Are scratchcards addictive? : two-year cumulative incidence and stability of pathological scratchcard gambling among Dutch scratchcard buyers

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CHAPTER 5

PREVALENCE OF PATHOLOGICAL GAMBLING: VALIDITY OF THE DUTCH VERSION OF THE SOUTH OAKS GAMBLING SCREEN

ABSTRACT

Aims To estimate the prevalence of pathological gambling (PG) in a community sample of young adults (12-35 years old) in the Netherlands and to test the validity of the South Oaks Gambling Screen (SOGS) as a screener for pathological gambling.

Methods A representative sample of 5830 young adults were assessed for PG using a two-stage sampling design with the SOGS as the stage-1 screening instrument and the PG section of the Diagnostic Interview Schedule (DIS-T) as the diagnostic instrument for stage-2. Sensitivity and specificity of the SOGS with DIS-T as a criterion for PG were estimated using both stage 1 and stage 2 data. These estimates were used to obtain an adjusted prevalence estimate of PG.

Results The SOGS had good sensitivity (.94) and specificity (.99), using a cut-off score of 5. Stage-1 and adjusted stage-2 prevalence estimates for PG among males were 2.9% and 2.0%, respectively, for the general population, 4.6% and 3.2% for males playing games of chance, and 6.7% and 4.6% for males playing short-payout interval games (e.g. slot machine, casino games, etc.). The positive predictive value (PPV) of the SOGS as a screener for DSM-III-R PG, using a threshold value of 5, was 65%. The probability of being a pathological gambler at any given SOGS total score is presented.

Conclusions SOGS is a good screening questionnaire for pathological gambling. However, as a consequence of the relatively low prevalence of PG in the general population, the SOGS considerably overestimates the prevalence of PG in community samples.

INTRODUCTION

The increasing availability and social acceptance of gambling has, inevitably, resulted in higher rates of problem and pathological gambling among players, especially among young adults and adolescents (Fisher, 1993; NORC, 1999; Duvarci and Varan, 2000; Gotestam and Johansson, 2003). A substantial part of society sees hazardous games of chance as a pleasant leisure time activity, whereas some consider it a risky, and even morally inferior, behaviour. In many countries gaming laws are developed to canalise gambling behaviour. In the Netherlands, the gaming law has three main aims: the prevention of pathological gambling, the protection of gamblers by assuring fair games of chance and the prevention of criminality by cracking down on illegal providers of gambling. New developments (like Internet or SMS

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Prevalence of Pathological Gambling

gaming) require both the adaptation of the existing gaming law and the development of new gaming legislation.

Reliable and valid screening instruments for the general population are needed to assess, monitor and evaluate the effects of existing gaming policy and to keep track of new developments as to the extent and character of the gambling possibilities offered. As Ladouceur et al. (2000) pointed out, the accuracy with which the prevalence of pathological gambling is estimated has important implications for both empirical research and for the wider political debate concerning the desirability of having more forms of gambling available in society.

Reported prevalence estimates for pathological gambling vary substantially over different studies. For instance, prevalence estimates for the general population vary from 0.77% to 3.4% pertaining to the USA (Shaffer et al., 1999; NORC, 1999; Volberg & Bank, 2002; Welte et al., 2002), from 0.25% to 1.73% in Australia (Dickerson et al., 1996; Productivity Commission, 2002; Sakurai and Smith, 2003), and from 0.9% to 1.5% in New Zealand (Abbott and Volberg, 1996). Reported European estimates of pathological gambling were: 0.6% in Norway (Gotestam and Johansson, 2003), 1.2% in Sweden (Volberg, et al., 2001), 1.5% in Spain (Becona, 2002) and between 0.13% to 1.3% for the Dutch population (Brink, van den et al, 1998).

There are at least three explanations for these variations among studies. First, the characteristics of the samples on which these estimates were based may have been responsible for the different outcomes. Second, the methods used to estimate the prevalence varied per study, and finally, there was great diversity in the case criteria or definitions used to identify pathological gamblers, as well as in the time frames applied (lifetime, last-year or last-month prevalence).

As regards the first issue, it has been shown that some groups are more at risk than others groups. For instance, relatively higher prevalence rates have been found among young adults (age group 18-29, Abbott & Volberg, 1996; Gotestam and Johansson, 2003), adolescents (Gupta & Derevensky, 1998; Stinchfield et al., 1997) and adults undergoing treatment for mental health and substance abuse (Shaffer et al., 1999; Potenza and Kosten, 2001). Most epidemiological surveys also reported that men are more at risk of pathological gambling than women (Gotestam and Johansson, 2003; Abbott and Volberg, 1996, etc.) and that level of education, employment and marital status are related to problematic gambling (Abbott and Volberg, 1996).

