

Gambling Participation and Prevalence Estimates of Pathological Gambling in a Far-East Gambling City: Macao

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Abstract

This research is the first scientific study of gambling participation and pathological gambling in Macao. In 2003, a computer-assisted random digit dialing method was used to conduct 1,121 telephone interviews. Two-thirds of respondents expressed that they have participated in at least one of the fourteen forms of gambling in the past year. The three most popular forms of gambling include social gambling, Mark Six lottery, and soccer/basketball betting. As for the prevalence of pathological gambling, the Chinese DSM-IV Gambling Behavior Index was used as the screening tool and results indicate that 1.78% of respondents are classified as probable pathological gamblers and 2.5% are classified as probable problem gamblers. Logistic Regression test indicates that male respondents with a monthly personal income of less than MOP 8,000 (Macao currency is the Pataca) tend to be more vulnerable to problem and pathological gambling when they participate in casino gambling, soccer matches betting and mahjong house gambling.

KEY WORDS: gambling, pathological gambling, problem gambling, Chinese DSM-IV Index, Macao.

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Macao, a small city with only 26.8 square km of land and a population of 441,600 in 2002 (Statistics & Census Service of Macao, 2003), is located at the mouth of the Pearl River Delta, on the southwestern coast of China. It is about an hour away from Hong Kong by ferry. Macao had been a Portuguese colony for more than four hundred and forty years. On 20th December, 1999, its sovereignty was returned to China and Macao was granted the status of a Special Administrative Region (SAR) of the People's Republic of China. With this status, it enjoys a high degree of autonomy and is allowed to maintain its social and economical characteristics in accordance with the principle of "one country, two systems."

According to the description of the Macao gambling history provided by Chan and Chan (2001), the gambling industry in Macao was granted its legal status in 1847. The purpose of legalization was to bring Macao out of the economic recession after the Opium War. As the many small-sized operators competed in a somewhat "perfect competitive" environment, the industry did not bring much tax revenue to the Macao

government. Hence the government decided to monopolize the industry by means of inviting bids publicly. The first monopoly went to Hou Hing Company which safeguarded the government a tax revenue of MOP 0.8 million (equivalent to USD 0.0996 million)¹ per year. Seven years later, the monopoly went to Tai Hing Company which promised to pay USD 0.224 million as tax revenue per year to the government. Both companies made strong efforts to upgrade the management and the marketing plans, many of which continue into the modern days. In 1961, Dr. Marques, the 119th Macao Governor positioned the city as a tourism and gaming city. In the same year, Sociedade Turismo e Diversões de Macau (STDM) became the third tender in history. STDM agreed not only to pay around USD 0.373 million tax per year, but also to shoulder the responsibility to the development of tourism as well as the overall development of Macao. During its four decades of gaming monopoly, Macao's gaming tax increased from around USD 0.373 million to more than USD 0.747 billion per year, on average a compound increase of over 20% per year. In 2001, the Macao SAR government liberalized the gaming industry. The purpose of the latest move can best be understood from the 2002 Policy Address, in which the Chief Executive of Macao SAR, Mr. Edmund Ho, stated clearly that "an industrial structure is taking shape in Macao with the gaming sector as its "head" and the service industry as its "body", driving the overall development of other industries." The liberalization of the industry immediately turned Macao from an unknown and tiny gambling city into one considered by international businessmen as a top prioritized place for investment. Among the eighteen international bidders, three were chosen. One of them is Sociedade de Jogos de Macau (SJM), which is a subsidiary of the STDM group. The other two are Galaxy Casino Company Limited and Wynn Resorts (Macao) Limited.

Having attained a history of over one and a half centuries of legalization, the gaming sector has always been a major source of Macao's fiscal income. For instance, in the year 2002, gambling tax amounted to USD 0.946 billion and this amount already accounted for 68% of the public revenue of Macao (Monetary Authority of Macau, 2002). While everyone in Macao is expecting more gambling tax and further economic growth brought about by the liberalization of the gaming sector, it seems that side effects like pathological gambling, personal bankruptcy, suicide, domestic violence, financial stress, criminal problems. etc. are largely ignored by the public. So far, there is not even one article documenting Macao's gambling participation rates, the prevalence rates of pathological gambling, and social problems brought about by excessive gambling. Not only that, not even a government or non-government counseling or rehabilitation center has been created or is going to be created specifically for pathological gamblers and their family members in Macao.

