J Gambl Stud (2011) 27:709–724
DOI 10.1007/s10899-010-9234-9

ORIGINAL PAPER

Validation of the Chinese Version of the Gambling Motivation Scale (C-GMS)

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Published online: 30 December 2010

Abstract The French items of the Gambling Motivation Scale (GMS) were first developed and validated by Chantal and colleagues in 1994. The scale then became one of the most widely used motivational scales in the gambling literature of the West. The present study recruited 932 Chinese university students in order to validate the Chinese version of the Gambling Motivation Scale (C-GMS). The results of a confirmatory factor analysis of the Chinese data supported the 7-factor model as proposed by Chantal et al. (Soc Leis 17:189–212, 1994). This study also found a second-order model with three major factors, which corresponded to three types of gambling motivation including *self-determined motivation* (for *knowledge,* for *accomplishment,* for *stimulation,* and due to *identified regulation*), *non self-determined motivation* (due to *introjected regulation* and *external regulation*), and *amotivation.* All subscales demonstrated satisfactory internal consistency, and showed significant correlations with gambling correlates such as problem gambling symptoms and gambling intention. In sum, the C-GMS showed adequate psychometric properties and can be extended for use with Chinese populations.

Keywords Gambling · Motivation · Measurement · Validation · Self-determination · Chinese

Introduction

Motivation is the fundamental drive for people to engage in a specific behavior. Given the high prevalence rates of recreational and problem gambling in Chinese populations (Blaszczynski et al. 1998; Fong and Ozorio 2005; Tang et al. 2007; Wong and So 2003), the motivation for Chinese people to gamble should be better understood. In order to

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accurately capture the motivation to gamble among Chinese people in such a way that quantitative comparisons with previous Western findings are made possible, it is necessary to validate Western gambling-motivation assessment tools with Chinese samples first. The present study aimed to examine the psychometric properties of the Gambling Motivation Scale (GMS; Chantal et al. 1994) when it is translated for use in Chinese samples.

Dimensions of Gambling Motivation

From a psychological perspective, risk-taking behaviors like gambling are generally assumed to be rooted with both short-term and enduring motivational forces which initiate, maintain, and intensify people's gambling behavior. Common key themes of motivation reported by different segments of the population were observed (Neighbors et al. 2002; Platz and Millar 2001), though the primary motives to gamble may vary across groups like gender, age, and gambler type (Chantal and Vallerand 1996; Clarke 2004, 2008; Clarke et al. 2007; Desai et al. 2004; Lam 2007; Stewart et al. 2008; Walker et al. 2005). Gambling researchers have generally agreed that the motivational forces toward gambling can be at least categorized into intrinsic and extrinsic motivation (e.g. Chantal and Vallerand 1996; Chantal et al. 1994, 1995; Ladouceur et al. 1997; Oei and Raylu 2010). Intrinsic motivation stems from the desire to satisfy one's basic human needs. For instance, people may be motivated to gamble for learning new game knowledge and for improving betting skills. On the other hand, extrinsic motivation involves positive and negative reinforcement mechanisms which are mainly determined by one's environment. For example, people may be motivated to gamble in order to receive desirable outcomes (e.g. monetary reward).

Building on self-determination theory (Deci and Ryan 1985; Ryan and Deci 2000), Chantal et al. (1994) identified seven motivations of gambling. They are: intrinsic motivation toward *knowledge*, intrinsic motivation toward *accomplishment*, intrinsic motivation toward *stimulation*, extrinsic motivation due to *identified regulation*, extrinsic motivation due to *external regulation*, extrinsic motivation due to *introjected regulation*, and *amotivation*. Chantal and Vallerand (1996) then further proposed that these seven motivations can be classified into three types: *self-determined motivation, non self-determined motivation,* and *amotivation. Self-determined motivation* stems from fundamental psychological needs such as need of competence, need of autonomy, and need of relatedness. It includes three intrinsic motivations (toward *knowledge, accomplishment,* and *stimulation*) and extrinsic motivation due to *identified regulation*. For instance, people are driven to gamble by the desire of learning more new game knowledge (for *knowledge*), the want of improving skills in the betting activity (for *accomplishment*), the craving for excitement or stimulating experiences during gambling (for *stimulation*), and the additional personal values attached to the gambling activity (e.g. relaxation and socialization with friends; *identified regulation*).

With regard to empirical support for *self-determined* motivation for gambling, research findings consistently found that people gamble for various reasons other than money. For example, American gamblers reported that they gambled for enjoyment, excitement, alleviation of boredom, and social reasons (Cotte 1997; Lam 2007; Neighbors et al. 2002; Park et al. 2002). Cotte (1997) also observed that many American recreational gamblers were motivated to gamble by the desire of learning how to play the games in the casino. In addition, pathological gamblers were consistently shown to gamble in order to experience positive affects (e.g. enjoyment and stimulation) and to cope with boredom, depressive mood, and anxiety (Clarke et al. 2007; McCormick 1988; Stewart and Zack 2008). Among

Chinese adult gamblers, the findings of a recent exploratory study suggest that sensation excitement, boredom alleviation, and knowledge were the major reasons for them to engage in gambling activities (Tao et al. 2010). These motivations suggest that some gamblers have an internal locus of causality between their gambling participation and gambling outcomes (i.e. *self-determined*). Their gambling participation is less likely to be influenced by winning or losing games.

