

## Psychometric properties of a brief on-line screening instrument to detect at-risk gamblers

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### Abstract

**Background:** Gambling facilitates the development of psychopathological problems in some gamblers. Rapid and easy detection of the presence of these problems, or the risk of their development, will allow early action at the beginning of the problem, including preventive action. For this purpose, we developed the “Sistema de Cribado de Riesgo de Problemas de Juegos” (SCRI-PJ [Risk of Gambling Problems Screening System]), an on-line instrument for the detection of people who have, or may develop, gambling problems. The goal of this work is to present and validate the SCRI-PJ. **Method:** 85 people with gambling problems undergoing treatment and 119 people from the general population were assessed with the SCRI-PJ and the DSM-RT Diagnostic Criteria for Pathological Gambling questionnaire. **Results:** The SCRI-PJ showed high internal consistency ( $\alpha = .96$ ), sensitivity (94.2%) specificity (91.4%), with a negative predictive value of 98.6%. **Conclusion:** The SCRI-PJ is a brief and effective screening instrument to detect people with gambling problems or who are at risk of developing them.

**Keywords:** Gambling, measurement, computer assisted measurement, test reliability, test validity.

### Resumen

**Propiedades psicométricas de un instrumento de cribado breve on-line para la detección de jugadores de riesgo. Antecedentes:** los juegos de azar facilitan el desarrollo de problemas psicopatológicos en algunos jugadores. Detectar de forma rápida y sencilla la presencia de estos problemas, o el riesgo de su desarrollo, permitirá actuar precozmente al inicio del problema, incluso de forma preventiva. Con este propósito se ha desarrollado el Sistema de Cribado de Riesgo de Problemas de Juego (SCRI-PJ), un instrumento on-line para la detección de personas que tengan o puedan desarrollar problemas con el juego. El objetivo de este trabajo es presentar y validar el SCRI-PJ. **Método:** 85 personas con problemas de juego en tratamiento y 119 personas de la población general fueron evaluados mediante el SCRI-PJ y el cuestionario Criterios diagnósticos DSM-IV-TR para el Juego Patológico. **Resultados:** el SCRI-PJ mostró una alta consistencia interna ( $\alpha = .96$ ), sensibilidad (94,2%) y especificidad (91,4%), con un valor predictivo negativo del 98,6%. **Conclusión:** el SCRI-PJ es un instrumento de cribado breve y eficaz para detectar a las personas con problemas de juego o en riesgo de desarrollarlos.

**Palabras clave:** juegos de azar, evaluación, evaluación online, fiabilidad, validez.

Gambling is a leisure alternative that is legalized and regulated in most developed countries. According to the *Study on Gambling in Spain 2013* (Labrador, Becoña, Crespo, Echeburúa, & Labrador, 2013), 89.5% of Spaniards admit having participated in some kind of gambling. Also, gambling constitutes an important way of fund-raising for the State, which has the advantage of being voluntary. Although most people gamble without any problem, a small percentage of players' lives are negatively affected by their gambling. The Study of Gambling in Spain 2013 (Labrador et al., 2013) identifies a life prevalence of 1.1% of pathological players, 1% of problem players, and 2.9% of at-risk players. These data are similar to those in other countries (Gainsbury et al., 2014; Wardle et al., 2011).

These data highlight the importance of quickly identifying the presence of problem gambling and, better still, of detecting the risk of developing these problems before they appear, as this would allow us to act preventively, avoiding the emergence of problem gambling, either at the beginning of its onset or before it becomes chronic and produces substantial alterations in the players' lives and environment.