As mentioned, the methods and case definitions used to estimate prevalence varied across studies. Many of the epidemiological studies on pathological gambling used diagnostic interviews and/or self-report screening questionnaires to gather their prevalence estimates. In our opinion, the most appropriate instrument, in terms of validity, is a structured psychiatric interview like the DIS-T (Pathological Gambling Section of the Diagnostic Interview Schedule). However, in the case of relatively rare diseases, like pathological gambling, large samples are needed to get precise prevalence estimates. In this situation structured psychiatric interviews are very time consuming and expensive (non cost-effective). As a consequence self-report screening questionnaires are frequently preferred in general population surveys.
since they enable researchers to study relatively large populations fast and conveniently. One of the most widely used screening questionnaires in general population studies is the South Oaks Gambling Screen (SOGS, Lesieur and Blume, 1987; Volberg and Abbott, 1994; Emerson and Launergan, 1996). The original SOGS, however, has never been validated with a two-stage design in Europe.

Screening instruments always generate misclassification (false positives and false negatives). In case of a low prevalence disorder like pathological gambling, even a screener with excellent specificity like the SOGS will produce a substantial number of false positives, and as a consequence overestimate prevalence. This may be an important explanation for the variance in reported prevalence estimates.

Most methodological limitations mentioned can be overcome by the application of a cost-effective two-stage sampling design (Lesieur and Blume, 1987; Volberg and Abbott, 1994; Abbott and Volberg, 2001). In the first stage a self-report screening questionnaire is used to identify the people at risk of pathological gambling in a large and representative sample of the target population. In the second stage, all screener positives and a random sample of the screener negatives are given a structured diagnostic interview to assess whether or not they meet the diagnostic criteria for pathological gambling. This design will produce a more accurate prevalence estimate at considerably lower cost. This design also allows the sensitivity, specificity, positive predictive value and the negative predictive value of the SOGS to be tested in a target population.

The present study used a two-stage design and aimed (1) to assess the one-year prevalence of pathological gambling in a Dutch sample of individuals within the age range of 12 to 35 years, (2) to establish the validity of the Dutch version of the SOGS as a screener for pathological gambling in the general population using the DIS-T (APA, 1987) as criterion, and (3) to provide positive predictive values of the SOGS with respect to DSM-III-R criteria for pathological gambling. Additionally, two procedures are discussed to adjust biased (population survey) prevalence estimates.

METHODS

Participants
A two-stage sampling procedure was used. In the first stage, a self-report questionnaire was mailed to a self-weighting stratified random sample of 11,000 inhabitants of the Netherlands aged between 12 and 35 years. The sample was drawn from the municipal registers of a randomly selected sample of Dutch cities. For the participants under the age of 18 years, the survey was addressed to the parents with a cover letter explaining its purpose and requesting the parents’ to give their consent. The parents were instructed to hand the questionnaire to their son or daughter in the enclosed closed envelope. The Medical Ethics Committee of the Academic Medical Centre of the University of Amsterdam approved the procedures and design used in this study.

A total of 5,830 (53%) questionnaires were filled out and sent back. The main characteristics of this first-stage sample were: male 47.5%, mean age 20.9, 82% between 18
Prevalence of Pathological Gambling

and 35 years of age. Non-response was not related to gender, age, socio-economic status or urbanisation level. The achieved sample at stage-1 was representative of the Dutch population\(^2\) for this age group (12-35) in terms of demographic characteristics.

Based on the SOGS total score and using a threshold value of 3 all first-stage respondents were classified as either “possible problem players” (SOGS total score ≥ 3) or “recreational players” (SOGS total score < 3). To enhance the efficiency of our design a non-proportional stratified sampling strategy was used for the second stage. In this second stage all probable problem players (n = 135) and a random sample from the recreational players (n=391) were asked to participate in an individual diagnostic psychiatric interview (DIS-T, APA). A total of 163 respondents were actually interviewed, 112 (35%) of the recreational players (SOGS total score < 3) and 51 (38%) of the probable problem players. First-stage socio-demographic and gambling behaviour (SOGS) data were used to test for differential selection bias in the second-stage sample. The people who refused participation in the second-stage of this study did not differ from the participants in gambling variables, age, educational level or employment status.