Other than *self-determined motivation*, some gamblers gamble for reasons that involve an external locus of causality and do not involve self-determination (Chantal and Vallerand 1996). There are two types of *non self-determined motivation*: *external regulation* and *introjected regulation* (Chantal and Vallerand 1996; Ryan and Deci 2000). *External regulation* is implied when gambling behaviors are regulated by external rewards like money and become non-autonomous. Monetary reward is the most frequently reported reasons for gambling in various age and ethnic groups (e.g. Giacopassi et al. 2006; Lee et al. 2007; Neighbors et al. 2002; Tao et al. 2010). Gambling behaviors can also be regulated by introjection like ego involvement (i.e. *introjected regulation*). *Introjected regulation* is involved internalized beliefs rooted from past external contingencies (e.g. winning games or making a large bet promote one's status in the eyes of other people) (Chantal et al. 1994). The internalized beliefs may become a source of tension/stress and "force" people to gamble.

The third type of gambling motivation as proposed by Chantal and Vallerand (1996) is *amotivation. Amotivation* is displayed if gamblers do not perceive contingencies between their gambling participation and gambling outcomes and fail to experience the sense of choice/control over their gambling. Since the absence of perceived contingencies between one's actions and outcomes characterizes a loss of control over the actions, *amotivation* was found to be associated with problem gambling (Carruthers et al. 2006; Ladouceur et al. 1997; Oei and Raylu 2010).

Assessment of Gambling Motivation

In the West, motivation of gambling has been tested by both qualitative and quantitative method. Some researchers used either semi-structured or open questions (e.g. 'What was your main reason for gambling/increased gambling/reduced gambling?') to capture why people gamble and why they change their gambling practices (e.g. Abbott et al. 1999; Lee et al. 2007; Neighbors et al. 2002). This simple and direct assessment encounters a major problem of costly time and effort on coding and data analysis. In-depth qualitative interviews with different target groups were commonly used in order to explore a wider range of gambling motives (e.g. Clarke et al. 2007; Lee et al. 2006; Tao et al. 2010). Based on the results of in-depth interviews and open questions, various assessment instruments of gambling motivation were psychometrically developed and validated for use in gambling research (Clarke et al. 2007; Lee et al. 2006; Tao et al. 2010). Among these scales, the most widely used gambling-motivation instrument in the Western literature is the Gambling Motivation Scale (GMS; Chantal et al. 1994).

The GMS was first developed and validated in an adult sample recruited in Montréal (Chantal et al. 1994). It showed adequate psychometric properties with satisfactorily high reliabilities and significant correlation with gambling variables like intention. The GMS specifically assessed *self-determined motivation* (for *stimulation*, *knowledge*, for *accomplishment*, and due to *identified regulation*), *non self-determined motivation* (due to *external regulation* and *introjected regulation*), and *amotivation* of gambling (Chantal et al. 1994, 1995). It has been applied to college students (Burger et al. 2006; Carruthers

et al. 2006; Clarke 2008), adult gamblers (Chantal and Vallerand 1996; Mitrovic and Brown 2009; Oei and Raylu 2010), older adults (Clarke 2008; Clarke and Clarkson 2009), and pathological gamblers (Leblond et al. 2003), mainly from the Caucasian populations. Raylu and Oei (2004a, b) also used this scale when they tried to validate two scales of gambling-related cognition in a community-based sample recruited in Australia. They found that gambling cognitive bias and urge had positive correlations with the GMS.

The GMS has also been used in Chinese samples recruited in Australia (Oei and Raylu 2010), and the research findings suggest that some ethnic variation of motivation should be noted. For example, *knowledge* and *introjected regulation* showed a greater contribution to problem gambling among the Chinese, compared to the Caucasians (Oei and Raylu 2010). However, this previous study only directly translated and employed the GMS without validating it empirically. The legitimacy of applying the gambling-related measurement instruments originated from the Western culture and generalizing the results on Chinese gamblers is questionable (Loo et al. 2008; Raylu and Oei 2004c; Oei et al. 2008), and their psychometric properties should be properly tested before use.

