Psychiatry Research 180 (2010) 35–41

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Gambling in Brazil: Lifetime prevalences and socio-demographic correlates

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ARTICLE INFO

Article history:
Received 24 May 2009
Received in revised form 14 February 2010
Accepted 9 April 2010

Keywords:
Pathological gambling
Epidemiology
Developing countries
Gambling expenditure
Demography
Probability sample
Income

ABSTRACT

Gambling has experienced world-wide growth. The current study is the first national survey into household gambling conducted in a developing country. The sample was a three-stage probabilistic one designed to cover individuals 14 years old or older, of both genders and from all regions of the national territory; 325 census sectors were visited, including rural areas. DSM-IV-based instruments were used to assess problem and pathological gambling; individuals were asked to estimate their monthly gambling expenditure. The lifetime prevalences were: pathological gambling 1.0%, and problem gambling 1.3%. Maximum gambling expenditure corresponded to 5.4% of the household income for social gamblers, 16.9% for problem gamblers and 20.0% for pathological gamblers. The male:female ratio among adults for pathological gambling was 3.2:1. The data suggest the existence of two subgroups of pathological gamblers, one younger (33.9 ± 4.19) and severe (7 or more DSM-IV criteria), another older (47.8 ± 6.01) and less severe (5–6 criteria). In a multinomial logistic regression, problematic gambling was associated with gender, age, education, employment, region of origin and living in metropolitan areas. The data suggest that feeling active and socially inserted protects against problematic gambling. Individuals who are young, male, unemployed or not currently pursuing further education may be at special risk for severe pathological gambling.

1. Introduction

Gambling has been part of human behavior since prehistory. However, commercial gambling and its explosive growth is a recent phenomenon (Blume and Tavares, 2004). Indeed, gambling has been legalized over almost all of North America (Shaffer and Hall, 2001) and Europe, from East (Bondolfi et al., 2008) to West (Skokauskas and Satkeviciute, 2007). Because gambling is potentially addictive, there is a general concern that this broader access may cause an increase in problematic forms of gambling.

Shaffer proposed a classification of gambling behavior divided into three categories: Level 1 encompasses gamblers who gamble without experiencing adverse consequences; Level 2 gamblers are those who have experienced some adverse symptoms; Level 3 includes those who fulfill criteria for pathological gamblers as defined by the American Psychiatric Association's (APA's) diagnostic criteria (APA, 1994). Recently a subgroup has been spun off from Level 3; a Level 4 that comprises gamblers who, while having met Level 3 criteria, have also sought treatment for gambling-related problems (Shaffer et al., 2002). The emergence of gambling-related problems, and particularly financial ones, is a hallmark of pathological gambling (PG) as defined in previous and current classifications (APA, 1987, 2000). However, no specific limits for gambling expenditures have been proposed and tested in order to establish cutoff points to indicate risk of problem or pathological gambling.

Population-based gambling surveys are likely to cover all levels of gambling behavior, while studies based on clinical samples are restricted to the subgroup of pathological gamblers who are under treatment. Studying the profile of all three levels is important in order to establish factors related to disordered gambling. For instance, in previous reports, gender, age and several demographic variables have been deemed to play an important role in differentiating social gamblers from problematic ones. The gender ratio for PG has been reported as around 3:1 to 2:1 in different studies (Weinstock et al., 2008). Problem and pathological gambling have been associated with low socio-economic status (SES), represented by low educational standards, low income, loneliness and unemployment (Cunningham-

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doi:10.1016/j.psychres.2010.04.014

Williams and Cottler, 2001). Also, a disproportionate percentage of PG has been reported among ethnic and religious minorities, although such an association has been contested in recent studies. Gambling behavior seems to be significantly affected by environmental factors like social insertion and cultural background. Thus, regional variations are expected (Petry et al., 2005). Nonetheless, while prevalence studies on problem and pathological gambling have proliferated in the last few years in the northern hemisphere, few studies have been conducted south of the equator, and — to our knowledge — no data based on national surveys have been published regarding gambling in Latin countries.

In Brazil commercial gambling remains a grey area as regards the law. Brazil is the only Portuguese-speaking country in South America. Despite its continental dimensions and the fifth largest population in the world (roughly 188 million people), the country retains its linguistic unity. Conversely, Brazil presents strong contrasts as a result of its colonization processes. For administrative purposes, the country is divided into five regions according to geographical, historical and cultural criteria: South, Southeast, Northeast, Central-West and North. The Northeast is the oldest region, from which large numbers have immigrated to the North and Southeast regions over the last few decades (Santos and Silveira, 2001).

