ORIGINAL PAPER

The prevalence and nature of gambling and problem gambling in South Korea

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Abstract

Purpose   To establish the current prevalence of gambling and problem gambling in South Korea and to determine the associated demographic and game play patterns.

Methods   Administration of a gambling survey over the phone to 4,000 randomly selected South Korean adults (19+), supplemented by an online survey of 4,330 members of a South Korean online panel.

Results   The past year prevalence of gambling among South Korean adults was 41.8 %. The past year engagement in individual forms of gambling was 36.2 % for lotteries and instant lotteries; 12.0 % for social gambling; 2.3 % for sports betting; 1.5 % for casino gambling; 1.5 % for internet gambling; and 1.1 % for horse, bicycle, or motor boat betting. The past year prevalence of problem gambling was 0.5 %. Logistic regression identified the best predictors of problem gambling to be: having a greater number of gambling fallacies; gambling on the internet; betting on horses, bicycling, or motor boat racing; social gambling; male gender; mental health problems; sports betting; motivation for gambling (gambling to escape); casino gambling; and lower income.

Conclusions   The past year prevalence of gambling (41.8 %) and problem gambling (0.5 %) in South Korea is low compared to other countries, especially relative to other Asian jurisdictions. This relatively low prevalence of gambling is likely related to the very strong negative attitudes toward it, the low participation by females, and restricted access. The low prevalence of problem gambling is likely related to the relatively low prevalence of gambling and restricted access to continuous forms of gambling. The variables that are predictive of problem gambling in South Korea are quite similar to those found in other countries with a couple of important differences.

Keywords   Gambling · Prevalence · South Korea · Problem gambling

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Introduction

Population prevalence studies of gambling serve several important purposes. They establish the current prevalence of gambling, the prevalence of each form of gambling, personal expenditures on each form of gambling, and the prevalence of problem gambling.[1] This information, in turn, is very useful in understanding the overall recreational value of gambling to society, the negative social impacts of providing legalized gambling, the number of problem

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[1] Problem gambling is defined as having difficulties limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community [1]. It includes 'pathological gambling' (equivalent to severe problem gambling) that is characterized by severe difficulties in controlling gambling behaviour leading to serious adverse consequences.

gamblers that would benefit from treatment, the proportion of revenue derived from problem gamblers, and the types of gambling most strongly associated with problem gambling [2, 3]. Changes in the prevalence of problem gambling from one time period to the next, and/or differences between the prevalence rate in one jurisdiction relative to another, provides important information about the incidence of problem gambling and the potential effectiveness of policies implemented to mitigate gambling's harm [2, 3].

Worldwide, there have been 202 jurisdiction-wide prevalence studies of gambling and problem gambling conducted between 1975 to the present time [4], including two prior prevalence studies of problem gambling in South Korea. The first was conducted in 1984 by Lee et al. [5, 6] as part of a broader survey of psychiatric disorders. It involved a face-to-face residential interview of 5,176 adults, with urban samples taken from Seoul and rural samples from scattered rural locations. All family members age 18–65 were surveyed if they had lived in the house for at least three months. A structured diagnostic interview based on the diagnostic and statistical manual of mental disorders (DSM)-III was used to assess 'pathological gambling' (i.e., the Diagnostic Interview Schedule) [7]. The obtained lifetime prevalence rate of pathological gambling was determined to be 1.04 %. The only correlate of pathological gambling that was reported in the study was being in the age category 45–65.

A more recent prevalence study was conducted between July 2006 and April 2007 by Park et al. [8]. This study was a secondary analysis of data collected from the Korean Epidemiologic Catchment Area Study examining the nation-wide adult (18–64) prevalence of psychiatric disorders. Households were selected using stratified geographic clustering based on the 2005 census. One individual per selected household was randomly chosen for a face-to face interview. A total of 6,510 interviews were conducted with the Korean version of the composite international diagnostic interviews (K-CIDI) (an interview version of the DSM-IV criteria for the major psychiatric disorders). Of 6,510 participants, 5,333 completed the section that assessed problem/pathological gambling. Life time engagement in specific gambling formats was as follows: flower cards (Hwatu) 73.7 %; lottery 62.9 %; poker 28.7 %; electronic gambling machines (EGMs) 6.5 %; horse race betting 5.4 %; internet gambling 4.7 %; casino gambling 4.2 %; bicycle race betting 2.3 %; and motorboat race betting 2.2 %. The lifetime prevalence rate of problem gambling (defined as having 1–4 DSM-IV criteria) was found to be 3.0 % and the lifetime rate of pathological gambling (5 or more DSM-IV criteria) was 0.8 %. Problem and pathological gamblers were more likely to be male; age 30–49; divorced/separated/widowed; living in urban

rather than rural settings; and to have associated problems with alcohol and nicotine abuse, mood disorders, and anxiety disorders. In terms of game play, problem and pathological gamblers were significantly more likely to engage in poker, electronic gambling machines (EGMs), horse race betting, and bicycle race betting, as well as having a somewhat greater tendency of engaging in internet gambling and casino gambling [8].

While these two studies are quite informative, they also have some limitations. One issue concerns the uncertain representativeness of the samples. Random household sampling (as was used in both studies) works well in countries that are composed primarily of single family dwellings. However, it does not work well in countries like South Korea where a large portion of the population lives in multi-family dwellings (i.e., apartment or condominium complexes).[2] These dwellings are often excluded or under sampled in household surveys, as getting access to these buildings to do random sampling of the residents is very difficult. Residents of multi-family dwellings are much more likely to be in a lower income group, which is strongly related to problem gambling in most countries (although perhaps not in South Korea) [4]. A related issue is that face-to-face residential interviewing may not be the optimal administration format for obtaining valid self-report in South Korea as there is greater reticence to self-disclose problems in Asian cultures because of heightened concerns about stigma and shame [10–13].

