPGI: the first factor had an eigenvalues of 4.684 with percentage of variance 52 %, whereas the remaining eigenvalues were lower than 1 (0.747–0.354 with percentage of variance 8.3–3.9).

Table 1 Psychometric properties of CPGI

		Cronbach's alpha when item deleted	Item total correlation	Factor loadings
1	Have you bet more than you could really afford to lose?	0.849	0.658	0.750
2	Still thinking about the last 12 months, have you needed to gamble with larger amounts of money to get the same feeling of excitement?	0.855	0.588	0.676
3	When you gambled, did you go back another day to try to win back the money you lost?	0.864	0.568	0.653
4	Have you borrowed money or sold anything to get money to gamble?	0.861	0.595	0.700
5	Have you felt that you might have a problem with gambling?	0.854	0.605	0.697
6	Has gambling caused you any health problem, including stress or anxiety?	0.851	0.660	0.754
7	Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?	0.854	0.601	0.693
8	Has your gambling caused any financial problems for you or your household?	0.853	0.676	0.779
9	Have you felt guilty about the way you gamble or what happened when you gamble?	0.844	0.703	0.779

The Kaiser–Meyer–Olkin measure of sampling adequacy indicated that the sample was factorable (KMO = 0.921). Bartlett's test of Sphericity has $p < 0.0001$) and the diagonal values of the anti-image correlation matrix indicated that all correlations were above the recommended 0.5 (Brace et al. 2009), suggesting that the correlation is not an identity matrix.

These results were consistent with our a priori assumption that the nine items of the questionnaire can be expressed in terms of a single factor related to problem gambling.

Confirmatory factor analysis was then conducted to test whether the 1-factor structure of CPGI found in the Italian sample should be retained. The results indicated good indices of

Table 2 Comparison between CPGI and Lie/Bet, depression scale and stress scale

		CPGI				Pearson chi-squared test Or fisher test *P* value
		No problem gambling N %	Low problem gambling N %	Moderate problem gambling N %	Severe problem gambling N %	
Lie/Bet	No problem gambling	4005 94.7	403 69.6	65 29.0	3 4.3	0.000
	Problem gambling	224 5.3	176 30.4	159 71.0	67 95.7	
Depression scale	No depressed	1,626 87.8	181 80.1	79 73.8	17 58.6	0.000
	Depressed	225 12.2	45 19.9	28 26.2	12 41.4	
Mean score of stress scale		10.61	12.11	13.48	13.71	0.000

fit (CFI 0.949, NFI 0.947, RMSEA 0.083). The standardized regression weights (factor loadings) for the model are reported in Table 1: all the loadings are positive and, hence, the factor can be interpreted as problem gambling.

As far as convergent validity is concerned, Table 2 shows the comparison between CPGI and Lie/Bet, depression scale and stress scale. The association with Lie/Bet questionnaire resulted in a χ^2 test with $p < 0.0001$, demonstrating a strong convergent validity. Relating to depression, the higher the problem gambling score, the higher the proportion of depressed people (12 % of depressed no problem gambling, 20 % among low problem gambling, 26 % among moderate problem gambling, and 41 % among severe problem gambling, χ^2 test $p < 0.0001$). Moreover, the higher the problem gambling score, the higher the mean score of stress scale (Fisher test $p < 0.0001$). CPGI results correlate with stress scale (Spearman correlation coefficient 0.13, $p < 0.0001$).

Discussion

In Italy, because no scale assessing problem gambling has been validated to date, the aim of this study was to adapt to the Italian context the CPGI, a very commonly used instrument in problem gambling research, and determine its psychometric properties. For this purpose a survey among Italian general population was used.

The CPGI demonstrated a high reliability coefficient, meaning that it shows a very high quality of internal consistency notwithstanding that it is based on only nine items. In fact, it has to be highlighted that the alpha coefficient is affected by the number of items in the scale: the more items in the scale, the higher the alpha coefficient (Cortina 1993).

Moreover, CPGI claimed evidence of construct validity, in fact only one factor, that is problem gambling, was extracted from this questionnaire set, showing a very good dimensional quality.