Purposes of the Present Study

In the present study, we aimed to investigate the reliability and validity of the Chinese version of the GMS (C-GMS) among Chinese university students in Hong Kong and Macau. The psychometric properties of the C-GMS were evaluated for its seven-factor structure as well as the second-order model proposed by Chantal et al. (1994) and Chantal and Vallerand (1996). The reliability of each subscale was also examined. The associations of the scale scores with gambling problems and gambling related variables were then determined. Problem gambling symptoms have been consistently found to increase with gambling motivation (Clarke 2004, 2008; Mitrovic and Brown 2009; Oei and Raylu 2010; Tao et al. 2010). Pathological gamblers also reported a much stronger motivation of gambling than recreational gamblers in the West (Clarke et al. 2007; Platz and Millar 2001; Stewart and Zack 2008). Hence, it was hypothesized that the C-GMS scores were positively correlated with problem gambling, and significantly discriminated probable problem gamblers from non-problem gamblers. The C-GMS scores were also expected to significantly predict problem gambling. In addition, the gambling literature (e.g. Chantal et al. 1994; Lam 2007) suggests that gambling-related behaviors and gambling intention are influenced by one's gambling motivation. Thus, the C-GMS scores were expected to be positively correlated with number of game types and gambling intention.

Method

Procedures and Respondents

Students of various universities in Hong Kong and Macao were invited to participate in a study on university students' general social behaviors through announcement in classes, invitation made by interviewers on university campuses, as well as posters in dormitories and libraries. Participation in the study was totally voluntary and no monetary reward was given. A questionnaire was distributed to each respondent face-to-face by the interviewers after they had given their consent of participation. Respondents were asked to return the questionnaire to the interviewers upon completion. They were allowed to withdraw from the study at anytime, and confidentiality and anonymity of their responses on the

questionnaire was assured. About 1,500 questionnaires were distributed, but only 979 were returned to the interviewers. 932 of the collected questionnaires were considered as valid (i.e. the respondent answered 70% or more of the questionnaire and the respondent's age was not older than 25 years). The overall response rate was 62%. Approval to conduct the study was given by the ethics review committee of the Chinese University of Hong Kong.

With the above procedure, a convenience sample of 932 Chinese respondents was recruited for the study. The sample was composed of 456 male and 464 female (and 12 respondents with unidentified gender) students from the universities in the two Special Administrative Regions of the People's Republic of China (i.e. Hong Kong and Macao). They aged from 18 to 25 years, with the mean age of 20.64 years (SD = 1.49). The majority of them were single ($n = 928$). In this university student sample, 85.6% of the respondents ($n = 798$) had gambling experience in their lifetime, with 4% were in debt due to gambling ($n = 37$). Mahjong was the commonest gambling activity (68%), followed by card games (56%), lottery (47%), slot machine (30%), soccer game betting (22%), and horse race betting (8%), and others (11%).

Instrument

Chinese Version of GMS (C-GMS)

The GMS contains 28 items which evaluate seven motivations (Chantal et al. 1994). They include motivation for (i) knowledge (*Knowledge*), (ii) accomplishment (*Accomplishment*), (iii) stimulation from gambling activities (*Stimulation*), (iv) rewards independent from gambling activities, e.g. socialization with friends (*Identified regulation*), (v) a relief from self-imposed tension which were originally external (*Introjected regulation*), (vi) external rewards like money (*External regulation*); and (vii) *amotivation* when there are no perceived relations between actions and gambling outcomes. The sample items of these scales are "I gamble for the satisfaction of learning new ways of playing my favorite game", "I gamble because playing for money allows me to test my capacity to control myself", "I gamble because it is exciting to play for money", "I gamble because it's the best way I know of to meet my friends", "I gamble because when I win, I feel like someone important", "I gamble to buy something that I dream of", and "I gamble but at times I wonder if it's worth it" respectively. The respondents were asked to evaluate to what extent they agreed with each statement which corresponded to the reason why they gamble, using a seven-point scale ranging from 1 (totally disagree) to 7 (totally agree). The reliabilities of the seven subscales of the GMS were found to be high in the previous studies involving non-Chinese samples. For examples, their Cronbach's alphas ranged from .64 to .89 with college students in New Zealand (Clarke 2004) and with horse-race gamblers in Canada (Chantal et al. 1995). In the present study, the English items of the GMS were translated into Chinese language, and then back-translated by a professional translator. It was then proof-read and finalized by two bilingual Chinese psychologists to form the C-GMS.

Problem Gambling

The 20-item South Oaks Gambling Screen (SOGS) (Lesieur and Blume 1987) was used to evaluate respondents' gambling-related behaviors and problems. The SOGS was constructed on the basis of Diagnostic and Statistical Meanual of Menatl Disorders criteria (American Psychiatric Association 1994) to screen for lifetime problem gambling. It is

widely used in both community and clinical samples (Petry 2005; Stinchfield 2002). The Chinese version of the SOGS has also been empirically validated among Chinese adult gamblers (Tang et al. 2010). The present study used this Chinese version and the internal consistency of the scale was found to be satisfactorily high (Cronbach's alpha = .75). Participants responded to the scale items with "yes" or "no", and affirmative responses were summed to form a total score.