Aside from these methodological concerns, because both of these studies only had a small focus on problem/pathological gambling, they contain relatively little information about patterns of South Korean *gambling* behaviour, as well as the broader (non-psychiatric) correlates of problem gambling. It would be instructive to know about *current* participation rates in the various forms of both legal and illegal Korean gambling; whether these rates have changed since 2006/2007; frequency of involvement and expenditure on different forms of gambling; people's motivations and attitudes toward gambling; the nature and role of Korean gambling fallacies; the utilization of problem gambling treatment; and the role of Western-identified epidemiological correlates of problem gambling. Information about gambling and problem gambling in South Korea would not only inform cross-cultural etiological models, but provide valuable information about appropriate prevention and intervention strategies for South Korea.

More generally, there is also a need for more research on Asian gambling. Aside from the fact that Asians constitute 60 % of the world's population, it will soon become the world's largest casino market. Due to the recent expansion

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[2] 58.3 % of the 14.9 million housing units in South Korea in 2010 were apartments [9].

of legal gambling in Asia, casino revenue in this region will surpass all other regions beginning in 2013 [14].[3] Of the 202 worldwide population prevalence studies of gambling, only eight have been conducted in Asian jurisdictions (three in Hong Kong, one in Macau, two in Singapore, and two in South Korea) [4]. Furthermore, the small amount of empirical research on gambling behaviour has focused primarily on Asian communities within Western jurisdictions [15, 16]. However, gambling among Asian immigrants may not be reflective of Asian gambling more generally due to the stress of acculturation [16, 17] and the fact that people who choose to immigrate may be more tolerant of risk.

Method

The study involved two separate surveys: a short random digit dial *telephone (cell phone) survey* and a longer self-administered *online panel survey*. The sample size for the telephone survey was 4,000 adults (ages 19+) and the sample size for the online panel Survey was 4,330 adults. Both the Telephone and Online surveys were administered from July 7 to September 9, 2011 by the South Korean survey company Embrain.

Telephone survey

Telephone surveys have traditionally used residential 'landlines'. However, in most countries the use of household landlines has rapidly declined in favour of personal cell phones. For example, in 2011 31.6 % of households in the United States no longer had a residential landline, a dramatic increase from 6 % in 2005 [18]. As a consequence of this general worldwide trend, the present study opted to use cell phones rather than landlines. This exclusive use of cell phones was also made viable by the fact that 98 % of South Koreans have cell phones [19] and incoming calls are generally free (note: as far as we are aware, the present study is one of the first known population prevalence studies to exclusively use cell phones).

For the telephone survey, all prior identified 'best practices' in population survey research of gambling [3, 20] were employed. More specifically, this included:

- Random digit dialing (RDD) of the universe of possible cell phone numbers.
- Computer assisted telephone interview (CATI) administration of the questionnaire.
- Pilot testing of the questionnaire by Embrain.

- Stratified sampling to ensure that each age x gender category constituted at least 50 % of their 'true' prevalence as determined by the 2010 South Korean census.
- Sixteen attempts to contact the person with these attempts spread over a three month period so as to eliminate the contactability bias of problem gamblers relative to non-problem gamblers (i.e., problem gamblers are more difficult to contact, so more attempts are needed to ensure problem gamblers are not underrepresented in the sample) [3, 20].
- Recontacting 'soft refusals' at a later point to see if they would be willing to participate.
- Periodic visual and audio evaluation of the interviewers' work by a supervisor for quality assurance.
- Weighting the obtained sample to match the obtained age × gender distributions to the distributions in the 2010 South Korean census.
- Use of questions wordings that maximize correspondence between self-reported gambling activity and objective measures of gambling activity [21].
- Introducing the survey as a study about 'health and recreational behaviour' (rather than 'gambling') so as not to bias the sample toward gamblers [20, 22].[4]
- Only administering the problem gambling questions to individuals who have gambled at least once a month on some format in the past year so as to decrease false positive identification of problem gambling [20, 22].

Cell phone surveys are likely the optimal method to obtain a representative sample in South Korea. Hence, the cell phone data will be used to establish the prevalence rates of gambling and problem gambling in the present study. However, a limitation of telephone surveys in South Korea is that South Koreans are very reluctant to participate in lengthy telephone interviews, which limits the amount of information that can be collected (personal communication from Gallup Korea as well as Embrain, May 2010). However, this is not a problem with *online panel surveys*, where much longer questionnaires can be used. Online panels also offer other advantages as will be explained below.

Online panel survey

Online panels are composed of hundreds of thousands of individuals who have agreed to receive online solicitations to participate in online surveys in return for compensation (most often, a collection of 'points' having some cash

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[3] Most of this expansion has occurred in Macau and Singapore. In 2007 Macau surpassed the Las Vegas strip in annual gambling revenue and now has revenues that are five times higher.

[4] Questionnaires that are introduced as 'gambling surveys' produce artifactually high prevalence rates of gambling and problem gambling due to higher participation rates of gamblers and higher refusal rates of non-gamblers [20, 22].

value) [23, 24]. When an individual joins one of these panels, information is collected concerning his/her demographics. Subsequently, when a group is needed for a particular survey (e.g., 'representative sample of South Korean adults'), the survey is only sent out to this subsample.

The main advantages of online panels is that (a) the validity of answers to 'sensitive questions' (e.g., gambling) tends to be higher in self-administered formats [25–27]; (b) everyone has agreed to be and expects to be contacted (unlike telephone surveys); (c) the results can be obtained in a much shorter period of time; and (d) they are roughly one-third the cost of telephone surveys.

The main problem with online panels is that they are not perfectly representative of the population, as a significant portion of the population does not use the internet.[5] In addition, although online panelists are structured to be demographically representative in terms of age, gender and a few other demographic variables, other differences exist, as only a very small minority of people invited to be part of an online panel agree to participate [29].[6] In two other recent population prevalence studies of gambling in Alberta and Ontario the first author has found that online panelists have significantly higher rates of all types of pathology (i.e., health problems, mental health problems, problem gambling and other addictions) compared to the general population (something that was also found in the current study) [30, 31].