One possible explanation for this is that the gaming industry has always served as the economic pillar of Macao and no one in the society would dare to raise any issue against the well-being of the industry. Another possible explanation is that Macao residents are always thought to be born with immunity which allows them to effectively resist temptations from gambling. But is this rationale believable? Are Macao residents really free from pathological gambling, or is it just that Macao residents are being ignored, or is the problem itself being ignored?

It is clear that a scientific study of the above issues is not only necessary, but also is immediately needed. Such a study should at least be done before the openings of new casinos so that data collected in this study would be useful for assessing the influences brought about by the opening up of the market. Funded by the Research Committee of the University of Macau, this research aims to achieve the following objectives:

The gaming sector has always been a major source of Macao's fiscal income.

¹ With reference to the exchange rate quoted by the Monetary Authority of Macau at the end of 2002, the exchange rate used throughout this paper is USD 1 = MOP 8.0334.

1. To assess the gambling participation among Macao residents aged between 15 and 64,
2. To measure the prevalence rates of pathological gambling and problem gambling.

Method

Target respondents of this survey included all Macao residents aged between 15 and 64². Statistics and Census Service of Macao (2003) estimated there were a total of 319,313 Macao residents within this age bracket at the end of 2002. Since telephone interviewing is the usual way of data collection in epidemiological studies of pathological gambling in the past years, it was adopted in this survey. About half of all residential telephone numbers provided by Companhia de Telecomunicações de Macau S.A.R.L. (the only fixed-line service provider in Macao) were randomly drawn and

entered into a telephone interviewing computer program. From 26th March to 3rd April, 2003, a computer-assisted random digit dialing program was run between the hours of 14:00 and 22:00. A total of fourteen trained interviewers dialed telephone numbers drawn by the computer program. Respondents were asked to list the ages of all eligible members in the household. Interviewers then input the data into the computer program which randomly picked one of the members as the chosen respondent. If the selected respondents were not at home, follow-up calls were made. If the respondents refused to be interviewed, some attempts were made to encourage

This research aims to: assess the gambling participation among Macao residents aged between 15 and 64; to measure the prevalence rates of pathological gambling and problem gambling.

participation. If the respondents refused, their telephone numbers were then marked as “rejected” and would not be dialed again in the same research. Selection had never been settled by means of convenience sampling. A total of 1,121 successful interviews were conducted and the response rate was 68%³, which is considered to be acceptable when compared with other epidemiological studies of pathological gambling.

Measures

The questionnaire used in the survey consists of four major sections. The first section concerning facts such as the respondent’s age and residency was used to identify qualified respondents, whereas the last section was used to collect socio-economic data.

The second section was used to learn about the respondent’s involvement in the different forms of gambling. In Macao, a total of fourteen forms of gambling could be identified in 2003. Six of them were legalized activities, including gambling in Macao casinos, betting soccer/basketball matches with Macauslot, betting greyhound races with Macau (Yat Yuen) Canidrome Co. Ltd, buying Pacapio tickets⁴ from Weng Heng Lottery Co. Ltd., betting horse races with Macau Jockey Club, and playing in mahjong houses⁵. With the exception of casino gambling and mahjong houses, STDM and its subsidiaries were the only providers of all other forms of gambling. In addition to legal gambling, five forms of illegal gambling could also be found in Macao. One of them was buying Mark Six lottery tickets issued by the Hong Kong Jockey Club Lotteries Limited. Other illegal gambling activities include buying Mark Six lottery tickets from illegal bookmakers and betting Hong Kong horse races, Macao horse races and soccer/ basketball matches with illegal bookmakers. Meanwhile, Macao residents could also choose to participate in online casino gambling, or go to Hong Kong to board casino

² The Statistics and Census Service of Macao defines the adult population to be those aged between 15 and 64.

³ The response rate was calculated by having completes / completes + refusals + partial interviews + non-contacted but known eligible. Examples of gambling and problem gambling surveys using the same formula include Iowa survey (Volberg, 1995) and Washington State survey (Volberg & Moore, 1999).

⁴ Pacapio is the Macao version of keno.

⁵ A mahjong house functions like a poker room. Operators provide venues and the necessary facilities and earn commissions on winnings.

ships, or to participate in social gambling with relatives and friends. Respondents were asked about their participations, the number of times of participation, the monthly expenditure, and their perception of each of the above-mentioned activities.

