

The mediating effect of depression between superstitious beliefs and problem gambling: a cross-cultural study of Chinese and Caucasians residing in the United States

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Abstract

The purpose of this study was to address the mediational role of depression in the association between superstitions and problem gambling and to test whether this mediating process is significantly different between Chinese and Caucasian Americans. Eight items assessing superstitious beliefs, the 21-item Beck Depression Inventory-II, and the 20-item South Oaks Gambling Screen (SOGS) were completed by 115 Chinese gamblers and 187 Caucasian gamblers residing in the United States, and the responses between tests and between groups compared. Path analysis results showed that superstitious beliefs had a significant effect on both Chinese and Caucasian gamblers' SOGS scores (i.e., problem gambling symptoms). In both groups, depression played a significant mediating role between the superstitious beliefs variable and the problem gambling variable. Future clinical research might use the findings of this study to develop specific prevention and treatment approaches focusing on a gambler's cognitive bias and negative mood.

Résumé

Notre projet avait pour but d'étudier le rôle médiateur de la dépression dans la relation entre superstitions et jeu problématique et de déterminer si des différences existent entre les Américains d'origine chinoise et ceux d'origine européenne. Nous avons comparé les réponses données par 115 joueurs d'origine chinoise et de 187 joueurs d'origine européenne résidant aux États-Unis à huit questions sur les croyances superstitieuses, au Beck Depression Inventory II (21 questions) et au South Oaks Gambling Screen (SOGS) (20 questions). Les résultats de l'analyse des

pistes causales révèlent que les croyances superstitieuses ont eu une incidence notable sur les résultats au SOGS dans les deux groupes (c.-à-d. symptômes attestant de problèmes de jeu). Dans l'un comme dans l'autre, la dépression a joué un rôle médiateur important entre la variable liée aux croyances superstitieuses et la variable liée aux problèmes de jeu. Les conclusions de notre étude pourraient servir à orienter les recherches vers la conception de méthodes de prévention et de traitement axées sur la distorsion cognitive et l'humeur négative.

Introduction

With the global rise in access to gambling, interest in pathological gambling (PG) and related disorders has also increased markedly. In the United States, the prevalence of PG and problem gambling has been reported as being 1% to 2% and 2% to 5%, respectively (American Gambling Association, 2012; Petry, 2005), a finding that has been reasonably consistent internationally (Stucki & Rihs-Middel, 2007). Although the concepts are inextricable, problem gambling is commonly characterized as describing those gamblers who meet less than the number of criteria for a diagnosis of PG (Lesieur & Rosenthal, 1998). Problem gamblers are also described as in-transition gamblers who are moving either toward or away from pathological states (National Research Council Staff, 1999). In the increasingly important China-Hong Kong-Macau nexus, Fong and Ozorio (2005) found 2.5% of Macau respondents could be classified as PGs. Wherever the location, the consequences of PG include both economic (D. M. Walker, 2007) and psychological factors (Linden, Pope, & Jonas, 1986; McCormick, Russo, Ramirez, & Taber, 1984) and extend to social problems (Frost, Meagher, & Riskind, 2001; Ibanez et al., 2001; Johansson, Grant, Kim, Odlag, & Göttestam, 2009). PG has emerged as a significant global public health issue. With the continuing domestic and international proliferation of legalized commercial gaming, it becomes especially critical to gain a better understanding of underlying factors that might contribute to PG in diverse locales and cultures.

Previous studies have suggested that the two main influences on PG and related disorders are culture and cognitive biases. In his pioneering work on this topic, M. B. Walker (1992) posited that the opportunity to gamble clearly depends on the culture in which the individual lives. For example, many PGs believe that a variety of superstitious behaviors can influence outcomes—a belief that is particularly powerful in China, where the domestic film industry glorifies gambler-heroes who do just that. Appropriately, Raylu and Oei (2004) expressed concern that most previous studies of problem gambling are based on Western samples, but that the results have been generalized to other cultural groups without direct testing of the latter. They also stressed that generalization of the current literature to all cultural groups is inappropriate, given the different ways that gamblers from different

cultures experience gambling. Henrich, Heine, and Norenzayan (2010) criticized the tendency of human behavioral and psychological researchers to generalize their results without including pertinent cautionary notes. As an example, Arnett (2008) found that the substantial majority of study subjects (96%) in the top psychology journals were from Western industrialized countries. Henrich et al. (2010) stressed differences in basic cognitive and motivational processes across populations. For instance, Westerners characteristically rely on analytical reasoning and prefer to separate objects from their context. In contrast, non-Westerners such as Asians tend to reason holistically by considering people's behavior within the framework of the related situation.

A recent study by Loo, Raylu, and Oei (2008) reviewed 25 previous studies with a total sample of 12,848 Chinese community participants and 3,397 clinical participants. The authors concluded that Chinese gamblers are generally more inclined to possess erroneous beliefs and to commit cognitive errors, which in turn perpetuated gambling problems. Furthermore, the authors noted that the main differences between the Chinese and other groups seem to be related to distorted beliefs and cognitions that stemmed from superstitions. However, they criticized these studies on the basis of a variety of issues, including theoretical foundations, methods, and analytical rigor. For instance, only a single study (i.e., Papineau, 2005) of 25 specifically tested the influence of superstitious beliefs on problem gambling behavior.