Because of their imperfect representativeness, online panels cannot be used to establish precise estimates of population prevalence [3]. However, the much higher 'yield' of people with problem gambling in online panels does provide larger samples to investigate issues specific to problem gamblers (i.e., types of problems being experienced; types of gambling formats causing the most problems; treatment seeking tendencies; etc.). This will be one of the primary uses of the online panel data in the present study, in addition to administering a somewhat longer questionnaire to investigate additional issues such as gambling fallacies.

Email invitations to complete an online survey were sent out to a random sample of South Korean online panelists who were members of the Embrain Asia Panel.[7] These

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[5] Although South Korea has one of the highest rates of Internet use in the world, 23 % still did not use the Internet in 2008, with nonuse being disproportionately higher in people over 60 [28].

[6] With financial incentives being the main reported reason for participation [29]. (This motivation may make these panels suitable for consumer market research but perhaps not for academic studies).

[7] At the time of the survey, there were 490,000 South Korean members of the Asia Panel. Embrain recruits panelists via phone solicitation, email solicitation, self-referrals, recommendation by other panel members, and street recruitment.

emails were sent out in the same time period as the telephone survey. Although 'best practices' in online panel surveys have not yet been established, the same protocol was used regarding pilot testing, stratified sampling to ensure age × gender quotas that were at least 50 % of the true distributions in the population, post hoc weighting of the obtained sample to compensate for age × gender sampling deviations from the population, optimal question wordings, a generic email invitation with a subject line saying 'new research survey' and with the introduction of the questionnaire stating that the study is a survey on 'health and recreational behaviour', and requiring gambling once a month or more on some form to be administered questions about problem gambling.

Questionnaire

The telephone survey had sections on comorbidities, gambling attitudes, past year gambling behaviour, gambling motivations, problem gambling, and demographics. The online survey included these same sections plus a section on gambling fallacies, and a more extensive problem gambling section that included two additional measures of problem gambling. Both questionnaires were translated into Korean and then back-translated to ensure the accuracy of the translation. The contents of each of the sections of the questionnaire are described below:

Comorbidities

The seven questions in this section had two purposes. The first was to provide legitimacy to the 'health and recreation' description of the survey, as most of these questions asked about health related behaviours. The second was to establish the presence or absence of typical comorbidities for problem gambling. Substance abuse was assessed with a single question that asked "Have you had any problems with drugs or alcohol in the past 12 months. By this we mean difficulties in controlling their use that has led to negative consequences for you or other people?" General health was assessed with a question that asked about how they would rate their general health in the past 12 months with the response options being excellent (1), good (2), fair (3), and poor (4). Happiness and stress were assessed with questions that asked about overall level of happiness/ stress in the past 12 months with response options being very low (1), low (2), moderate (3), high (4), and very high (5). Mental health problems were assessed with the question "In the past 12 months, have you had any serious problems with depression, anxiety or other mental health problems?"

Gambling attitudes

There were three questions in this section. The first asked the person to "Describe your belief about the benefit or harm that gambling has for society", with the response options ranging from 'the harm far outweighs the benefits' to 'the benefits far outweigh the harm'. The second question asked "Do you believe that gambling is morally wrong?", with the response options being 'yes', 'no', or 'unsure'. The third question asked about "Your opinion about the availability of gambling opportunities in Korea", with the response options being 'it is too widely available', 'it is not available enough', or 'the current availability is fine'.

Gambling behaviour

The 15 questions in this section asked about the frequency of participation and average expenditure for the different types of gambling available in South Korea, using questions with optimal wording for obtaining this information [21]. More specifically, people were asked "In the past 12 months, how often have you played or bet money on [specific gambling format]?", and provided with closed ended response options. If they engaged in the activity they were then asked to provide an open-ended answer to the question "Roughly how much money do you spend on [specific gambling format] in a typical month? ('spend' means net win or loss)". Several gambling activities are currently legal in Korea, including various forms of social gambling (Hwatu or 'flower cards' being particularly popular) [32]. The commercial forms of gambling that are available are: instant lotteries, traditional lotteries, sports betting (on soccer, baseball, basketball, volleyball, golf, and Korean traditional wrestling), horse race betting, bicycle race betting, motorboat race betting, and slot machines and table games in casinos (poker, baccarat, blackjack, roulette, tai sai, wheel of fortune, sic bo). There are 17 casinos in South Korea, but Korean residents are only legally allowed to gamble at one of them, the Kangwon Land, located in the province of Gangwon-do, 4 h southeast of Seoul. The only legal form of online gambling is sports betting (Sports Toto/Proto).

Gambling motivation

A single question that asked about the person's main reason for gambling.

Gambling fallacies

This section consisted of the ten item gambling fallacies measure (unpublished scale developed by R. Williams)

which assesses the statistical misconceptions commonly associated with gambling (failure to understand the independence of random events, superstitious beliefs, illusion of control, belief in luck, failure to consider base rates or the law of large numbers, etc.). Higher scores indicate a greater number of gambling fallacies. This test has been administered to over 30,000 people from various countries in the past 9 years. It has good 1 month test–retest reliability ($r = 0.70$) and has consistently shown a significant positive correlation with problem gambling status and gambling frequency. Gambling fallacies are known to be an important correlate of problem gambling [33, 34] as well as often being a focus of therapeutic intervention [35].

Problem gambling

This section consists of the 24 unique questions that comprise the Canadian problem gambling index (CPGI) [36], the NORC DSM-IV screen for gambling problems (NODS) [37], and the problem and pathological gambling measure (PPGM) [20]. All of these instruments use a past-year time frame. The CPGI was the only instrument employed in the telephone survey.

