FULL-LENGTH REPORT

Journal of Behavioral Addictions 5(3), pp. 410–418 (2016)
DOI: 10.1556/2006.5.2016.066
First published online September 20, 2016

Gambling disorders, gambling type preferences, and psychiatric comorbidity among the Thai general population: Results of the 2013 National Mental Health Survey

SAWITRI ASSANANGKORNCHAI[1]*, EDWARD B. MCNEIL[1], NOPPORN TANTIRANGSEE[2], PHUNNAPA KITTIRATTANAPAIBOON[3] and THAI NATIONAL MENTAL HEALTH SURVEY TEAM

[1]Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand
[2]Songkhla Rajanagarindra Psychiatric Hospital, Songkhla, Thailand
[3]Department of Mental Health, Ministry of Public Health, Nonthaburi, Thailand

(Received: April 22, 2016; revised manuscript received: September 1, 2016; accepted: September 3, 2016)

Background and aims: To estimate the prevalence of problem and pathological gambling, gender and age-group differences in gambling types, and comorbidities with other psychiatric disorders among the Thai general population. *Methods:* Analysis was conducted on 4,727 participants of Thailand's 2013 National Mental Health Survey, a multistage stratified cluster survey, using the Composite International Diagnostic Interview. Diagnoses of problem and pathological gambling and other psychiatric disorders were based on the DSM-IV-TR criteria with the following additional criteria for gamblers: more than 10 lifetime gambling episodes and a single year loss of at least 365 USD from gambling. *Results:* The estimated lifetime prevalence rates of pathological and problem gambling were 0.90% [95% confidence interval (CI): 0.51–1.29] and 1.14% (95% CI: 0.58–1.70), respectively. The most popular type of gambling was playing lotteries [69.5%, standard error (SE) = 1.9], the prevalence of which was significantly higher among females and older age groups. The most common psychiatric disorders seen among pathological gamblers were alcohol abuse (57.4%), nicotine dependence (49.5%), and any drug use disorder (16.2%). Pathological gambling was highly prevalent among those who ever experienced major depressive episodes (5.5%), any drug dependence (5.1%), and intermittent explosive disorder (4.8%). The association between pathological gambling was strongest with a history of major depressive episode [adjusted odds ratio (AOR) = 10.4, 95% CI: 2.80–38.4]. *Conclusion:* The study confirms the recognition of gambling disorders as a public health concern in Thailand and suggests a need for culturally specific preventive measures for pathological gamblers and those with a history of substance use disorders or major depression.

Keywords: pathological gambling, problem gambling, psychiatric comorbidity, gambling type preference, National Mental Health Survey

INTRODUCTION

Because of the advances in technology and increased socialization and Internet access in the modern world today, several types of gambling have become easily accessible in daily life. Some people gamble occasionally, and/or place only small bets, thus not causing them to experience any major problems. However, others do so excessively, to an extent that results in major problems occurring both to themselves, their families, and society. The prevalence of excessive gambling, which includes both problem and pathological gambling, varies by country and depends on the measuring instrument and definition used. A review of studies published between 2000 and 2005 found that the prevalence rates for excessive gambling was 3.0% (problem 1.2% and pathological 1.8%) based on the South Oaks Gambling Survey, 3.2% (problem 2.4% and pathological 0.8%) based on the Canadian Problem Gambling Index, and 3.1% (problem 1.9% and pathological 1.2%) based on the DSM-IV (Stucki & Rihs-Middel, 2007). More recent studies found different prevalence rates of problem and pathological gambling by world regions. The prevalence of problem gambling in western countries including England (Cowlishaw & Kessler, 2016), Finland (Castren et al., 2013), and Hungary (Kun, Balazs, Arnold, Paksi, & Demetrovics, 2012) ranges between 0.7% and 1.9% with rate as high as 3.0% in South Korea (Park et al., 2010). Furthermore, the prevalence of pathological gambling varies between 1.1% (Italy and Spain) and 6.5% (Estonia) in European countries (Kun et al., 2012), while it was 0.8% in South Korea (Park et al., 2010) and 2.7% in Singapore (Subramaniam, Abdin, Vaingankar, Wong, & Chong, 2015).

Clinical studies on gambling have mostly focused on pathological gamblers, mainly because these types of gamblers are a treatment-seeking sample. Population-based studies not only eliminate treatment-seeking bias but also cover all levels

* Corresponding author: Sawitri Assanangkornchai; Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand; Phone: +66 74 451 165; Fax: +66 74 429 754; E-mail: savitree.a@psu.ac.th

of gambling populations, including at-risk and sub-syndromal gamblers, who will not likely be found in clinical samples. Such groups of gamblers, who may also experience gambling harms such as financial difficulties and feelings of guilt, could account for a higher proportion of gamblers in a society than those strictly meeting the criteria for problem or pathological gambling (Walker, Abbott, & Gray, 2012). Different types of gambling differ in the range of stakes involved, odds of winning, and mental and physical skills required. The preferences for each gambling type, therefore, differ across gambler and population groups. An exploration of gambler profiles, including preferences for the various gambling types and comorbidities with other psychiatric disorders, is useful for planning preventive and treatment interventions.