Rationale of This Study

The need for further work in this area is apparent in order to assist researchers and clinicians with diagnoses, interventions, and treatment plans. Of importance, aspects of Chinese culture may preclude certain gambling behaviors from being viewed as problematic, as they represent part of their cultural belief system (Papineau, 2005). The current study focuses on a particularly neglected aspect of PG and related disorders: potential cultural differences between Asian and Western cultures. Despite the global growth of the gaming industry, a lack of information remains concerning the gambling cognitions of specific cultural groups who may be at particularly high risk for developing gambling problems or related disorders such as depression. This lack of knowledge may be partially attributable to a lack of adequate measures for assessing gambling cognitions (e.g., gambling superstitious beliefs) that may influence people's gambling behavior to varying degrees, depending on cultural effect. Thus, the specific aims of this study are (a) to address the mediational role of depression in the association between superstitions and problem gambling and to test any overarching differences in these relationships between Chinese and Caucasian Americans and (b) to explore differences between Chinese and Caucasian Americans in gambling behavioral variables (i.e., types of games, level of gambling loss, and gambling frequency). In addition, the mediating effect of depression on the path from superstitious beliefs to problem gambling relies on the presence of several sets of relationships (Baron & Kenny, 1986). First,

superstitious beliefs (i.e., the antecedent predictor) should have a direct effect on depression (i.e., the mediator). Second, there must be a direct effect of depression on problem gambling (i.e., the dependent variable). Third, there must be a direct effect of superstitious beliefs on problem gambling. In the following section, we discuss the literature and theory that supports each of the requisite sets.

Theoretical Foundations and Development of Hypotheses

Superstitious Beliefs and Problem Gambling

Previous studies suggest that culture and related cognitive biases have a marked impact on PG and related disorders such as depression. For example, previous research has suggested that gamblers are generally influenced by (a) the extent to which different types of gambling are available within their culture (historically and currently); and (b) the attitudes and customs of their given cultures (including cognitive and superstitious customs) that encourage or discourage involvement in gambling behavior (M. B. Walker, 1992). Several studies have also suggested that cognitive biases and distortions contribute to the development of PG. For example, gamblers often have false superstitious beliefs that they are able to influence the outcome of a chance event by using lucky charms or rituals. Lotto players tend to believe in hot and cold numbers despite possessing knowledge as to the actual probability of winning (Ariyabuddhiphongs & Chanchalernporn, 2007; Carroll & Huxley, 1994; Rogers, 1998; Toneatto, 1999; M. B. Walker, 1992).

Previous studies also suggest that these illusions of control and unrealistic outcome perceptions are more prevalent among problem gamblers (Dragonetti & Tsanos, 1997; Gupta & Derevensky, 1998a; Toneatto et al., 1997). A previous study found that electronic gaming machine problem gamblers showed a significantly higher rate of superstitious beliefs than non-problem gamblers did (Joukhador, Blaszczynski, & Maccallum, 2004). The authors recommended further replication of their study because of the limited game type (i.e., electronic gaming machine, a low-skill game), the lack of ethnic diversity, and the relatively small sample size (56 problem gamblers and 22 non-problem gamblers). A recent study by Zheng, Walker, and Blaszczynski (2010) focused on the role of superstitious beliefs related to Mahjong, a popular game in Chinese communities all over the world. Some participants reported that they play this game to earn quick money, as it permits a quick exchange of money, with hands lasting an average of 5.5 min (Bell, 1976), while others reported that they play this game primarily for the opportunity to socialize. The authors found that players who used Mahjong for non-leisure purposes (i.e., winning money, chasing losses, or escaping life problems) were more superstitious than were those who played for leisure.

Over the past 5,000 years, Chinese culture has accumulated many distinctive superstitious traditions (Huang & Teng, 2009). Many Chinese believe the position of a building and the interior arrangement of furniture (i.e., *feng-shui*) can influence

events inside that building, for example, whether those inside the structure will become rich and prosperous (Tsang, 2004). Furthermore, numbers play an important role in Chinese culture. For instance, many Chinese executives prefer product prices that use the number 8 and avoid using the number 4. This is because in the Chinese language, the pronunciation of “four” sounds similar to the word for “death,” and “eight” sounds similar to the word for “prosperity” (Huang & Teng 2009; Simmons & Schindler, 2003). Likewise, hotels or apartments in China and Taiwan usually do not have a fourth floor (Huang & Teng, 2009). Finally, a recent study by Huang and Teng (2009) with Taiwanese gamblers found other superstitious beliefs related to gambling: (a) not drinking “Supau” (a popular drink in Taiwan) before gambling because “Su” sounds like the word for “losing” in Chinese; (b) not having sex before gambling because of the possibility of losing positive energy (*chi*); and (c) not reading books before gambling because “Su” also sounds like the word for losing (*shu*) in Chinese. Given these previous research findings, the present study predicts that problematic gambling behavior in both Chinese and Caucasian gamblers will be influenced by their level of superstitious beliefs. In particular, Chinese American gamblers are expected to be more strongly affected by superstitious beliefs when compared with Caucasian American gamblers. This reasoning leads to the following hypotheses:

H1: Gamblers with higher levels of gambling superstitious beliefs will score higher on the problem gambling scale in both Caucasian and Chinese groups.