The third section in the questionnaire consists of the scale used to measure the prevalence rate of pathological gambling. Pathological gambling was included in the International Classification of Diseases (ICD-9) in 1977 (Volberg, Abbott, Rönnerberg, & Munck., 2001). Then in 1980, largely through the efforts of Robert Custer, it was included for the first time under the category of disorders of impulse control in DSM-III (American Psychiatric Association, 1980). In 1994, as defined in the 4th edition of Diagnostic and Statistical Manual of Mental Disorders, the clinical state of pathological gambling is “a persistent and recurrent maladaptive gambling behavior that disrupts personal, family or vocational pursuits” (American Psychiatric Association, 1994). A review of the past fifteen years of epidemiological research of pathological gambling found that there were only a few measures that were commonly adopted. They include the American Psychiatric Association’s diagnostic criteria for pathological gambling (e.g., Becoña, 1993; Bray, Kroutil, Luckey, Wheelless, Iannacchione, Anderson, Marsden, & Dunteman, 1992; Laventhal & Horwath, 1990; Reilly & Guida, 1990; Wong & So, 2003), the Gamblers Anonymous questions (e.g., Ursua & Uribebarrea, 1998), the South Oaks Gambling Screen (the SOGS) and modifications of it (e.g., Bondolfi, Osiek, & Ferrero, 2000; Cox, Kwong, Michaud, & Enns, 2000; Ladouceur, Jacques, Ferland, & Giroux, 1999; Laudergeran, Schaefer, Eckhoff, & Pirie, 1990; Omnifacts Research, 1993; Volberg & Abbott, 1994; 1997; Volberg, et al., 2001), and the Cumulative Clinical Signs Method (CCSM) (e.g., Sommers, 1988).

For this study, the Chinese DSM-IV Gambling-Behavior Index developed by Wong and So (2003) was adopted. The DSM-IV criteria are commonly used by clinicians to diagnose pathological gambling (Pike, 2002). With a total of ten criteria, participants are asked how many of these diagnostic criteria are met. Those claiming to have had five or more criteria met are classified as pathological gamblers (American Psychiatric Association, 1994). The Chinese DSM-IV Gambling-Behavior Index was developed for the prevalence study of pathological gambling in Hong Kong in 2001. It is the de facto Chinese version of the DSM-IV gambling diagnostic criteria. The Index retains the ten criteria of DSM-IV and by following the DSM-IV’s diagnostic cutoff system, the Index identifies Probable Pathological Gamblers (PPaG) with a score of 5 or more⁶.

One of the major reasons for adopting such a system is to observe the problem of cross-cultural differences that may arise when the same instrument is administered in different countries (Lesieur, 1994). The Chinese version of the DSM-IV has been tested for reliability as well for its construct validity (claimed to have three factors extracted from the Chinese scale replicating those of the original index) in a Chinese context, Hong Kong (Centre for Social Policy Studies of the Department of Applied Social Sciences & The General Education Centre of the Hong Kong Polytechnic University, 2002). Moreover, the use of the DSM-IV in the Macao study provides a good chance to understand more about the DSM-IV which has been served as either a direct or an indirect basis against which a number of other prevalence scales appropriate for the general population like the SOGS, the CCSM, and the Canadian Problem Gambling Index (CPGI) (Doiron & Nicki, 2001) were constructed. It has to be clarified that it is not the purpose of this study to challenge the conception and the appropriateness of the ten criteria of the DSM-IV, but the authors just hope that the data found in this study could pave ways for the development of a more meaningful pathological instruments for the Chinese society in subsequent researches. Lastly, as mentioned above, this research is not limited to the prevalence estimate of pathological gambling; gambling participation is another major focus of the study. The number of questions asking about participation in the different forms of gambling, the DSM-IV criteria and socioeconomic

⁶ Since the self-report instrument was in way of replacing a formal psychiatric diagnosis, the word “Probable” is used to describe pathological gambler in the article.

data amounted to sixty-six. Say if the SOGS⁷ screen was chosen, ten or more questions would have to be added to the questionnaire, thus increasing the possibility for the questionnaire being uncompleted.

Results

The sample drawn was found to be highly representative of the adult population of Macao as there were good matches in the distributions of gender, age and monthly personal income between the survey and the 2002 data issued by the Statistics and Census Service of Macao (2003). Hence, the sample was regarded to be good enough to serve as an important reference for the gambling behavior of Macao residents aged between 15 and 64. As a tourism and a gambling city, there are reasons to believe that Macao residents participate actively in gambling. Table 1 shows that among the 1,121 respondents, 67.9% of them revealed participation in at least one of the fourteen forms of gambling in the past year, i.e., 2002. As many as 21.8% of respondents were involved in three or more forms of gambling (the highest number of forms participated was eight). There were only 32.1% of respondents who had not participated in any gambling activity.