Gambling is deeply rooted in Brazilian culture, even though it was partially prohibited in the late 1940s by a presidential decree that banned casinos but kept lotteries and betting on horse races. In the early 1990s electronic gambling machines (EGMs) were introduced through a loophole in a law that allowed bingo games for sports fundraising. A diverse array of electronic devices offered in venues of various sizes (from 20 machines up to 400) was swiftly made available for the population. Because of political scandals involving undeclared funds for electoral campaigns, gambling has undergone alternate legalization and bans over the last six years. However, it seems that Pandora's Box has been opened, and even during periods of prohibition EGM venues are busy operating underground (Tavares and Spritzer, 2007).

The goals of the current study were to investigate in a nationally representative sample the lifetime prevalence of four gambling categories (non-gamblers, social gamblers, problem and pathological gamblers), contrasting gambling expenditures among these categories; and to compare the demographic profiles of the gambling categories. Additionally, on an exploratory basis, we intended to tap into cultural issues regarding religious practices and cultural background. In this survey, both region of origin and current living region, besides different measures of migration and living environment, were registered in order to account for influences of past and current cultural background.

Should gambling behavior in Brazil follow patterns previously reported, then problem and pathological gambling would be more frequent among men, youth, and low SES individuals from ethnic and religious minorities (Alegria et al., 2009). However, such associations are likely to vary according to time and community (Abbott et al., 2004), and some of these factors probably interact in complex ways. For instance, while men represent the majority of pathological gamblers, the gender imbalance decreases as one moves to older age brackets, since onset of gambling presents later in women (Petry et al., 2005). Likewise, the international trend has been of juvenalization of gambling (Derevensky et al., 2003). But age may have a bi-directional effect over gambling, while young individuals are naturally curious and action prone (Ernst et al., 2006), older adults are emotionally less vulnerable to monetary losses (Samanez-Larkin et al., 2007), thus both age extremes could be at higher risk for harmful gambling.

Finally, the contribution of SES to gambling behavior may not fall into a simple linear logic (i.e. the lower the SES, the higher the commitment to gambling). Indeed, Welte et al. (2002) reported that gambling participation increased with SES, but lower SES individuals were more likely to be pathological gamblers than higher SES individuals. This apparent paradox may be solved if one's gambling participation is adjusted to his/her income, since low absolute expenditures may represent a higher proportion of the income for low SES individuals. Besides, SES may not be a factor in itself, but rather a partial indicator of social insertion, modulated by other aspects such as ethnicity, religion and other factors related to one's cultural background.

Our hypotheses were that problematic gambling behavior in Brazil would be associated with higher betting expenditures in relation to the family income, male gender, lower age, poorer social insertion, past and present culture background, and affiliation to minority groups, either ethnic or religious ones.

2. Methods

2.1. Sampling

The *Pesquisa Nacional Brasileira sobre Padrões de Consumo de Álcool* (Brazilian National Survey on Alcohol Consumption Patterns: Laranjeira et al., 2007) was carried out between November 2005 and April 2006. It was a household survey that visited 143 cities, making in total 325 census sectors as defined by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* — IBGE, 2000). The sample was designed to represent the Brazilian population aged 14 years or older, of both genders, from all regions of the national territory, including rural areas. The survey did not cover non-Portuguese speakers living in Brazil, individuals suffering from mental retardation or other conditions that precluded the understanding of the interview, aboriginal individuals living in reservations, and other collective households (hospitals, internships, shelters, military quarters, etc.).

The sample was a three-stage stratified probabilistic one, following a standard method for survey sampling as described below (Hansen et al., 1993). In the first stage cities were classified according to five geographical–political regions and city size (five brackets). Then, Brazil was divided into 25 strata. Within each stratum, cities were ordered by mean income according to the last national census, then submitted to a systematic selection proportional to population size considering the estimated population size for 2005 (IBGE, 2005).

In the second stage, census sectors were selected from the previously selected cities. First they were ordered according to the population's mean income, and then submitted to another systematic selection proportional to population size considering the sector size. Each selected sector was submitted to a household count. The households were chosen according to a random numerical table, the goal being to obtain eight interviews by sector. The final number of household selected by sector was determined bearing in mind previous non-response rates for each region, estimated from the Brazilian Social Research (*Pesquisa Social Brasileira* — PESB, 2009) data.

The interviewer had to approach the chosen household at least three times at different times of day on two different days, having tried to make at least one visit on the weekend. Household substitution was not allowed in case of contact failure. After a successful contact was made, the interviewer surveyed all members of the household aged 14 years old or older. The person whose birthday was the closest to the current date was chosen to be interviewed. In order to control for varying numbers of inhabitants, each household was attributed a weighting factor according to the total number of residents. The final data were submitted to weights following current practice in some American major surveys. First the base weight gave each respondent the inverse of selection probability and then each respondent had a weight that was the number of residents in the household. A non-response weight was applied adjusting gender and education that are affected by non-response in Brazil. Finally a post-stratification weight was used to adjust the main demographic variables to known population figures, based on the last census data (IBGE, 2000).