H2: Superstitious beliefs will have a stronger impact on Chinese gamblers’ problem gambling than on that of Caucasian gamblers.

Superstitious Beliefs and Depression

Fate control, including superstitious beliefs, has been identified as an example of gambling-related cognitive distortions (Toneatto, 1999). A study by Leung and Bond (2004) suggests that fate control refers to the general belief in the existence of external forces, including destiny, fate, and luck, that affect life events. Furthermore, fate control also describes the ability to influence or shape outcomes by engaging in certain culture-specific activities. When examined, the cognitive thinking of gamblers has been frequently shown to contain elements of this belief in cause-and-effect relationships; gamblers subscribe to the notion that they are somehow able to predict or impact the outcome of future events (Ladouceur & Walker, 1996; Raylu & Oei, 2002; Sharpe, 2002; Steenbergh, Meyers, May, & Whelan, 2002; Tang & Wu, 2010; Toneatto & Sobell, 1990). According to Tang and Wu (2010), fate control belief has a direct effect on negative mood, while showing only an indirect effect on problem gambling. This finding suggests that a gambler’s accurate understanding of the probabilistic parameters related to casino games can be undermined by their notions of fate control. Operationally, gamblers who adopt fate control beliefs were found to be more likely to partake in behaviors such as persisting in gambling despite mounting losses, and therefore were eventually left

depressed when the expected fate of winning failed to materialize (Getty, Watson, & Frisch, 2000; Morasco, Weinstock, Ledgerwood, & Petry, 2007; Oei, Lin, & Raylu, 2008; Scherrer et al., 2005; Tang & Wu, 2010). On the basis of these previous studies, this study suggests the following hypothesis:

H3: Gamblers with higher levels of gambling superstitious beliefs will score higher on the depression scale in both Caucasian and Chinese groups.

Gambling Addiction and Depression

Previous studies demonstrated a positive relationship between problem gambling and depression, suggesting depression as one of the major comorbid mental health disorders in problem gambling (e.g., Chang, 2007; Shek, 1991). According to Getty et al. (2000), Gamblers Anonymous members reported higher levels of depression on the Beck Depression Inventory (BDI) than non-members did. Furthermore, it has been suggested that depression and other mood disorders may often exist before gambling problems develop (Feigelman, Wallisch, & Lesieur, 1998; Kessler et al., 2008). From a review of 80 studies relevant to mood disorders and problem gambling (Martin, 2004), it appears that mood disorders predate the onset of PG and may play a causative role as gamblers seek relief from depression, but gambling does not appear to relieve depression. Instead, gambling may worsen depression because of the negative effects of gambling (e.g., financial losses, strained relationships). Researchers Gupta and Derevensky (1998b) used path analysis to demonstrate that among adolescents, depression was a predictor of problem gaming and not vice versa. Most research in this area supports the hypothesis that a depressed individual may engage in gambling as a means of relieving chronic depression (Clarke, 2006; Griffiths, 1995; Gupta and Derevensky, 1998b; Raviv, 1993). Thus, in the present study, we expect problem gambling symptoms to be elevated when the depression level increases in both Caucasian and Chinese groups, which leads to the following hypothesis:

H4: There will be a positive direct effect of depression on problem gambling in both Caucasian and Chinese groups.

An interesting finding by Raylu and Oei (2002) is that estimations measuring the prevalence of depression were unusually low not only in Hong Kong, but also in mainland China. Researchers have made various assumptions about this low prevalence and have suggested that traditional Chinese values (e.g., pertaining to family cohesiveness and a cultural trait of enduring hardship) protect Chinese people from depression (Hwu, Yeh, & Chang, 1989; Lee & Kleinman, 2003). In addition, a marked fear of stigma is also thought to lead Chinese to consciously hide their feelings and depression during face-to-face psychiatric surveys or consultations (Lee & Kleinman, 2003). Furthermore, Chinese people with depression typically initiate somatic distress (e.g., headache, breathing difficulties) before describing psychological symptoms (Kleinman, 2004). Since most diagnostic interviews

obligatorily focus on core psychological symptoms first (e.g., persistently depressed mood), the interview may not be able to associate depression with the corresponding somatic presentation of problems by Chinese people (Kleinman, 1986; Parker, Cheah, & Roy, 2001). From previous studies using Western samples and the low estimate of prevalence of depression found in the Chinese community, in the present study, we expect Caucasian gamblers to demonstrate a stronger association between their problem gambling scores and their depression levels. Therefore, we propose the following hypothesis:

H5: There will be a stronger relationship between problem gambling and depression for Caucasian gamblers than for Chinese gamblers.

Depression: Mediating Effect

As conceptualized in Figure 1 and developed in the previous discussion, the research model indicates that the depression variable mediates the relationship between superstitious beliefs and problem gambling. That is, the depression variable can explain why the effect of the predictor (i.e., superstitious beliefs) on problem gambling occurs. On the basis of the conceptualization of this model, the literature reviewed, and the previous discussion, we propose the following mediating hypothesis:

H6: The depression level will have a mediating effect on the relationship between the level of superstitious beliefs and problem gambling for both Caucasian and Chinese gamblers.

