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Problem Gambling Among International and Domestic University Students in Australia: Who is at Risk?

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Abstract Young people are a high risk group for gambling problems and university (college) students fall into that category. Given the high accessibility of gambling in Australia and its association with entertainment, students from overseas countries, particularly those where gambling is restricted or illegal, may be particularly vulnerable. This study examines problem gambling and its correlates among international and domestic university students using a sample of 836 domestic students (286 males; 546 females); and 764 international students (369 males; 396 females) at three Australian universities. Our findings indicate that although most students gamble infrequently, around 5 % of students are problem gamblers, a proportion higher than that in the general adult population. Popular gambling choices include games known to be associated with risk (cards, horse races, sports betting, casino games, and gaming machines) as well as lotto/scratch tickets. Males are more likely to be problem gamblers than females, and almost 10 % of male international students could be classified as problem gamblers. Hierarchical regression analysis showed that male gender, international student status, financial stress, negative affect and frequency of gambling on sports, horses/dogs, table games, casino gaming machines, internet casino games and bingo all significantly predicted problem gambling. Results from this study could inform gambling-education programs in universities as they indicate which groups are more vulnerable and specify which games pose more risk of problem gambling.

Keywords University (college) students · International students · Stressors · Negative affect

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Introduction

Problem gambling is a significant issue in most Western societies. Meta analyses suggest that depending on country, methodology and classification system, between 0.2 and 3 % of the adult population experience severe gambling problems (Shaffer et al. 2004; Stucki and Rihs-Middel 2007). Young people are considered a high risk group, with research suggesting youth problem gambling rates are two to three times those of adults (Blinn-Pike et al. 2007; Delfabbro et al. 2005). The high problem gambling prevalence among youth partly reflects a tendency for young people to experiment with new and risky behaviours (e.g., DiClemente et al. 2009; Snow et al. 2002). Youth, particularly young men, can view gambling and alcohol consumption as 'rites of passage' into adulthood (Welte et al. 2009). Additionally, when young people gamble they often chose higher risk games such as cards, electronic gaming machines (EGMs) and sports betting (Clarke 2003; Moore and Ohtsuka 1997; Wickwire et al. 2007), activities that have been associated with gambling problems in young people in the past (Clarke and Rossen 2000; Felsher et al. 2004; Welte et al. 2007).

Apart from youthful experimentation and risky gambling choices, there are several other factors that may leave young university students vulnerable to gambling problems. Recent psycho-social models show that gambling provides pleasant temporary distraction from life's problems (Blaszczynski and Nower 2002) and indeed, severity of problem gambling is positively associated with situational stressors, negative emotions, loneliness and a lack of social support (e.g., Bergevin et al. 2006; Hardoon et al. 2004; Thomas and Moore 2003; Thomas et al. 2011; Turner et al. 2006). Many university students are transitioning to social, emotional, academic and financial independence and some experience difficulties managing these transitions. Stress levels and mood disorders are a possible outcome, which, in university students who gamble, may exacerbate vulnerability to gambling problems (Clarke 2004; Lightsey and Hulsey 2002).

In this respect, international students—those who move from their home country to a different country to study—may be even more at risk for problem gambling than local/domestic students. On top of the usual pressures associated with transitions to adulthood and adjusting to university life, these students face additional stressors related to loneliness and social isolation brought on by being far from family, friends and home country (Khawaja and Dempsey 2008; Leung 2001). As well, families of international students often make heavy sacrifices to send their children overseas to gain degree, post-graduate, and other professional qualifications (Khawaja and Dempsey 2008; Mori 2000). The considerable financial and emotional investment can lead families to expect high achievement from their sons and daughters, who can feel under intense pressure to succeed in their studies (Mori 2000). Additional stress can result if students need to combine paid work with study in order to support themselves financially. International students must also adapt to a new culture, and in many cases learn and study in a new language. Acculturative adaptation is greater when cultural and language differences between the country of origin and the host country are large (Dao et al. 2007; Leung 2001; Poyrazli et al. 2004). A failure to manage this process of acculturation can have a negative impact on an individual's physiological, psychological and social health (Poyrazli et al. 2004).