As a consequence of the non-proportional random stratification the sample had a strong overrepresentation of screener positives. To get unbiased estimates, all second-stage data were weighted back, using the reciprocal of the inclusion probability as weight factor.

**Instruments**

The first-stage self-report questionnaire had two versions, one for adolescents (age 12–17) and the other for adults (age 18–35). Both versions comprised sections on socio-demographics, leisure time activities, and type and frequency of involvement in games of chance. The main differences between the two versions concerned the socio-demographic questions: where young adults were questioned about the status and nature of their employment, adolescents were asked about their school situation.

Prevalence of pathological gambling in the first-stage sample was estimated with the South Oaks Gambling Screen (SOGS, Lesieur and Blume, 1987), a 20-item self-report screening questionnaire based on DSM-III criteria for pathological gambling. This instrument correlates well with the DSM-III-R criteria (Lesieur and Blume, 1993), and recently the SOGS' reliability, validity and classification accuracy were examined against the DSM-IV criteria (Stinchfield, 2002). The SOGS is the most commonly used screening instrument to identify lifetime gambling problems and has good psychometric properties. The SOGS total score ranges from 0 to 20. A SOGS score below 3 indicates no problem with gambling, a score of 3 to 4 implies possible problem gambling and a cut-off score of 5 is frequently used to identify probable pathological gamblers. Originally, the SOGS has a lifetime time-frame. In accordance with several other studies (Emerson and Launergan, 1996; Dickerson et al, 1996; etc.) we changed this into a one-year time-frame both to make it more suitable as an indicator of the number of people in the population who are currently experiencing gambling-

\(^2\) The stage-1 sample was compared with the data from the Dutch Central Bureau for Statistics (CBS), the government’s official statistics agency.
related problems and to make our results comparable with those of the other studies. To minimise the number of false negatives a cut-off score of 3 was used to identify possible problem gamblers for the second-stage sample.

The Pathological Gambling Section of the DSM-III-R Diagnostic Interview Schedule (DIS-T, APA, 1987) was used during the second stage of this study. According to DSM-III-R a pathological gambler is "a person who is chronically and progressively unable to resist impulses to gamble and for whom gambling compromises, disrupts or damages family, personal and vocational pursuits". For the DSM-III-R diagnosis 'pathological gambling' a person has to fulfil at least 4 of the 9 criteria (e.g. preoccupation, loss of control, tolerance, withdrawal symptoms, chasing, social/job disruption, etc).

Statistical analysis
In addition to the prevalence estimate of pathological gambling based on SOGS (i.e. the proportion of respondents with a SOGS total score ≥ 5 at the first stage), a prevalence estimate of pathological gambling based on the combined SOGS and DIS-T data was calculated using the following procedure: (1) All second-stage respondents were given a weight factor equal to the inverse of their inclusion probability, (2) sensitivity and specificity of the SOGS as a screener for DSM-III-R pathological gambling (using a threshold value of 5) were assessed based on the weighted-back stage-2 data, (3) prevalence of pathological gambling in the stage-1 sample was estimated using the following formula: prev = (S+spec-1)/(sen+spec-1) with S = proportion of respondents in stage 1 with a SOGS total score ≥ 5; specificity and sensitivity values were calculated from the SOGS5+ as screener for DSM-III-R pathological gambling. Positive predictive values (PPV) for pathological gambling for all different SOGS scores were calculated using the following procedure: (a) $P(DSM+|SOGS=x) = 1/(1+(-\exp(\beta_{0adj}+\beta_1\cdot SOGS\ total\ score)))$, (b) $\beta_0$ and $\beta_1$ parameter estimates were obtained from a logistic regression analysis with DIS-T caseness as dependent and SOGS total score as independent variable on stage-2 data, (c) since $\beta_0$ depends on the prevalence of the population ($\beta_1$ is independent of prevalence population) and since the prevalence in the stage-2 sample differs from the prevalence in stage-1, $\beta_0$ had to be adjusted using the following formula: $\beta_{0adj} = \beta_0 + \ln(P/(1-P) - \ln (p/(1-p))$ with $P$ = prevalence stage-1 sample (the estimated prevalence using weighted stage-2 data described above was used) and $p$ = prevalence stage-2 sample (observed prevalence of the stage-2 sample was used).