Methods

Survey Instrument

To measure the participants' superstitious beliefs, eight items were adapted from the key set of cognitive gambling beliefs elucidated by Toneatto (1999) and Toneatto, Blitz-Miller, Calderwood, Dragonetti, and Tsanos (1997) (Table 1). In the present

Figure 1. Research framework.

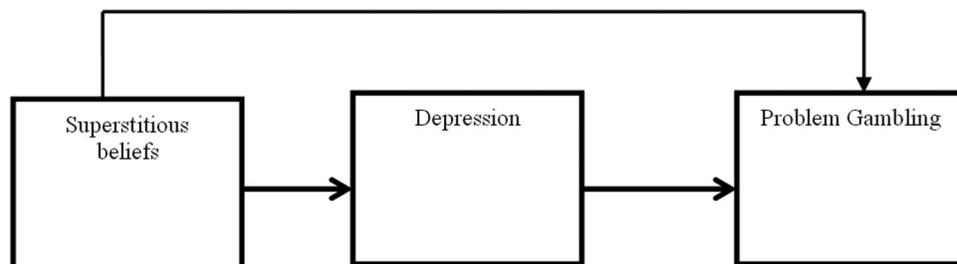


Table 1
Superstitious Beliefs (SB) Items

SB1: My hunches have a big influence on my winning.
 SB2: Sometimes I get spiritual help when gambling.
 SB3: When I'm feeling down I just know that my luck will be bad.
 SB4: If someone is sitting or standing next to me that I feel is giving me "bad vibes" then I need to change or I don't win.
 SB5: I often get hunches which I must follow.
 SB6: I think I have the psychic ability to predict a winner.
 SB7: I'm superstitious about the way I gamble.
 SB8: I have a ritual which I must carry out when I'm gambling.

Note. A 5-point Likert scale ranging from 1(*strongly disagree*) to 5 (*strongly agree*) was used to measure the respondents' levels of agreement with these statements.

study, we used the diagnostic criteria from the South Oaks Gambling Screen (SOGS) to identify the level of a participant's problem gambling. The SOGS scale was selected not only because it has been widely used in numerous epidemiological studies (Shaffer, Hall, & Bilt, 1997), but also because its validity has been tested with Chinese gamblers (Tang & Wu, 2009). In particular, a study by Tang and Wu (2009) found that the Chinese version of the SOGS (C-SOGS) demonstrated satisfactory internal consistency and convergent validity with the criteria of the *Diagnostic and Statistical Manual of Mental Disorders-IV*, one of the commonly used PG screening instruments (American Psychiatric Association, 1994), and suggested the C-SOGS as a valid screening instrument for probable PG. A cut score of 5 or more (out of 20) was used to consider the respondents as probable pathological gamblers (PPGs) on both the SOGS and the C-SOGS (Lesieur & Blume, 1987; Tang & Wu, 2009). The aim of these screening tools is to identify the possible presence of the target gambling problem rather than to diagnose it. Thus, the SOGS term of "probable pathological gambling" is designed to guard against the mistake of claiming "no gambling problem" when in fact one exists—a Type 2 error (National Research Council Staff, 1999).

Respondents' depression levels were assessed through the use of the BDI-II (Beck, Steer, & Brown, 1996). The Chinese version of the BDI-II (C-BDI-II) was adapted from the study of Chang (2007). The BDI-II is scored by summing the ratings for the 21 items. Each item, a list of four statements arranged in increasing severity about a particular depression symptom, was rated on a 4-point scale ranging from 0 (*not at all*) to 3 (*severely*), the maximum total score being 63. Two doctoral students in a hospitality program, who were bilingual in English and Chinese, assisted with obtaining the original C-SOGS and C-BDI-II survey questions and translating the English version of the survey into a Chinese version: One was translated from English to Mandarin, and then the other was back-translated from Mandarin into English to check for consistency of words. The face validity and accuracy of the

survey were checked by three Chinese graduate students, one Chinese professor, and three Chinese employees of U.S. gaming companies.

Participants

The online survey link was posted on the Nevada Gaming Council on Problem Gambling website between October 21, 2010, and December 31, 2010, and 138 respondents opened the link. Among those who opened it, 46 partially completed questions or were not of the targeted ethnic backgrounds. As a result, the total complete and usable response set was 90 (five Chinese American gamblers and 85 Caucasian American gamblers). To increase the sample diversity and size, the researchers also collected data between January 10, 2011, and January 31, 2011, from the panel members of Qualtrics, an online survey company. The company's representative sent out the survey link to approximately 7,400 panel members, and 1,745 attempted the survey. Among those participants, 102 Caucasian American respondents and 110 Chinese American respondents satisfactorily answered two critical screening questions (indicating that they gambled more than four times per month and that they were of the targeted ethnic backgrounds) and completed the remaining survey questions. In summary, the sample used in the study comprised 115 Chinese American gamblers and 187 Caucasian American gamblers.