In Australia, international students constitute nearly one-fifth of the nation's higher education population (Australian Government Department of Foreign Affairs and Trade 2008). Almost half of the international student population in Australia is aged between 20 and 24 years, with the majority (88 %) under 30 years of age. Students most commonly come from China (24 %), India (18 %), and other Asian countries including Korea,

Malaysia, Thailand, Vietnam, and Indonesia (Australian Government 2010). Access to gambling opportunities in these countries is far more restricted than in Australia, where gambling has high public exposure and opportunities to gamble are numerous. Exposure, high geographic accessibility to gambling and long opening hours of gambling venues have been linked to increased uptake, frequency and problems (Moore et al. 2011; Storer et al. 2009; Thomas et al. 2011).

International students who come from countries with limited exposure to gambling are likely to be curious about new gambling opportunities, and are also less likely to have been educated about potential dangers associated with different forms of gambling or what constitutes excessive gambling. They may be inexperienced at handling their own finances, yet some bring large sums of money from their home country. These funds are often meant to be for living expenses for a whole semester or year, but the temptation to use the money for entertainment, including gambling, can be strong. Such a combination of factors can be particularly risky, giving these young people the potential to lose more than they can afford, chase losses and engage in other behaviours typical of problem gambling. However, there is little published evidence on whether international students are in fact more prone to problem gambling than local students. One Australian study of international student well-being found that although the majority did not gamble, 1.4 % of the sample defined themselves as problem gamblers (Rosenthal et al. 2008), but no corresponding data for local students was collected. Nevertheless, the results of the study demonstrated that 7 % of international students who had previously not gambled took up gambling in Australia, and the vast majority of the problem gamblers had strongly increased their gambling after arriving in Australia.

In summary, both domestic and international university students may be vulnerable to problem gambling given their propensity to experiment with new and potentially risky behaviours, their gambling preferences and the need to manage emotional, financial, academic and social stressors associated with university studies and their developmental stage. International students may be at even higher risk as they are subject to additional stressors associated with acculturation coupled with a sudden exposure to a high access gambling culture. To date, relatively little research has examined correlates of problem gambling among international students, or compared their gambling behaviours with those of domestic students. Although many studies of gambling use college students as research participants, student status per se is rarely the focus of the investigation, that is, features of student life and the student experience are not generally examined as part of these studies. The objective of this study, therefore, is to compare domestic and international students' gambling behaviours, and explore how these relate to stress and negative affect. Specifically, we predict that (a) international students will show higher levels of stressors and negative mood than domestic students; and (b) problem gambling will be positively associated with male gender, international student status, higher levels of stress, greater negative affect, and participation in more risky gambling activities such as EGMs, card games, and casino games.

Method

Participants

International and domestic students were sampled across three universities, two in Victoria and one in Queensland, Australia. The final survey sample consisted of 764 international

students and 836 domestic students across the three universities, a total sample of 1,600. A breakdown of demographic characteristics is shown in Table 1.

Measures

Demographics

Age, gender, country of birth, student status (domestic, international), university attended, number of years in Australia, and other demographics were collected.

Table 1 Demographics relating to international and domestic students

Variable	International students		Domestic students	
	%	n	n	%
Gender				
Females	396	51.8	546	65.6
Males	369	48.2	286	34.4
Country of birth				
Australia	N/A	NA	693	83.1
China/Chinese countries	200	26.3	17	2.0
India	111	14.6	14	1.7
Canada/USA	98	12.9	12	1.4
Other Asian countries	159	20.9	24	2.9
Western Europe	75	9.9	6	0.7
Middle East	14	1.8	6	0.7
South America	25	3.3	1	0.1
New Zealand/Pacific islands	5	0.7	16	1.9
Eastern Europe	10	1.3	10	1.2
Pakistan/Sri Lanka	37	4.8	3	0.4
Africa	17	2.2	17	2.0
United Kingdom	10	1.3	15	1.8
Length of time in Australia				
Less than 1 year	374	49.0	6	0.7
1–4 years	350	45.8	15	1.8
5–9 years	39	5.1	37	4.4
10 + years (but not for your whole life)	1	0.1	118	14.1
All your life	N/A	0.0	659	78.9
	M	SD	M	SD
Mean years studying at University in Aust.	1.34	1.24	1.89	1.91
Mean age	23.84	4.22	23.35	7.85

In each case the percentages refer to the percentage of responses in each category as a proportion of each student group (i.e., as a percentage of international students and as a percentage of domestic students)