Participant demographics

Age, gender, marital status, highest level of education, employment status, household income, number of people in household, number of children, whether or not the person was an immigrant, and which geographic region they resided in.

Results

Response rates

The Telephone Survey took an average of 5.2 min to complete. Overall response rate was 17.0 %, using calculations derived from the Council of American Survey Research Organizations (CASRO) [38] and the American Association for Public Opinion Research (AAPOR) [39] (see Table 1).

The online panel survey took an average of 8.1 min to complete and 20.2 % of the online panelists who received the email solicitation completed the survey.

Descriptive statistics

The following tables provide the descriptive statistics from the weighted telephone sample of 4,000 individuals (supplemented by the online panel data for the gambling fallacies and problem gambling specific questions). Because

Table 1 Telephone response rate calculations

Not a valid or active cell phone number	19,780
Person did not meet eligibility criteria	1,260
Ineligible total	21,040
Always busy, never answered, or ringer is off	6,670
Eligibility not determined total	6,670
Refusal	16,248
Completed interviews	4,000
Eligible total	20,248
Eligibility rate = 20,248 ÷ (20,248 + 21,040)	49.04 %
Estimated # of eligibles = 20,248 +(6,670 × 49.04 %)	23,519
Response rate = 4,000 ÷ 23,519	17.0 %

of the marked gender differences in the response profiles, most of the tables also report descriptive statistics for each gender. An asterisk in the female column denotes a significant gender difference at the $p < 0.05$ level (2-tail) using either Chi-square tests for nominal variables or t tests for continuous variables.

The telephone sample was 50.0 % male. In terms of age distribution, 12.0 % were between 19 and 24; 41.6 % were between 25 and 44; 33.7 % were between 45 and 64; and 12.8 % were 65 and older. With regard to marital status, 68.6 % were married or in a common-law relationship; 28.7 % were single (never married); and 2.6 % were separated, divorced, or widowed. A total of 17.2 % had less than a high school education; 30.4 % had completed high school and/or had some post-secondary education; and 52.4 % had completed a post-secondary degree at a college or university; 51 % were employed full time; 38.7 % were retired, a student, or a homemaker; 6.4 % were employed part-time; and 3.7 % were unemployed and looking for work. A total of 27.7 % had a monthly household income between 0 and 1.9 million Korean won; 38.8 % had a household income of 2.0–3.9 million won; and 33.5 % had a household income of 4.0 million won or higher($1 US = 1,147 South Korean won (₩)). Ninety-eight percent of the sample reported being born in South Korea.

Table 2 documents the past year adult prevalence of substance use, substance abuse, and mental health problems as well as overall ratings of general health, happiness, and stress. Standard deviations are reported in brackets. The average general health rating was between "good (3)" and "fair (2)". Both the average happiness and stress ratings were in the "moderate" range.

Table 3 presents attitudes towards gambling and motivations for gambling (motivations for gambling was just assessed for the 1,680 gamblers). As can be seen, the large majority of people believe that gambling is morally wrong and that the harm of gambling outweighs its benefits, with

these negative sentiments being even more pronounced in females. About one-half of the sample believes that gambling is too widely available, with only about 11 % believing it is not available enough. Similar to what has been found in surveys from other countries, the most common motivations for gambling are to make money and for fun.

As mentioned earlier, the ten item gambling fallacies measure (GFM) was administered to the online panel sample ($n = 4,330$), but not the telephone sample (due to time limitations in the telephone survey). The average number of gambling fallacies in the online panel sample was 4.98/10. This compares to an international average of only 3.24/10.[8] As illustration of the relatively high rate of fallacies among South Koreans, an examination of individual items from the GFM shows that the majority of South Koreans (59.5 %) believe that certain numbers and number combinations are more likely to be selected as the winning lottery number. Most South Koreans (55.0 %) also believe that the recency of a jackpot on a slot machine has an influence on its current likelihood of providing a jackpot.

Table 4 shows participation in the various forms of gambling as well as typical month gambling expenditure (in South Korean won (₩); $1 US = ₩1,147) for people who participated in each form. Similar to other countries, lotteries and instant lotteries are the most common form of gambling, and internet gambling is among the least common forms. There is a marked gender difference in overall gambling participation, with rates being much higher for males compared to females. Among the 1.5 % ($n = 59$) of people who reported patronizing a casino in the past year, 31 reported going to the Kangwon Land casino, 4 reported patronizing other South Korean casinos, and 25 indicated they patronized casinos in other countries. In terms of types of casino games played, 21/59 reported played blackjack, 16/59 slot machines, 13/59 roulette, 10/59 baccarat, 5/59 wheel of fortune, 5/59 tai sai, 4/59 poker, and 2/59 sic bo. Among the 1.5 % ($n = 59$) of internet gamblers, 30 reported online gambling at an offshore site, with the rest only accessing online gambling from the domestically provided sports toto/proto.

Reported average monthly gambling expenditure was quite modest on most forms of gambling, with the exception of internet gambling and horse/bicycle/motorboat betting. This latter fact is consistent with the observation that 62 % of South Korean gambling revenue in 2009 derived from horse/bicycle/motorboat racing (primarily horse racing) [42]. The proportion of total reported

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[8] The international average was derived from a sample of 8,330 people from 105 countries in 2007, with the majority of these people being from North America [40, 41].