Results

Profile of Participants

Among the 302 participants of this study, 38% of them were Chinese Americans, and the rest (62%) were Caucasian Americans. About 50% reported that they gambled five to eight times per month, and about 40% reported playing nine times or more per month. A slightly higher number of participants reported that they often played games that depend mostly on luck (e.g., bingo, lottery, and slot machines) rather than those requiring skill and concentration such as blackjack and poker (42.7% and 30.8%, respectively), and about 39% of the participants reported incurring a weekly gambling loss of \$500 or more (all monetary figures herein are expressed in US dollars). Their ages ranged from 21 to 79 years: 59% represented the younger generations, 21–45 years old (Gen-X and Gen-Y) and about 40% represented the older generations, over 46 years old (baby boomer and World War 2 generations). The respondents reported living in various regions of the United States, including California (11%), Nevada (10%), New York (7%), Texas (6%), New Jersey (6%), and Florida (5%). According to the BDI-II rating, 51% of the participants were estimated to have minimal depression symptoms (score 0–13), and 43% had either moderate or severe depression. With a threshold of five or more positive responses on the SOGS (Lesieur & Blume, 1987), 48% were categorized as PPGs. In particular, 52.9% of Caucasian American respondents and 40.0% of Chinese American respondents were identified as PPGs.

Comparisons Among Chinese and Caucasian Non-Problem and Problem Gamblers

Cross-tabulation analysis was used to compare the mean SOGS, BDI-II, and superstitious beliefs scores among Chinese American non-problem gamblers, Chinese American problem gamblers, Caucasian American non-problem gamblers, and Caucasian American problem gamblers, as well as to evaluate associations with their ages, gambling frequencies, losses, and favorite games. Table 2 summarizes the various gambling-related characteristics of the participants and categorizes the groups on the basis of their ethnic background, as well as by their status as a PPG or a non-problem gambler. More specifically, the results indicate that Caucasians characterized as PPGs tend to gamble much more frequently than non-problem gamblers do. In addition, both Chinese gamblers and Caucasian gamblers who fell into the category of PPGs had larger losses than the non-problem gamblers did. The Chinese PPGs did not appear to lose as much in a week as did the Caucasian PPGs. In fact, only 2.2% of Chinese PPGs lost over \$1,500, as compared with the 29.3% of American PPGs who admitted to losing over \$1,500 per week. Both Chinese PPGs and non-problem gamblers gravitated toward skillful games at approximately the same frequencies. Chinese gamblers tended to favor games of skill to a greater degree than Caucasian gamblers did. We find it interesting that both Caucasian and Chinese PPGs tended to be younger than their non-problem gambler counterparts. Finally, the mean SOGS, BDI, and superstitious beliefs scores for Caucasian and Chinese PPGs were higher than those for Caucasian and Chinese non-problem gamblers.

Path Analysis

If a mediating effect is present, then a path analysis should be conducted to estimate the direct and indirect effect of superstitious beliefs, with depression as the mediating variable (Pedhazur, 1997). For this study, EQS for Windows, a leading path analysis software program, was used to analyze the relationships among the variables in the proposed model (Figure 1). One independent variable (superstitious beliefs scores), one mediating variable (depression level: BDI scores), and one dependent variable (level of PG: SOGS scores) were included in the model. One moderator variable was also included and represented cultural differences (i.e., Chinese vs. Caucasian gamblers). As a measure of internal consistency, Cronbach's alpha for each variable was calculated for both groups: superstitious beliefs score ($\alpha = .89$ in the Chinese group; $\alpha = .90$ in the Caucasian group), the SOGS score ($\alpha = .94$ in Chinese; $\alpha = .95$ in Caucasians), and the BDI score ($\alpha = .97$ in Chinese; $\alpha = .97$ in Caucasians). All were higher than the acceptable level, $\alpha > .6$ (Hair, Anderson, Tatham, & Black, 1998). Table 3 depicts the intercorrelations, means, and standard deviations for the variables. All of the variables are significantly related to one another. The results of the path analysis predicting problem gambling as a function of superstitious beliefs, mediated by depression, appear in Table 4.

Chinese American model. The standardized parameter estimates (beta, β) in Table 4 show that the superstitious beliefs variable for the Chinese respondents had

Table 2
Demographics and Gambling Characteristics

Characteristic	Chinese (<i>n</i> = 115)		Caucasians (<i>n</i> = 187)	
	Non-problem gambler (<i>n</i> = 69)	Probable pathological gamblers (<i>n</i> = 46)	Non-problem gamblers (<i>n</i> = 88)	Probable pathological gamblers (<i>n</i> = 99)
Gambling frequency (times per month)				
0–4	4.3%	2.2%	14.8%	14.1%
5–8	58.0%	63.0%	56.8%	33.3%
9–12	17.4%	23.9%	5.7%	20.2%
13 or more	20.3%	10.9%	22.7%	32.3%
Average gambling loss (per week)				
Less than US\$500	81.2%	34.8%	93.2%	31.3%
US\$501 to US\$1,000	13.0%	43.5%	4.5%	25.3%
US\$1,001 to US\$1,500	5.8%	19.6%	0%	14.1%
More than US\$1,500	0%	2.2%	2.3%	29.3%
Favorite games				
Skillful games	37.7%	37.0%	25.0%	28.3%
Unskillful games	34.8%	34.8%	47.7%	47.5%
Both types	27.5%	28.3%	27.3%	24.2%
Mean age	39.7 (<i>SD</i> = 12.9)	33.0 (<i>SD</i> = 10.0)	49.2 (<i>SD</i> = 12.8)	42.9 (<i>SD</i> = 12.5)
Mean SOGS score	2.5 (<i>SD</i> = 1.9)	12.3 (<i>SD</i> = 4.1)	2.5 (<i>SD</i> = 2.0)	13.9 (<i>SD</i> = 3.5)
Mean BDI score	6.2 (<i>SD</i> = 8.9)	25.6 (<i>SD</i> = 13.0)	10.0 (<i>SD</i> = 12.4)	29.4 (<i>SD</i> = 15.9)
Mean superstitious beliefs score	20.1 (<i>SD</i> = 7.2)	25.4 (<i>SD</i> = 6.3)	20.0 (<i>SD</i> = 7.0)	25.2 (<i>SD</i> = 7.8)