Stressors

A 19-item scale was developed to measure participants' level of stress from several sources likely to be relevant to both international and domestic students. Items were adapted from previous scales (Burke et al. 2007; Rosenthal et al. 2008) and relevant literature. Three subscales were developed: A four-item subscale measuring *academic/study stressors*, a four-item subscale measuring *financial stressors*, and an 11-item subscale measuring *relationship stressors* including items about loneliness, lack of social support, being bullied and experiencing racism. All items were rated on a 5-point Likert scale where 1 = *Strongly disagree* and 5 = *Strongly agree*. Scores on each subscale were summed and divided by the number of items to produce means ranging from 1 to 5, where higher scores reflect more stress. Internal consistencies were: academic/study stressors $\alpha = 0.54$, relationship stressors $\alpha = 0.84$, and financial stressors $\alpha = 0.86$. Because internal consistency for the academic/study stressors was low, further analysis was conducted. This revealed that two items 'I am having difficulty with my studies' and 'I feel that I am not progressing well enough with my studies' correlated well, while two items 'I put pressure on myself to succeed academically' and 'It is important to my family that I succeed academically' did not. The first two items relating to personal study difficulties are a more pure measure of academic stress. Putting pressure on the self to succeed may simply relate to a desire to do well and so may not translate to feelings of stress. Similarly, the importance attached to academic success by an individual's family may or may not translate to feelings of stress. We therefore used the initial two items to measure academic stress in this study. Internal consistency for these two items was 0.81.

Sociocultural Adaptation

Participants completed 18 items of the *Sociocultural Adaptation Scale* (SACS; Ward and Kennedy 1999), which measures degree of adaptation to a new environment. Participants were asked to indicate the amount of difficulty experienced in various areas since starting university studies in Australia (e.g., 'making friends'). The 18 items were rated on 5-point Likert scales where 1 = *no difficulty* to 5 = *extreme difficulty*, summed and converted to item means ranging from 1 to 5. This enabled comparability with the stressor subscales above. High scores reflect low levels of cultural competence. The SACS has shown high internal consistency (0.75–0.91) and excellent construct validity (Ward and Kennedy 1999). Internal consistency for the current study was $\alpha = 0.89$.

Depression, Anxiety and Stress

The 21-item *Depression Anxiety Stress Scale* (DASS-21; Lovibond and Lovibond 1995) measured three separate factors; depression, anxiety and stress, each containing seven items. Statements are rated on 4-point Likert scales where 0 = *did not apply to me at all* and 3 = *applied to me very much or most of the time* in relation to how much each statement applied to the participant over the past week (e.g., 'I found it hard to wind down'). Subscale scores can range from 0 to 21, with higher scores reflecting higher severity ratings. Subscales can be added to form a total negative affect scale. The DASS-21 has shown excellent internal consistency ($\alpha = 0.88$ for depression, $\alpha = 0.82$ for anxiety and $\alpha = 0.90$ for stress) and validity (Henry and Crawford 2005). Internal consistency was comparable in the present study: depression $\alpha = 0.90$; anxiety $\alpha = 0.84$; stress $\alpha = 0.88$; total negative affect $\alpha = 0.94$.

Type and Frequency of Gambling

These were assessed by a version of Moore and Ohtsuka's (1997) *Gambling Behaviour Scale*, adapted to include internet gambling activities. In this scale, frequency of gambling over the past 12 months across 12 different types of games (e.g., 'Played cards' or 'Bet on sports') is assessed. Frequency is measured on a 4-point scale where 0 = *Not in the last year or never* and 3 = *Frequently, once a week or more*.

Problem Gambling

The *Problem Gambling Severity Index* from the Canadian Problem Gambling Index (PGSI; Ferris and Wynne 2001) was used to assess severity of problem gambling. The PGSI consists of 9 statements about participants' gambling (e.g., 'Have you gone back another day to try to win the money you lost?') rated on a 4-point scale where 0 = *Never* and 3 = *Almost always*. Scores are summed across items, with the total score ranging from 0 to 27. Scores are interpreted within the following risk categories (Ferris and Wynne 2001): 0 = no risk, 1–2 = low risk gambling, 3–7 = moderate risk gambling, 8+ = problem gambling. Those who score below eight are collectively categorised as non-problem gamblers. The PGSI has demonstrated high internal consistency ($\alpha = 0.84$–0.92), stability (test–retest at 3–4 weeks 0.78), and validity with high correlations between the PSGI and other measures of problem gambling (Ferris and Wynne 2001). The PGSI had high internal consistency in this study ($\alpha = 0.92$).