Table 1
Gambling Participation and Betting Mean Per Month – Past Year

<i>Gambling Types</i>	<i>Participation %</i>	<i>Betting Mean/Month USD</i>
1. Social gambling	43.8	20
2. Mark Six	38.7	5
3. Soccer/basketball Betting	20.9	68
4. Macao Casino	20.2	87
5. Greyhound Racing	5.8	9
6. Horse Racing	5.7	32
7. Mahjong House	3.3	46
8. Pacapio	2.3	6
9. Casino Ship	1.0	278
10. Online Casino	0.8	20
Participating at least one type of gambling	67.9	49

Which were the Most Popular Forms of Gambling?

Social gambling ranked first in terms of popularity among respondents. Its rate of participation reached 43.8% and the average amount of betting money spent on the activity was USD 20 per month. As discussed in the later section, chi-square statistics revealed that participation rates of activities tended to be high among those who viewed them as a form of entertainment than as a form of gambling. Hence the way social gambling was perceived by respondents provides a possible explanation for its popularity. The majority (73.1%) of respondents viewed it as a form of entertainment while 12.5% of respondents treated it as a social activity. Only 11.5% of respondents regarded it as a gambling activity.

Social gambling ranked first in terms of popularity among respondents.

Buying Mark Six lottery tickets (38.7%) issued by the Hong Kong Jockey Club Lotteries Limited came second in terms of popularity. An average of USD 5 was spent each month on the tickets. Although it is not legal in Macao, paying small and winning

⁷ The SOGS appears in a self-report format and consists of twenty items from which a score of 5 serves as the cutoff point to indicate "probable pathological gambling" (Lesieur & Blume, 1987).

big seems to be the likely reason for its popularity and it is not surprising to find many mom and pop stores running the risks of carrying these tickets.

Soccer/basketball betting was the third most popular form of gambling in Macao. Out of 1,121 respondents, 234 (20.9%) admitted involvement in these games, each spending an average of USD 68 per month. In reality, since its introduction by Macauslot in 1998, the participation rate of soccer/basketball betting has been increasing gradually (Gaming Inspection and Coordination Bureau, 2004). Although World Cup 2002 might have promoted soccer betting participation, packaging it as a sport in addition to a gambling activity; aggressive promotions and convenience made possible through the openings of a number of betting branches, tele-betting and Internet-betting might be able to explain why it was so popular in Macao.

Gambling in casinos ranked fourth in terms of popularity. The results indicate that about one-fifth (20.2%) of respondents gambled in casinos. The average monthly amount of betting money spent on the activity was USD 87. Other than Macao casinos, casino gambling also includes gambling on board casino ships and gambling online. But these two forms of casino gambling were not attractive among respondents. Only 11 respondents (1.0%) and nine respondents (0.8%) had ever participated in gambling on the casino ship and online casino respectively. One of the likely explanations for the low participation rate of casino ship gambling is that it is more convenient to gamble in Macao casinos than to go to Hong Kong to board casino ships. So only those who have been bored by patronizing the same casinos and those who are not allowed to enter Macao casinos such as civil servants are most likely to take part in casino ship and on-line casino gambling. However, when it comes to the average amount wagered per month, casino ship gambling was on top of the list (USD 278). As for online casino, the amount was much smaller, only USD 20 per month.

Gambling in casinos ranked fourth in terms of popularity.

Even though different betting channels like off-course betting branches, telephone and Internet betting are offered, horse racing was not popular among Macao residents. Only 5.7% of respondents (64 respondents) had ever engaged in this activity and the average amount wagered per month was only USD 32. One likely reason for the low participation is the small and unattractive pool.

Betting on greyhound racing (5.8%) and buying Pacapio tickets (2.3%) were not very active. The average amounts of money wagered per month were also low, only USD 9 and USD 6 for greyhound racing and Pacapio respectively. One possible reason for the low participation rate could be the old-fashioned image of these activities. Another possible answer for the result is that promotional activities have never been targeted at Macao residents. In fact the same promotional strategy can be found not just in greyhound racing and Pacapio, but also in all other gambling activities offered by the STD group. Soccer/basketball betting is the only exception. TV commercials of soccer/basketball betting are shown during peak watching hours in Teledifusão de Macau, S.A. (TDM – the only television broadcast company in Macao) and printed materials of soccer/basketball betting can well be accessed in Macao. Thus, the marketing strategy of the STD group could possibly pose an influence on the popularity of the different commercial gambling activities in Macao.