Note: BDI = Beck Depression Inventory; SOGS = South Oaks Gambling Screen.

Table 3
Means, Standard Deviations, and Intercorrelations for Key Variables

Variable	Chinese Americans (<i>n</i> = 115)					Caucasian Americans (<i>n</i> = 187)				
	<i>M</i>	<i>SD</i>	1	2	3	<i>M</i>	<i>SD</i>	1	2	3
1. Superstitious beliefs	22.3	7.3	1			22.7	7.8	1		
2. Depression	13.9	14.3	.35	1		20.3	17.3	.34	1	
3. Problem gambling	6.4	5.7	.48	.65	1	8.5	6.4	.37	.66	1

Table 4
Parameter Estimates in Model

Parameter	Direct effect (β)		Indirect effect (β)		Total effect (β)	
	Chinese	Caucasians	Chinese	Caucasians	Chinese	Caucasians
Effect of superstitious beliefs on problem gambling	.29*	.17*	.19*	.20*	.48*	.37*
Effect of depression on problem gambling	.55*	.60*				
Effect of superstitious beliefs on depression	.35*	.34*				
R^2	.50	.46				

Note. * $p < .05$, two tailed.

a significant positive effect on their problem gambling symptoms (i.e., SOGS score; $\beta = .29, p < .05$). The beta indices in Table 4 also show a significantly positive direct effect of depression on the SOGS score ($\beta = .55, p < .05$), as well as a positive effect of superstitious beliefs on depression ($\beta = .35, p < .05$) in the Chinese group. The statistically significant indirect effect indicates that depression mediates the relationship between superstitious beliefs and problem gambling ($\beta = .19, p > .05$). The total effect ($\beta = .48$) of superstitious beliefs on problem gambling symptoms consists of a direct effect ($\beta = .29$) and an indirect effect ($\beta = .19$) through depression. Therefore, as a mediator, depression accounted for 40% of the total effect of superstitious beliefs on problem gambling. Overall, the pattern of results supports the conclusion that Chinese American gamblers with higher levels of superstitious beliefs and depression are likely to become problem gamblers, and 50% of the variance (R^2) in the Chinese SOGS score was explained by these two variables.

Caucasian American model estimation. The standardized parameter estimates from the path analysis with the Caucasian group are shown in Table 4. The results show that both superstitious beliefs and depression had significant direct effects on problem gambling (i.e., the SOGS score) ($\beta = .17$ and $\beta = .60$, respectively, $p < .05$) in the Caucasian group. Similar to the findings from the Chinese group, superstitious beliefs positively influenced depression ($\beta = .34, p > .05$). The beta index for the indirect effect in Table 4 also indicates that depression played a significant role as a mediator between the level of superstitious beliefs and the level of problem gambling ($\beta = .20, p < .05$). As shown in Table 4, the total effect ($\beta = .37$) of superstitious beliefs on problem gambling symptoms is the combination of a direct effect ($\beta = .17$) and an indirect effect through depression ($\beta = .20$). Therefore, as a mediator, depression accounted for 54% of the total effect of superstitious beliefs on problem gambling. The findings indicate that a Caucasian American gambler with higher levels of superstitious beliefs and depression may be more likely

to become a problem gambler. Overall, 46% of the variance (R^2) in the Caucasian SOGS score was explained by these two variables.

Model fit by ethnicity

To explore the possibility that the level of significance in the paths differs between the two groups (Chinese American gamblers and Caucasian American gamblers), we conducted a multiple-group analysis. Three constraints were set up to test for potential group differences. The multi-group analysis assumed that the level of significance in the relationship among the three variables (i.e., superstitious belief, depression, and problem gambling) would be the same across both groups. If there were any differences, the Lagrange Multiplier (LM) test would suggest releasing some constraints (Byrne, 2006). The configured model fits the data well: $\chi^2(3, N = 302) = 1.69, p > .05$, Comparative Fit Index = 1.00, standardized root mean square residual = .025, root mean square error of approximation = .00. The path coefficients for each of the subsamples were measured so that the magnitude of any differences between Caucasian and Chinese paths could be shown. Although all coefficients were slightly different, the LM test suggested not releasing any constraints.