RESULTS
Prevalence estimates for potential problematic gambling based on the SOGS total score using a threshold value of 5 were 1.6% for the total population, 2.8% for players and 4.5% for high-risk players. The term players refers to participants that played any game of chance (e.g. lotteries, bingo, casino, etc.). High-risk players refers only to those participants that played short-payout interval games or continuous games of chance (e.g. fruitmachines, casino, scratchcards, etc.). Prevalence estimates for potential problematic gamblers stratified on
Prevalence of Pathological Gambling

gender and age are presented in Table 5.1. Both adolescents and adult males were more at risk than females since the former reported more gambling-related problems. In the same way, players of short-payout interval games were clearly more at risk than players of games of chance in general. However, since the SOGS is a screening instrument, an above-threshold score may indicate an increased risk for pathological gambling but it is not equivalent to the diagnosis ‘pathological gambling’. SOGS prevalence estimates comprise both false positives (SOGS+ and DSM-) and false negatives (SOGS- and DSM+).

Table 5.1 Prevalence estimates of potential problematic gamblers (SOGS ≥ 5)

<table>
<thead>
<tr>
<th></th>
<th>Age 12 – 17</th>
<th>Age 18 – 35</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>Total sample</td>
<td>.009</td>
<td>.002</td>
<td>.034</td>
</tr>
<tr>
<td>Players¹</td>
<td>.031</td>
<td>.010</td>
<td>.048</td>
</tr>
<tr>
<td>High-risk players²</td>
<td>.031</td>
<td>.013</td>
<td>.073</td>
</tr>
</tbody>
</table>

¹ Players refers to participants that played games of chance in general (e.g. lotteries, bingo, casino, etc.)
² High-risk players refers only to participants that played short-payout interval games of chance (e.g. fruitmachines, casino, scratchcards, etc.)

Twenty of the 163 respondents of the second-stage sample fulfilled the DSM-III-R criteria for pathological gambling. All were adult males. This implies a limited generalisability of the combined first and second-stage data to women and to males under the age of 18. Therefore, the results based on the combined stage-one and stage-two data will be presented for young adult males only (18-35 years of age).

Sensitivity, specificity and positive and negative predictive value of the SOGS total score for DSM-III-R pathological gambling were assessed using the inverse of the inclusion probability as a weight factor (see Table 5.2). In the general population sample, the SOGS had an excellent sensitivity (.94) and specificity (.99) among young adult males. However, as a consequence of the relatively low prevalence, the positive predictive value was only .65, meaning that approximately 65% of the participants with a SOGS total score ≥ 5 met DSM-III-R criteria for pathological gambling.

Table 5.2. Validity of SOGS and prevalence of DSM-III-R pathological gambling using combined stage 1 and stage 2 data (males 18-35).

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV¹</th>
<th>NPV¹</th>
<th>SOGS 5+</th>
<th>DSM-III-R +²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample</td>
<td>.944</td>
<td>.990</td>
<td>.654</td>
<td>.999</td>
<td>.029</td>
<td>.020</td>
</tr>
<tr>
<td>Players² (1651)</td>
<td>.944</td>
<td>.984</td>
<td>.671</td>
<td>.998</td>
<td>.046</td>
<td>.032</td>
</tr>
<tr>
<td>High-risk players³ (1008)</td>
<td>.944</td>
<td>.975</td>
<td>.680</td>
<td>.997</td>
<td>.067</td>
<td>.046</td>
</tr>
</tbody>
</table>

¹ PPV = positive predictive value = P(DSM+|SOGS+); NPV = negative predictive value = P(DSM-|SOGS-).
² DSM-III-R+ = (S + Spec - 1)/(Sens + Spec - 1) with S = observed prevalence SOGS+ in first-stage sample = SOGS 5+.
³ Players refers to male participants that played games of chance in general (e.g. lotteries, bingo, casino, etc.)
⁴ High-risk players refers only to male participants that played short-payout interval games of chance (e.g. fruitmachines, casino, scratchcards, etc.)
Chapter 5

When the prevalence of SOGS5+ in the first-stage sample and the sensitivity and specificity estimates of the combined first and second-stage sample were combined, the prevalence of DSM-III-R pathological gambling among males (18-35 years old) in the total population was estimated to be .020, while the prevalence for players and high-risk players was .032 and .046, respectively.