With this goal, we developed the SCRI-PJ. The instrument should act as a filter that excludes people without gambling problems and identifies those who have them or are at risk of developing them. Thus, we considered the NODS CLiP (Toce-Gerstein, Gerstein, & Volberg, 2009), a short 3-item version of the *NORC Diagnostic Screen for Gambling Disorders* (NODS; Gerstein et al., 1999), given the number of studies available on its utility as a screening tool and its values of reliability and validity. The NODS-CLiP identifies 99.3% of pathological gamblers and 93.7% of problematic gamblers, with a high sensitivity index (98.4%). Nevertheless, the NODS-CLiP is not an ideal instrument for screening, as it is designed to identify gamblers with clinical features but it does not identify people “at risk” of developing

problem gambling. The authors admit that the NODS-CLiP could only identify 43% of at-risk gamblers in the general population (Toce-Gerstein et al., 2009), or 30% in people seeking help (Volberg, Munck, & Petry, 2011).

A more sensitive screening instrument is needed to maximize its negative predictive power (only excluding people who definitely present no risk or problems), although the specificity and predictive power of the test (including false positives) must be sacrificed. The increase of false positives is considered an acceptable and even positive risk, because “over-inclusion” can increase the psychoeducational value of the system and serve as a protection/prevention factor. Thus, we considered the most used and acknowledged questionnaires to detect problem gambling in epidemiological studies: the NODS (Gerstein et al., 1999), the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), and the Canadian Problem Gambling Index (CPGI; Ferris & Wynne, 2001). The item analysis of the NODS performed by Volberg et al. (2011) concluded that Item 10, referring to “chasing the losses,” is the one that best identifies at-risk gamblers and that best discriminates “normal” from at-risk gamblers. The combinations that included this item showed a greater negative predictive power, ostensibly increasing test sensitivity, although penalizing its specificity. On another hand, Volberg and Williams (2011), concluded that the combination of items called Brief Problem Gambling Screen (BPGS), made up of five items, two from the CPGI (Items 1 and 3), two from the Problem and Pathological Gambling Measure (PPGM; Williams & Volberg, 2010) (Items 8 and 10C), and one from the SOGS (Item 4), improved the negative predictive power of the test, identifying 83% of the at-risk gamblers and practically all of the problematic and pathological gamblers.

As the goal is early detection, both of pathological gambling and of the risk of its development, we considered it appropriate to include the NODS CLiP, the Brief Problem Gambling Screen (without Item 3 already included in the NODS-CLiP), and Item 10 (“Chasing”) of the NODS. The result is the “Sistema de Cribado de Riesgo de Problemas de Juego” (SCRI-PJ [Risk of Gambling Problems Screening System]).

The goal of this work is to validate the SCRI-PJ as a screening instrument for people with gambling problems or at risk of developing them. In particular, we intended to (a) examine the internal consistency of the questionnaire; (b) analyze its convergent validity with an already validated diagnostic instrument; and (c) analyze its sensitivity, specificity, and positive and negative predictive value. We expect that the SCRI-PJ will show appropriate reliability, sensitivity, and specificity indices, and it that will improve the negative predictive power of other instruments such as the NODS-CLiP and the BPGS.

## Method

### Participants

The sample consisted of two groups: (a) a group of gamblers (Group G), made up of 85 gamblers in treatment and; (b) a control group (Group C) including 119 people from the general population.

Group G was a convenience sample of problem gamblers in treatment recruited from: the Leganes Association of Gamblers in Rehabilitation (ALEJER) (n = 41), the Association for the

Prevention and Support for Pathological Gamblers (APAL) (n = 30), the Association of Gamblers in Rehabilitation (AJER) (n = 7), the Therapeutic Association of Gamblers (ATEJ) (n = 6), and the Clinical Unit of the Clinical Psychology Master’s Degree of the UCM (n = 1). Inclusion criteria were: being a gambler, aged 18 years or over, having sought help for gambling problems, and having voluntarily agreed to participate in this study. Data were collected from February to October 2015. This sample of gamblers is mostly made up of males (95.3%), with a mean age of 46.55 years (SD = 16.03), married (51.8%), with secondary studies (51.8%), and in an active work situation (62.4%). All the participants of Group G had had gambling problems, with a mean duration of these problems of 4 years (range of 6 months to 54 years). They had been attending the associations for an average of 2 years (range 0-22 years). The attention received in the associations was usually less than one year (49.3%), and less than 6 months in 32.8%.