Sampling error was estimated at 2% for a confidence interval of 95%; 2522 individuals were interviewed and an additional quota of 485 interviews with individuals between 14 and 17 years old was carried out to provide insights into this particular age bracket, which is under the legal age (in Brazil full legal age is attained at 18 years old). This additional quota was built up following the same procedures described above for the regular sample. One last weighting factor was attributed, to control for this adolescent additional quota. The final sample had 3007 individuals with 2346 adult individuals (18 years old or older). The interviews were carried out face-to-face by trained interviewers, and lasted an average of 53 min. The interviewers carried out a pilot study in order to identify difficulties and specific needs for further training. The response rate was 66.4%.

The study was approved by the Research and Ethics Committee of the Federal University of São Paulo (UNIFESP), Brazil.

2.2. Scales and variables

2.2.1. Demographic variables

The variables investigated were: “gender” (male = 1; female = 2); “age in years”; “age in quartiles”: *up to 19 years*, *20 to 32 years*, *33 to 48 years*, *49 years or older*; “education level”, divided into three categories: *elementary school*, *middle school*, and

high school (or higher); "currently studying" (yes = 1, no = 0), meaning the subject is engaged on a structured course aiming at an education degree; "ethnicity", categorized into four possibilities: *European*, *African*, *African-European*, and *Other*; "marital status", divided into three categories: *single*, *married* (or common-law), and *unmarried*; "employment status", categorized into five possibilities: *employed* (including self-employed), *unemployed*, *housewife*, *retired* and *student*; "household monthly income" and "personal income" monthly revenues in Brazilian currency; "personal income — dichotomized" the interviewee has his/her own source of revenue (yes = 1, no = 0); "holds a registered job", meaning the interviewee has an officially recognized trade or skill (yes = 1, no = 0); "holds a valid driver's license", means that the subject has attained an important skill certification for job application, used as an indirect measure of social insertion (yes = 1, no = 0); "country region of origin", indicating where the interviewee was born: *Southeast*, *Northeast*, *South*, *Central-West*, and *North*; "country region of current domicile" (same categorization as the previous variable); "years lived in current town of residence"; "previously lived in another town" (yes = 1, no = 0); "lives in a metropolitan area", meaning any urban conglomerate with one million inhabitants or more (yes = 1, no = 0); "religious affiliation" divided into four categories: *Catholic*, *Protestant*, *other*, *none*; "frequency of attendance at religious services" categorized into three possibilities: *roughly once a week or more*, *once or twice a month* (three times would fall into the previous category), *once in a while* (includes never); and "importance attributed to religion": *very important*, *important*, *indifferent*, *not very important*, and *not important at all.*

2.2.2. Gambling variables

Because of time constraints, only three questions were generalized for the whole sample at the beginning of the gambling questionnaire. The first part of the questionnaire opened with the Lie/Bet Questionnaire (LBQ), which is a screening tool for PG (Johnson et al., 1998). It is based on the DSM-IV criteria for PG (APA, 1994); comprising two "yes or no"-type questions representing criteria 3 and 7: "Have you ever felt the need to bet more and more money?", and "Have you ever had to lie to people important to you about how much you gambled?" A positive answer to at least one of these questions is related to probable problem gambling, with a sensitivity of 99% and specificity of 91% for PG diagnosis. The third general question inquired about the individual's average monthly expenditure on gambling; answers were divided into four brackets: *does not gamble regularly — less than R$ 1.00* (approximately US$ 0.45), *between R$ 1.00 and 10.00*, *between R$ 10.00 and 100.00*, and *between R$ 100.00 and R$ 1000.00* (no subject reported a monthly expenditure beyond this bracket).

If the subject scored in the LBQ as a probable problem gambler, the interviewer was then to proceed to the second part of the session enquiring into gambling. This part investigated lifetime diagnostic criteria for PG using the National Opinion Research Center DSM-IV Screen for Gambling Problems NODS; (Gerstein et al., 1999) for individuals 18 years old or older and the DSM-IV Juvenile Criteria (DSM IV-J — Fisher, 1992) for individuals between 14 and 17 years old. The PG diagnosis was based on DSM-IV operational criteria (APA, 1994). The subject is considered a pathological gambler when he/she is positive for at least five out of 10 criteria. In the DSM IV-J criteria, 2 (tolerance), 5 (escape), and 6 (chasing) have been transferred from the original DSM-IV without change, whilst criteria 1 (preoccupation), 4 (withdrawal), and 7 (lies) underwent minor adjustments that omitted details less relevant to young people. Criteria 3 (loss of control), 8 (illegal acts), and 9 (risking job/education) went through greater changes in order to better reproduce cultural and developmental features of young people. Criterion 10 was excluded because it overlapped with criterion 8. Hence, in the DSM IV-J, someone is considered a pathological gambler when he/she is positive for at least four criteria out of nine (Fisher, 2000). Aiming to gauge gambling severity, we computed the "number of positive criteria for PG" for individuals 18 years old or older who answered to the NODS, and for individuals between 14 and 17 years who answered to the DSM IV-J (in this case the scores were proportionally transformed from a 9- to a 10-criteria base).