Table 2 Past year substance use, health and mental health (telephone sample; $n = 4,000$)

	Overall	Male	Female
Tobacco user	31.8 %	55.9 %	7.8 %*
Alcohol user	74.2 %	83.4 %	65.1 %*
Problems with drugs or alcohol	1.5 %	1.7 %	1.2 %
Mental health problems	4.4 %	3.9 %	4.9 %
General health rating (1–4)	2.57 (0.78)	2.51 (0.78)	2.62 (0.78)*
Overall level of happiness rating (1–5)	3.27 (0.77)	3.25 (0.81)	3.28 (0.74)
Overall level of stress rating (1–5)	3.09 (0.89)	3.10 (0.90)	3.07 (0.87)

* $p < 0.05$

Table 3 Gambling attitudes, motivations, and fallacies

Gambling attitudes (telephone; $n = 4,000$)	Overall (%)	Male (%)	Female (%)
Gambling is morally wrong	77.4	71.1	83.7*
Harm of gambling outweighs the benefits	78.1	75.6	80.6*
Gambling is too widely available	48.9	47.9	49.8
Gambling is not available enough	11.4	14.3	8.4*
Current availability of gambling is fine or don't know	39.7	37.8	41.8*
Primary motivation for gambling (telephone; $n = 4,000$)	**Overall (%)**	**Male (%)**	**Female (%)**
To make money	34.5	34.3	34.8
For fun/pleasure/to make me happy	27.5	26.7	29.1
To get away from it all	14.8	15.2	13.9
To socialize	14.5	15.1	13.1
Uncertain	4.7	4.7	4.8
Other reason	4.0	3.8	4.4
Gambling fallacies (online panel; $n = 4,330$)	**Overall**	**Male**	**Female**
	4.98	4.90	5.06

* $p < 0.05$

Table 4 Gambling participation and expenditure (telephone sample; $n = 4,000$)

Past year gambling participation	Overall	Male	Female
Lottery or instant lottery gambling	36.2 %	49.0 %	23.3 %*
Social gambling	12.0 %	16.8 %	7.1 %*
Sports betting (sports toto/proto)	2.3 %	4.1 %	0.4 %*
Casino gambling	1.5 %	2.0 %	0.9 %*
Internet gambling	1.5 %	2.6 %	0.4 %*
Horse, bicycle, or motorboat betting	1.1 %	1.7 %	0.6 %*
Any gambling in past year	41.8 %	55.6 %	28.0 %*
Average number of gambling formats engaged in	1.3 (0.63)	1.4 (.70)	1.2 (0.43)*
Typical monthly gambling expenditure (Korean won ₩)	**Mean**	**Median**	**Mode**
Lottery or instant lottery gambling	12,758	5,000	5,000
Social gambling	89,683	20,000	100,000
Sports betting (sports toto/proto)	98,033	20,000	10,000
Casino gambling	57,623	57,793	10,000
Internet gambling	271,998	55,989	100,000
Horse, bicycle, or motorboat betting	437,380	30,000	10,000
Total monthly expenditure	62,465	9,332	5,000

* $p < 0.05$

Table 5 CPGI gambling categorizations (telephone sample; n = 4,000)

	Overall (%)	Male (%)	Female (%)
Non-gambler	58.2	44.4	72.0*
CPGI non-problem gambler	39.9	52.1	27.8*
CPGI at risk gambler	0.8	1.6	0.1*
CPGI moderate risk gambler	0.7	1.3	0.2*
CPGI problem gambler	0.3	0.7	0*
CPGI 5+ problem gambler	0.5	1.0	0.1*

* p < 0.05

expenditures accounted for by CPGI 5+ problem gamblers was 58.0, or 40.8 % when winsorizing the top five values which were large statistical outliers.[9]

Table 5 documents the gambling categorizations from the Canadian problem gambling index. A score of 0 indicates a gambler who does not experience any problems. A score of 1–2 denotes someone who is an "At Risk" gambler. A score of 3–7 denotes a "Moderate Risk" gambler. A score of 8 or higher denotes someone who is a "Severe Problem Gambler". In addition to the usual CPGI categorizations, the percentage of people who scored five or higher is also reported, as recent research has shown this level to be a better demarcation of clinically assessed problem gambling [20]. By either the 5+ or 8+ measure, the rate of problem gambling in South Korea is quite low.

Everyone who had a CPGI score of five or higher was asked supplemental questions about problem gambling. As expected (and explained in the "Method"), there was a much higher number of problem gamblers (i.e., CPGI 5+) in the online panel sample (n = 282) relative to the telephone sample (n = 22). Hence, the descriptive data below is based on the larger online panel sample.

Among these 282 problem gamblers, the types of problems most commonly experienced were financial problems (76.1 % of cases), mental health problems (40.7 %), relationship problems (29.3 %), work or school problems (23.1 %), and engagement in illegal activity (23.5 %). Only 24.3 %of these 282 individuals indicated there was a certain form of gambling causing more problems than other forms, with the most commonly identified problematic forms being social gambling (primarily Hwatuand poker) (38.7 %), horse/bicycle/motorboat gambling (17.7 %), and casino table games (e.g., baccarat, blackjack, roulette) (12.9 %). Only 23.0 % (n = 65) of problem gamblers reported that they wanted help for gambling-related problems. For these 65 individuals, 58 % (n = 38)

reported having sought help for problems in the past 12 months, with the most common sources of help being family/friends (38.9 %), online websites (27.8 %), Gamblers Anonymous (Dandobak Association) (11.1 %), a psychiatrist or hospital (8.3 %), and a counselor or counseling centre (5.6 %). A total of 30.2 % of people wanted to know about the free gambling and mental health treatment services in their local area. Roughly 13 % of problem gamblers reported there was also a history of gambling problems in either their parents or a sibling.

Logistic regressions

Logistic regressions were run to identify the variables that best differentiated gamblers from non-gamblers and problem gamblers (CPGI 5+) from gamblers who did not have any gambling-related problems. These analyses were conducted on the online panel sample because of the much greater proportion of CPGI 5+ problem gamblers (n = 282; 6.5 % of the total sample). Furthermore, the data was weighted so that problem gamblers were given equal weighting to the non-problem gamblers in the analysis.[10]

Thirteen predictor variables were used to discriminate gamblers from non-gamblers: age, gender, marital status, educational attainment, employment status, household income, immigrant/non-immigrant status, geographic residence, gambling fallacies, tobacco use, alcohol use, substance abuse, and mental health problems. All nominal variables were dummy coded. Entry of the variables into the equation was forward stepwise. Variable entry order was determined by the size of the Wald statistic, with a variable entry level of $p = 0.01$ and an exit level of $p = 0.05$.