Although the mahjong house has a long history in Macao, gambling there was not common in Macao. Only 37 respondents (3.3%) admitted participation in the past year. People in Macao tended to prefer social gambling, i.e., playing mahjong with friends than playing mahjong with strangers in mahjong houses. In addition, gamblers can save commissions paid to mahjong houses when they play mahjong at home. Lastly, the mahjong house gives a strong impression that it is a place for gambling rather than for social gathering. As mentioned above, the way respondents viewed the activities influenced their participation in them. Less than half (48.4%) of respondents regarded participation in a mahjong house as gambling while 38.1% of respondents perceived it

as a form of entertainment. Those who participated in mahjong house gambling spent an average of USD 46 per month.

Given the availability of the different forms of legal gambling in Macao, participation in illegal forms (except Mark Six) was not common. Less than 2% admitted involvement in illegal soccer/basketball betting, illegal betting on horse races and buying Mark Six tickets from illegal bookmakers.

Who were those that Participated in Gambling?

In order to understand who were those gamblers taking part in the most popular forms of gambling in Macao, the authors used cross-tabulation to find out the relationships between participation in the four most popular forms and socio-economic variables. As shown in Table 2, similar socio-economic patterns were found in the four forms of gambling.

Table 2
Cross-tabulation between Different Forms of Participation and Socio-economic Data

	<i>Gender</i>		<i>Marital Status</i>		<i>Monthly Personal Income</i>			<i>Monthly Family Income</i>			
	Male %	Female %	Married %	Single %	Below MOP 5,000 %	MOP 5,001-15,000 %	Above MOP 15,000 %	Below MOP 7,000 %	MOP 7,001-13,000 %	MOP 13,000-19,999 %	Above MOP 20,000 %
Gambling Activities											
1. Social Gambling	49.7***	38.5***	39.1***	50.0***	36.5**	47.5**	55.6**	36.0***	46.6***	59.5***	55.0***
2. Mark Six	46.1***	32.1***	47.1***	24.7***	29.4***	47.5***	44.4***	36.0***	41.0***	47.3***	53.7***
3. Soccer/ Basketball Betting	32.5***	10.5***	22.6	19.2	13.5***	23.0***	22.2***	16.4***	16.1***	32.4***	32.2***
4. Macao Casino	25.7***	15.4***	23.6***	12.1***	13.2	18.4	17.8	20.7	22.1	12.2	21.5

**p<.01
***p<.001

The popularity of social gambling varied with gender, marital status, as well as monthly personal and family income. Men had significantly more involvement than women (p<.001). About half of male respondents (49.7%) admitted that they had participated in social gambling in the past year but only 38.5% of women admitted participation in the past year. In addition, there were significantly more singles participating in social gambling than married (p<.001). Fifty percent of the singles versus only 39.1% of the married had ever participated in it. Chi-square statistics reveal that social gambling was significantly more popular among those earning high monthly personal income (p<.01). Lastly, social gambling was more popular among those who had a monthly family income of MOP 13,000 to MOP 19,999 (p<.001). In fact the participation rate increased with the monthly family income. But when it comes to the highest monthly family income group, i.e., MOP 20,000 or more, the participation rate dropped slightly; making this group the second highest in participation among all family income groups.

As for Mark Six, chi-square statistics found that men were more active in buying Mark Six lottery tickets than women (p<.001). In the past year, 46.1% of male respondents had bought Mark Six tickets while only 32.1% of female respondents had ever done so. Different from social gambling, Mark Six was more attractive to the married (47.1%) than to singles (24.7%) (p<.001). Mark Six was significantly not so popular among respondents earning a monthly personal income of MOP 5,000 or below (29.4%) as those earning more than MOP 5,000 monthly (p<.001). Similarly, the lower the monthly family income, the lower the participation rate in Mark Six (p<.001).

When it comes to soccer/basketball betting, statistical analysis reveals that soccer/basketball betting was far more popular among men than women (32.5% as against 10.5% in participation). Furthermore, soccer/basketball betting experienced different degrees of popularity among respondents of different levels of monthly personal and family income. Participation rate was significantly higher amongst respondents with a monthly personal income of more than MOP 5,000 ($p < .001$) or a monthly family income of MOP 13,000 or above ($p < .001$).