The result indicates that both Caucasian American and Chinese American gamblers with a higher level of superstitious beliefs and depression are more likely to be problem gamblers (i.e., scoring higher on their SOGS), *supporting H1 and H4*. However, no statistically significant ethnicity differences were found in the effects of a gambler's superstitious beliefs and depression level on his or her problem gambling symptoms, hence *not supporting H2 and H5*. The depression variable was found to have a significantly positive effect on both Chinese and Caucasian gamblers' problem gambling symptoms, *supporting H3*. Specifically, the depression variable had a stronger direct effect on problem gambling in both Chinese American and Caucasian American groups than the superstitious belief variable did.

Discussion

The results of this study indicate that Caucasian gamblers living in the United States scored higher on the problem gambling scale (SOGS) ($M = 8.5, SD = 6.4$) than Chinese gamblers living in the United States did ($M = 6.4, SD = 5.7$). Caucasian gamblers also scored higher on the depression scale (BDI-II) ($M = 20.3, SD = 17.3$) than Chinese gamblers did ($M = 13.9, SD = 14.3$). The lower depression mean score in the Chinese group may be explained by findings from previous studies suggesting that traditional Chinese values (e.g., enduring hardship and pertaining to family cohesiveness) protect them from depression (Hwu et al., 1989; Lee & Kleinman, 2003). Another potential explanation of the lower depression score reported by Chinese is that Chinese tend not to directly express their emotional distress. For instance, if Chinese patients express having "heartache," it may mean they are experiencing "sadness," and being "tired" can indicate they are "depressed"

(Chang, 2007). Furthermore, the average age of Chinese PPGs was younger than that of non-problem gamblers. This result supports the findings of Welte, Barnes, Wieczorek, Tidwell, and Parker (2002), who reported that gambling rates in the year reviewed declined significantly with age. It is possible that Chinese gamblers who have lived longer in the United States have an increased chance of achieving a cultural shift, which helps them to handle unrealistic expectations of making money from gambling (Raylu & Oei, 2004; Victorian Casino and Gaming Authority, 2000).

As summarized in Table 5, the result of testing the first hypothesis supported the general consensus of previous studies (e.g., Joukhador et al., 2004; Zheng et al., 2010) and showed that superstitious beliefs are positively correlated with problem gambling behavior. The results of cross-tabulation analysis indicates that the type of game played (one requiring skills vs. one depending mostly on luck) was not related to problem gambling in either group. In addition, no group differences were detected with respect to the impact of playing games requiring problem gambling skills. The result of comparing gambling loss among Chinese and Caucasian non-problem and problem gamblers indicated that the problem gamblers (in both ethnic groups) tend to report a higher level of gambling loss, but that the gambling frequency variable did not seem to be correlated with problem gambling symptoms. For example, 20.3% of Chinese non-problem gamblers reported that they gamble 13 times or more per week, whereas only 10% of Chinese PGs did. Thus, having high gambling losses can be a risk factor for problem gambling for both Caucasian and Chinese players, whereas gambling frequency may not have a significant influence on problem gambling.

Table 5
Results of Testing the Hypotheses

Hypothesis	Description	Results
H1	Gamblers with higher levels of gambling superstitious beliefs will score higher on the problem gambling scale in both Caucasian and Chinese groups.	Supported
H2	Superstitious beliefs will have a stronger impact on Chinese gamblers' problem gambling than Caucasian gamblers.	Not supported
H3	Gamblers with higher levels of gambling superstitious beliefs will score higher on the depression scale in both Caucasian and Chinese groups.	Supported
H4	There will be a positive direct effect of depression on problem gambling in both Caucasian and Chinese groups	Supported
H5	There will be a stronger relationship between problem gambling and depression for Caucasian gamblers than for Chinese gamblers.	Not supported
H6	The depression variable is a mediator between the superstitious beliefs and problem gambling variables.	Supported

Although there was no group difference detected, the results of this study support the notion that the presence of depression may increase the risk for problem gambling in both ethnic groups. This finding supports previous studies showing that those with other mental health issues are more likely to become PPGs or PGs (Bondolfi, Osiek, & Ferrero, 2000; Petry & Armentano, 1999; Potenza, Kosten, & Rounsaville, 2001). The current study also found depression to be influenced by superstitious beliefs in both groups. A previous study by Beck (1967) suggested that cognitive problems related to depression are dysfunctional thoughts and that this selective attention may operate at the schema level. For instance, a depressed gambler will dwell on negative thoughts, but will blame this on dysfunctional schemas. In particular, the person will emulate negative thoughts, which potentially results in tangible negative consequences for the person. Therefore, gamblers may use superstitious beliefs to shift their focus away from this loop of negative thoughts. One strategy, via cognitive therapy, would be to highlight this problem and teach gamblers how to focus on neutral information such as negative winning expectancies and independence of gambling outcomes.

Previous studies have proposed that for those who possess chronic inner need states (e.g., depression), the diversion or narrowing of attention associated with gambling can alleviate negative mood. However, the rebound state of depression, which has greater intensity than the original need state, can lead to increasingly higher levels of gambling (Getty et al., 2000) and likely higher gambling losses. Accordingly, gamblers who seek sensation to improve their mood will likely become even more depressed again when they realize the substantial amount of money lost from gambling. Thus, therapies might be designed to increase gamblers' tolerance of depression and manage their ability to engage in activities other than gambling when depression levels rise.

