THE EFFECTS OF GOALS AND GAMBLING SYMPTOMS ON GAMBLING MOTIVATION, RISK SEEKING, AND GAMBLING OUTCOMES

by

THITAPA SHINAPRAYOON

(Under the Direction of Adam Goodie)

ABSTRACT

This study focused on whether gambling motivation, risk seeking, and gambling payoffs changed depending on specificity and difficulty of goals and number of gambling symptoms. Gamblers and nongamblers with nonspecific goals were more motivated to gamble by external sources (i.e., money and peers) and a lack of purpose (i.e., gambling without specific reasons). When risk seeking and overconfidence increased, the total gambling payoffs in the Georgia Gambling Task decreased. Knowledge of a game increased a tendency to seek risks in the gambling task. These might be risks of gaining lower payoffs. In addition, the Gambling Motivation Scale had the same factor structure as the newly developed Modified Gambling Motivation Scale. A confirmatory factor analysis supported the seven-factor model suggesting that amotivation and motivations of knowledge, accomplishment, stimulation, identified regulation, introjected regulation, and external regulation were distinct motives of gambling behaviors.

INDEX WORDS: Gambling motivation, Risk seeking, Gambling outcomes, Overconfidence, Specific goals, Difficult goals, Gambling disorder, Gambling Motivation Scale, Modified Gambling Motivation Scale, Confirmatory factor analysis

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THITAPA SHINAPRAYOON

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THITAPA SHINAPRAYOON

Major Professor:	Adam Goodie
Committee:	Michelle vanDellen
	Lawrence H. Sweet

Electronic Version Approved:

Julie Coffield
Interim Dean of the Graduate School
The University of Georgia
May 2015

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CHAPTER 1

INTRODUCTION

Why do people gamble? Researchers have been seeking the reasons why people enjoy gambling even though the probability of winning large prizes is often very low. For example, millions of people, both problem and nonproblem gamblers, buy millions of lottery tickets annually to win million dollars prizes. People also enjoy many other gambling activities such as slot machines, poker games, and sports betting. Some games require pure luck and some require a certain skill. Yet, people usually do not realize how low probabilities are to win big prizes in games of luck. In games of skill, there are some amounts of control due to knowledge and skills. In both cases, people appear to have certain cognitive distortions when processing the probability of winning prizes. These cognitive distortions are an illusion of control, a belief of control over rolling a dice, pulling a slot machine lever, and other gambling activities (Goodie, 2005; Langer, 1975).

Some cognitive biases are a gambler's fallacy and an overconfidence bias. Gambler's fallacy is a belief that an event will occur less frequently in the future if the event has occurred repeatedly in the recent past (Tversky & Kahneman, 1971). For example, if a ball lands in the number three slot on a roulette table twice, it may lead gamblers to believe that the ball has a lower chance to land in the same slot next round. Another cognitive bias is the overconfidence bias, a tendency to be more confident about a judgment than the actual accuracy of the judgment (Fischhoff, Slovic, & Lichtenstein, 1977). For instance, a stockbroker confidently predicts an increase in a particular stock's value tomorrow when, in fact, the stock goes down on the next

day. Besides these cognitive distortions, the present study focused on how a goal pursuit and gambling problems affected a risk taking, gambling motivation, and gambling performance or payoffs. This study aimed to investigate these influences to better understand the reasons why people gambled and took risks.

Some studies found a goal progress or a goal to increase motivation. Altering the mental representation of a goal progress was found to increase motivation to invest more effort in pursuing the goal. When they set their goals, people overestimated their goal progress in the beginning and underestimated it in the end to increase motivation to achieve their goals (Huang, Zhang, & Broniarczyk, 2012). Setting a goal also appeared to motivate people to pursue a goal because they experienced loss if they had not achieved their goal. This experience of loss motivated people to work towards their goal (Heath, Larrick, & Wu, 1999).