Procedure

Ethics approval to conduct the survey was obtained from the Human Research Ethics Committees at the three participating universities. All on-campus international students in the Higher Education division of each university were emailed directly and invited to participate in a study of gambling, whether or not they gambled themselves, through clicking a link to an online survey. Announcements were also placed in electronic newsletters. Domestic students were either emailed directly or recruited via flyers provided at lectures and around campuses and through announcements in electronic newsletters. Survey participation was voluntary and anonymous. Students were eligible if they were 18 years of age or over. After submitting the survey, students were eligible to go into a prize draw for one of several shopping vouchers. Separate prize draws were conducted for each university. These details were saved to a second secure online database to preserve participant anonymity.

Analysis

Rates of gambling on 12 different gambling activities were compared for male and female international and domestic students using MANOVA, with gender and student status (domestic, international) as the independent variables. Stressors and negative affect differences between male and female international and domestic students were also assessed with MANOVAs. Changes in international students' gambling patterns on coming to Australia were examined with Chi-square. Problem gambling differences between male and female international and domestic students were examined with ANOVA (for problem gambling score) and Chi-square (for problem gambling category). Hierarchical regressions

were conducted to predict problem gambling, with gender and student status entered at Step 1, stressor variables and negative affect at Step 2, and gambling type at Step 3.

Results

Gambling Preferences and Frequency

Table 2 shows the rates of gambling on 12 different activities for international and domestic students over the last year. Rates for all types of gambling were generally low, on average less than once a month. Cards and lottery/scratch-it tickets were the most popular forms of betting overall. To compare preferred gambling choices, a student status (international, domestic) by gender MANOVA was conducted on the 12 gambling items (see Table 2).

There was a significant main effect for student status on frequency of gambling activities ($F(12, 1{,}567) = 24.84$, $p < 0.001$, partial $\eta^2 = 0.16$). Domestic students were significantly more likely than international students to bet on horses and dogs, buy lottery or scratch-it tickets, bet on gaming tables at a casino and bet on EGMs both at a casino and at other venues. International students were significantly more likely than domestic students to play bingo and bet on EGM type games on the internet. Males gambled more frequently than females across activities ($F(1, 1{,}567) = 21.71$, $p < 0.001$, partial $\eta^2 = 0.14$), with univariate tests showing males gambled significantly more often on average on all activities except bingo and buying lottery tickets, for which there were no gender differences. A multivariate interaction between gender and student status ($F(1, 1{,}567) = 2.74$, $p = 0.001$, partial $\eta^2 = 0.02$) showed male domestic students bet more commonly on horses and dogs than international students or female domestic students.

To examine changes in gambling patterns of international students, we compared their gambling at home with their gambling over the last 12 months in Australia. This showed that only 23.4 % (N = 151) of international students reported gambling prior to commencing studies in Australia; however, 67.7 % (N = 434) reported gambling at least once in the past 12 months on one or more of the 12 gambling activities listed. Further, 59 % of those who were non-gamblers in their home-countries reported that they gambled at least once in Australia in the past year. The change from non-gambler status to gambler status was significant ($\chi^2(1) = 72.46$, $p < 0.001$).

Stressors and Negative Affect Among International and Domestic Students

International and domestic students were compared on stressors (academic, relationship, financial, socio-cultural adaptation) using MANOVA (see Table 2). The main effect for student status was significant ($F(4, 1{,}569) = 37.82$, $p < 0.001$, partial $\eta^2 = 0.09$). Gender was not significant ($F(4, 1{,}569) = 1.88$, $p > 0.05$), but the gender by student status interaction was significant $F(4, 1{,}569) = 2.84$, $p < 0.05$, partial $\eta^2 = 0.007$). International students scored significantly higher than domestic students on three of the four stressor variables, but the two groups did not differ on the magnitude of their academic stress. The significant interaction showed that male domestic students were less likely to report financial stress than either female domestic students or international students $F(1, 1{,}572) = 5.45$, $p < 0.05$, partial $\eta^2 = 0.0{,}037$). The mean scores for stressors in Table 2 indicate that, in general, students were more likely to report academic and financial stresses than relationship or socio-cultural adaptation stress.