Gambling behavior is affected by social context and cultural background. Regional variations of gambling behaviors have been observed (Francis, Dowling, Jackson, Christensen, & Wardle, 2015; Petry, Stinson, & Grant, 2005). In Thailand, certain kinds of gambling are illegal – casinos and electronic gambling machines are banned but lotteries and horse race betting are allowed. Gambling behavior is deeply rooted in Thai culture. Social gambling, for example, gambling while playing golf or cue sports with friends, is widespread and cards are commonly played as a recreational activity with exchange of money being involved. Several kinds of online gambling, including underground casinos, have become available for the majority of the population, especially those who have access to smart phones or computers. Betting on football matches and underground lotteries are also popular. Because of the popularity of online gambling and football betting in recent years, several strategies have been implemented to prevent gambling problems both by the government and civil society networks. The most recent global sporting event, the 2016 EUFA European Championship, raised a lot of concerns within the country, including the Thai prime minister who expressed his concerns over people falling prey to gambling and advised parents and teachers to warn children not to gamble. Other strategies include patrons of football betting and alcohol sales to underage drinkers in entertainment venues, monitoring the football gambling websites, provision of educational programs in schools, and the media and educational campaigns by the Stop Gambling Network (Center for Gambling Studies, 2016).

Many studies on problem and pathological gambling have been recently conducted in western countries and eastern Asian countries (e.g., Taiwan, Korea, and Japan); however, no population-based national study investigating the prevalence, types, and correlates of problem and pathological gambling has been conducted in Thailand. Using data from the National Mental Health Survey in 2013, this study aimed to examine the prevalence of problem and pathological gambling, gender and age-group differences in gambling types, and comorbidities with other psychiatric disorders among the Thai general population.

METHODS

Participants

Details of the sampling procedure have been published elsewhere (Kittirattanapaiboon, Tantirangsee, Chutha, Assanangkornchai, & Supanya, 2016). In short, the National Mental Health Survey 2013 was designed to be representative of the general population of Thai adults aged 18 years or older who are permanent residents of non-institutionalized civilian households in Thailand. A stratified multistage probability sampling technique was used. First, the Thai population was stratified into Bangkok metropolitan area and four other regions of the country. Three to five provinces in each region and four zones from Bangkok were then randomly chosen as the primary sampling unit (PSU). Within each PSU, 53 enumeration areas (EAs) (between 4 and 17 per PSU) were chosen based on the probability proportional to size, resulting in 265 EAs across the country. In each EA, 24 households were systematically selected giving a total of 6,360 households. An individual living in each selected household was randomly selected using the Kish selection table without replacement (Kish, 1949). The inclusion criteria were the individual who has been living in the household for the past 3 months prior to the interview, have Thai nationality, and be able to communicate in Thai.

Procedure

The data were collected using face-to-face interviews by trained interviewers who were mental health workers in each region. The paper-and-pencil interviewing version of the WHO World Mental Health Initiative version 3.0 of the Composite International Diagnostic Interview (WMH-CIDI) (Kessler & Ustun, 2004; World Health Organization, 2004) was used during the interview. The CIDI is a fully structured interview that generates diagnoses according to the definitions and criteria of both the ICD-10 (World Health Organization, 1994) and DSM-IV (American Psychiatric Association, 2000) diagnostic systems. The DSM-IV-TR criteria were used for the diagnoses of psychiatric disorders here. Only 18 of the 42 CIDI modules were used in this survey. Interviews lasted approximately 45–90 min.

Households were revisited at most two times on different days if a household member was not present at a previous visit. Replacement of households was not implemented in cases of non-response.

The gambling module of the CIDI began with questions on the frequency of lifetime gambling, types of gambling engaged in, age at gambling onset, and, in order to screen out non-problematic gamblers – thus minimizing interview duration, the largest amount of money ever lost from gambling in any single year. An individual who gambled more than 10 times in their lifetime and lost at least 365 USD (10,950 Thai Baht) in a single year was further assessed with four questions enquiring about problems associated with gambling, for example, Did gambling often interfere with your work or responsibilities at school, on a job, or at home? Did gambling cause repeated arguments or other serious problems with your family, friends, neighbors, or coworkers? A respondent who answered at least one of these four questions in the affirmative was further asked 12 questions that reflected 10 symptoms of pathological gambling, for example, Did you spend a lot of time thinking about gambling when you should have been thinking about other things? Did you ever have to increase the amount you

bet or gambled in order to keep it exciting? Did you often use gambling as a way to alleviate bad moods or to improve your mood? Multiple questions were used for the conceptually more complex symptoms. A DSM-IV diagnosis of pathological gambling is made if at least five out of the 10 criteria, reflected in these 16 questions, were satisfied. A lifetime pathological gambler defined in this study was, therefore, an individual who gambled more than 10 times in their lifetime, lost at least 365 USD in a single year, and satisfied five or more DSM-IV-TR criteria for pathological gambling. A lifetime problem gambler was defined as an individual who gambled more than 10 times in their lifetime, lost at least 365 USD in a single year, and satisfied at least one but no more than four DSM-IV-TR criteria for pathological gambling. A regular gambler was defined as an individual who gambled at least once per week for 6 months or more consecutively but did not satisfy the criteria of the DSM-IV-TR for pathological or problem gambling.

Diagnoses of other psychiatric disorders, such as substance use disorders (alcohol, tobacco, and illegal substance use), mood disorders (depression and mania), anxiety disorders (panic disorder, agoraphobia, generalized anxiety disorder, and post-traumatic stress disorder), psychotic disorders, intermittent explosive disorder, and suicidality, were also derived from the modules of the CIDI and based on the DSM-IV-TR criteria.