Goals affected motivation, but some goals could improve task performances. Difficult goals led to a higher level of performance than easy goals, though difficult goals did not necessarily lead to more successes. In a study where people were given feedbacks on their performance, difficult goals improved performance significantly more than easy or "do your best" goals (Locke, 1968). Another study also found that having specific and difficult goals motivated people to improve their performance (Locke & Latham, 2002). Specific and difficult goals appeared to increase motivation and performance in general. Therefore, research questions of this paper were how specificity and difficulty of goals could influence motivation and how they could affect gambling performance. Moreover, this study focused on motivation and performance specifically with regard to gambling. To my knowledge, these gambling motivation and gambling performance have never been done in a goal pursuit.

One of the research questions in the gambling literature has been focusing on reasons to gamble. Some argue that gambling provided social rewards, a release of tension, an intellectual challenge, a chance of winning money, and a dream of winning a jackpot. Gambling allows people to connect to other via socialization (i.e., bingo and pool) and to entertain themselves. Some games may require strategies and skills to play the games such as sport betting. Because there are always possibilities of winning money, people may want to take chances to win money (Binde, 2013; Neighbors, Lostutter, Cronce, & Larimer, 2002). Some suggest that gambling motivation originates from fundamental needs to be free, competent, and accepted. Due to these needs, people naturally desire to challenge one's knowledge and skills, to experience excitement, to identify with others, to gamble with friends for social acceptance, and to feel competent by winning money (Chantal & Vallerand, 1996; Lee, Chae, Lee, & Kim, 2007).

Gambling motivation that is based on self-determination theory may answer some of the motives behind gambling behaviors. The self-determination theory states that three mechanisms influence human behaviors. They are intrinsic motivation, extrinsic motivation, and amotivation (Deci & Ryan, 2000; Ryan & Deci, 2000). These three motivations are further categorized into seven motivations to gamble, which are intrinsic motivation toward knowledge, intrinsic motivation toward accomplishment, intrinsic motivation toward stimulation, extrinsic motivation toward identified regulation, extrinsic motivation toward introjected regulation, extrinsic motivation toward external regulation, and amotivation (Chantal, Vallerand, & Vallieres, 1994).

Firstly, intrinsic motivation to know captures a drive to learn or explore new games and strategies. For instance, gamblers may receive a pleasure from improving the knowledge of the games, from knowing their abilities in the games, and from knowing what can happen in the games. Secondly, intrinsic motivation to accomplish refers to receiving pleasure from

achievements in gambling activities such as an enjoyment to test their abilities and to have control in the games. Thirdly, intrinsic motivation to experience stimulation refers to getting excitement from gambling activities such as experiencing thrill or strong sensation from the games (Chantal et al., 1995; Chantal & Vallerand, 1996).

Motivations of identified regulation, external regulation, and introjected regulation are driven by external sources such as social view and monetary rewards (external rewards). Extrinsic motivation toward identified regulation refers to relaxing, escaping from stress, and socializing via the gambling activities. Extrinsic motivation toward external regulation refers to pleasure of chasing after monetary rewards. Extrinsic motivation toward introjected regulation refers to self-esteem and self-worth enhancements. These enhancements are accomplished through betting high amount of money to feel important among their peers (Chantal et al., 1995; Chantal & Vallerand, 1996).

Though gamblers are intrinsically and extrinsically motivated to gamble, they sometimes gamble without a sense of purpose (Carruthers, Platz, & Busser, 2006). This is called amotivation. In other words, people may continue to gamble, even though they do not know why they gamble or what they can get out of gambling. Thus, gamblers who are neither intrinsically motivated nor extrinsically motivated to gamble are considered amotivated gamblers (Chantal et al., 1995; Chantal & Vallerand, 1996).