The researchers also investigated whether the items of the CPGI are best represented by a single underlying dimension or whether they have to be thought as indicators of different dimensions (which could reflect different aspects of problem gambling). Problem gambling also, in Italian context, can be understood as a unidimensional phenomenon and not a complex of behaviors: this idea that a gambling scale score assumes a unitary concept of problem gambling is very useful. In other words, it represents a true measure of problem gambling and is able to differentiate between those who do and do not have this characteristic.

It is worthwhile to mention that the large sample size of slightly less than 5.300 cases compares to similar studies that had analyzed smaller samples. The CPGI is an instrument developed precisely to detect the prevalence of problem gambling among general population and we choose to validate it on this purpose in a large-scale survey representative of the Italian general population. We have undertaken this comprehensive study to show that the tool can work well across the entire population.

Screening is a preliminary assessment that attempts to identify individuals with characteristics of pathological gambling in a wide population. Although a screening test does not enable a clinical interview to determine the complete profile of psychosocial functioning and needs, it may be used by clinicians to identify those who have a problem that warrants further assessment. In Italy the psychometric properties of the CPGI have not yet been investigated in a clinical sample. The goal of future projects should be to validate the CPGI in people with clinically-significant gambling disorders.

Furthermore, it has been very important to determine that the Italian version of CPGI had good psychometric properties because it produced relevant scores of gambling and problem gambling prevalence (Fig. 1), showing, for example, that there are some Italian regions with high problem gambling prevalence notwithstanding they have low gambling prevalence.

However, in order to find out whether an instrument indeed measures what it is intended to measure, it should utilize some "external" criterion. For instance, for the validation of gambling screens, it is a common procedure that psychologists determine in-depth interviews whether or not the respondents have a gambling problem. This assessment can then be used as a "gold standard" with which the scores of the gambling screen can be correlated, in order to establish how well the screen predicts the expert assessment. Unfortunately, with our large-scale surveys, this has not been possible to do as yet.

Also adding another long gambling screen instrument as, for instance, the paper-and-pencil version of DSM-IV interview to use as a gold standard, would have required exceedingly long time to complete the questionnaire. Moreover, as the two screens could have had similar questions, too high a degree of repetition, would have been found unacceptable by many respondents. Thus, the aspect of external validity where instruments presumably measure the same concept to validate one other, could not be tested.

For this reason, other means to test for external validity were used. We used a "pseudo-external" criteria for the validation of the CPGI. These criteria are not "gold standards" and they are not superior to the screen in terms of reliability or validity of measurement, however, they may be important correlates of problem gambling. For this purpose we used the Lie/Bet short questionnaire finding strong convergent validity (χ^2 test $p < 0.0001$). This questionnaire, has not been validated in Italy, but being composed of two of the ten DSM-IV clinical criteria that maximally differentiated the groups of problem gamblers