Two dependent variables were established:

- "Gambling category", classified respondents according to four possibilities: *non-gambler* (negative for the LBQ and denied any gambling expenditure), *social gambler* (declared a monthly gambling expenditure of more than zero, but was negative for the LBQ; or was positive for the LBQ, but fulfilled no DSM-IV criteria for PG), *problem gambler* (adults: positive for one to four DSM-IV criteria for PG; adolescents: positive for one to three DSM IV-J criteria for PG), and *pathological gambler* (adults: positive for five or more DSM-IV criteria; adolescents: positive for four or more DSM IV-J criteria);
- "Alternative gambling category"; as explained above, NODS and DSM IV-J share six criteria for PG. In order to check whether the adoption of distinct criteria set for adolescents and adults may have skewed PG diagnosis in favor of one of the age brackets, or not, we devised an alternative gambling classification based on the six shared criteria: non-gambler (the same as for the previous classification), *social gambler* (does not fulfill any of the six shared DSM-IV criteria for PG), *problem gambler* (positive for one or two out of six DSM-IV shared criteria), and *pathological gambler* (positive for three or more out of six DSM-IV shared criteria).

2.3. Statistical analysis

Data were weighted to adjust for sampling probability selection and non-response rate. Post-stratification weights were calculated to adjust the sample to gender, age and country region distribution. A two-stage analysis was carried out using the Statistical Package for Social Sciences (SPSS) Complex Sample module for weighted comparisons, version 13.0 (SPSS inc., 2004).

In the first stage of the statistical analysis, gambling lifetime prevalences were calculated for both "gambling category" and "alternative gambling category". Then, the groups within "gambling category" were preliminarily compared regarding "average monthly expenditure", gender, age and other demographic variables. Univariate comparisons were carried out using Analysis of Variance (ANOVA) for continuous variables, and using Tests of Independence (Pearson's and Likelihood ratio) for variables expressed in frequencies.

Variables that reached significance at 0.10 or lower on the univariate analysis were selected for the second-stage multivariate analysis, using multinomial logistic regression. This regression model had "gambling category" as the dependent variable ("non-gambler" was set as the reference category because it provided the largest denominator for the estimation of odds); nine individuals were excluded because of missing values ($N = 2998$). Demographic variables reaching significance (0.10) on the univariate analysis entered the model as independent factors. The selected variables were: "gender", "age in quartiles", "education level", "currently studying", "ethnicity", "marital status", "employment status", "personal income — dichotomized", "holds a registered job", "holds a valid driver's license", "country region of origin", "country region of current domicile", "years lived in current town of residence", "previously lived in another town", "lives in a metropolitan area", "religious affiliation", "frequency of attendance at religious services", and "importance attributed to religion". The categories within "employment status" had to be merged because of the small number of subjects in the categories housewife and student, especially for pathological gamblers. It was decided to group this variable in two categories — external activities (employed) and no external activities (unemployed, housewife and students). A step-by-step procedure was adopted: I) the selected independent variables entered as a block; II) the least significant variables were manually excluded from the model one at a time, until all remaining variables in the model were significant at 0.05 or less. Variables not included in the final model were withdrawn in the following order: "previously lived in another town", "personal income — dichotomized", "frequency of attendance at religious services", "years lived in current town of residence", "marital status", "country region of current domicile", "holds a valid driver's license", "education level", "importance attributed to religion", and "ethnicity"; III) excluded variables were separately re-introduced into the remaining block to see if they could figure in the final model. Relative risk ratios (RRR) were calculated for categorical factors. A 5% significance level was adopted ($\alpha = 0.05$) and descriptive values (P) under this threshold were considered statistically significant (Tabachnick and Fidell, 2001).

3. Results

The sample demographics were presented in a previous communication (Laranjeira et al., 2007); the profile was considered compatible with the last national census (IBGE, 2008), and representative of the Brazilian population.