Statistical analysis

The prevalence rates of problem and pathological gambling were compared among demographic characteristics using Pearson's chi-squared test with Rao–Scott adjustment. The prevalence of lifetime gambling for various types was presented with standard errors (SEs) and compared between males and females, and between different age groups using Pearson's chi-squared test with Rao–Scott adjustment. The prevalence rates of pathological gambling among those with psychiatric disorders and the rates of mental health disorders among those with pathological gambling were estimated and presented with SEs. Associations between lifetime pathological gambling and various lifetime mental health disorders were determined using multivariate logistic regression models adjusted for demographic characteristics and presented as adjusted odds ratios (AORs) with 95% confidence intervals (CIs). All analyses were conducted using R language and environment (R Core Team, 2015). All estimates and SEs were adjusted using sampling weights calculated from the multistage sampling study design. Post-stratification calibration was used to adjust the sampling weights based on the non-response and the age and sex distribution of the Thai population.

Ethics

Respondents were interviewed only after informed written consent was obtained and total confidentiality was assured. The study procedures were carried out in accordance with the Declaration of Helsinki. The survey was approved by the Ethical and Research Committee (Mental Health and Psychiatry) of the Ministry of Public Health, and the secondary data analysis proposal approved by Institutional Review Board of Faculty of Medicine, Prince of Songkla University.

RESULTS

Sample characteristics

Of 6,360 households, 5,996 were visited and 5,884 respondents agreed to participate in the survey (response rate = 98%), of whom 4,727 provided complete data for the analyses (effective response rate = 79%). The majority was female (64%), aged 45 years or older (63%), married (66%), and attained a primary school education (61%). Almost all respondents were in the lower income status with an annual personal income less than 1,000 USD. About 40% were self-employed, while 26.5% were unemployed.

Prevalence of problem and pathological gambling

The estimated lifetime prevalence of any type of gambling was 76.8% (95% CI: 73.5–80.0). 26.2% (95% CI: 23.7–28.8) gambled more than 100 times in their lifetime and 7.7% (95% CI: 6.5–9.0) gambled at least once a week for 6 months or more in a row.

The estimated lifetime prevalence rates of regular, problem, and pathological gambling were 6.85% (95% CI: 5.75–7.95), 1.14% (95% CI: 0.58–1.70), and 0.90% (95% CI: 0.51–1.29), respectively.

The weighted prevalence of problem and pathological gambling in the past year was 1.00% (95% CI: 0.50–1.49) and 0.72% (95% CI: 0.36–1.08) and in the past 30 days were 0.15% (95% CI: 0.0–0.40) and 0.11% (95% CI: 0.0–0.30), respectively.

Table 1 compares the prevalence rates of regular, problem, and pathological gambling among different demographic groups. Males were more likely to gamble than females with significantly higher rates of problem and pathological gambling. There were significant differences in the distributions of education level and annual income between the three categories of gambling. The prevalence of problem gambling was higher among those with university or higher degrees compared to those having a lower educational level and the prevalence of all gambling categories was higher among people with higher incomes.

Gambling types among different gender, age, and gambling categories

The most popular type of gambling was playing lottery-type games (69.5%, SE: 1.9), the prevalence of which was significantly higher among females than males. The least popular types of gambling were gambling at a casino (0.6%, SE: 0.1), speculating on high-risk stocks (0.7%, SE: 0.2), and playing video gambling machines (1.2%, SE: 0.2).

Common gambling types played by males and females were different. For example, males were significantly more likely to play games or sports which needed mental skills such as cards and dice, or physical skills such as pool, golf, or bowling. Males were also more likely to participate in gambling which involved betting on sports with friends or in

Table 1. Prevalence rates of regular, problem, and pathological gambling by demographic characteristics, weighted % (standard error)

	Gambler type			
	Regular	Problem	Pathological	*p*-value
Gender				
Male	10.3 (1.0)	1.8 (0.6)	1.3 (0.3)	<.001
Female	3.7 (0.4)	0.5 (0.2)	0.5 (0.2)	
Age (years)				
18–24	8.3 (2.5)	0.7 (0.6)	0.5 (0.5)	.5
25–34	6.9 (1.6)	1.8 (0.7)	0.9 (0.4)	
35–44	6.1 (0.8)	1.5 (0.8)	0.9 (0.3)	
45–54	7.8 (1.0)	1.1 (0.7)	1.5 (0.5)	
55–59	4.8 (0.9)	0.8 (0.6)	1.6 (0.8)	
≥60	6.5 (0.6)	0.4 (0.2)	0.3 (0.2)	
Marital status				
Currently married	6.7 (0.6)	1.3 (0.4)	0.8 (0.1)	.5
Previously married	5.7 (1.0)	0.3 (0.1)	1.2 (0.5)	
Never married	8.3 (1.5)	1.2 (0.7)	1.0 (0.6)	
Education level				
Primary school	5.7 (0.6)	0.4 (0.1)	1.0 (0.2)	<.001
Secondary school	8.7 (1.2)	0.5 (0.3)	0.8 (0.3)	
University or higher	6.2 (1.4)	4.7 (1.2)	0.9 (0.5)	
Employment status				
Employed	6.1 (0.9)	1.8 (0.6)	0.9 (0.2)	.16
Self-employed	7.5 (0.8)	0.7 (0.2)	1.1 (0.3)	
Unemployed	6.9 (1.2)	0.8 (0.4)	0.5 (0.2)	
Annual income (USD)				
<1,000	5.7 (0.7)	0.7 (0.3)	0.5 (0.2)	.04
≥1,000	7.6 (0.7)	1.4 (0.4)	1.1 (0.3)	
Region				.11
Bangkok	7.7 (1.0)	1.4 (0.7)	0.1 (0.1)	
Central	7.4 (1.3)	1.3 (0.6)	0.9 (0.3)	
North	4.4 (0.8)	0.9 (0.3)	0.4 (0.1)	
North-east	6.4 (0.9)	0.9 (0.5)	1.0 (0.3)	
South	8.9 (1.0)	1.1 (0.5)	2.1 (0.6)	

an office pool, betting on sports with a bookie or with parlay cards, or betting on horse races or cock fights (Table 2).