Gambling Involvement and Intention

Respondents were asked to indicate whether they had engaged in various gambling activities, such as betting on soccer games or horse races, buying lottery, and playing mahjong, cards, or slot machines. They also provided information on the amount of gambling debt that they had incurred at the time of the study. In addition, they were asked to rate on two items about how much they "want to gamble" and how likely they "would gamble in the near future" on a seven-point Likert scale. The item scores were averaged and a high score represented a higher gambling intention.

Demographics

Participants were asked to provide information on their age, gender (Male = 1, Female = 2), and marital status (1 = Single, 2 = Married, 3 = Others).

Results

Confirmatory Factor Analysis (CFA)

With EQS 6.1 for Windows, a CFA with maximum likelihood estimation was conducted to determine whether the seven-factor model proposed by Chantal et al. (1994) explained the data set well. To evaluate the adequacy of fit of the model, the Bentler-Bonnet Normed Fit Index (NFI), the Bentler Bonnet Non-Normed Fit Index (NNFI), the Comparative Fit Index (CFI), and the Bollen's Incremental Fit Index (IFI) were considered. The fit of the model is generally regarded as acceptable if the indexes are greater than 0.9. A value of 0.09 or less of the root mean square error of approximation (RMSEA) is also recognized as a good fit. A non-significant χ^2 value is also a common statistic for an acceptable fit of the model to the data, but it is usually difficult to achieve, particularly if the model is tested with a very large sample size (Kline 2005).

The seven-factor model was composed of seven specific types of gambling motivation factors which corresponded to seven subscales of the C-GMS. No cross-loadings were postulated and all factor correlations were free. The CFA results indicated that this postulated model had satisfactory fit with the university sample data set ($N = 932$), though the χ^2 statistic was significant, $\chi^2(329) = 2{,}303.47$, $P < .05$. All five fit indices were satisfactory (NFI = .91; NNFI = .91; CFI = .92; IFI = .92; RMSEA = .082). The five factors were significantly correlated with each other ($P < .05$), with all values of the inter-correlation exceeding .70. The factor loadings of all scale items were listed in Table 1.

Since the factors were positively correlated with each other, a general one-factor model was also tested. All motivation items were set to load onto a single factor. However, the result of CFA showed that the single factor model did not fitted the data well. The χ^2

Table 1 Factor loadings of the C-GMS items in the seven-factor model

Factor	Item																											
	10	15	18	20	3	6	19	24	1	12	14	28	4	13	17	23	2	9	16	26	8	11	22	27	5	7	21	25
1. Knowledge	.86	.83	.85	.78																								
2. Accomplishment					.86	.80	.81	.83																				
3. Stimulation									.74	.88	.87	.79																
4. Identified regulation													.85	.87	.87	.73												
5. Introjected regulation																	.88	.87	.82	.82								
6. External regulation																					.82	.87	.78	.79				
7. Amotivation																									.87	.88	.78	.84

statistic remained significant, $\chi^2(329) = 4{,}158.32$, $P < .05$, and all five fit indices were less than acceptable (NFI = .84; NNFI = .84; CFI = .85; IFI = .85; RMSEA = .110). For instances, the values of its fit indexes (e.g. CFI < .90 and RMSEA > .10) consistently indicated a poor fit of the model (Browne and Cudeck 1993; Hu and Bentler 1999). In addition, gambling researchers also provide both theoretical and empirical support to the existence of various kinds of motivation (e.g. Chantal and Vallerand 1996; Deci and Ryan 1985). Hence, with the consideration of the current and previous evidence for a multiple-factor model, the seven-factor model was preferred than the single factor model in the present study.

Though the seven-factor model demonstrated a satisfactory fit with the data of the Chinese gamblers, an additional CFA was further conducted to examine whether there were higher-order factors which could explain the co-variation among the seven factors. According to Chantal et al. (1995), Chantal and Vallerand (1996), the three intrinsic motivations (i.e. *knowledge, accomplishment and stimulation*) and *identified regulation* should be classified as the same type of motivation as they are all "characterized by an internal locus of causality" (p. 410; Chantal and Vallerand 1996). Together, they are termed *self-determined motivation*. *External regulation* and *introjected regulation* do not involve self-determination and so are classified as *non self-determined motivation*. *Amotivation* should not be categorized into either *self-determined* or *non self-determined motivation* as it does not involve any specific internal needs or external contingencies when one engages in gambling. The second-order model of factorial structure for the C-GMS was shown as Fig. 1. Analyses revealed that the higher order model provided a good fit of the data. Though the χ^2 statistic was significant, $\chi^2(341) = 2{,}651.22$, $P < .05$, all indices were in the acceptable range (NFI = .90; NNFI = .90; CFI = .91; IFI = .91; RMSEA = .087). Hence, the results suggest that, based on this tripartite taxonomy of motivation, it is possible to simplify the seven C-GMS subscales into three subscales of *self-determined motivation*, *non self-determined motivation*, and *amotivation*.