Out of 3007 respondents, 88.3% were classified as non-gamblers, 9.4% were social gamblers, 1.3% problem gamblers, and 1.0% pathological gamblers. Among current regular gamblers (those who declared a monthly gambling expenditure above zero, $N = 309$), 17.9% reported an average monthly expenditure of less than R$ 1.00, 50.9% reported a monthly expenditure between R$ 1.00 and 10.00, 27.7% between R$ 10.00 and 100.00, and only 3.5% declared a monthly expenditure on gambling beyond R$ 100.00. The Pearson's chi-square test of independence showed a significant correlation between gambling involvement and increasing expense ($F = 7.42$, df1 = 4.82, df2 = 780.9, $P < 0.001$). Aiming at a rough estimation of gambling expenditures in relation to personal income, we attributed three maximum gambling expenditure (MGE) values for current regular gamblers: R$ 1.00/month for those classified in the "less than R$ 1.00" bracket, R$ 10.00/month for those in the "between R$ 1.00 and 10.00" bracket and R$ 100.00/month for those in the "between R$ 10.00 and 100.00" bracket. Only two individuals, out of nine reporting a monthly gambling expenditure between R$ 100.00 and R$ 1000.00, declared their personal income (R$ 600.00 and R$ 700.00). These two individuals were considered outliers and were excluded from this comparison, because it was not possible to attribute a reliable MGE value to them. Then, we divided the MGE by the monthly personal income and compared this ratio between the gambling categories (ANOVA was used to compare the logarithm of this ratio to ascertain data normality): for social gamblers the MGE corresponded to 8.67% [SE = 1.7] of the personal income, 20.54% [SE = 4.2] for problem gamblers and 39.58% [SE = 6.1] for pathological gamblers (Wald

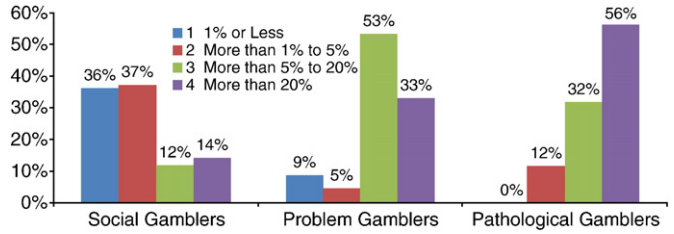

Fig. 1. Maximum gambling expenditure per month in relation to personal income (%).

$F_{[2,55]} = 66.2$, $P<0.001$, $N = 141$). Fig. 1 shows the MGE/income ratio for the gambling categories. Because a considerable proportion of regular gamblers could not give any information on personal income, we calculated the same ratio in relation to the household monthly income (ANOVA was used to compare the logarithm of this ratio to ascertain data normality): for social gamblers the MGE corresponded to 5.37% [SE = 0.68] of the household income, 16.93% [SE = 4.3] for problem gamblers and 19.96% [SE = 4.3] for pathological gamblers (Wald $F_{[2,59]} = 40.0$, $P<0.001$, $N = 156$).

Table 1 presents lifetime prevalences of the gambling categories subdivided by gender. Men are more prominent than women in all gambling categories, but especially among pathological gamblers. For those reporting problematic gambling (problem and pathological gamblers together) the male:female ratio was 2.6:1. However, gender distribution is strongly impacted by age; whilst adolescent males reported similar rates to their adult counterparts of problem (1.4%) and pathological gambling (1.4%), no adolescent female reported any gambling problem, and only 1.8% of female teenagers were social gamblers. Considering only the adult segment of the sample (18 years old or older), the PG male:female ratio decreases to 3.2:1.

Using the alternative gambling categorization (classifying individuals according to NODS and DSM IV-J shared criteria for PG) yielded prevalence estimates slightly higher for male adolescents and male adults, but the ratio between them was 0.7:1 for problematic gambling (problem and pathological gamblers together), almost the same as was obtained with the regular categorization (0.8:1). The prevalences of female adolescent gambling were not impacted by the alternative gambling categorization. In other words, the adoption of age-adapted criteria did not skew the diagnosis towards adolescents or adults, but rather made it more stringent for both.

Age also impacted gambling severity as measured by total DSM-IV positive criteria for PG. The distribution of "number of positive criteria for PG" among problem and pathological gamblers suggested subdivisions within the latter. As shown in Table 2, we identified a sub-category of severe (seven or more DSM-IV-TR positive criteria for PG) and younger pathological gamblers. On an additional analysis, keeping the original categories, non-gamblers were significantly younger than all other gambling categories except pathological gamblers ($F_{[3;160]} = 9237$, $P<0.001$; post-hoc (LSD): non-gambler<social gambler, $P<0.001$; non-gambler<problem gambler, $P = 0.008$).

Table 1
Gambling categories by gender ($N = 3007$).

Gambling category	Estimate		Standard error		Male to female ratio
	Male	Female	Male	Female	
Non-gambler	83.3%	92.8%	1.6%	0.8%	0.9:1
Social gambler	13.3%	5.9%	1.4%	0.8%	2.25:1
Problem gambler	1.8%	0.9%	0.5%	0.3%	2:1
Pathological gambler	1.6%	0.4%	0.4%	0.2%	4:1
Tests of independence		Statistic	*F*	df1	df2	*P*
	Pearson	66.4	14.3	2.87	464.4	<0.001
	Likelihood ratio	67.6	14.6	2.87	464.4	<0.001

Table 2
Age and gambling sub-categories, ANOVA ($N = 3007$).