Comparing between age groups, betting on sports with friends or in an office pool was more common among the younger age groups for both genders. Among males, the younger age groups were significantly more engaged in betting on sports with a bookie or with parlay cards, and playing games of physical skills for money, such as pool, golf, or bowling, than the older age groups. Among females, games involving cards, dice, or other games of mental skills for money and playing slot machines or bingo were more common in the younger age groups. Playing lottery-type games were significantly more common among the older age groups with the highest percentages among those aged 26–60 years (Table 2).

Classified by gambling category, the significant differences were only found in four types of gambling, that is, sports betting with a bookie; cards, dice, or chess; lottery-type games; and slot machines or bingo. Pathological gamblers reported never engaging in gambling involving speculating on high-risk stocks, gambling on the Internet, and gambling at a casino (Table 3).

Comorbidity of other mental disorders

Table 4 shows that for most psychiatric comorbidities, the prevalence of each psychiatric disorder among those with a history of pathological gambling was higher than the prevalence of pathological gambling among those with a history of psychiatric disorders. The most common psychiatric disorders seen among pathological gamblers were any alcohol use disorder (57.4%) and alcohol abuse (57.4%), followed by nicotine dependence (49.5%) and any drug use disorder (16.2%). On the other hand, pathological gambling was more highly prevalent among those with a history of major depressive episode (5.5%), any drug dependence (5.1%), and intermittent explosive disorder (4.8%). The association between pathological gambling was strongest with major depressive episode (AOR = 10.4, 95% CI = 2.80–38.4) indicating that pathological gamblers, compared to those without, were about ten times as likely to have major depression and vice versa, regardless of sociodemographic factors. In addition, pathological gambling was significantly more likely to co-occur with substance use disorders, either with alcohol, illicit drug, or tobacco use disorder, compared to those without (Table 4).

DISCUSSION

Prevalence of problem and pathological gambling

To the best of our knowledge, this is the first study to examine the profiles of gambling disorders at the national level in a Southeast Asian county where gambling is illegal. The prevalence rates of pathological gambling (0.94%) and problem gambling (1.2%) in our study are lower than that found in western and eastern Asian countries (Castren et al., 2013; Cox, Yu, Afifi, & Ladouceur, 2005; Hodgins, Stea, & Grant, 2011; Kessler et al., 2008; Kun et al., 2012; Lorains, Cowlishaw, & Thomas, 2011; Park et al., 2010; Subramaniam et al., 2015). This may due to the use of different research instruments and the fact that many kinds of gambling asked in the CIDI are less available in Thailand. The most common type of gambling played by Thai adults is lottery-type games and these are more likely to be played by females in the middle to older age groups. In Thailand, lottery games are widely available. Apart from the main lottery tickets, which are issued by the Government Lottery Office and drawn twice a month, there are several other underground or illegal lottery tickets available across the country. The ease of access, simplicity of playing, and social acceptability are likely to be the main reasons that this type of gambling is so popular in Thailand. This

Table 2. Gambling types ever played in lifetime by age group and gender, weighted % (standard error)

Gambling type	Gender	Age group (years) 18–25	26–60	>60	Total
Betting on sports with friends or in an office pool**	Male*	23.5 (4.8)	13.6 (1.3)	7.7 (1.0)	13.9 (1.5)
	Female*	5.7 (3.1)	0.7 (0.2)	0.6 (0.3)	1.3 (0.4)
Betting on sports with a bookie or with parlay cards**	Male*	9.8 (2.4)	8.3 (1.9)	2.4 (0.7)	7.4 (1.4)
	Female*	1.1 (0.9)	0.2 (0.1)	0.0 (0.0)	0.3 (0.1)
Playing cards, dice, chess, or other games of mental skill for money**	Male*	37.9 (6.2)	40.5 (2.7)	23.3 (2.7)	37.1 (2.0)
	Female*	35.8 (4.3)	16.7 (1.2)	7.2 (1.2)	17.2 (1.3)
Playing games of physical skill for money, such as pool, golf, or bowling**	Male*	20.0 (6.4)	11.8 (2.1)	3.1 (1.0)	11.4 (1.6)
	Female	0.9 (0.9)	0.2 (0.1)	0.0 (0.0)	0.2 (0.1)
Speculating on high-risk stocks, day trading, real estate, or stock options	Male	0.0 (0.0)	1.0 (0.3)	1.0 (0.4)	0.9 (0.2)
	Female	0.9 (0.9)	0.5 (0.2)	0.7 (0.3)	0.6 (0.2)
Playing the numbers, Lotto, video lottery games, instant Lotto games, or instant scratch-off tickets**	Male*	36.5 (4.6)	71.4 (2.5)	67.5 (3.0)	66.0 (2.1)
	Female*	52.3 (4.7)	76.3 (1.9)	66.3 (2.5)	71.3 (1.9)
Gambling on the Internet	Male	0.9 (0.7)	1.3 (0.5)	1.7 (0.7)	1.3 (0.5)
	Female	1.8 (1.1)	1.4 (0.5)	0.9 (0.3)	1.3 (0.3)
Playing video poker machines or other gambling machines**	Male	3.5 (1.8)	1.8 (0.5)	1.4 (0.5)	2.0 (0.4)
	Female	0.9 (0.9)	0.3 (0.2)	0.5 (0.2)	0.4 (0.2)
Playing slot machines, bingo, or pull tabs	Male	7.4 (2.7)	2.6 (0.7)	2.9 (1.7)	3.3 (0.7)
	Female*	8.3 (3.1)	2.3 (0.8)	0.4 (0.3)	2.7 (0.8)
Betting on horse or dog races or on dog or cock fights**	Male	8.3 (3.0)	7.4 (1.1)	8.4 (1.4)	7.7 (0.9)
	Female	0.9 (0.9)	0.3 (0.2)	0.0 (0.0)	0.3 (0.2)
Gambling at a casino	Male	0.0 (0.0)	1.0 (0.4)	0.2 (0.1)	0.8 (0.3)
	Female	0.9 (0.9)	0.3 (0.1)	0.1 (0.1)	0.4 (0.1)