Maximal discrimination between the groups occurred with a constant and nine predictor variables. Gamblers were significantly more likely to have more gambling fallacies, to use alcohol, to be male, to be employed full time, to use tobacco, to be substance abusers, to be younger than 65, to have lower educational attainment, and to have lower overall happiness. A test of the full model with the nine predictors against a constant-only model was statistically significant, $\chi^2 (12) = 786.7$, $p < 0.0001$, indicating that the predictors reliably distinguished between gamblers and non-gamblers. The variance accounted for was small, however, with Nagelkerke $R^2 = 22.2$ %. Overall prediction success was also modest at 66.8 %, with 66.8 % of non-gamblers correctly classified and 66.7 % of gamblers correctly classified. Table 6 shows regression coefficients,

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[9] For the online sample, the proportion of total reported gambling expenditure accounted for by CPGI 5+ problem gamblers was 63.9 % for the unwinsorized sample and 31.1 % for the winsorized sample.

[10] With such a low prevalence rate, failure to overweight the problem gamblers leads to analytic solutions that maximize classification accuracy by identifying everyone as a non-problem gambler.

Table 6 Logistic regression of characteristics differentiating gamblers from non-gamblers (online panel sample; $n = 4,330$)

Variable	Regression coefficients (B)	Wald statistics	Odds ratios
# Gambling fallacies	0.220	147.035	0.803
Alcohol user	1.066	96.340	2.903
Gender (male = 1, female = 2)	−0.691	80.261	0.501
Employed full time	0.510	44.393	1.666
Tobacco user	0.449	30.415	1.567
Substance abuse	0.858	24.192	2.359
Age	−0.175	13.470	0.840
Educational attainment	−0.195	8.841	0.823
Overall happiness	−0.109	5.733	0.897
Constant	2.136	36.007	8.463

Table 7 Logistic regression of characteristics differentiating problem gamblers from non-problem gamblers (online panel sample; $n = 4,330$)

Variable	Regression coefficients (B)	Wald statistics	Odds ratios
# Gambling fallacies	0.268	111.810	0.765
Internet gambling	1.144	100.127	3.138
Horse, bike, motorboat gambling	1.394	95.754	4.032
Social gambling	0.899	75.644	2.458
Gender (male = 1, female = 2)	−0.866	72.382	0.421
Mental health problems	0.902	61.873	2.466
Motivation for gambling		48.773	
Sports betting	0.832	48.701	2.297
Casino gambling	0.836	23.948	2.306
Income	−0.218	9.796	0.804
Constant	2.102	31.832	8.183

Wald statistics, and odds ratios for each of the two predictors.

Nineteen predictor variables were used to discriminate problem gamblers (CPGI 5+) from non-problem gamblers: age, gender, marital status, educational attainment, employment status, household income, immigrant/non-immigrant status, geographic residence, gambling fallacies, tobacco use, alcohol use, substance abuse, mental health problems, motivation for gambling and whether the person had engaged in any of the six different types of gambling. All nominal variables were dummy coded. Entry of the variables into the equation was forward stepwise. Variable entry order was determined by the size of the Wald statistic with a variable entry level of $p = 0.01$ and an exit level of $p = 0.05$.

Maximal discrimination between the groups occurred with a constant and ten predictor variables. Problem gamblers were significantly more likely to have more gambling fallacies; to gamble on the internet; to bet on horse, bicycle, or motorboats; to be a social gambler; to be male; to have mental health problems; to bet on sports; to espouse certain gambling motivations (gambling to get away from it all); to be a casino gambler; and to have a lower income. A test of the full model with the ten predictors against a constant-only model was statistically significant, χ^2 (15) = 1735.9, $p < 0.0001$, indicating that the predictors reliably distinguished between problem gamblers and non-problem gamblers. The variance accounted for was good, with Nagelkerke R^2 = 53.6 %. Overall prediction success was also quite good at 80.2 %, with 83.3 % of non-problem gamblers correctly classified and 77.1 % of problem gamblers correctly classified. Table 7 shows regression coefficients, Wald statistics, and odds ratios for each of the predictors.

Discussion

The present study provides the first comprehensive profile of gambling in South Korea as well as an update on the current prevalence and correlates of problem gambling in this country.

The first thing of note is the relatively low overall participation in gambling. South Korea's past year gambling participation rate of 41.8 % compares to an average of 66.6 % in the 55 other national prevalence studies from around the world [4]. Only Germany has reported a lower past year participation rate of 39.2 % in 2006 [43]. The rate of 41 % is also low, relative to the other Asian jurisdictions of Hong Kong, Macau, and Singapore, where rates have ranged from 47 % in Singapore in 2011 to 81 % in Hong Kong in 2005 (average of 64.0 %) [4]. It is unknown whether the current prevalence rate of 41.8 % in South Korea represents an increase or decrease relative to past rates, as the two prior South Korean studies [5, 6, 8] focused on lifetime engagement and did not report overall gambling prevalence.

One of the main factors contributing to the relatively low overall prevalence of gambling in South Korea is the low participation rates by females (28 %). Another important factor is the very negative attitudes toward gambling with 77 % of South Koreans believing it is morally wrong and 78 % believing the harm of gambling outweighs its benefits. This compares to 9 % and 43 %, respectively, in an international survey of 8,330 gamblers in 2007 [40, 41].[11] A third factor likely contributing to

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[11] These negative attitudes lends credence to the suggestion made in the Introduction that gambling participation may be a stigmatized activity in South Korea, and that face-to-face administration may be a less optimal administration format relative to telephone administration.

relatively low gambling participation is the limited legal availability of gambling relative to other countries (i.e., having only one domestic casino, the lack of electronic gambling machines in lounges/bars, restricted internet gambling opportunities). At an individual level, the best predictors of whether someone was a gambler in the present study was having more gambling fallacies, alcohol use, tobacco use, male gender, full time employment, substance abuse, being younger than 65, having lower educational attainment, and having lower overall happiness.