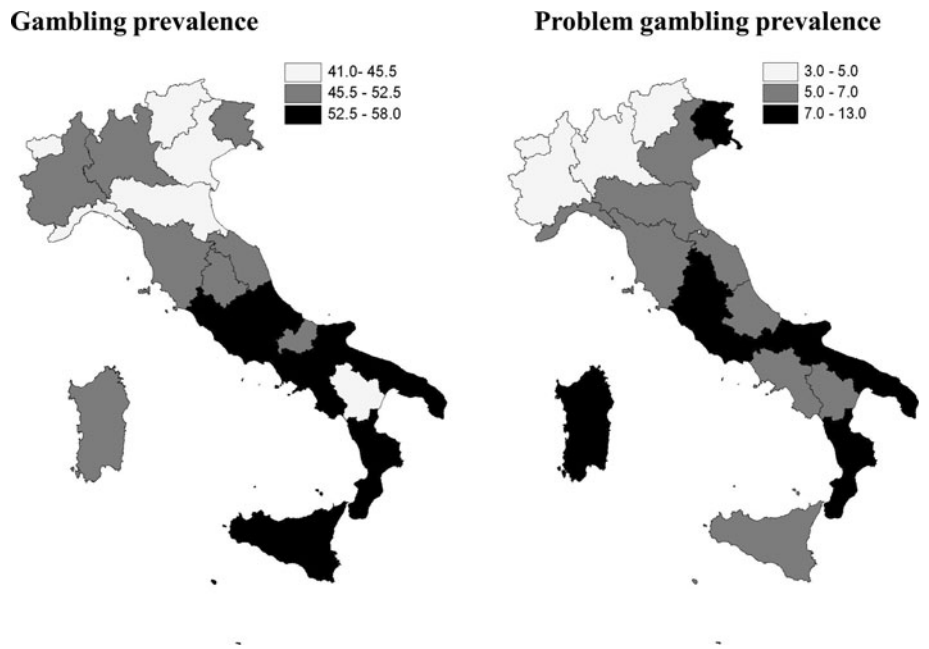

Fig. 1 Gambling and problem gambling prevalence in Italian regions

from non-problem gamblers, it is unlikely that any of these criteria is present in a person who has a gambling problem, so the presence of one of these two characteristics define a problem gambler. Moreover, we searched for significant positive association between CPGI with depression and stress and results have been able to show good correlation. These findings are consistent with past research on problem gambling (Petry 2005; McMillen et al. 2004), where another way to confirm the validity is to determine the extent to which it correlates with other qualities or measures known to be related to problem gambling (Loo et al. 2011).

In our opinion, CPGI could usefully be included in future prevalence research as an Italian gambling screen, also in order to make comparisons with international research, however future studies could be replicated including a "gold standard" or other validation methods such as Latent Class or Bayesian Models (Joseph et al. 1995; Walter and Irwig 1988; Yang and Becker 1997).

Acknowledgments The authors would like to thank Daniela Capitanucci for helpful suggestions.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IVTR* (4th, text revision ed.). Washington, DC: American Psychiatric Association.

Amministrazione Autonoma dei Monopoli di Stato, AAMS. (2011). I dati ufficiali AAMS ''Official data AAMS''. Retrieved from http://www.aams.gov.it/.

Arthur, D., Tong, W. L., Chen, C. P., Hing, A. Y., Sagara-Rosemeyer, M., Kua, E. H., et al. (2008). The validity and reliability of four measures of gambling behaviour in a sample of singapore university students. *Journal of Gambling Studies, 24*, 451–462. doi:10.1007/s10899-008-9103-y.

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. J Gambl Stud 2011 Dec 4 [Epub ahead of print].

Beaton, D. E., Bombardier, C., Guillemin, F., et al. (2000). Guidelines for the process of crosscultural adaptation of self-report measures. *Spine, 25*, 3186–3191.

Bolen, D. W., & Boyd, W. H. (1968). Gambling and the gambler: A review and preliminary findings. *Archives of General Psychiatry, 18*(5), 617–629.

Brace, N., Kemp, R., & Snelgar, R. (2009). *SPSS for psychologists*. Hampshire: Palgrave Macmillan.

Brooker, I. S., Clara, I. P., & Cox, B. J. (2009). The Canadian problem gambling index: Factor structure and associations with psychopathology in a nationally representative sample. *Canadian Journal of Behavioural Science, 41*(2), 109–114.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*(1), 98–104.

De Oliveira, M. P., Da Silveira, D. X., De Carvalho, S. V., Collakis, S. T., Bizeto, J., & Silva, M. T. (2009). Reliability, validity and classification accuracy of the South Oaks gambling screen in a Brazilian sample. *Journal Gambling Studies, 25*(4), 557–568.

Dipartimento per le Politiche Antidroga (DPA), Presidenza del Consiglio dei Ministri. (2008). Relazione Annuale al Parlamento sullo Stato delle Tossicodipendenze In Italia 2007. Retrieved from http://www.governo.it/GovernoInforma/Dossier/relazione_droga_2007/.

Ferris J,Wynne H (2001a). The Canadian problem gambling index: User manual. Ottawa: The Canadian centre on substance abuse. Ottawa, ON: Canadian centre on substance abuse.

Ferris, J., & Wynne, H. (2001b). *The Canadian problem gambling index: Final report*. Ottawa, ON: Canadian Centre on Substance Abuse.