Casino gambling was found to be more popular among men than women (25.7% as against 15.4%) ($p < .001$) and among the married than singles (23.6% vs. 12.1%) ($p < .001$). However, participation rates did not vary significantly among different income levels.

In sum, participation rates were absolutely higher among male respondents than female respondents. In terms of marital status, more married respondents participated in Mark Six and Macao casinos than their single counterparts. In terms of monthly personal and family income, “somewhat” positive relationships were found between the income levels and the participation rates in all forms except gambling in Macao casinos.

How were the Games Perceived?

The majority of respondents regarded the nature of Mark Six (58.8%), soccer/basketball betting (58.8%) and casino gambling (66.8%) as “gambling”. As expected, the overwhelming majority (73.1%) of respondents perceived social gambling as a form of entertainment. With the exception of casino gambling, chi-square statistics revealed that there was a relationship between the respondents’ views of the nature of the activity and the participation in the activity ($p < 0.001$). Involvement in the Mark Six, soccer/basketball betting and social gambling tended to be high among those who viewed them as a form of entertainment than as a form of gambling.

Were the Prevalence Rates High?

Among the 761 respondents who had ever participated in any one of the fourteen forms of gambling, 176 respondents (23.1%) admitted that at least one of the Chinese DSM-IV criteria was met. As shown in Table 3, there were 20 PPaGs (those who satisfied five or more criteria), accounting for 1.78% of the sample. Fifty-five percent of them expressed that the diagnostic criteria were met when they gambled in Macao casinos. Since anyone meeting three to four criteria is classified as a Probable Problem Gambler (PPrG), then 28 respondents belonged to this group and they together accounted for 2.5% of the sample.

Table 3
Cross-tabulation between Degree of Pathological Gambling
and the Chinese DSM-IV Gambling Behavior Index

Chinese DSM-IV Gambling Behavior Index n =	Chinese DSM-IV Score		
	1-2	3-4	5+
In the past 12 months...	128	28	20
1. is preoccupied with gambling	18	19	15
2. needs to gamble with increasing amounts of money in order to achieve the desired excitement.	14	8	8
3. has repeated unsuccessful efforts to control, cut back, or stop gambling.	37	15	15
4. is restless or irritable when attempting to cut down or stop gambling.	11	10	16
5. gambles as a way of escaping from problems or of relieving a dysphonic mood.	14	7	15
6. after losing money gambling, often returns another day in order to get even.	49	21	16
7. lies to family members, therapist, or others to conceal the extent of involvement with gambling.	15	12	12
8. has committed illegal acts, such as forgery, fraud, theft, or embezzlement, in order to finance gambling.	0	0	2
9. has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.	5	1	9
10. relies on others to provide money to relieve a desperate financial situation caused by gambling.	2	5	15
	165	98	123

A look at Table 3 found that the criteria with the highest frequency of occurrence among PPaGs included: criterion 1 (is preoccupied with gambling), criterion 3 (has repeated unsuccessful efforts to control, cut back, or stop gambling), criterion 4 (is restless or irritable when attempting to cut down or stop gambling), criterion 5 (gambles as a way of escaping from problems or of relieving a dysphonic mood), criterion 6 (after losing money gambling, often returns another day in order to get even), and criterion 10 (relies on others to provide money to relieve a desperate financial situation caused by gambling). One should notice that if SOGS⁸ had been used as the screening instrument, criteria 1, 4 and 5 would have been missed out. In other words, those about criteria about thoughts, feelings and behaviors of PPaGs would have been ignored.

It was not common among Macao PPaGs to commit illegal acts in order to finance their gambling (criterion 8). Cushion hypothesis suggested by Hsee and Weber (1999) may help explain this situation. According to this hypothesis, family or other in-group members in socially-collectivist cultures like China are very likely to help any group members in overcoming a serious financial difficulty. This hypothesis has received support from Mrs. Ip Yung Wai Mui, Centre in-charge of Rehabilitation Centre for Problem Gamblers, Hong Kong. In a personal interview with Mrs. Ip, she said: "The concept of family is very strong in the Chinese society. It is not uncommon for mothers

⁸ One of the criticisms of SOGS is that the SOGS puts too much emphasis on money than thoughts, feelings and behaviors of problem gamblers. Almost all of the SOGS items ask about the amounts of money wagered, lost, borrowed, and stolen (Stinchfield, 1997). The findings of this research help to add one more piece of evidence to support this criticism against the SOGS screen.

and wives to try their best to conceal the gambling behaviors of their sons and husbands respectively and very often they feel obliged to shoulder the gambling debts of their family members.” Macao, which is populated by Chinese, belongs to the socially-collectivist culture. Before having to commit illegal acts as their last resort, criterion 10 (relying on others to provide money to relieve a desperate financial situation) is found able to solve the financial problems. Hence this might explain the low frequency of criterion 8 and the high frequency of criterion 10 among PPaGs. Furthermore, it is obvious that criterion 8 is an important determining factor distinguishing a PPaG from any other categories of gamblers as it was found only in the group of PPaG but not in any other groups.