The relative popularity of individual forms of gambling is similar to what is found in other countries, with lotteries, instant lotteries, and social gambling being the most common forms and internet gambling being among the least common [4]. However, participation in casino gambling is very low (1.5 %) relative to other countries, which again is partly attributable to the fact there is only one domestic casino (Kangwon Land casino). It is important to note that the Kangwon Land casino accounted for 55.7 % of all South Korean casino revenue in 2009 with the 16 foreigners-only casinos collectively accounting for just 44.3 % [42], suggesting that South Korean participation in casino gambling would increase if availability increased. Although concern is sometimes expressed about illegal 'underground' casinos or Koreans using false identification to enter foreigners-only casinos, only about 0.1 % of South Koreans report doing this. A more frequent (but still uncommon) strategy is the patronization of casinos outside of South Korea, reported by 0.6 % of the sample. Of final note, similar to what has been found in other Asian jurisdictions [4], South Koreans who do patronize casinos are more likely to play table games rather than electronic gambling machines (EGMs).

There were relatively high rates of gambling fallacies among South Koreans, with the average number of fallacies being 4.98/10, compared to an international average of 3.24/10. Western beliefs about gambling are strongly influenced by mathematical probability theory (developed in Europe in the 1600s) where the outcome of 'games of chance' are seen as probabilistic events governed by physical principles.[12] In contrast, and as evidenced by the present results, these principles are less well established in Asian cultures [15, 44–46].For example, the present study found that the majority of South Koreans (59.5 %) believe that certain numbers and number combinations are more likely to be selected as the winning lottery number, whereas this is a much less common belief internationally (29.3 %). The majority of South Koreans (55.0 %) also believe that the recency of a jackpot on a slot machine has

an influence on its current likelihood of providing a jackpot, whereas this is an uncommon belief elsewhere (23.0 %). In addition to less understanding of the independence of random events, examination of other individual questions shows that South Koreans are significantly more likely to be susceptible to superstitious conditioning; to believe that certain people are luckier than other people; and to be insensitive to statistical probabilities when gambling. Interestingly, although it is sometimes said that Asians believe luck can be 'cultivated', this is the one question favouring South Koreans, with only 24.8 % believing that a positive attitude or doing good deeds can increase the likelihood of winning, compared to 35.8 % of people elsewhere.

Similar to what has been found in surveys in other jurisdictions, the two most common motivations for gambling are for fun and to make money. However, in most other jurisdictions, gambling for fun tends to be the most highly endorsed motivation, whereas gambling to make money is the most commonly reported motivation in South Korea. This may be due to a stronger belief among Koreans that winning is possible.

The past year prevalence of problem gambling among South Korean adults was 0.5 % (using a CPGI 5+ cut-off). It is difficult to compare problem gambling rates between jurisdictions because of the use of different problem gambling assessment instruments, different cut-offs, and different methodological approaches (i.e., face-to-face versus telephone administration, survey description, etc.), all of which have a significant impact on the obtained prevalence rate [3, 22]. In order to rectify this situation, Williams et al. [4] determined the relative influence of each of these methodological differences and applied appropriate conversion factors to produce *standardized* rates of problem gambling for all 202 jurisdiction-wide problem gambling prevalence studies. Using this approach, the standardized past year prevalence rate in South Korea in the present study would be 0.8 %, and would be 0.9 % in the previous 2006/2007 study by Park et al. [8]. It was not possible to apply these standardization procedures to the 1984 study by Lee et al. [5, 6] because it used an instrument (DSM-III) with a unknown relationship to other instruments. Nonetheless, it is worth noting that the reported lifetime prevalence rate of 1.02 % in Lee et al. is quite similar to the 0.8 % in the present study and the 0.9 % in the Park et al. study.

By comparison, worldwide, the standardized past year rate of problem gambling ranges from 0.5 to 7.6 %, with the average rate across all countries being 2.3 % [4]. This low prevalence rate in South Korea is especially notable considering that the highest standardized prevalence rates have been found in Hong Kong, Macau, and Singapore (standardized rates ranging from 3.1 to 7.6 %) [4]. With an

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[12] Most Westerners 'know' this, even if their gambling behaviour is not consistent with this knowledge.

estimated adult population of 37,882,368 in 2010, a prevalence rate between 0.5 and 0.8 % in South Korea would translate into between 200,000 to 300,000 problem gamblers, with roughly 23 % of these individuals desiring help for their gambling problems. As has been found in other countries [47, 48], the small percentage of problem gamblers in South Korea accounts for a disproportionately large percentage of gambling revenue, conservatively estimated to be between 30 and 40 % of total revenue in the present study.

The low prevalence rate of problem gambling in South Korea is related to the relatively low prevalence of gambling, as the average level of gambling activity in a jurisdiction roughly predicts the jurisdiction's level of excessive activity or problem gambling [49–51]. This is known as the 'single distribution theory' [52, 53], which has been shown to have applicability in predicting rates of alcoholism. Data derived from Williams et al. [4] confirms that standardized past year rates of problem gambling correlates with the percentage of the population that engages in gambling in both Australian states (Kendall tau $b = 0.21$, $p = 0.05$ (one-tail), $N = 30$ pairs) as well as Canadian provinces (Kendall tau $b = 0.24$, $p = 0.01$ (one-tail), $N = 47$ pairs). An additional factor likely responsible for the low prevalence rate of problem gambling in South Korea is the restricted access the populace has to commercial forms of continuous gambling (casino table games, EGMs) and more readily accessible forms (i.e., online gambling) that have higher risk potential for problem gambling compared to other formats [33, 34] (although it is important to note that only 24.3 % of South Korean problem gamblers reported there to be a particular form of gambling that was more problematic than other forms).