Hong, S., Malik, M. L., & Lee, M. (2003). Testing configural, metric, scalar, and latent mean invariance across genders in sociotropy and autonomy using a non-western sample. *Educational and Psychological Measurement, 63*(4), 636–654.

Johnson, E. E., Hamer, R., & Nora, R. M. (1998). The lie/bet questionnaire for screening pathological gamblers: A follow-up study, in. *Psychological Reports, 83*, 1219–1224.

Johnson, E. E., Hamer, R., Nora, R. M., & Tan, B. (1997). The lie/bet questionnaire for screening pathological gamblers, in. *Psychological Reports, 80*, 83–88.

Joseph, L., Gyorkos, T. W. & Coupal, L. (1995). Bayesian estimation of disease prevalence and the parameters of diagnostic tests in the absence of a gold standard. *American Journal of Epidemiology, 141*(3), 263–272.

Kerber, C. S., Black, D. W., & Buckwalter, K. (2008). Comorbid psychiatric disorders among older adult recovering pathological gamblers. *Issues in Mental Health Nursing, 29*(9), 1018–1028.

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*(9), 1184–1188.

Loo, J. M. Y., Oei, T. P. S., & Raylu, N. (2011). Psychometric evaluation of the problem gambling severity index-chinese version (PGSI-C). *Journal of Gambling Studies, 27*, 453–466.

McMillen, J., Marshall, D., Ahmed, E., & Wenzel, M. (2004). *2003 Victorian longitudinal community attitudes survey*. Canberra, Australia: The Centre for Gambling Research, Australian National University.

McMillen, J., & Wenzel, M. (2006). Measuring problem gambling: Assessment of three prevalence screens. *International Gambling Studies, 6*(2), 147–174.

Neal, P., Delfabbro, P. H., & O'Neill, M. (2004). *Problem gambling and harm: Towards a national definition*. Melbourne: National Gambling Research Program Working Party.

Nunnally, J. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

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.

Pancheri, P., Martini, A., Tarsitani, L., Rosati, M. V., Biondi, M., & Tomei, F. (2002). Assessment of subjective stress in the municipal police force of the city of Rome. *Stress and Health, 18*, 127–132.

Patten, S. B. (1997). Performance of the composite international diagnostic interview short form for major depression in community and clinical samples. *Chronic Diseases in Canada, 18*, 109–112.

Patten, S. B., Brandon-Christie, J., Devji, J., & Sedmak, B. (2000). Performance of the composite international diagnostic interview short form for major depression in community samples. *Chronic Diseases in Canada, 21*(2), 68–72.

Petry, N. M. (2005). *Pathological gambling: Etiology, comorbidity, and treatment*. Washington, DC: American Psychological Association.

Raylu, N., & Oei, T. P. S. (2002). Pathological gambling: A comprehensive review. *Clinical Psychology Review, 22*(7), 1009–1061.

Rosenthal, R. J. (2003). Distribution of the DSM-IV criteria for pathological gambling. *Addiction, 98*(12), 1674–1675.

Roy Morgan Research. (2006). *The fourth study into the extent and impact of gambling in Tasmania with particular reference to problem gambling: Follow-up to the studies conducted in 1994, 1996, and 2000*. Hobart, Tasmania: Gambling Support Bureau, Department of Health and Services.

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

Tarsitani, L., & Biondi, M. (1999). Sviluppo e validazione della scala VRS (valutazione rapida dello stress). Development and validation of the VRS, a rating scale for rapid stress assessment. *Medicina Psicosomatica, 3*, 163–177.

Treasury, Queensland. (2006). *Queensland household gambling survey 2003–04*. Brisbane: Queensland Government.

Walter, S. D. & Irwig, L. M. (1988). Estimation of test error rates, disease prevalence and relative risk from misclassified data: a review. *Journal of Clinical Epidemiology, 41*(9), 923–937.

Yang, I. & Becker, M. P. (1997). Latent variable modeling of diagnostic accuracy. *Biometrics, 53*(3), 948–958.

Zheng, W. Y., Walker, M. & Blaszczynski, A. (2010). Mahjong gambling in the chinese-australian community in sydney: A prevalence study. *Journal of Gambling Studies, 26*(3), 441–454. doi: 10.1007/s10899-009-9159-3.