The relationship between the SOGS total score and DSM-III-R caseness was assessed among young adult males at stage two. Logistic regression analysis with caseness as dependent and SOGS totals score as independent variable resulted in a $\beta_0$ of -4.822 and a $\beta_1$ of .732, which was equivalent to an OR (odds ratio) of 2.08 (p< .01). After adjustment of the $\beta_0$ estimate (see statistical section) this model could be used to calculate the probability of being categorised as a ‘pathological gambler’ at any given SOGS total score. These results are presented in Table 5.3. This table clearly shows that although most studies use SOGS threshold values of 3 or 5, the risk of caseness for people of the general population with such SOGS total scores is fairly low.

Table 5.3 Relationship between the SOGS total score and DSM-III-R diagnostic criteria for Pathological Gambling for Men.

<table>
<thead>
<tr>
<th>SOGS total score</th>
<th>Positive predictive value$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>.0010</td>
</tr>
<tr>
<td>1</td>
<td>.0021</td>
</tr>
<tr>
<td>2</td>
<td>.0043</td>
</tr>
<tr>
<td>3</td>
<td>.0089</td>
</tr>
<tr>
<td>4</td>
<td>.0184</td>
</tr>
<tr>
<td>5</td>
<td>.0374</td>
</tr>
<tr>
<td>6</td>
<td>.0748</td>
</tr>
<tr>
<td>7</td>
<td>.1439</td>
</tr>
<tr>
<td>8</td>
<td>.2590</td>
</tr>
<tr>
<td>9</td>
<td>.4209</td>
</tr>
<tr>
<td>10</td>
<td>.6018</td>
</tr>
<tr>
<td>11</td>
<td>.7586</td>
</tr>
<tr>
<td>12</td>
<td>.8673</td>
</tr>
<tr>
<td>13</td>
<td>.9314</td>
</tr>
<tr>
<td>14</td>
<td>.9658</td>
</tr>
<tr>
<td>15</td>
<td>.9833</td>
</tr>
<tr>
<td>16</td>
<td>.9919</td>
</tr>
<tr>
<td>17</td>
<td>.9961</td>
</tr>
<tr>
<td>18</td>
<td>.9981</td>
</tr>
<tr>
<td>19</td>
<td>.9991</td>
</tr>
<tr>
<td>20</td>
<td>.9996</td>
</tr>
</tbody>
</table>

$^1$ Players refers to male

$^2$ The probability of meeting DSM-III-R Diagnostic criteria for PG given any specific SOGS total score (positive predictive value).
Prevalence of Pathological Gambling

DISCUSSION

This study confirmed that the Dutch version of the SOGS, when applied to the general population, is a valid screener for pathological gambling according to the DSM diagnostic criteria for PG. Although the SOGS has been widely used in epidemiological studies, to our knowledge, ours was the first community study in Europe that used a two-stage design to test the SOGS validity against the DSM diagnostic criteria. It needs to be noted that the present study provides sensitivity and specificity figures of the SOGS for the Dutch general population. Nevertheless, the specificity (0.99) found in this study is comparable to the results reported in other studies, whereas the sensitivity rate of 0.94 is considerably higher in our sample than those observed in other general populations. For instance, the figures reported in a Minnesotan sample were a specificity of 0.99 and a sensitivity of 0.67 (Stinchfield, 2002) and a National Survey in New Zealand (Abbott and Volberg, 1996) yielded comparable results. Since, in this study, the specificity of the SOGS is higher than 0.95, it is justified to conclude that the SOGS is a good screener for pathological gambling when applied in general population studies.

However, even with this excellent specificity, the SOGS overestimates the prevalence of pathological gambling in community samples. In our study, the number of false positives was relatively high compared to the number of true positives. After combining the stage-1 and stage-2 data, an adjusted prevalence estimate was made that was approximately 40% lower than the SOGS prevalence estimate. Our findings are in line with other studies. A meta-analyses of prevalence studies comparing all the studies that used a two-stage methodology with the SOGS and the DSM diagnostic criteria revealed that the number of pathological gamblers positively screened by the SOGS is approximately twice as high as the cases obtained with the DSM criteria (Shaffer et al., 1999). Recently, in a Minnesota general population sample a false positive rate of 50% was found (Stinchfield, 2002). These findings suggest that all community studies solely using the SOGS to estimate the prevalence rate generate an overestimation of the true prevalence of pathological gambling.