Table 2 Means, standard deviations and associated F statistics for frequency of gambling, gambling problems, stress and mood

Variable	Local students				International students				M/ANOVA statistics			
	Male (N = 286)		Female (N = 544)		Male (N = 368)		Female (N = 396)		Gender		Student status	
	M	SD	M	SD	M	SD	M	SD	F	η	F	η
Frequency of gambling x type												
Playing cards	0.71	0.82	0.29	0.53	0.69	0.82	0.38	0.60	112.0.45***		0.07	0.82
Horses/dog	0.59	0.77	0.33	0.50	0.18	0.49	0.11	0.37	35.30***	0.02	131.10***	0.08
Sports betting	0.54	0.83	0.13	0.41	0.46	0.79	0.11	0.39	152.98***	0.09	2.83	
Lottery/scratch tickets	0.65	0.74	0.68	0.71	0.50	0.75	0.38	0.62	1.75		37.90***	0.02
Casino gaming tables	0.56	0.72	0.22	0.48	0.40	0.70	0.14	0.42	100.52***	0.06	16.92***	0.01
EGMs at casino	0.46	0.66	0.42	0.58	0.32	0.60	0.20	0.50	7.60**	0.01	35.33***	0.02
EGMs outside casino	0.48	0.70	0.39	0.59	0.19	0.52	0.11	0.37	9.82**	0.01	102.70***	0.06
Bingo	0.06	0.27	0.09	0.33	0.14	0.44	0.13	0.39	0.45		8.86**	<0.01
Pool/billiard games	0.26	0.59	0.09	0.35	0.27	0.61	0.12	0.40	40.39***	0.03	0.53	
Casino games (internet)	0.18	0.53	0.06	0.32	0.19	0.51	0.10	0.37	22.21***	0.01	1.16	
EGMs (internet)	0.12	0.43	0.04	0.25	0.20	0.54	0.12	0.39	14.78***	0.01	16.04***	0.01
Card games (internet)	0.40	0.79	0.11	0.44	0.40	0.77	0.22	0.54	56.05***	0.03	2.83	
Severity problem gambling	1.94	3.62	0.68	2.15	2.01	3.81	0.78	2.49	67.59***	0.04	0.44	
Stressors and mood												
Academic stress	2.59	0.97	2.59	1.01	2.54	0.99	2.69	1.02	2.28	2.59	0.18	
Relationship stress	1.66	0.52	1.66	0.52	1.93	0.59	1.93	0.62	0.03		84.72***	0.05
Financial stress	2.44	0.98	2.69	1.09	2.68	1.04	2.67	1.01	4.58*	<0.01	4.40*	<0.01
Adaptation stress	1.66	0.52	1.68	0.49	1.94	0.58	1.92	0.60	0.01		87.93***	0.05
DASS—anxiety	3.13	3.35	3.58	3.85	4.44	4.23	4.53	4.32	1.70		30.78**	0.02
DASS—depression	4.34	4.33	4.36	4.64	5.29	4.63	4.93	4.60	0.53		10.24**	0.01
DASS—stress	5.42	4.42	6.96	4.85	5.81	4.46	6.41	4.72	19.80***	0.01	0.11	

Sample sizes for each group varied slightly across different M/ANOVAs due to small amounts of missing data; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

A gender by student status MANOVA was conducted on students' depression, anxiety and stress scores as measured by the DASS (Table 2). There were significant gender effects ($F(3, 1{,}588) = 20.10$, $p < 0.001$, partial $\eta^2 = 0.04$) and student status effects ($F(3, 1{,}588) = 29.87$, $p < 0.001$, partial $\eta^2 = 0.05$), but no significant interaction. Univariate comparisons showed that females rated themselves higher on DASS-stress than males. International students scored significantly higher than domestic students on anxiety and depression, but not stress.

Problem Gambling

A gender by student status ANOVA on PGSI-assessed problem gambling score showed no significant differences between domestic and international students on this variable (Table 2). Males showed significantly more symptoms of problem gambling than females, but there was no interaction between student status and gender.

Analysis of gambler risk categories (rather than PGSI scores) is shown for domestic and international students in Table 3. Categories were defined using the PGSI cut-off points advanced by Ferris and Wynne (2001). For the student population as a whole, problem gambling rates were 5 to 10 times the rates of the general Australian adult population, estimated to be in the range of 0.5–1.0 % (Productivity Commission 2010). The problem gambling rate among male international students in this sample approached a very high 10 %, more than twice the rate for female students (domestic or international) and somewhat higher than the rate for male domestic students. Chi-square analysis of the association between student status and problem gambling categories, conducted separately for the sexes were, however, non-significant.