*$p < .05$ for the comparison of the prevalence of each gambling type between age groups within the same gender. **$p < .05$ for the comparison of the prevalence of each gambling type between males and females.

Table 3. Gambling types ever played in lifetime by gambler groups, weighted % (standard error)

Gambling type	Gambler group Regular	Problem	Pathological	*p*-value
Betting on sports with friends or in an office pool	30.2 (4)	22.8 (5.6)	32.8 (9)	.449
Betting on sports with a bookie or with parlay cards	18.2 (3.3)	38.7 (11.4)	16.2 (4.6)	.061
Playing cards, dice, chess, or other games of mental skill for money	61.6 (3.7)	62.9 (9.1)	91.4 (3.4)	.016
Playing games of physical skill for money, such as pool, golf, or bowling	26.1 (3.9)	44.9 (9.7)	24.1 (6.3)	.1
Speculating on high-risk stocks, day trading, real estate, or stock options	2 (0.8)	6.3 (3.1)	0 (0)	.13
Playing the numbers or lottery games	80.7 (2.8)	96.4 (2.4)	91.9 (4.9)	.036
Gambling on the Internet	2.2 (1.3)	8.5 (4.8)	0 (0)	.148
Playing video poker machines or other gambling machines	7.4 (2.2)	3.5 (2.5)	2.3 (2.1)	.308
Playing slot machines, bingo, or pull tabs	8.9 (3)	22.7 (9.2)	3.4 (2.6)	.008
Betting on horse races or cock fights	19.2 (2.8)	2.2 (1.2)	28.8 (11.9)	.075
Gambling at a casino	2.7 (0.8)	0.9 (0.9)	0 (0)	.244

finding is similar to what is found in other Asian countries, for example, South Korea (Park et al., 2010), Taiwan (Yen & Wu, 2013), Hong Kong, and Macau (Liu, Luo, & Hao, 2013), reflecting the role of availability and social approval on some gambling activities of the residents of a country.

As seen in other studies, males were more likely to gamble than females (Blanco, Hasin, Petry, Stinson, & Grant, 2006; Castren et al., 2013; Froberg, Hallqvist, & Tengstrom, 2013; Husky, Michel, Richard, Guignard, & Beck, 2015). However, contradictory to a previous study (Kun et al., 2012), a higher prevalence of problem and pathological gambling was found among higher education and income groups. The explanation for this may be related to the types of gambling commonly played by the Thai people. Apart from the lottery games, other common gambling types include cards, dice, or other games of mental skill; betting on sports with friends or in an office pool; and playing games of physical skill for money, such as golf or bowling, all of which are more likely to be played by those in higher socioeconomic groups. In addition, the original CIDI minimum single year threshold for money lost due to gambling that is used to screen out respondents before asking questions about gambling problems is 365 USD (World Health Organization, 2004), which is equal to about 10,950 Thai Baht. It is therefore possible that a number of

Table 4. Lifetime prevalence rates of comorbid psychiatric disorders and associations with pathological gambling

Psychiatric disorders	Prevalence of pathological gambling among respondents with psychiatric disorders (weighted %; SE)	Prevalence of psychiatric disorders among respondents with pathological gambling (weighted %; SE)	Association between pathological gambling and other psychiatric disorders (AOR; 95% CI)[a]
Any alcohol use disorder	2.85 (0.97)	57.4 (13.2)	5.24 (1.84–14.9)
Alcohol abuse	2.93 (1.00)	57.4 (13.2)	5.51 (1.92–15.8)
Alcohol dependence	2.87 (1.66)	13.26 (7.84)	2.63 (0.63–10.9)
Any drug use disorder	3.56 (1.05)	16.2 (6.86)	3.83 (1.42–10.3)
Any drug abuse	3.71 (1.06)	16.2 (6.86)	3.98 (1.51–10.5)
Any drug dependence	5.10 (2.80)	7.33 (4.28)	5.05 (1.60–15.9)
Nicotine dependence	2.97 (0.94)	49.5 (12.3)	4.85 (1.68–14.0)
Any mood disorder	4.72 (2.31)	10.1 (5.06)	9.06 (2.70–30.4)
Major depressive episode	5.50 (2.91)	9.10 (5.34)	10.4 (2.80–38.4)
Any anxiety disorder	1.52 (0.85)	5.24 (3.60)	1.99 (0.46–8.54)
Panic disorder (without agoraphobia)	3.27 (2.54)	2.28 (1.76)	4.34 (0.75–25.2)
Panic disorder (with or without agoraphobia)	1.64 (1.77)	0.94 (0.97)	1.98 (0.23–17.0)
Psychotic disorder	2.21 (1.03)	14.48 (8.18)	2.85 (0.85–9.56)
Intermittent explosive disorder	4.83 (3.15)	14.9 (7.77)	6.25 (1.77–22.0)
Any suicidal behavior	2.53 (1.75)	9.89 (6.98)	3.12 (0.69–14.2)

Note. SE = standard error; AOR = adjusted odds ratio; CI = confidence interval.
[a]Adjusted for demographic and socioeconomic characteristics.

respondents with low incomes may have been inadvertently excluded.