Gambling sub-category	Mean	Std. error	95% Confidence interval	
			Lower	Upper
Non-gambler	36.8	0.403	36.0	37.6
Social gambler	42.9	1.22	40.5	45.3
Problem gambler level 1[a]	42.3	4.49	33.4	51.1
Problem gambler level 2[b]	40.4	4.98	30.6	50.3
Pathological gambler level 1[c]	47.8	6.01	35.9	59.6
Pathological gambler level 2[d]	33.9	4.19	25.7	42.2

$F_{[5;158]} = 5{,}805$; $P<0.001$; post-hoc (LSD): non-gambler<social gambler ($P<0.001$); pathological gambler level 2<social gambler ($P = 0.047$).
[a] 1 or 2 DSM-IV-TR positive criteria for PG.
[b] 3 or 4 DSM-IV-TR positive criteria for PG.
[c] 5 or 6 DSM-IV-TR positive criteria for PG.
[d] 7 or more DSM-IV-TR positive criteria for PG.

Table 3 summarizes the main findings of the multinomial logistic model for "gambling category" and demographic variables. The regression model confirmed that men were more prevalent in all gambling sub-categories (social, problem and pathological gamblers), and that social and problem gamblers were significantly older than non-gamblers and pathological gamblers. Variables representing social insertion remained in the final model. Compared to the other categories, very few pathological gamblers (less than 3%) were currently involved in any sort of formal education. Also, a higher proportion of pathological gamblers are unemployed, whereas a higher proportion of social gamblers work under registration. Holding a registered job means that one is not self-employed and is under full protection of federal laws that regulate employer/employee relationship. Both past and current living environment had an influence over gambling behavior. Individuals born in South and Southeast regions were less likely to present problem gambling, whilst currently living in Metropolitan areas increases the odds of being a pathological gambler almost five fold. Although significant, the impact of religious affiliation remains somewhat obscure. Social gamblers have a significant lower proportion of Protestants, but this was not true for other gambling sub-categories (problem and pathological gamblers).

4. Discussion

To our knowledge, this is the first epidemiological study to investigate the prevalence of gambling and its socio-demographic predictors in a national Latin–American sample, and possibly the first one of its kind among developing countries.

Approximately 12% of the sample declared that they gambled on a monthly basis, indicating that regular gambling is not an uncommon behavior in Brazil. The overall lifetime prevalences of 1% of pathological gamblers and an additional 1.3% of problem gamblers are compatible with gambling prevalence rates reported in other countries (Weinstock et al., 2008). As predicted, gambling expenditure was higher for problem and pathological gamblers. The ratios between gambling expenditure and income are within the scope of previous reports (Currie et al., 2006; MacDonald et al., 2004). It is noteworthy that the ratio between MGE and personal income for social gambling approached 10%, which has been adopted in previous studies as the upper limit of safe gambling (Grun and McKeigue, 2000). For those gamblers who did not have a source of personal income the percentage of household income spent on gambling is an alternative for measuring one's expenses with gambling. Despite being only rough estimates, such ratios may help in the future setting of gambling limits with a suggestion that gambling should not exceed 9% of one's personal income, or 5% of the household income, and that

Table 3
Demographics and gambling categories, multinomial logistic regression (final model, $N = 2998$).