Predicting Problem Gambling Among University Students

Hierarchical regressions were conducted to predict problem gambling. Gender and student status were entered at Step 1, followed by the stressor variables (academic, relational, financial, adaptation) and negative affect at Step 2, then gambling type (12 different gambling activities) at Step 3 (see Table 4 for results). A combined total negative affect score was used to avoid multicollinearity because the correlations between the individual anxiety, depression and stress subscales were >0.7. Preliminary examination of raw correlations showed that problem gambling was significantly correlated with all potential predictors (Table 4). As would be expected, the strongest correlations were between problem gambling and frequency of participation in various gambling activities.

Table 3 Percentage of students in gambler risk category by gender and student status

	Domestic students		International students		All students
	Males (N = 282)	Females (N = 542)	Males (N = 361)	Females (N = 389)	(N = 1,574)
Non problem gambler	55.0	79.9	57.3	81.5	70.7
Low risk gambler	22.3	13.1	20.2	9.5	15.4
Moderate risk gambler	14.9	4.6	12.7	5.1	8.5
Problem gambler	7.8	2.4	9.7	3.9	5.4

Table 4 Hierarchical regression predicting problem gambling among university students

Variables	Raw correlations	Beta weights		
		Step 1	Step 2	Step 3
Gender[a]	−0.21***	−0.21***	−0.22***	−0.05*
Student status[b]	0.05*	0.02	−0.02	0.06**
Stressors and affect				
Academic stress	0.10***		−0.02	0.02
Relationship stress	0.16***		0.03	0.02
Financial stress	0.13***		0.06*	0.05*
Adaptation stress	0.19***		0.07*	0.04
Negative affect	0.23***		0.18***	0.08**
Gambling type				
Cards	0.39***			0.02
Horses/dogs	0.36***			0.09***
Sports betting	0.45***			0.17***
Lottery/scratch-it tickets	0.27***			0.03
Gaming tables	0.51***			0.21***
EGMs[c] at a casino	0.41***			0.13***
EGMs at hotels/clubs	0.32***			0.01
Bingo	0.32***			0.11***
Pool/other game betting	0.40***			0.04
Casino games on internet	0.41***			0.13***
EGM type games on internet	0.31***			−0.02
Card games on internet	0.37***			0.06*
F		35.22***	27.02***	68.84***
df		2, 1,552	7, 1,547	19, 1,535
R^2		0.043	0.109	0.460

[a] Male = 1, female = 2; [b] Domestic student = 1, international student = 2; [c]EGM = electronic gaming machines; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

At Step 1 gender (being male) was a significant independent predictor of problem gambling (explaining 4 % of the variance) and remained so with the addition of the stressors and negative affect, which added a further 7 % to the prediction accuracy. At Step 2, higher financial and adaptive stress, greater negative affect and male gender were predictive of problem gambling. The addition of frequencies of different types of gambling at Step 3 greatly increased prediction accuracy to 46 % (accounting for an additional 35 % of the variance of problem gambling). Inclusion of gambling frequencies in the regression equation led to student status becoming a significant predictor. Thus, when the higher rates of domestic student gambling were taken into account within the regression equation, international student status was a predictor of problem gambling. At Step 3, male gender, international student status, higher financial stress and higher levels of negative affect were associated with greater problem gambling scores, as was the playing of seven out of twelve gambling games. The strongest predictors were frequency of betting on sports, table games, EGMs at casinos and internet casino games.

Discussion

For both domestic and international students, gambling on the whole was fairly infrequent (on average, less than once a month for all 12 gambling games assessed). Nevertheless, more than 5 % of students reached the PGSI criterion for classification as a problem gambler. The most popular forms of betting for both domestic and international students were cards, sports betting, casino games and buying lottery or scratch-it tickets. Domestic students also bet commonly on horses/dogs, EGMs at the casino and EGMs in hotels and clubs. Frequency of each gaming activity showed low to moderate correlations with the problem gambling score. The strongest correlations were with casino-linked activities, including casino-type games played on the internet, plus betting on sports and card play. Gambling frequency was the major predictor of problem gambling, contributing 35 % of the total 46 % of the variance of problem gambling accounted for, with seven of the twelve gambling activities significant independent predictors. The strongest predictors of problem gambling were frequency of betting on sports, table and EGM games at casinos and internet casino games. Cards games, casino games and EGMs appear regularly in the list of gaming activities associated with problem gambling (e.g., Petry 2003; Welte et al. 2007). Thus although university students in our sample did not gamble frequently in general, popular and more frequent gaming choices were associated with gambling risk.