The use of this minimum threshold is simply to reduce the time taken during the interview as unnecessary questions can be avoided. Previous studies have shown a relationship between degree of gambling problem with money spent on gambling (Johansson & Götestam, 2003; Tse, Hong, & Ng, 2013). However, using a cutoff for losing more than 365 USD in any single year from gambling in a country where the average income in 2013 was around 12,000 Thai Baht (400 USD) might have underestimated the prevalence of gambling disorders. In diagnosing gambling disorders, according to the DSM-IV or ICD-10, the amount of money lost from gambling, either in a lifetime or in the worst year, is not used as a diagnostic criterion. In our study, it was found that of the 307 lifetime gamblers who lost at least 365 USD, 68 (22%) were classified as problem or pathological gamblers. The remaining 2,715 lifetime gamblers were not asked about gambling problems as their greatest loss in any single year was less than 365 USD and thus assumed to not have gambling problems. Multiple imputations of these 2,715 respondents' unknown gambling types using other variables in the dataset resulted in a further number being classified as problem or pathological gamblers (Van Buuren & Groothuis-Oudshoorn, 2011). The prevalence of gambling in the Thai population was re-estimated to range from 2.2% to 3.0% for problem gambling and 1.7% to 2.1% for pathological gambling, or 3.9% to 5.1% for excessive gambling, which is much more than 2.1% obtained from the available data.

Gambling type preferences

Gambling type preferences were different by age group. We found that the prevalence rate of regular gambling was higher among young adults aged 18–24 years, whereas the rates of problem or pathological gambling were smaller. However, this should still be a concern because if regular gambling continues then the gamblers may eventually become problem gamblers due to their deficits in self-regulation and the role of behavioral conditioning on the brain reward pathways as seen in other addictive disorders (Clark, 2014; Goudriaan, Oosterlaan, de Beurs, & Van den Brink, 2004). Furthermore, we found that the preferred types of gambling among the younger age groups were those played in a group with friends, especially among young males, that is, betting on office sports pool and golf or bowling. It is evident that peer influence might promote risk-taking behaviors particularly among adolescents, and certain adolescents might be particularly prone to risk-taking behaviors under peer influence (Cavalca et al., 2013; Potenza, 2014). Type of gambling and particular context when they play is useful information for planning preventive programs in Thailand.

There was not much difference in gambling type preferences between the three gambler categories. After lottery-type games, the second most popular type of gambling was games involving cards, dice, or chess, which had the highest prevalence among pathological gamblers (91.4%), compared to problem (62.9%) and regular gamblers (61.6%). Street craps is very popular in Thailand, despite being illegal. The game requires few pieces of equipment, it can be played almost anywhere and is often seen being played at funeral functions and community fairs in rural areas. The players are usually regulars who follow the bank of the game everywhere and play with high stakes. In fact, street craps does not need a high mental skill level and the gambler's fallacy is often seen among those who play in the long run. Thus, the high availability of street craps may explain our results.

Psychiatric comorbidity

Consistent with other studies (Chou & Afifi, 2011; Desai & Potenza, 2008; Grant & Chamberlain, 2015; Parhami, Mojtabai, Rosenthal, Afifi, & Fong, 2014; Petry et al., 2005), gambling disorder was associated with other psychiatric disorders, especially substance use disorders, intermittent explosive disorder, and major depressive episode. The high prevalence rates of alcohol abuse (57.4%) and nicotine dependence (49.5%) among pathological gamblers and their strong associations (OR = 4.85 and 5.51, respectively) found in our study confirm the universality of the comorbidity between these two addictive disorders, despite different sociocultural contexts and population groups. Nevertheless, it is clearly seen that the proportions of individuals with pathological gambling who used alcohol, tobacco, or other drugs was higher than the proportion of individuals with these substance use disorders who had pathological gambling. Both gambling and alcohol and tobacco use are seen as social behaviors by many groups in Thailand. It is commonly found that gamblers drink alcohol and smoke cigarettes while gambling, especially when they do social gambling with friends. On the other hand, alcohol or other drug-dependent individuals are likely to preoccupy with their substance use rather than engage in other activities such as gambling.

The strongest association found in this study was between pathological gambling and major depressive episode (OR = 10.37). Researchers have identified a genetic overlap between pathological gambling and major depression, and this genetic correlation is more substantial than the correlations with other psychiatric disorders, including substance use disorders (Lobo & Kennedy, 2009; Potenza, Xian, Shah, Scherrer, & Eisen, 2005). This may explain the strong association between pathological gambling and major depressive episode found in our study. Another explanation may be that individuals with depressive episode may take risky behaviors, including gambling, as a relief of their depression or because of poor judgment. On the other hand, pathological gambling may lead to major depression as suggested by some longitudinal studies (Chou & Afifi, 2011; Parhami et al., 2014) because of guilt related to their gambling problem or some adverse gambling-related events, for example, large financial loss or threats from loan sharks. However, the temporal sequence of the occurrence of the two disorders is beyond the scope of our study.