At an individual level, the variables that are most predictive of problem gambling in South Korea are: having a greater number of gambling fallacies; gambling on the internet; betting on horses, bicycling, or motor boat racing; social gambling; male gender; mental health problems; sports betting; motivation for gambling (gambling to escape); casino gambling; and lower income. Comparisons with the 1984 South Korean study are limited by the fact that most of these variables were not assessed in 1984 (the only correlate reported was being in the age group 45–65). Comparisons with the 2006/2007 South Korean study are also somewhat limited due to the lifetime timeframe used in 2006/2007 and the fact that some of the variables assessed in 2011 were not assessed in 2006/2007 (i.e., gambling fallacies, gambling motivations). However, there was a fairly high degree of correspondence for variables assessed in both studies, with male gender, mental health problems, horse race betting, bicycle betting, internet gambling, and casino gambling being associated with problem gambling in both studies. Variables significant in 2006/2007 but not in 2011 were: age 30–49; being divorced/separated/widowed; living in urban rather than rural settings; having associated problems with substance abuse; and playing poker or electronic gambling machines. Variables significant in 2011 but not 2006/2007 were engaging in social gambling; sports betting; and having a lower income.

In general, most of the variables associated with problem gambling in the present study are also associated with problem gambling in the 201 other worldwide population prevalence studies of gambling [4]. The main exceptions to this are that younger age (18–35), lower educational attainment, substance abuse, and EGM gambling are typically correlated with problem gambling in other jurisdictions but were not found to be correlated with problem gambling in the present study. It is worth noting that younger age and EGM play have not been consistently linked to problem gambling in other Asian (Hong Kong, Macau, Singapore) jurisdictions either [4].

The types of problems experienced by South Korean problem gamblers also appears to be similar to problem gamblers elsewhere, with the most common problems being financial problems and mental health problems. (There had been some prior speculation that *relationship* problems may have been a more prominent symptom in a society such as South Korea which is very family-focused). The percentage of problem gamblers who desire help for their problems is quite low (23.0 %). Furthermore, those who do seek help are much more likely to seek help from family, friends, or online websites, rather than Gamblers Anonymous, counselors, or physicians. This may be due to the reticence to self-disclose problems in Asian cultures [10, 12, 13] and/or a disinclination to seek help from outside sources. While less awareness of and/or availability of problem gambling treatment may also be a factor, it is not likely the most important factor, as only 30.2 % of problem gamblers wished to know about treatment options in their local area.

Summary and conclusions

The past year adult prevalence of gambling in South Korea is 41.8 %, which is fairly low by international standards. This is likely related to the very strong negative attitudes toward gambling in South Korea, the low participation by females, and its limited legal availability relative to other countries. An important observation from a policy perspective is that despite the restrictions on legal gambling availability, only 0.1 % of South Koreans report illegally gambling at a domestic casino, only 0.6 % report gambling at foreign casinos, and only 0.7 % report online gambling at an offshore site.

The past year adult prevalence of problem gambling is 0.5, or 0.8 % using a standardized rate that levels out methodological differences between jurisdictions. This is also very low by international standards and is likely attributable to the relatively low prevalence of gambling as well as restricted legal access to continuous forms of gambling as well as forms that are more readily accessible (i.e., online gambling). There is potential for higher rates of problem gambling because of high rates of gambling fallacies, a greater tendency for South Koreans to report gambling to win money, and the fact that the one domestic casino accounts for 55.7 % of all South Korean gambling revenue. It does not appear that the rate of problem gambling in South Korea has changed significantly since 2006/2007, which is consistent with there being no major change in the legal availability of gambling in the past 5 years. There would be merit in conducting an additional prevalence study in another 5 years to observe whether the prevalence rate continues to be stable.

Similar to other jurisdictions, the small percentage of problem gamblers in South Korea accounts for a disproportionate amount of Korean gambling revenue (30–40 %). The variables that are predictive of problem gambling in South Korea are also quite similar to those found in other countries. The exceptions are that the present study did not find younger age (18–35) or EGM gambling to be associated with problem gambling, which is similar to findings in other Asian jurisdictions, but dissimilar to findings in most other non-Asian jurisdictions.

There are an estimated 200,000–300,000 problem gamblers in South Korea. However, only 23 % of these individuals desire help for their gambling problems, and those that have sought help are much more likely to seek help from family, friends, or online websites, rather than outside treatment sources. Hence, strengthening online and self-help resources with a particular focus on addressing gambling fallacies may prove to be a useful clinical approach for this population [54–56].

Study limitations

The main potential limitation of the present study concerns the response rates (17 % in the telephone survey and 20.2 % in the online panel survey), which are quite low compared to historical response rates, but are similar to the response rates that have been obtained in many prevalence studies in the last few years [4]. Contacting people on their cell phones may have been a contributing factor, as people are unfamiliar with being solicited for surveys via this modality. However, while a low response rate always increases the risk of non-representativeness, there is no clear evidence that low response rates by themselves create biased data [57–59]. Furthermore, weighting the sample to correct for demographic sampling biases helps address potential non-representativeness.

A second limitation is that time limitations precluded the use of more extensive and well validated measures of substance abuse and mental health problems (i.e., the presence/absence of each of these things was assessed with a single face-valid question).

A third limitation concerns potential response bias which may have artificially reduced gambling and problem gambling prevalence rates to some extent. Although social desirability has some impact on all surveys, it may be more important in the present one due to the reticence to self-disclose problems in Asian cultures compounded by the fact that the majority of South Koreans believe that gambling is morally wrong.

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