Some researchers have studied these motives to understand what drives people to gamble. Previous studies have explored gambling motivation, but they have not examined the gambling motivation in the presence of goals. Studying motivation to gamble in the presence of a goal may reveal a new perspective of what motivates people to continue gambling, which may be a risk of a gambling addiction. Gambling motivation has been found to differ in games of skill and games

of luck. Self-determined motivations to gain knowledge of the games, to accomplish the games, to experience stimulation, and to reach important goals in the games predicted participation in a horse race that required skill, whereas nonself-determined motivation to win money predicted participation in a lottery that required luck (Chantal & Vallerand, 1996). Gamblers with self-determined motivations to learn about the games and to identify their gambling behaviors as important goals were more involved in gambling, such as spending more time and money gambling, than gamblers with nonself-determined motivations to win money and to appear important among their peers (Chantal, Vallerand, & Vallieres, 1995). Moreover, gamblers, who gambled pathologically, were more motivated to gamble without a purpose and were less intrinsically motivated to gamble than gamblers, who gambled recreationally (Carruthers et al., 2006). Another study also found that gamblers and nongamblers spent more money in gambling, gambled more, and were more likely to be classified as problem gamblers when they had less control of their behaviors and choices (Neighbors & Larimer, 2004). Though these researchers investigated gambling motivation, they did not examine gambling motivation when gamblers were pursuing their goals in gambling activities.

One of the aims of this study was to explore the relationship between gambling motivation and goals among gamblers and nongamblers. Since specific and difficult goals have been associated with motivation, this study would examine whether or not the specificity and difficulty of goals affected gambling motivation. This study would further contribute to the understanding of the effect of gambling problems on self-determined or nonself-determined gambling motivation in the presence of the specificity and difficulty of goals, since previous studies have not examined the gambling motivation in the goal pursuit. The hypotheses were:

H1: When goals are specific, self-determined gambling motivation should increase,

H2: When goal are difficult, self-determined gambling motivation should increase,

H3: As gambling behaviors become more problematic, self-determined gambling motivation should decrease.

Besides goals and gambling problems, overconfidence and risk seeking might affect how much people gain or lose in gambling tasks. A study recorded how confident and accurate people were at estimating odds of events which had occurred. People had higher confidence than their actual accuracy of their odds. This indicated overconfidence bias that was associated with losses in a gambling task (Fischhoff et al., 1977). A study showed that bankers and students had greater overconfidence, as they invested more in risky stocks (Lambert, Bessière, & N'Goala, 2012). In another study, overconfidence and choosing on risky bets were associated with fewer points earned in the Georgia Gambling task (GGT; Goodie, 2003). It suggested that confidence and risk seeking might lead to lower payoffs or more gambling losses. Therefore, one of the purposes of this study was to determine if the specificity and difficulty of goals predicted lower payoffs in gambling activities. If people set specific and difficult amount of money to win, would they become riskier in order to win big prizes to accomplish their goals? The hypotheses were:

H4: As overconfidence and acceptance of risky bets increase, performance in the Georgia Gambling Task should decrease,

H5: When goals are specific, performance in the Georgia Gambling Task should increase,

H6: When goals are difficult, performance in the Georgia Gambling Task should increase,

Some researchers have studied an allocation of risky strategies when a goal was present. It was found that people tended to utilize a riskier strategy when they pursue the difficult goals

than the easy goals in an absence of incentives (Knight, Durham, & Locke, 2001). It had been shown that people with a specific and challenging goal chose to bet on riskier choices than people with a nonspecific goal or do-your-best goal. This specific and challenging goal also led people to get smaller payoffs than people with the nonspecific goal did because they were less likely to meet agreements with the other buyers in bargaining tasks (Larrick, Heath, & Wu, 2009). In the present study, the aims were whether specific goals and difficult goals affected risk seeking during gambling. Since accuracy (i.e., answering questions correctly) and overconfidence were correlated with risky-choice preference, they were hypothesized to predict risky preference.

H7: As accuracy and overconfidence increase, acceptance of risky gambles in the Georgia Gambling Task should increase,

H8: When goals are specific, acceptance of risky gambles should increase,

H9: When goals are difficult, acceptance of risky gambles should increase.