Limitations

Because of the limited availability of some gambling types and their illegal status, for example, casinos, gambling machines, and slot machines, respondents might have been reluctant to admit playing these games. At the other extreme, some games such as golf and office pool, although played for money, are widely and socially accepted, and respondents who engaged in these activities may not have reported so as they may not have thought about these types of activities as gambling. As previously mentioned, an underestimate of the prevalence of gambling disorders might have occurred as 2,715 lifetime gamblers losing less than 365 USD in a single year were excluded. As seen in other national surveys in Thailand, and around the world, females and older people were oversampled, which is likely due to the fact that they stay at home while young males tend to live and/or work in other provinces, mainly Bangkok, and thus are excluded from the sample. However, to overcome this imbalance, sampling weights and post-stratification calibration using the age and sex distribution of the Thai population were applied in all analyses. Finally, the cross-sectional nature of the study design precludes drawing any causal relationships between pathological gambling and other psychiatric disorders.

CONCLUSION

Despite these limitations, the study confirms the recognition of gambling disorders as a public health concern in Thailand. Culturally specific preventive measures for the Thai general population, taking preferences of gambling types across population groups and interventions into account, specifically tailored for pathological gamblers with comorbid substance use disorders or major depression, are suggested.

Funding sources: The National Mental Health Survey was mainly funded by the Department of Mental Health (DMH), Ministry of Public Health (DMH2556) with additional support for the gambling section from the Thai Health Promotion Foundation (Grant number 56-019). The DMH and Thai Health Promotion Foundation had no involvement in the study design, collection, analysis, or interpretation of data, writing of the manuscript, or decision to submit the manuscript for publication.

Authors' contribution: PK was the principle investigator of the National Mental Health Survey. SA and EBM were responsible for the preparation of this manuscript. EBM and NT conducted the statistical analysis. SA wrote the first draft of the manuscript with inputs from EBM, NT, and PK. All authors contributed to and have approved the final manuscript.

Conflict of interest: All authors declare that they have no conflict of interest.

REFERENCES

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR* (4th ed. text rev.). Washington DC, USA: American Psychiatric Association.

Blanco, C., Hasin, D. S., Petry, N., Stinson, F. S., & Grant, B. F. (2006). Sex differences in subclinical and DSM-IV pathological gambling: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychological Medicine, 36,* 943–953. doi:10.1017/S0033291706007410

Castren, S., Basnet, S., Pankakoski, M., Ronkainen, J. E., Helakorpi, S., Uutela, A., Alho, H., & Lahti, T. (2013). An

analysis of problem gambling among the Finnish working-age population: A population survey. *BMC Public Health, 13,* 519. doi:10.1186/1471-2458-13-519

Cavalca, E., Kong, G., Liss, T., Reynolds, E. K., Schepis, T. S., Lejuez, C. W., & Krishnan-Sarin, S. (2013). A preliminary experimental investigation of peer influence on risk-taking among adolescent smokers and non-smokers. *Drug and Alcohol Dependence, 129,* 163–166. doi:10.1016/j.drugalcdep.2012.09.020

Center for Gambling Studies. (2016). *Thai society and gambling culture*. Retrieved from http://www.gamblingstudy-th.org/

Chou, K. L., & Afifi, T. O. (2011). Disordered (pathologic or problem) gambling and axis I psychiatric disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *American Journal of Epidemiology, 173,* 1289–1297. doi:10.1093/aje/kwr017

Clark, L. (2014). Disordered gambling: The evolving concept of behavioral addiction. *Annals of the New York Academy of Sciences, 1327,* 46–61. doi:10.1111/nyas.2014.1327.issue-1

Cowlishaw, S., & Kessler, D. (2016). Problem gambling in the UK: Implications for health, psychosocial adjustment and health care utilization. *European Addiction Research, 22,* 90–98. doi:10.1159/000437260

Cox, B. J., Yu, N., Afifi, T. O., & Ladouceur, R. (2005). A national survey of gambling problems in Canada. *Canadian Journal of Psychiatry, 50,* 213–217. doi:10.1177/070674370505000404

Desai, R. A., & Potenza, M. N. (2008). Gender differences in the associations between past-year gambling problems and psychiatric disorders. *Social Psychiatry and Psychiatric Epidemiology, 43,* 173–183. doi:10.1007/s00127-007-0283-z

Francis, K. L., Dowling, N. A., Jackson, A. C., Christensen, D. R., & Wardle, H. (2015). Gambling motives: Application of the reasons for gambling questionnaire in an Australian population survey. *Journal of Gambling Studies, 31,* 807–823. doi:10.1007/s10899-014-9458-1

Froberg, F., Hallqvist, J., & Tengstrom, A. (2013). Psychosocial health and gambling problems among men and women aged 16–24 years in the Swedish National Public Health Survey. *European Journal of Public Health, 23,* 427–433. doi:10.1093/eurpub/cks129

Goudriaan, A. E., Oosterlaan, J., de Beurs, E., & Van den Brink, W. (2004). Pathological gambling: A comprehensive review of biobehavioral findings. *Neuroscience and Biobehavioral Reviews, 28,* 123–141. doi:10.1016/j.neubiorev.2004.03.001

Grant, J. E., & Chamberlain, S. R. (2015). Gambling disorder and its relationship with substance use disorders: Implications for nosological revisions and treatment. *The American Journal on Addictions, 24*(2), 126–131. doi:10.1111/j.1521-0391.2013.12112.x

Hodgins, D. C., Stea, J. N., & Grant, J. E. (2011). Gambling disorders. *Lancet, 378,* 1874–1884. doi:10.1016/S0140-6736(10)62185-X

Husky, M. M., Michel, G., Richard, J. B., Guignard, R., & Beck, F. (2015). Gender differences in the associations of gambling activities and suicidal behaviors with problem gambling in a nationally representative French sample. *Addictive Behaviors, 45,* 45–50. doi:10.1016/j.addbeh.2015.01.011