Besides the dichotomous approach to evaluate the SOGS as a reliable screener for PG, this study has also provided new data that may contribute to the current debate on the predictive values of the SOGS in relation to the DSM diagnostic criteria (continuous approach). In other words, we examined the probability of fulfilling the DSM-III-R diagnostic criteria for pathological gambling given any SOGS total score. Our analyses show that one can be fairly confident that the respondent is a pathological gambler when his/her SOGS total score lies between 8 and 20. Notwithstanding its proven reliability, one should be aware that only a SOGS total score ≥ 8 has a substantial positive predictive value for pathological gambling. Additionally, our results show that although most studies use threshold values of 3 or 5, the likelihood of caseness for people with such SOGS total scores is quite low. Similar results were found in other studies (Duvarci et al., 1997; Stinchfield, 2002; Battersby, 2002). A Turkish study (Duvarci et al., 1997), for instance, also demonstrated that the cut-off score that yielded the lowest false negative and false positive rates was 8. The issue of overestimation of gambling problems in community surveys has received a great deal of
critical attention. More specifically, in their Australian studies Dickerson and colleagues found that a cut-off of 10 (rather than 5) identifies individuals who are likely to have gambling problems similar to those who apply for treatment (Dickerson, et al., 1996). On the other hand, Stinchfield pointed out that “a SOGS score of 5 remains the best cut-off score in terms of maximising the hit rate and balancing false positive and false negative errors” (Stinchfield, 2002, page. 12).

The low response rate at both sampling stages (stage 1 = 53% and stage 2 = 36.5%) may be seen as a limitation of the present study. This is a typical problem in studies investigating sensitive topics such as gambling and the amount of money spent in games of chance. However, it is important to emphasise that, first, the sample at stage 1 was representative of the Dutch population for this age group (12-35) in terms of demographic characteristics, and second, that first-stage socio-demographic and gambling behaviour data were used to test for differential selection bias in the second-stage sample and that non-response was non-differential on all these characteristics. Additionally, our response rates are comparable to the response rates reported by previous addiction surveys conducted in the Netherlands and gambling prevalence studies carried out elsewhere (59.8% RR in home interviews, (Legarda, 1992); 66% RR in telephone interviews, (Abbott and Volberg, 1996); 47% RR in telephone interviews among a Norwegian sample (Gotestam and Johansson, 2003).

Another issue we need to address is the fact that the positive predictive values of the SOGS with respect to the DSM-III-R criteria could only be calculated for young adult men (18-35). The relationship between SOGS total score and pathological gambling may be different for adolescents and women. In both subgroups none of the SOGS5+ cases fulfilled the DSM-III-R criteria for pathological gambling, whereas among adult males this was approximately 63%. Our results are in contrast with other studies that showed that adolescents have a higher prevalence of PG than adults (Gupta and Derevensky, 1998, Fisher, 2000). Additionally, retrospective studies have shown that the majority of male pathological gamblers started gambling in their teens (e.g. Fisher, 1993). Possibly, given that it takes, on average, 3.5 years to become a pathological gambler, it is likely that the group of adolescents would need more time to develop the full range and intensity of this disorder (Meyer, 1992). Moreover, it must be taken into account that the gambling law in the Netherlands is quite restricted in terms of accessibility/availability of games of change to persons under the age of 18 years.

We believe that the most accurate case criterion to estimate prevalence of pathological gambling is the use of a diagnostic, structured interview like the DIS-T. Nevertheless, the use of this method implicates high human, economic and time investments. The DIS-T, as a face-to-face interview, requires a trained interviewer and up to an hour and a half for each participant, which implies that this method is unlikely to be applied in large-scale studies. In these circumstances is recommend the two-stage design as used in this study, i.e. initial application of the SOGS as a screener to identified possible case positives (stage-1), followed by the DSM diagnostic interview (DIS-T, stage-2) to identify pathological gamblers. Despite the limitations of this study, we have provided evidence that the SOGS can indeed be used as
Prevalence of Pathological Gambling

the initial screener in a two-stage methodology in order to estimate the prevalence of PG at community level. However, additional studies are necessary to further test the validity of the SOGS for use in general populations. There is a clear need for an instrument that can accurately assess the prevalence of gambling problems in the general population. The SOGS appears to be a valid and reliable screening instrument for general populations with a “reasonable professional agreement” at international level, which facilitates comparisons of prevalence and incidence estimates at both the national and international level.

Although we strongly advise to use a two-stage methodology to estimate the prevalence of PG in future studies, if the resources for a two-stage study are lacking, one could use the sensitivity and specificity figures of two-stage studies on comparable populations to adjust first-stage estimates using the formulae proposed in this study.

REFERENCES