Confirmatory Factor Analysis

Another purpose of the study was to test for factor structures of the English version of the Gambling Motivation Scale (GMS; Chantal, Vallerand, & Vallieres, 1994) and to show the same factor structures for a development of a modified version of the GMS, called the Modified Gambling Motivation Scale (MGMS). The MGMS was developed to provide an alternative option for better language comprehension for English speakers. This would clarify most of the items and eliminate any ambiguous language in the GMS. It might improve researchers' confidence that the respondents understood the items. A confirmatory factor analysis was used to test whether or not the factor structures of the GMS and MGMS were equivalent. The GMS was initially developed and validated in French to assess a gambling motivation (Chantal et al.,

1994). It was translated into English that was most used as a measure of the gambling motivation in previous studies (Carruthers et al., 2006; Clarke, 2005, 2008), and it had been translated in other languages such as Chinese (Wu & Tang, 2011). To capture gambling motivation, this study showed if seven motives were distinct and necessary, or if fewer motives were enough to describe gambling motivation.

Seven-factor model. Three intrinsic motivations of knowledge, accomplishment, stimulation; three extrinsic motivations of identified regulation, introjected regulation, and external regulation; and amotivation were identified as important motives of gambling behaviors (Chantal et al., 1994). These seven motivations were tested if they were distinctive motives of the gambling motivation construct.

Three-factor model. The seven types of gambling motivation could be combined into three factors as well. The three factors were self-determined gambling motivation, nonself-determined gambling motivation, and amotivation (Chantal et al., 1995). Self-determined gambling motivation comprised the items for intrinsic motivations toward knowledge, accomplishment, stimulation, and extrinsic motivation toward identified regulation. Nonself-determined gambling motivation included the items for extrinsic motivations of external regulation and introjected regulation.

One-factor model. Because the seven factors were highly correlated with each other as well as the three factors, the one-factor model would be tested to determine whether these different types of gambling motivation should be combined into a single construct to best fit the sample data.

Thus, this study aimed to test these three models, using CFA to determine which model best fitted the sample data for the GMS and MGMS, and to show the same factor structures of

both scales. The more comprehensible language was the only change in the MGMS from the GMS; therefore, the items in the MGMS should assess the same factors as the items in the GMS.

CHAPTER 2

METHOD

Participants

Two hundred and seventy-five participants were recruited from the psychology research pool at the University of Georgia. Participants were eligible if they gambled at least once a week. They were compensated with credit for participation as an alternative option to fulfill requirements of their psychology courses. Participants' ages ranged from 18 to 29 (M = 19.47, SD = 1.43) years. Their demographic information, such as race, gender, gambling frequency, and participation in gambling activities (e.g., lottery, dice, betting on sports) are reported in Table 1 and 2. Even though the eligibility of the study was to gamble at least once a week, nongamblers were oversampled. They were included in the data analyses to represent nongamblers in the population. Participants were randomly assigned to one of three conditions in Phase 2 of the GGT which is described in detail below.

Procedure

Once consent forms were signed, an experimenter escorted participants to their computer stations. Participants were approximately two feet away from each other and there were partitions to prevent the participants from seeing the other computer screens. In Phase 1 of the Georgia Gambling Task (GGT), participants answered 100 questions about population and rated their confidence on their answers. For example, they were asked, "Which state has the larger population, according to the 2010 U.S. Census?" in each question. Then, two states were randomly chosen by the computer, and participants rated their confidence on the answer using a

confidence interval (i.e., 50-52%, 53-60%, 61-70%, 71-80%, 81-90%, 91-97%, or 98-100%). In Phase 2, participants were presented with the same questions, two states, and their answers from Phase 1. For each question, they decided whether they would take a risky bet or a sure bet based on their chosen answer and the potential rewards associating with the two bets (gambles). For a risky bet, they could win a larger reward if their answer to the corresponding question was correct or they could win nothing if their answer was wrong. For a sure bet, they could win 100 points whether or not their answer was correct. Once they chose a bet, they were presented with a correct answer, their reward for that question, and their running total score. This process repeated until they placed their bets on all the 100 questions from Phase 1. During Phase 2 in the GGT, the goals were manipulated. In the specific-difficult goal condition, participants were told to win at least 13,720 points (i.e., 70% of the highest possible points earned). In the specific-easy goal condition, they were told to win at least 5,880 points (i.e., 30% of the highest possible points earned). In the nonspecific goal condition, they were told to win as many points as possible. Figure 1 illustrates the procedure of Phase 1 and Phase 2.