Demographics[a]	Non gambler[a]	Social gambler	Problem gambler	Pathological gambler	*P*
Gender	% [SE]	% [SE]	% [SE]	% [SE]	<0.001
Male	45.3 [1.3]	67.6 [3.7]†	64.6 [9.7]‡	77.3 [8.2]§	
Female	54.7 [1.3]	32.4 [3.7]	35.4 [9.7]	22.7 [8.2]	
†RRR = 2.626, $P<0.001$; ‡RRR = 2.598, $P=0.030$; §RRR = 5.295, $P=0.003$					
Age (quartiles)	% [SE]	% [SE]	% [SE]	% [SE]	0.012
Up to 19 years old	16.9 [0.9]	7.4 [1.6]†	17.2 [8.8]	15.9 [5.3]	
20 to 32 years old	30.4 [1.1]	20.6 [3.0]‡	15.4 [7.3]§	29.3 [9.6]	
33 to 48 years old	28.4 [1.0]	36.3 [4.0]	30.4 [10.9]	29.1 [7.5]	
49 years old or older	24.4 [1.0]	35.8 [4.0]	37.0 [9.0]	25.7 [7.5]	
†RRR = 0.262, $P=0.001$; ‡RRR = 0.399, $P=0.001$; §RRR = 0.260, $P=0.039$					
Currently studying	% [SE]	% [SE]	% [SE]	% [SE]	0.016
Yes	22.0 [1.0]	13.6 [3.1]	19.8 [9.0]	2.8 [2.5]†	
No	78.0 [1.0]	86.4 [3.1]	80.2 [9.0]	97.2 [2.5]	
†RRR = 0.057, $P=0.002$					
Employment Status	% [SE]	% [SE]	% [SE]	% [SE]	0.025
External activity	66.1 [1.1]	64.3 [3.6]†	56.2 [10.0]‡	58.9 [9.6]	
No external activity	33.9 [1.1]	35.7 [3.6]	43.8 [10.0]	41.1 [9.6]	
Holds a registered job	% [SE]	% [SE]	% [SE]	% [SE]	0.001
Yes	21.3 [1.2]	34.7 [4.2]†	24.6 [10.8]	18.4 [7.9]	
No	78.7 [1.2]	65.3 [4.2]	75.4 [10.8]	81.6 [7.9]	
†RRR = 2.241, $P<0.001$					
Region of origin	% [SE]	% [SE]	% [SE]	% [SE]	0.013
Southeast	39.7 [1.4]	34.8 [4.1]	26.1 [8.3]†	27.5 [9.1]	
Northeast	33.9 [1.4]	34.0 [4.1]	47.4 [10.5]	48.6 [10.8]	
South	14.2 [1.0]	23.9 [4.1]	1.1 [1.1]‡	6.5 [4.7]	
Central-West	6.6 [0.6]	2.7 [1.2]	11.8 [7.4]	6.1 [4.3]	
North	5.6 [1.3]	4.6 [2.6]	13.7 [8.9]	11.3 [6.3]	
†RRR = 0.154, $P=0.040$; ‡RRR = 0.021, $P=0.005$					
Lives in a metropolitan area	% [SE]	% [SE]	% [SE]	% [SE]	0.001
No	80.4 [1.0]	80.7 [3.1]	64.2 [10.1]	50.7 [10.9]†	
Yes	19.6 [1.0]	19.3 [3.1]	35.8 [10.1]	49.3 [10.9]	
†RRR = 0.208, $P=0.001$					
Religious affiliation	% [SE]	% [SE]	% [SE]	% [SE]	<0.001
Catholic	66.1 [1.4]	78.8 [3.1]	62.7 [9.6]	60.9 [9.0]	
Protestant	24.9 [1.3]	9.0 [1.8]†	19.6 [7.0]	26.7 [10.2]	
Others	3.8 [0.5]	4.4 [2.2]	8.0 [5.5]	8.2 [5.6]	
None	5.2 [0.6]	7.8 [2.2]	9.6 [6.1]	4.3 [2.6]	
†RRR = 0.190, $P<0.001$					

Model data: $F_{[45;118]} = 6.108$, $P<0.001$, Nagelkerke's $R^2 = 0.152$.
[a] Non-gambler is the reference category, for the independent variables the reference category is the last one.

expenditure equal and above 20% of the household is strongly suggestive of pathological gambling.

The data on gender and age point to some peculiarities of the Brazilian gambling scenario. For instance, in North American studies of the adult population, regular and problematic gamblers were younger than non-gamblers (Shaffer and Hall, 2001), and PG prevalence rates among adolescents were three to four times higher than the adult rates (Messerlian et al., 2005); whereas contrary to our initial hypothesis in Brazil gambling is still most prevalent among middle-aged men, and the age extremes did not relate to gambling behavior. This is probably because gambling popularization in Brazil happened later than in North hemisphere; hence gambling has not had time to spread much beyond the limits of the male adult segment which is always the first target.

Gambling behavior clearly differed for male and female individuals. Men prevailed in all gambling categories, and especially among pathological gamblers. Adolescent gambling was mostly a male behavior, in accordance with previous published reports (Pietrzak et al., 2003). In this regard, gambling may be following the trajectory of other addictive behaviors such as alcohol and drugs. Epidemiological reports from the 1980s pointed to a predominance of men; then through the 1990s and the first years of the current millennium women caught up with men, and the age of onset became alarmingly lower (Zilberman et al., 2003). In fact, the phenomenon of female gambling seems now to have gained momentum in North America, with the male:female ratio showing a steep drop in the last years (Welte et al., 2001). Thus, prevention targeting adolescent and female gambling in Brazil nowadays is desirable, before gambling becomes widespread in these population segments.

The importance of such preventative measures is further underscored by the discovery of a sub-sample of young pathological gamblers who may be suffering severe gambling problems. This particular group is comprised of individuals presenting seven or more DSM-IV positive criteria for PG. For comparison: treatment-seeking pathological gamblers (i.e. corresponding to Level 4, the top category in Shaffer's classification) presented an average score of eight positive DSM-IV criteria for PG in Brazilian clinical studies (Tavares and Gentil, 2007; de Castro et al., 2007). Interestingly, a previous study of two US community-based samples (Toce-Gerstein et al., 2003) suggested that pathological gamblers were separated into two distinct levels of severity based on similar cutoffs of DSM-IV criteria.