Group C was made up of a convenience sample from the general population, with sociodemographic characteristics similar to Group G. The inclusion criteria were: people aged between 20 and 65 years, preferably males and without university studies, who had not sought help for gambling problems, or attended associations of gamblers or ex-gamblers, or consulted a health professional. The data were collected between March and April of 2015. Group C was mostly made up of males (95.8%), with a mean age of 42.72 years (SD = 11.67), married (55.5%), with secondary studies (61.3%), and in an active work situation (91.6%). Table 1 shows sociodemographic characteristics of Group G and Group C and statistical differences between them.

Table 1  
Sociodemographic characteristics of the participating gamblers and controls

Variables	Participants (N = 205)		P
	Gamblers (n = 85)	Controls (n = 119)	
Age (Years $M \pm SD$ )	46.55 $\pm$ 16.03	42.72 $\pm$ 11.67	.06
Sex (% men)	95.3	95.8	.56
Marital status (%)			
Single	38.8	39.5	.51
Married/Living with partner	51.8	55.5	
Separated/Divorced	8.2	5.0	
Widowed	1.2	0	
Educational level (%)			
Incomplete Primary	8.2	4.2	.01
Primary	27.1	5.8	
Secondary	51.8	61.3	
University studies	12.9	22.7	
Current work situation (%)			
Is working	62.4	91.6	< .001
Unemployed	7.1	3.4	
Retired or receives subsidy	24.6	1.7	
Sick leave	1.2	0.8	
Student	4.7	2.5	
Profession (%)			
Farmer	0	4.2	.002
Entrepreneur/Owner	5.9	5.9	
Liberal profession	14.1	16.0	
Management member	3.5	2.5	
Intermediate post	15.3	11.8	
Office employees/Administrative employees	21.2	10.1	
Employees outside the office/Specialized workers	23.5	45.4	
Workers, laborers, junior staff	16.5	4.2	

*Instruments*

DSM-IV and DSM-IV-TR Diagnostic Criteria for Pathological Gambling (Stinchfield, 2003). This is a 19-item questionnaire that includes the diagnostic criteria of the DSM IV and the DSM-IV-TR for pathological gambling. We used the Spanish translation of Jiménez-Murcia et al. (2009), which is supported by its psychometric properties (alpha reliability coefficient of .95, high sensitivity .92, and specificity .99). Following the recommendation of the authors, the questionnaire is applied in the form of an interview to ensure comprehension of the questions and to specify compliance with the diagnostic criteria.

“Sistema Experto de Reconocimiento de Problemas de Juego” (SER-PJ [Expert system for the recognition of problem gambling]), for free use on the web page: [www.famgi14.es/juego](http://www.famgi14.es/juego). It consists of: a homepage, a psychoeducational module about gambling and its associated problems, a first common assessment protocol, a second specific assessment protocol in case of gambling problems or their risk. Finally, it includes intervention protocols for the diverse problems detected.

The first evaluation protocol, to which all users gain access, is a screening system for gambling problems or their risk. It consists of 5 steps: (1) knowing the level of risk (three general questions about the user’s way of gambling); (2) collection of user’s demographic data; (3) games that the user has played live and/or online; (4) user’s involvement in the game (weekly time and money spent on the game); and (5) the SCRI-PJ, a brief questionnaire consisting of 8 items which consider the presence of gambling both in the past 12 months and lifetime (Table 2). After completing Step 5, an individualized report on the existence of risk of gambling problems is offered.

*Procedure*

Inter-judge reliability of the diagnostic instrument and training of the evaluators.

As the criterion to establish the presence or not of gambling risk, either problematic or pathological, we used the above-mentioned questionnaire of the DSM-IV-TR criteria validated by Jiménez-Murcia et al. (2009), administered in the form of an interview. To control a possible bias of the evaluators when encoding the participants’ responses, we studied the inter-judge reliability of experts on four hypothetical situations recorded in audio, which simulated the responses of a subject without risk, with risk, with problem gambling, or with pathological gambling.