Johansson, A., & Götestam, K. (2003). Gambling and problematic gambling with money among Norwegian youth (12–18 years). *Nordic Journal of Psychiatry, 57,* 317–321. doi:10.1080/08039480310002129

Kessler, R. C., Hwang, I., LaBrie, R., Petukhova, M., Sampson, N. A., Winters, K. C., & Shaffer, H. J. (2008). DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychological Medicine, 38,* 1351–1360. doi:10.1017/S0033291708002900

Kessler, R. C., & Ustun, T. B. (2004). The World Mental Health (WMH) survey initiative version of The World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). *International Journal of Methods in Psychiatric Research, 13,* 93–121. doi:10.1002/mpr.168

Kish, L. (1949). A procedure for objective respondent selection within the household. *Journal of the American Statistical Association, 44,* 380–387. doi:10.1080/01621459.1949.10483314

Kittirattanapaiboon, P., Tantirangsee, N., Chutha, W., Assanangkornchai, S., & Supanya, S. (2016). Thai national mental health survey 2013: Methodology and procedure. *Journal of Mental Health of Thailand, 24,* 1–14. doi:10.14456/dmhjournal.2016.4

Kun, B., Balazs, H., Arnold, P., Paksi, B., & Demetrovics, Z. (2012). Gambling in Western and Eastern Europe: The example of Hungary. *Journal of Gambling Studies, 28,* 27–46. doi:10.1007/s10899-011-9242-4

Liu, L., Luo, T., & Hao, W. (2013). Gambling problems in young people: Experience from the Asian region. *Current Opinion in Psychiatry, 26,* 310–317. doi:10.1097/YCO.0b013e328361ebbf

Lobo, D. S., & Kennedy, J. L. (2009). Genetic aspects of pathological gambling: A complex disorder with shared genetic vulnerabilities. *Addiction, 104,* 1454–1465. doi:10.1111/add.2009.104.issue-9

Lorains, F. K., Cowlishaw, S., & Thomas, S. A. (2011). Prevalence of comorbid disorders in problem and pathological gambling: Systematic review and meta-analysis of population surveys. *Addiction, 106,* 490–498. doi:10.1111/add.2011.106.issue-3

Parhami, I., Mojtabai, R., Rosenthal, R. J., Afifi, T. O., & Fong, T. W. (2014). Gambling and the onset of comorbid mental disorders: A longitudinal study evaluating severity and specific symptoms. *Journal of Psychiatric Practice, 20,* 207–219. doi:10.1097/01.pra.0000450320.98988.7c

Park, S., Cho, M. J., Jeon, H. J., Lee, H. W., Bae, J. N., Park, J. I., Sohn, J. H., Lee, Y. R., Lee, J. Y., & Hong, J. P. (2010). Prevalence, clinical correlations, comorbidities, and suicidal tendencies in pathological Korean gamblers: Results from the Korean Epidemiologic Catchment Area Study. *Social Psychiatry and Psychiatric Epidemiology, 45,* 621–629. doi:10.1007/s00127-009-0102-9

Petry, N. M., Stinson, F. S., & Grant, B. F. (2005). Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of Clinical Psychiatry, 66,* 564–574. doi:10.4088/JCP.v66n0504

Potenza, M. N. (2014). The neural bases of cognitive processes in gambling disorder. *Trends in Cognitive Science, 18,* 429–438. doi:10.1016/j.tics.2014.03.007

Potenza, M. N., Xian, H., Shah, K., Scherrer, J. F., & Eisen, S. A. (2005). Shared genetic contributions to pathological gambling and major depression in men. *Archives of General Psychiatry, 62,* 1015–1021. doi:10.1001/archpsyc.62.9.1015

R Core Team. (2015). *R: A language and environment for statistical computing*. Retrieved from https://www.R-project.org/

Stucki, S., & Rihs-Middel, M. (2007). Prevalence of adult problem and pathological gambling between 2000 and 2005: An update. *Journal of Gambling Studies, 23,* 245–257. doi:10.1007/s10899-006-9031-7

Subramaniam, M., Abdin, E., Vaingankar, J. A., Wong, K. E., & Chong, S. A. (2015). Comorbid physical and mental illnesses among pathological gamblers: Results from a population based study in Singapore. *Psychiatry Research, 227,* 198–205. doi:10.1016/j.psychres.2015.03.033

Tse, S., Hong, S., & Ng, K. (2013). Estimating the prevalence of problem gambling among older adults in Singapore. *Psychiatry Research, 210,* 607–611. doi:10.1016/j.psychres.2013.06.017

Van Buuren, S., & Groothuis-Oudshoorn, K. (2011). MICE: Multivariate imputation by chained equations in R. *Journal of Statistical Software, 45,* 1–67. doi:10.18637/jss.v045.i03

Walker, S. E., Abbott, M. W., & Gray, R. J. (2012). Knowledge, views and experiences of gambling and gambling-related harms in different ethnic and socio-economic groups in New Zealand. *Australian and New Zealand Journal of Public Health, 36,* 153–159. doi:10.1111/azph.2012.36.issue-2

World Health Organization. (1994). *The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines*. Geneva: World Health Organization.

World Health Organization. (2004). *The World Health Organization (WHO) Composite International Diagnostic Interview (CIDI)*. Retrieved from http://www.hcp.med.harvard.edu/wmhcidi/

Yen, C. F., & Wu, H. Y. (2013). Gambling in Taiwan: Problems, research and policy. *Addiction, 108,* 463–467. doi: 10.1111/j.1360-0443.2012.03823.x