Consistent with prior literature (Blinn-Pike et al. 2007; Delfabbro et al. 2005; Derevensky et al. 2003) this sample of university students showed much higher rates of problem gambling than community norms. While the vast majority were at low or no risk, the rate of problem gambling was five to ten times that of general adult population estimates: 9.7 % of male international students being classified as problem gamblers, a disconcerting figure. An important caveat is that this was not a prevalence study, although the sample size was quite large. Even though non-gamblers as well as gamblers were encouraged to participate, students who were interested in gambling and who gambled themselves may have been more motivated to volunteer, thus biasing data toward higher rates of problem gambling. Additionally, it is unclear without a longitudinal study the extent to which these high rates relate to age and life stage, and whether they represent a relatively transient phenomenon. Nevertheless, the number of problem gamblers in the sample was in itself cause for concern, whatever the prevalence rates.

Gender was significantly associated with both gambling frequency and gambling problems, with males gambling more frequently and more problematically than females, as in previously published research (Clarke et al. 2006; Welte et al. 2008). Regression analysis showed that gender remained a significant independent predictor of problem gambling even when frequency of gambling was taken into account. In addition, international students, both males and females, displayed higher rates of problem gambling than domestic students. These differences were not statistically significant using univariate statistics; however, the multivariate hierarchical regression (which essentially controlled for domestic students higher frequency of gambling) showed that international student status was a significant and independent risk factor for problem gambling. In other words, although international students gambled less frequently than domestic students, they were more likely to be vulnerable to problems when they did gamble. The risk posed by international student status is far less than that associated with male gender, but the two factors together describe a group that appears to be particularly susceptible to gambling problems. A large proportion of international students in Australia come from Asian countries with much more restricted access to gambling. Students coming from western countries such as the United States may also be suddenly exposed to increased gambling

opportunities due to the lower legal age for gambling in Australia. As demonstrated in the present study, 59 % of international students who said they did not gamble prior to arrival in Australia reported gambling at least once in the last 12 months in Australia. While some of this change is likely to relate to factors such as reaching the legal age for gambling, it is feasible that increased accessibility may also have a role here.

Are international students more at risk of problem gambling because of higher stress levels? Our predictions that they would show higher levels of stressors and negative mood than domestic students, and that problem gambling would be associated with these high stress levels were both supported. International students reported higher levels of relationship stress, financial stress and socio-cultural adaptation stress, as well as more anxiety and depression than domestic students. This is consistent with prior research indicating that international students have less social support, use less functional coping strategies, have more difficulty adjusting, and are more stressed than local students (e.g., Burns 1991; Khawaja and Dempsey 2008). Both financial and adaptive stress, along with negative affect, were independent predictors of problem gambling, with financial stress and negative affect remaining so even when frequency of gambling items were included in the regression equation. However, the percent of variance accounted for by these variables was low. This suggests that although some university students may be using gambling as an escape or distraction from negative affect and day-to-day pressures and hassles (Bergevin et al. 2006; Thomas and Moore 2003), there are clearly other factors at play, including cultural values and beliefs about gambling (Raylu and Oei 2004), as well as ready access in Australia to a wide variety of gambling activities.

The high rates of gambling problems found in these university students (compared with the general community) suggest that students as a whole could benefit from information and/or educational programs about gambling risks. These would be particularly beneficial for males because they are more frequent and risky gamblers than females, and to international students who may have a limited understanding of how to manage their gambling responsibly in a high access environment, and who are more prone to the problem gambling trigger of stress and low mood than domestic students. The results of this study suggest that information should include warnings about risky forms of gambling and the dangers of using gambling as a way of coping with stress, depression or anxiety, in addition to information about ways to gamble responsibly and how to obtain help or advice.

In conclusion, this study found that university students in the main were infrequent gamblers but that a higher than expected proportion were experiencing gambling problems. Problem gambling was more closely associated with frequency and type of gambling than it was with stress or negative affect. These results could be taken into consideration when developing educational programs aimed at university students, particularly those targeted toward males and international students.

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