As for PPrGs, the criteria met most were similar to those met by PPaGs. Criteria met most include: criterion 6 (returning another day to get even after losing money), criterion 1 (preoccupying with gambling) and criterion 3 (unsuccessful attempts to control, cut back or stop gambling). To those with one or two criteria satisfied, they mainly felt problems in criterion 6 (returning another day to get even) and criterion 3 (unable to control or stop gambling). Commonality of criteria 6 and 3 across all three levels of pathological gambling may suggest that these criteria are signs or symptoms of an early stage of pathology.

Who were at Risk?

In order to have a deeper understanding of pathological gambling, respondents with three or more of the Chinese DSM-IV criteria were compared to respondents with less than three criteria. In other words, the first group of respondents includes all PPrGs and all PPaGs. A total of 48 respondents⁹ fell into the first group. The second group includes all gambling participants with less than three criteria and 713 respondents belonged to the second group.

Logistic Regression was carried out to find out the probable determining factors of problem gamblers (PPrGs and PPaGs). Table 4 suggests that some demographical factors (e.g., gender and income) and forms of gambling participation had significant influences on the likelihood of a person's becoming a PPrG or a PPaG ($p < 0.05$). Eighty-six and 6/10 percent of the variances in the probability could be explained by predictors in the model.

⁹ One should note that since 20 probable problem or pathological gamblers refused to disclose some of their personal data, there were only 28 respondents who could enter into the final regression model. Although the small number of respondents made the model sensitive to some particular cases, the authors insist that some attempts should be made to find hints of who had the tendency of becoming pathological gamblers in the first epidemiological research of pathological gambling in Macao. The results of the analysis do not mean to be conclusive.

Table 4
Summary of Logistic Regression Equation with the Probability of Becoming Probable Problem or Pathological Gamblers as the Criterion Variable and the Socioeconomic Variables and Forms of Gambling as the Predictor Variables

Predictor Variables	B	Odd Ratio	95% Confidence		p-value
			Interval		
Gender	1.475	4.3710	1.523~	12.547	0.006
Education Level (1)	-0.269	0.7640	0.226 ~	2.581	0.664
Monthly Personal Income (1)	-4.749	0.0087	0.002 ~	0.032	0.000
Monthly Personal Income (2)	-5.388	0.0046	0.001 ~	0.020	0.000
Monthly Personal Income (3)	-5.871	0.0028	0.001 ~	0.017	0.000
Soccer Betting	1.013	2.7540	1.151 ~	6.588	0.023
Mahjong House	2.270	9.6790	3.051~	30.705	0.000
Casino Gambling	1.147	3.1490	1.296 ~	7.651	0.011
Social Gambling	0.629	1.8760	0.761 ~	4.621	0.171

Note: Dependent Variable: Probabilities of becoming Probable Problem or Pathological Gamblers

Nagelkere R² = 0.866

Gender: Female = 0; Male = 1

Education Level (1): Others = 0; Primary or below = 1;

Monthly Personal Income (1): Others = 0; Below MOP 2,000 = 1;

Monthly Personal Income (2): Others = 0; MOP 2,000 ~ MOP 7,999 = 1;

Monthly Personal Income (3): Others = 0; MOP 8,000 or above = 1;

Soccer Betting: Never Participated = 0; Ever Participated = 1;

Mahjong House: Never Participated = 0; Ever Participated = 1;

Gambling at Casino: Never Participated = 0; Ever Participated = 1

Social Gambling: Never Participated = 0; Ever Participated = 1

Pezzulo (2005) explained that the odds of an event is defined as the probability of the outcome event occurring divided by the probability of the event not occurring. The odds ratio for a predictor tells the relative amount by which the odds of the outcome increase (O.R. greater than 1.0) or decrease (O.R. less than 1.0) when the value of the predictor value is increased by 1.0 units. (p. 1)