Table 2  
SCRI-PJ

<p>1. Have there ever been periods lasting 2 weeks or longer when you spent a lot of time thinking about your gambling experiences or planning out future gambling ventures or bets?</p> <p>2. Have you ever tried to stop, cut down or control your gambling?</p> <p>3. Have you ever lied to family members, friends or others about how much money you lost on gambling?</p> <p>4. Has there ever been a period when if you lost money gambling one day, you would return another day to get even?</p> <p>5. Would you say you have been preoccupied with gambling?</p> <p>6. Have you needed to gamble with larger amounts to get the same feeling of excitement?</p> <p>7. Have you often gambled longer, with more money or more frequently than you intended to?</p> <p>8. Have you borrowed money or sold anything to get money to gamble?</p>
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The concordance index among the experts in all the criteria and in each one of the four situations was 100%, except for two items, which obtained 80% concordance. These two items were discussed by the committee of experts to arrive at a consensus that was established as the criterion. The group of experts was composed by four psychologists with a Phd. in Clinical Psychology, and with both clinical and research experience within the field of gambling and addictive behaviors. All experts had at least 10 years of clinical practice.

Training of evaluators: the work of the group of experts served as a criterion to train the evaluators who made the subsequent assessments until it was observed that the evaluators’ ratings converged with those of the group of experts in all four situations. Then, the evaluators were trained in the application of the rest of the protocol.

*Data collection.* After contacting the associations for gamblers and having obtained their consent, we started to perform the evaluations. Four psychologists with at least a Master’s degree in Clinical Psychology and supervised clinical practice went to the associations to perform the evaluation, usually at the time when the support groups were held. Those who agreed to participate were evaluated individually in one session. The evaluation consisted of two parts: in the first part, the interview was carried out, and in the second part, the SER-PJ was applied on a computer prepared for this purpose. The participants responded on the computer individually, in order to contrast whether the expert system was comprehensible and appropriate to their language and capacity, without external help. The average time of the assessments ranged between 30-45 minutes.

Prior to the evaluations, both groups were informed of the goal of the research and that their data would be treated anonymously. They were also asked to read and sign an informed consent form, if they agreed.

*Data analysis*

The descriptive statistics and frequencies of the sociodemographic variables and gambling habits were calculated in both groups, as well as the scores of the screening and diagnostic instruments. The results were compared to determine possible significant differences. For continuous variables, their adjustment to normality was confirmed with the test of Kolmogorov-Smirnov, if their distribution was normal, Student’s t-tests were used, otherwise, we used Mann-Whitney’s U-tests. Comparisons between nominal variables were performed using Chi square tests. To study the reliability of the screening and diagnosis instruments, we used Cronbach’s alpha.

To study the instrument’s convergent validity, we used its Pearson correlation coefficient with the DSM-IV and DSM-IV-TR diagnostic criteria interview. Sensitivity, specificity, and positive and negative predictive value were analyzed through the Receiver Operating Characteristic (ROC) curve.

**Results**

The values of internal consistency obtained were high, with a Cronbach’s alpha coefficient of .96 in all cases (see Table 3).

To study the convergent validity, we used the DSM-IV and DSM-IV-TR Diagnostic Criteria Questionnaire as a “gold standard” (Jiménez-Murcia et al., 2009). Given that the questions

in this instrument only refer to the past year, we analyzed its correlation with the SCRI-PJ score, which asks about the past year, and it was high and significant ( $r = .77$ ,  $p < .01$ ). The ROC curve was analyzed, obtaining an area under the curve of .92. The SCRI-PJ screening showed a 94.2% sensitivity and a 91.4% specificity. That is, it has been shown to be capable of detecting 94.2% of the true positives.

Moreover, it showed a positive predictive value of 70.2% (probability of being a pathological gambler if the result is positive) and a negative predictive value of 98.6% (probability that a person with a negative result is really not a pathological gambler).