After they completed the GGT, participants completed the Gambling Motivation Scale (GMS), a demographics questionnaire, the Diagnostic Interview for Gambling Severity (DIGS), the South Oaks Gambling Screen (SOGS), and the Modified Gambling Motivation Scale (MGMS) on the Medialab software. The GMS and MGMS were counterbalanced. Participants responded to an item that assessed frequency of gambling activities ("How many times do you gamble?) using a 7-point likert scale ranging from one (*never gamble*) to seven (*more than 5 times a week*). They also wrote down how many points they were aiming for during the GGT as a manipulation check. This item was added after the data of 136 subjects were collected. Lastly,

they were debriefed for the purpose of the study once they completed the series of questionnaires.

Materials

The following materials describe measurements of variables of interests in details. The Georgia Gambling Task (GGT) measured the acceptance of risky bets, overconfidence, and gambling outcomes (GGT performance). The Gambling Motivation Scale measured gambling motivation. The Diagnostic Interview for Gambling Severity (DIGS) and South Oaks Gambling Screen (SOGS) measured gambling problems. The selection of risky gambles, sure gambles, and measures of gambling motivation and gambling disorder are described in their respective sections.

Georgia Gambling Task (GGT). The GGT was used to measure acceptance of risky gambles (i.e., risk attitudes), overconfidence, and performance (gambling outcomes) on knowledge-based gambles (Goodie, 2003). Overconfidence had been found in various studies (Camchong, Goodie, McDowell, Gilmore, & Clementz, 2007; Goodie, 2005; Lakey, Goodie, Lance, Stinchfield, & Winters, 2007). Out of these three outcome variables, the acceptance of risky gambles and total points earned (GGT performance) were dependent variables in the following regression analyses.

The rewards of risky gambles varied depending on the selected confidence for each item. For example, participants who were 50% confident on their answers would be offered higher payoffs for risky gambles than participants who were 90% confident. To calculate rewards for risky gambles, the midpoint for each confidence interval and points for the specific confidence interval were required. The midpoint of each confidence interval was calculated with equation 1.

$$\text{Midpoint of a confidence interval} = \frac{\text{lowest confidence + highest confidence}}{2} \quad (1)$$

For example, a midpoint of 50-52% confidence interval was (0.50 + 0.52) / 2 or 0.51. Confidence intervals' midpoints for 53-60%, 61-70%, 71-80%, 81-90%, 91-97%, and 98-100% were 0.565, 0.655, 0.755, 0.855, 0.940, 0.990, respectively. Once the midpoint of each confidence interval was determined, points for risky gambles could be calculated by the following equation:

$$\text{Points for a confidence interval} = \left(\frac{1}{\text{Midpoint of confidence}} \right) \times 100 \quad (2)$$

Using equation 2, the points that could be won for the risky bet for the 50-52% confidence interval was 196 points. Therefore, points for risky bets with confidence intervals of 50-52%, 53-60%, 61-70%, 71-80%, 81-90%, 91-97%, and 98-100% were 196, 177, 153, 132, 117, 106, and 101 points, respectively. Therefore, when participants were 50-52% confident on their answer in Phase 1 of GGT and chose a risky bet, they would gain 196 points if they were correct or gain zero points if they were not correct. On the contrary, they would gain 100 points regardless of their accuracy for the sure bets.

Gambling Motivation Scale (GMS) and Modified Gambling Motivation Scale (MGMS). The language in the Gambling Motivation Scale (GMS) was not clear such as item three ("For the feeling of efficacy that I get when I play my favorite game"). A general audience might not understand the meaning of the efficacy and inaccurately respond the items. The wording of many GMS items was awkward. Therefore, the Modified Gambling Motivation Scale (MGMS) was developed to augment the language in the GMS, and its factor structures were

compared with the structures of the GMS. All the GMS items except item nine was augmented for better language comprehension and clearer wording in the MGMS items. Three different factor structures of each scale were compared. The GMS and MGMS consisted of seven subscales: intrinsic motivation toward knowledge, intrinsic motivation toward accomplishment, intrinsic motivation toward stimulation, extrinsic motivation toward identified regulation, extrinsic motivation toward external regulation, extrinsic motivation toward introjected regulation, and amotivation. Each subscale measured each type of gambling motivation using four items.