Reliability and Validity of the C-GMS

Reliability

High reliabilities were found for each of the seven subscales: *knowledge* ($\alpha = .90$); *accomplishment* ($\alpha = .89$); *stimulation* ($\alpha = .89$); *identified regulation* ($\alpha = .90$); *introjected regulation* ($\alpha = .91$); *external regulation* ($\alpha = .88$); *amotivation* ($\alpha = .90$). In addition, the internal consistencies of the three higher-order subscales, *self-determined motivation*, *non self-determined motivation*, and *amotivation*, were also high ($\alpha = .97, .92,$ and .90 respectively). The Cronbach's alpha for the overall C-GMS was .98.

Validity

The validity of the C-GMS was examined by its association with gambling behaviors and intention, its discriminant power on separating problem gamblers from non-problem gambler, and its predictive power of problem gambling after demographics like gender were controlled.

As hypothesized, the C-GMS scores were significantly and positively correlated with number of game types and gambling intention ($P < .001$). People who reported a higher total score of the C-GMS got involved in more types of games, and reported a higher intention to gamble ($r = .33$ and .68 respectively). Similar correlation pattern was

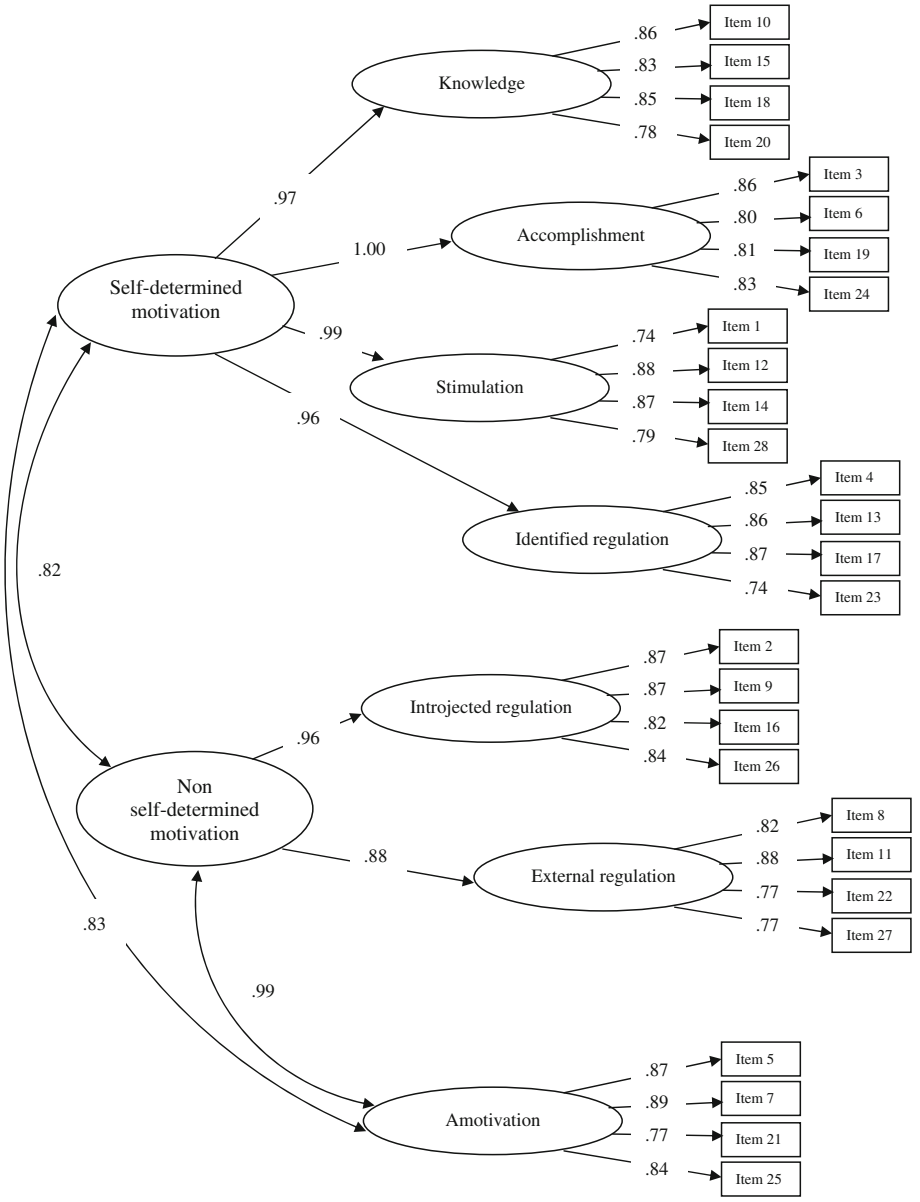

Fig. 1 Second-order model of factorial structure for the C-GMS

observed between these gambling correlates and the seven lower-order C-GMS subscales (r ranged from .26 to .68, $P < .001$). The scores of subscales of *self-determined motivation*, *non self-determined motivation*, and *amotivation* were also positively correlated with game types ($r = .33$, .29, and .32 respectively, $P < .01$) and gambling intention ($r = .69$, .61, and .57 respectively, $P < .01$). The results of correlation analyses were displayed in Table 2. Results of t-test and multivariate analyses of variance also showed that there was