Table 4 presents the results of the screening and diagnostic instrument of problem gambling and pathological gambling for the past year. There were significant group differences in the screening instrument,  $\chi^2(1) = 50.08$ ,  $p < .001$ . Approximately half of Group G (50.6%) presented problem gambling in the past year compared with 5.9% of Group C. The results of the DSM-IV-RT diagnostic interview, used as criterion instrument, also presented significant differences,  $\chi^2(1) = 53.48$ ,  $p < .001$ , indicating that, in the past year, 43.5% of Group G met the criteria for a diagnosis of pathological gambler, versus 1.7% of Group C.

	Lifetime	Past year	No. of items
Screening SCRI-PJ	0.96	0.96	8
Diagnosis DSM interview		0.96	19

Instruments (%)	Participants (N = 204)		P
	GAMBLERS (n = 85)	CONTROLS (n = 119)	
SCRI-PJ			
At-risk gambler (1 + criteria)	50.6	5.9	< .001
DSM-IV Interview			
Pathological gambler (5 + criteria)	43.5	1.7	< .001
(% ) Percentage of gamblers in past year			

## Discussion

The purpose of this study was to validate the SCRI-PJ as a screening instrument for people with gambling problems or at risk of developing them.

The fact that the two samples were matched in age, sex, and marital status allows comparing their results. The scientific literature indicates that the most important differences are in the variable sex, with gambling problems being more frequent men and these differences increase when considering the people who seek help for gambling problems (Gainsbury et al., 2014; Wardle

et al., 2011). In this study, the percentages of men were higher and similar in both groups (95.3 vs. 95.8%). However, greater equality in the educational level would have been desirable, given that it has sometimes been considered a relevant variable for gambling problems in the literature (Kairouz, Paradis, & Nadeau, 2011; Shead, Derevensky, & Gupta, 2010) although this does not seem so relevant because it has not occurred in all cases (Labrador et al., 2013). Further, the differences in this study are not large because in both groups, most of the participants have secondary studies (51.8% G vs. 61.3% C). The greatest difference is in the percentage of people with primary studies (27.1% G vs. 5.8% C). Summing up, the analyses of the sociodemographic variables allow us to generalize the results, within acceptable limitations.

With regard to reliability, the Cronbach alpha of .96 is a high value, the same as that obtained with the DSM interview, but with a great difference: we used 8 items instead of 19.

Regarding convergent validity, the value obtained by the SCRI-PJ is also high (.77). Nonetheless, the NODS-CLiP has shown higher values of validity in other studies (Toce-Gerstein et al., 2009; Volberg et al., 2011). However, these differences are logical, as both the DSM interview and the NODS-CLiP only try to identify problem gamblers or pathological gamblers, whereas the SCRI-PJ also tries to identify people at risk of developing problems. Some of the people detected by the SCRI-PJ were probably not detected by the DSM interview, which may explain the lower correlation between these instruments. The same argument may also explain its lower positive predictive power (70.2%), as some people who are identified as at-risk gamblers in the first stage are not identified as pathological gamblers in the second stage of more specific assessment. Nevertheless, as intended, the negative predictive power has increased (98.6%), a higher value than that reported by the 3- and 4-item reduced versions of the NODS (80 and 96.3%, respectively) (Volberg et al., 2011).

Summing up, the results support the value of the SCRI-PJ as a brief and efficacious screening instrument for cases of pathological gamblers and problem gamblers, and probably also at-risk gamblers.

In spite of the good psychometric characteristics of the instrument, the results should be considered with caution, given the particularities of the sample that makes up Group G, as it consists of a small number of gamblers and most are in treatment. Furthermore, they attend treatment in associations of ex-gamblers, whose goal is complete abstinence from gambling, some participants have been in treatment for some time, and others have just started treatment or have had relapses. It would be desirable to expand the number of active gamblers prior to the start of the treatment or at the beginning of treatment. Also it seems appropriate to try to improve the cut-off point of the instrument with a view to increasing its positive predictive value, and also to include at-risk gamblers.

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