Most problem gambling studies have been conducted with Western samples (i.e., generally Caucasians) and the results generalized to other ethnic groups (Raylu & Oei, 2002). A few recent gambling studies have collected their samples from other ethnic groups such as Thai and Chinese, but they were not cross-cultural studies. For example, Zheng et al. (2010) studied the impact of acculturation on PG for Chinese residing in Australia. In addition, Ariyabuddhiphongs and Chanchalermporn (2007) measured the relationships among hope, superstitious belief, environmental factors, and gambling behavior for Thai people living in Bangkok and 12 contiguous provinces. Thus, the current study fills the gap in the problem gambling research by examining superstitious beliefs, gambling behavioral factors, depression, and PG behavior of Chinese gamblers residing in the United States compared with Caucasian American gamblers.

Limitations and Future Studies

The findings reported in this study have some methodological limitations. Using an online survey can potentially produce a biased estimate, as it excludes gamblers who

do not have access to the Internet. Furthermore, the self-administered survey method allows participants to under- or overreport their gambling behaviors and depression symptoms. While creating a more anonymous environment, the online survey may lead to decreased accountability. In addition, it is critical not to overlook the relatively low response rate, because generalizing responses from the particular group to the intended population may be risky. By reviewing previous studies that compared response rates of mail and email surveys, we found that an email survey generally displayed a lower response rate than a mail survey (e.g., Bachmann, Elfrink, & Vazzana, 1996; Schaefer & Dillman, 1998; Tse et al., 1995). A study by Groves, Cialdini, and Courier (1992) explained that the U.S. population is being oversurveyed because of the growth in the number of studies using survey instruments. Non-respondent bias (i.e., the likelihood that those who received the survey link but did not respond to the survey would differ from those who responded) was addressed by comparing the answers from the early respondents (those who responded within 2 weeks of the survey distribution) to those offered by the later respondents (those who responded after 2 weeks). The results of the *t*-test analysis showed no significant difference in their answers to the key questions (i.e., superstitious beliefs, BDI, SOGS) in both Chinese and Caucasian groups.

However, the potential for self-selection bias is sufficiently serious that the contribution of this work is limited to demonstrating a potentially interesting mediational role of depression that could be explored further. Therefore, future research is needed to use different approaches such as face-to-face interviews or paper-based surveys. In addition, future studies should identify subjects who have a family history of depression or a personal history of depression prior to when they engaged in gambling as an activity, as compared with those who have neither family nor personal depression histories.

Although this study used the validated C-BDI, it is reasonable to argue that validated instruments designed for Chinese individuals and depression are lacking. If new measures are developed in future studies, they can be used to assess depression with different terms and categories specifically for the Chinese. For example, a somatic distress category should be considered because the Chinese tend to report headache and breathing difficulties before describing their psychological symptoms (Kleinman, 2004). In addition, different terms should be tested to address the tendency of Chinese individuals to express their depressed feelings indirectly, such as by using the term “heartache” instead of “sadness” and “tired” instead of “depressed” (Chang, 2007).

As an extension of the theoretical framework tested in this study, future studies could explore other variables such as help-seeking behavior and treatment receptiveness. Such future studies will assist in understanding how the correlates among cognitive bias, depression, and PG found in this study eventually affect the outcomes of preventive or intervention programs developed for gamblers. Furthermore, the ubiquitous growth of the mobile phone provides a potential

opportunity for gambling treatment clinics or institutes that could use this technology to provide advanced self-monitoring, instant feedback, exercise programs, and other features designed to inhibit gambling tendencies and to reduce depression levels. The undeniable impact of the mobile phone is illustrated by the 200 million Facebook users who log-in from their mobile device every day. The impact of these technologies is not restricted to the younger demographic categories, as the use of social networking sites among baby boomers grew from 9% to 43% in 2010 (Peter, 2011). One program, for example, by the UNLV International Gaming Institute, provides Health-E Gambling, an integrated web and SMS system that offers mobile learning and intervention by sending text messages related to gambling.

The decision to focus this study on Chinese and Caucasians living in the United States reflects both academic and practical reasoning. Academically, this research extends a prior inquiry concerning these two ethnic groups in Australia. Oei (2010) examined gambling-related behaviors and motivations using a cross-cultural approach that limited its scope to Chinese and Caucasians living in Australia. Furthermore, the impracticality of including all potential ethnic groups, combined with the current commercial casino growth in the United States and Macau, supports limiting this particular inquiry to the two chosen groups. It should be noted that previous studies investigated ethno-racial disparities in gambling motivations and prevalence of PG. For instance, Volberg, Toce, and Gerstein (1999) found that Latinos were more likely to report socializing as a motivation for gambling, whereas African Americans were more likely to gamble for the purpose of winning money. Another study (Volberg & Wray, 2007) showed that African Americans were nearly three times more likely than Caucasians to acknowledge symptoms of PG such as preoccupation with gambling, increased tolerance to achieve the same level of excitement, and lying. Furthermore, African Americans were two times more likely to chase after lost money and to use gambling as a means to escape problems. Similar to other previous research that limited the scope to a finite set of variations across racial and ethnic boundaries, the current study limited the target population to Caucasian and Chinese living in the United States. Clearly, future research into a more diverse collection of ethnic backgrounds is of great interest.

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