Table 2 Correlation matrix of the major variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. C-GMS total score	–												
2. Knowledge	.92**	–											
3. Accomplishment	.95**	.88**	–										
4. Stimulation	.93**	.88**	.87**	–									
5. Identified regulation	.90**	.81**	.84**	.85**	–								
6. Introjected regulation	.92**	.83**	.88**	.84**	.86**	–							
7. External regulation	.87**	.74**	.77**	.75**	.72**	.77**	–						
8. Amotivation	.85**	.73**	.77**	.73**	.65**	.69**	.77**	–					
9. Self-determined motivation	.98**	.95**	.95**	.95**	.93**	.90**	.79**	.77**	–				
10. Non self-determined motivation	.95**	.83**	.87**	.85**	.84**	.93**	.95**	.78**	.90**	–			
11. Number of game types	.33**	.30**	.31**	.33**	.29**	.26**	.28**	.32**	.33**	.29**	–		
12. Gambling intention	.68**	.64**	.63**	.68**	.64**	.58**	.57**	.57**	.69**	.61**	.37**	–	
13. SOGS	.38**	.34**	.38**	.36**	.33**	.34**	.28**	.37**	.37**	.33**	.42**	.36**	–
14. Gender	−.20**	−.16**	−.19**	−.19**	−.20**	−.22**	−.15**	−.14**	−.20**	−.19**	−.17**	−.21**	−.14**

** Correlation is significant at the 0.01 level (2-tailed)

a significant gender difference in the C-GMS total score ($t(911) = 6.01$, $P < .001$) and subscale scores ($F(3, 909) = 12.92$ and $F(7,905) = 6.98$, $P < .001$). In general, male respondents had higher scores on the C-GMS total and subscales than female respondents.

In order to examine the discriminant power of the C-GMS scores on problem gambling, respondents were classified into non-problem gambler group (NPG group) and probable problem gambler group (PPG group), based on their SOGS scores. A SOGS total score of 5 or lower was conventionally used to screen for problem gambling (Carruthers et al. 2006; Lesieur and Blume 1987; Rosenthal 2003; Shaffer et al. 1997; Stinchfield 2002), even in Chinese gamblers (Oei et al. 2007). The validity of using this grouping criterion has been empirically tested against both clinical diagnosis and other screening assessment tools (e.g. DSM-IV scale) by researchers (Lesieur and Blume 1987; Stinchfield 2002).Thus the cut-off of 5 was used to divide respondents into NPG group and PPG group in the present study. It resulted in 552 respondents in NPG group (those with the SOGS = 0) and 58 in PPG group (those with the SOGS = 5 or above). Due to these extremely uneven group sizes and the higher flexibility in assumptions (Tabachnick and Fidell 1996), logistic regression analyses, instead of discriminant analyses, were performed to investigate whether the C-GMS scores could be useful in discriminating respondents into two gambler groups.

When the respondents were classified into NPG/PPG groups (i.e. the criterion variable) by a SOGS cut-off score of 5, the results of the first logistic regression analysis, with the C-GMS total score as the sole discriminant variable, revealed the significant discriminant power of the C-GMS ($\chi^2(1) = 71.77$, $P < .001$). The total percentage of correct classification by the model was 88.9%, and the C-GMS total score significantly improved the classification (Wald = 65.41, $P < .001$). The higher the C-GMS total score, the more likely to be classified into PPG group ($OR = 2.53$). Then another logistic regression analysis (using the seven lower-order C-GMS factors as discriminant variables) also showed consistent results that the C-GMS subscale scores significantly helped discriminating PPG from NPG ($\chi^2(7) = 104.83$, $P < .001$), and the total percentage of correct classification by the model was 91.1%. *Accomplishment*, *external regulation*, and *amotivation* were found to be the significant discriminant variables in the model (Wald = 7.25, 16.97, and 11.26 respectively, $P < .01$). The third logistic regression analysis with the three higher-order factors (*self-determined motivation*, *non self-determined motivation,* and *amotivation*) was conducted. It was found that all three factors significantly discriminated 90.4% NPG and PPG ($\chi^2(3) = 90.93$, $P < .001$; Wald = 15.84, 7.77 and 13.43 respectively, $P < .01$).