As expected, the gambling categories showed different demographic profiles, pointing to an interesting mix of cultural and social insertion factors that prevailed over direct measures of SES. Being employed or studying emerged as significant protective factors, respectively for problem and pathological gambling. Current studying made it 17 times less likely for someone to become pathologically involved with gambling. Moreover, carrying on with one's own education came out as more important than the actual level of education. Contrasted with previous reports, this is a new perspective on the impact of education on gambling behavior, because epidemiological studies so far have pointed only to problem and pathological gambling being more frequent among less educated individuals. These results partly conflict with previous reports from Anglophonic communities since in these countries adolescents and college based samples presented higher prevalences of PG (Martens et al., 2009). Hypothesizing about reasons for such discrepancy may become too

speculative, but risking an explanation it seems from the profile of pathological gamblers that Brazil is currently experiencing a gambling scenario that North America has already surpassed, when gambling was regarded as an adult entertainment and not so normative to the point that society would be complacent with youth gambling. Thus, in Brazil lower age is not a particular risk factor for gambling involvement and it does not overshadow the protective factor of being mentally busy, be it either working or studying. Nonetheless, under age gambling is still a controversial issue. Late reports have included youth gambling among a broader array of socially deviant behaviors such as substance use, violence and school truancy (Donovan and Jessor, 1985). Conversely, recent contributions have pointed that behavioral deviance does not fully account for gambling behavior (Willoughby et al., 2004). An in depth analysis of adolescent gambling is beyond the scope of the current investigation and it is reported in another ensuing article (Spritzer et al., 2009).

Epidemiological studies on gambling have presented conflicting results regarding the association between unprivileged social status and PG (Weinstock et al., 2008; Petry et al., 2005). In the regression model marital status, ethnicity and personal income were dislodged by other factors that translate into measures of social insertion, such as currently studying, being employed, holding a registered job and past/present living background. Jointly, these findings suggest that SES is a less important factor than a sense of belonging and being an active member of the community.

Being born in the South and Southeast regions were protective factors for problem gambling. Together these regions aggregate the most developed states within the country, underscoring the protective role of a better past socio-cultural background. Conversely, currently living in a metropolitan area increased PG risk almost five fold; half of the pathological gamblers identified in this study were living in big cities. Thus, past and present cultural milieus combine to influence gambling behavior.

Regarding religion, affiliation impacted only the expression of social gambling; Protestants were less likely to be classified in this category. No specific religion was associated with problem and pathological gambling. Therefore, the hypothesis raised in other studies about the Protestant culture protecting against problems with gambling, and that minority religious affiliations such as Catholicism and Judaism could facilitate PG was not confirmed (Welte et al., 2004). Thus, the issue of how religious affiliation interacts with gambling behavior remains unclear.

The current study presents some limitations: first, at the time the survey was being conducted some states in Brazil underwent a brief period of riots, purportedly engendered by organized crime. This raised security concerns, hence the modest response rate. Nonetheless, this may be a relatively low level of bias, because it is improbable that gambling households would be more likely to refuse to participate in interviews because of security issues than non-gambling households. The adoption of adapted criteria (DSM IV-J) for assessing PG for individuals between 14 and 17 years old is at the same time an asset and a limitation of the current study. The adult criteria being excessively focused on financial issues is likely to underestimate youth PG. On the other hand, different criteria can partly hinder comparability and previous reports have raised the concern that the DSM IV-J may overestimate the prevalence of problem gambling among youths (Jacques and Ladouceur, 2003). However, this is likely neither the case, because as cautioned by Jacques and Ladouceur we used a 9-criteria base and adjusted to a 10-criteria base when comparing with the adult counterpart of the sample. Moreover, as pointed in the Results section, an alternative analysis using only the shared criteria between DSM IV-J and regular DSM-IV criteria for PG showed that age specific criteria made PG diagnosis more stringent for both adolescents and adults and did not skew the assessment towards any age groups. A more in depth analysis of the DSM IV-J could bring to light potential confounding variables in the estimation of PG in adolescents. As demonstrated by our data, gambling behavior is impacted by regional and cultural variations, and hence coupling quantitative and qualitative methodology may provide a wider view of gambling within a community. Types of games and other culture-bound issues could be better assessed if the survey questions were perfected after a qualitative appraisal of the variations of gambling behavior. Also, exploring regional differences requires a specific methodology and an over-sampling of gamblers that the present study could not cover.

On the other hand, this study compensates for its constraints by making use of a rigorous stratified household survey technique covering both urban and rural areas, which gathered a sample that was representative of Brazilian society as a whole. Its originality is guaranteed by the fact that it is the first survey of its kind in a developing country with a varied social background that allows cross-cultural comparisons. It also casts light on new perspectives such as the importance of social insertion and the perception of oneself as operational, as well as the identification of a segment of young at-risk male gamblers who are usually overlooked in clinical studies. Altogether, the data from the current investigation produce a solid platform on which future studies and prevention efforts can be based.

Acknowledgment

This study was partially funded by the National Anti-Drug Secretariat (SENAD), grant# 017/2003.

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