Hence, the model in Table 4 indicates that the probability of a male gambler becoming a PPrG or PPaG was 4.4 times (a 95% confidence interval between 1.5 to 12.5 times) higher than that of a female gambler. A gambler earning a personal income of less than MOP 8,000 per month was over 100 times more likely to become a PPrG or PPaG than one earning MOP 8,000 or more per month. In addition, the different forms of gambling participated in by gamblers had different influences on the probabilities. A Macao casino participant was 3.1 times (a 95% confidence interval between 1.3 to 7.7 times) more likely than a non Macao casino participant to become a PPrG or PPaG. The probability of a gambler betting soccer matches was 2.8 times higher while that of playing at mahjong houses was 9.7 times higher than

the respective non-participants in becoming a PPrG or PPaG. Education level and social gambling were found to pose no significant influence on the probability.

A gambler earning a personal income of less than MOP 8,000 per month was over 100 times more likely to become a PPrG or PPaG than one earning MOP 8,000 or more per month.

Conclusion

This research discovers that Macao residents are not free from temptations. The prevalence estimates were 1.78% for PPaG and 2.5% for PPrG. Are these rates high or low? A comparison of these rates with those of Hong Kong Special Administrative Region (SAR) was made as Hong Kong shares similar cultural and political backgrounds with Macao. Besides, since the Chinese DSM-IV Gambling-Behavior Index had been used as the pathological gambling screening tool in both cities, direct comparison of the prevalence rates can be made without hesitation. Hong Kong, though not a gambling city, was found to have even higher prevalence rates than Macao. According to Wong and So (2003), Hong Kong had 1.8% pathological gamblers and 4.0% problem gamblers in 2001. Although the possible answers for the lower prevalence rates of Macao is not yet available in this paper, the comparisons provide at least some ideas of how serious the problem of gambling was in Macao at a time before new casinos began their operations. Nevertheless, no matter how high the prevalence rates are, the authors would like to take the opportunity to remind the Macao government as well as the casino operators to guard Macao residents against the threats of pathological gambling, at least not to allow the current problems to get worse. On the part of the government, a number of preventive measures that are absent in Macao are suggested for implementation. These include incorporating the preventive measures into its educational programs, carrying out strict enforcement to forbid under-aged people entering the gaming venues, encouraging the practice of and promotion of self-exclusion programs, setting up rehabilitation centers and 24-hour hotlines to assist pathological gamblers and their family members, regulating the borrowing activities so that at least those who are already heavily indebted are not able to borrow more money for gambling, and setting clear long-term strategies so that Macao can realize the economic benefits from the healthy development of the gaming industry. On the part of the industry, casino operators are encouraged to put responsible gambling into practice. It has to be made clear that this paper has no intention of putting pressure on the government to restrict gambling. Rather the authors would like to remind both the government and the casino operators that profits would not come until current and possible problems of gambling are kept at a minimum.

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Suggestions for Further Research

There are two suggestions that the authors would like to discuss. First of all, ongoing studies, especially after the openings of new casinos in Macao, are imperative. The Macao government is paving ways for the gaming-led tourism industry to serve as the main driving force with the service industry acting as the mainstay for the co-ordinated development of other sectors. Once again, the authors have nothing against this strategic direction; it is important that the negative impacts, like pathological gambling, brought about by the opening of the gaming industry be traced and reduced to a minimum or else real economic benefits may not be realized. It is hoped that this landmark research could provide some baseline data against which future studies can be compared.

Second, the effectiveness of the Chinese DSM-IV in discriminating pathological gamblers from non pathological gamblers in a Chinese context requires further investigations. In a research investigating the effectiveness of the DSM-IV diagnostic criteria and the SOGS items, Duvarci, et al. (1997) found that two out of ten DSM-IV criteria and four out of twenty SOGS items have problems in discriminating Turkish pathological gamblers from subjects in the comparison group. Since the debates

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on the conception and accuracy of prevalence measures are still going on and since all of these instruments were developed on the basis of western societies, it is possible that all the existing scales including the Chinese DSM-IV are not properly diagnosing Chinese pathological gamblers. Thus it is worthwhile to spend effort to either validate the Chinese DSM-IV or to develop a scale that is meaningful to the Chinese.

Limitations

Problems with telephone interviews raised by Lesieur (1994) are also the problems of this research. Denial, minimization and exaggeration of problem gambling are unavoidable. Furthermore, individuals without phones or under confinement are not accessible even though a number of ways had been tried to include them into the sample.

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