The SOGS was moderately correlated with the C-GMS total and all of its subscale scores in the present study ($P < .001$). Three separated hierarchical multiple regression analyses with "enter" method were conducted to investigate whether the C-GMS total and subscale scores predicted problem gambling. The SOGS was set as the dependent variable. Age was not significantly correlated with the SOGS ($r = .05$, $P > .05$) whereas gender was significantly associated with the SOGS ($t = 4.20$, $P < .001$), and male respondents reported more gambling problems than their female counterparts. Consistently, a higher proportion of PPG was male 81% ($n = 46$) than female ($\chi^2(1) = 21.26$, $P < .001$). As a result, only gender was first entered into the first block in all of the three regression analyses to control for its effect on the SOGS.

In the first regression analysis, only the C-GMS total score was entered into the second block. The results showed that 2 and 13% of the variances of the SOGS was accounted for by gender and the C-GMS total score respectively ($F = 17.30$ and 135.42 respectively, $P < .001$). In the final model, the standardized coefficients of gender and the C-GMS total

score were −.07 and .36 respectively ($P < .05$). As expected, respondents with a high C-GMS total score were more likely to report a high SOGS.

In the second regression analysis, all seven lower-order C-GMS subscale scores were entered into the second block of the regression model after gender was controlled in the first block. Gender and the seven lower-order motivational factors accounted for 2 and 15% of the variances of the SOGS (*F Change* = 17.30 and 23.35 respectively, $P < .001$). In the final model, gender, *accomplishment*, *external regulation*, and *amotivation* significantly explained the variance of the SOGS, with standardized coefficient as −.07, .22, −.14, and .24 respectively ($P < .05$).

Consistent results were observed from the third regression analysis, which consisted of gender in the first block as well as the higher-order factors of (1) *self-determined motivation*, (2) *non self-determined motivation*, and (3) *amotivation* in its second block of the regression model. The first and the second blocks explained 2 and 15% of the variances of the SOGS (*F Change* = 17.30 and 52.03, $P < .001$), and all these three higher-order factors significantly explained the variances of the SOGS with standardized coefficients as .31, −.15, and .24 respectively ($P < .05$).

The results of these three multiple regression analyses are summarized in Table 3. It was noted that, in contrary to the positive bivariate correlation found between the SOGS and either *non self-determined motivation* or *external regulation*, the negative sign of the standard coefficient of *non self-determined motivation* or *external regulation* in the final regression models indicated a net suppression effect. The real relationship of these two factors with the criterion variable (i.e. the SOGS) was hidden/suppressed by its

Table 3 The final models of the three regression analyses with SOGS score as dependent variable

Regression	Standardized coefficients	*t*	Sig.	Total *R* square	*F*	Sig. *F* change
1						
(Constant)		.80	.42	.15	77.64	.00
Gender	−.07	−2.10	.04			
C-GMS total score	.36	11.64	.00			
2						
(Constant)		.78	.44	.17	22.97	.00
Gender	−.07	−2.11	.04			
Knowledge	−.05	−.73	.46			
Accomplishment	.22	2.65	.01			
Stimulation	.09	1.16	.25			
Identified regulation	.06	.82	.41			
Introjected regulation	−.01	−.14	.89			
External regulation	−.14	−2.56	.01			
Amotivation	.24	4.44	.00			
3						
(Constant)		.85	.40	.16	44.07	.00
Gender	−.07	−2.31	.02			
Self-determined motivation	.31	4.49	.00			
Non self-determined motivation	−.15	−2.12	.03			
Amotivation	.24	4.71	.00			

relationships with other variables in the model (Cohen et al. 2003). Clarke (2008) reported the similar effect when testing the relationship between the C-GMS subscales and problem gambling among the adult gamblers of New Zealand.

Discussion

The present study aimed at validating the C-GMS, which is the Chinese version translated from the GMS (Chantal et al. 1994), in a Chinese sample. Chantal et al. (1994) revealed the seven-factor model of gambling motivation, which reflected seven different constructs including motivation toward *knowledge*, motivation toward *accomplishment*, motivation toward *stimulation*, motivation due to *identified regulation*, motivation due to *introjected regulation*, motivation due to *external regulation*, and *amotivation*. The results of confirmatory factor analysis suggested that this seven-factor model was also applicable among Chinese university students. In line with the findings of Chantal et al. (1994), all these seven motivational factors were correlated with each other. The internal consistencies of the overall scale and all the subscales of the C-GMS were high in the present study, and thus both the total score and the subscale score should be appropriate to be used for understanding Chinese people's gambling motivation. Though the present study only examined the reliability of the C-GMS with cross-sectional data, Chantal et al. (1994) demonstrated the test–retest reliability of the instrument when they developed it.

More importantly, the results of another confirmatory factor analysis further suggest that these seven factors can be converged into three higher-order categories of motivation, i.e. *self-determined motivation*, *non self-determined motivation*, and *amotivation*. With the tripartite taxonomy of motivation proposed by Chantal and Vallerand (1996) on the basis of self-determination theory (Deci and Ryan 1985; Ryan and Deci 2000), we found that *self-determined motivation* consisted of all three types of intrinsic motivation (for *knowledge, accomplishment, and stimulation*) and motivation due to *identified regulation*, whereas *non self-determined motivation* included two extrinsic motivations (due to *external regulation* and *introjected regulation*). The subscales corresponding to *self-determined motivation*, *non self-determined motivation*, and *amotivation* showed adequate reliabilities ($\alpha > .90$) and validities (e.g. positive correlation with gambling intention and the SOGS).

Significant positive correlations were observed between the C-GMS scores and gambling-related variables such as gambling intention of Chinese students. The C-GMS scores were positively associated with gambling intention and the number of game types they engaged in. These findings gave support to the validity of the C-GMS because high motivation to gamble would generate a greater intention and likelihood to engage in the betting activities in the future (Chantal et al. 1994; Lam 2007). Though Chantal et al. (1994) only found positive correlations between the four types of *self-determined motivation* and gambling intention among a group of Canadian adult gamblers, the present findings suggest that gambling motivation, regardless of types, may contribute to a higher intention to participate in gambling activities and a greater involvement in gambling among Chinese university students. Moreover, additional support for the validity of the C-GMS was obtained when significant positive correlations were established between the C-GMS and SOGS. These findings were in line with what was consistently observed in previous studies: a high level of gambling motivation was correlated with more problem gambling symptoms (Clarke 2004, 2008; Oei and Raylu 2010; Tao et al. 2010).

In previous research, pathological gamblers reported a higher level of gambling motivation than recreational gamblers (Platz and Millar 2001; Stewart and Zack 2008). For instance, Mitrovic and Brown (2009) found that problem poker-gamblers reported higher scores on both intrinsic and extrinsic motivation than their non-problem counterparts. Consistently, the C-GMS scores were able to discriminate between non-problem gamblers and probable problem gamblers among Chinese university students. The total score of the C-GMS, as well as its three subscale scores (i.e. *self-determined motivation*, *non self-determined motivation*, and *amotivation*) significantly explained the variances of problem gambling after gender effect was controlled. These findings provided some support to the discriminant and predictive validity of the C-GMS. Echoing with a study on college pathological gamblers (Carruthers et al. 2006), the present study found that problem gamblers were not primarily motivated by either intrinsic or extrinsic motives, and *amotivation* was a significant predictor of problem gambling symptoms (Oei and Raylu 2010; Ladouceur et al. 1997). Besides, both *self-determined motivation* and *non self-determined motivation* significantly explained problem gambling, but motivation toward *accomplishment* and motivation due to *external regulation* particularly emerged as its salient predictors. The findings suggest that Chinese problem gamblers are probably motivated to continue gambling for a sense of accomplishment and monetary or materialistic rewards, even though they are also aware that there is a lack of causality between their gambling action and positive outcomes and so they may not reach these goals through gambling.

The high positive correlation among the C-GMS subscale scores even resulted in a net suppression effect, which masked the real relationship between either *non self-determined motivation* or motivation due to *external regulation* and problem gambling of Chinese university students. Net suppression effect was also observed by gambling researchers (Clarke and Clarkson 2009; Raylu and Oei 2004b) when they conducted a regression of the C-GMS subscale scores and irrational gambling cognitions on the SOGS respectively. Thus, this possible suppression effect needs to be taken into consideration when using the C-GMS subscales to predict problem gambling in future research.

Some limitations of the present study should be acknowledged. First, due to the cross-sectional nature of the present data, the causality between gambling motivation and problem gambling cannot be confirmed. Second, a convenience sample of university students was employed, and so the generalizability of the findings may be reduced by the sampling procedures taken in the present study. The findings also may not be fully generalized to other Chinese populations such as older people. The self-report nature of the research design made the findings vulnerable to social desirability biases though the anonymity of the survey was highlighted and the respondents were encouraged to provide honest answers before they started completing the survey.

Despite of the limitations, the present findings suggest that the C-GMS is an appropriate tool for assessing Chinese people's gambling motivation. Moreover, the tripartite taxonomy of gambling motivation was supported in our Chinese university student sample, and so the seven subscales of the C-GMS, which correspond to seven specific gambling motivations, can be used to assess three major types of motivation—*self-determined motivation, non self-determined motivation,* and *amotivation*. The C-GMS can be used in various types of future research for a better understanding of gambling in Chinese culture. For examples, the C-GMS could be used to directly compare Western and Chinese findings of gambling motivation, to investigate potential motivational differences between non-problem and problem gamblers in Chinese communities, and to evaluate prevention as well as treatment intervention programs for Chinese problem gamblers. The present study is an essential step toward these objectives.

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