In the GMS, participants rated a degree of correspondence between their gambling motivation and the 28 items. Likert scale ranged from one (*does not correspond*) to seven (*corresponds exactly*). For example, the items in the GMS included intrinsic motivation toward knowledge ("For the satisfaction of learning new ways of playing my favorite game"), intrinsic motivation toward accomplishment ("For the feeling of efficacy that I get when I play my favorite game"), intrinsic motivation toward stimulation ("Because it is exciting to play for money"), extrinsic motivation toward identified regulation ("Because, for me, it is the best way to relax completely"), extrinsic motivation toward external regulation ("To get rich"), extrinsic motivation toward introjected regulation ("Because it makes me feel like somebody important"), and amotivation ("I play for money, but sometimes I ask myself what I get out of it") on 7-point likert scales. The complete GMS is on Appendix A.

In the MGMS, participants completed the augmented 28 items from GMS using 7-point likert scale ranging from one (*strongly disagree*) to seven (*strongly agree*). The items measured intrinsic motivation toward knowledge ("I enjoy learning new strategies"), intrinsic motivation toward accomplishment ("I feel competent when I gamble"), intrinsic motivation toward

stimulation (“It is exciting to gamble”), extrinsic motivation toward identified regulation (“It is the best way to relax”), extrinsic motivation toward external regulation (“I play for money”), extrinsic motivation toward introjected regulation (“It makes me feel important”), and amotivation (“I play for money, but I sometimes wonder what I get out of gambling”) on 7-point likert scales. The complete MGMS is on Appendix B.

Diagnostic Interview for Gambling Severity (DIGS). Participants responded to 19 items on the modified DIGS (Fortune & Goodie, 2010; Winters, Specker, & Stinchfield, 2002) using three choices (1 = *very true*; 2 = *somewhat true*; 3 = *false*). Out of the 19 items, 18 items are used to screen respondents because one item assesses their participations of gambling activities. The questionnaire is based on the nine symptoms of gambling disorder in the DSM 5 (i.e., tolerance, irritability, loss of control, preoccupation, escaping from problems, chasing after losses, lying, jeopardizing significant relationship and career, and reliance on others for desperate financial situations). Each pair of items corresponds to each diagnostic criterion for the gambling disorder. To receive a score for each symptom, any pair of answers other than false-false and somewhat true-false resulted in one point for a particular symptom. The points from the 18 items, then, were summed to get a DIGS score for each individual. The scores or gambling symptoms ranged from zero to nine.

South Oaks Gambling Screen (SOGS). Based on the DSM 3 criteria, the seven criteria for problem gamblers were formed. They were family interference, job interference, lying about gambling, debts from gambling, seeking someone to relieve desperate financial situation caused by gambling, borrowing from illegal financial sources, and committing an illegal act to finance gambling (Lesieur & Blume, 1987). Participants answered 16 questions on SOGS using varied

response scales (e.g., *yes* or *no*). The SOGS scores ranged from zero to 20 using 13 items to measure these seven criteria.

Model Fit

There were 266 observations in this sample. Since each individual completed both GMS and MGMS, the two scales were counterbalanced. The total scores of GMS and MGMS were positively correlated, $r(264) = .73$, $p < .001$. The responses to GMS, $t(264) = -0.87$, $p = .388$, and the responses to MGMS, $t(264) = 0.59$, $p = .553$, did not vary by the order effect. Confirmatory Factor Analysis (CFA) with maximum likelihood estimation was used to determine an adequate model fitting for the 28 items in each GMS and MGMS.

Three first-order models were analyzed for each scale to determine if a one-factor model, three-factor model, or seven-factor model best captured the latent variable called gambling motivation. The one-factor model consisted of the 28 observable variables that loaded onto a single gambling motivation factor. In the three-factor model, 16 items for self-determined motivation, eight items for nonself-determined motivation, and four items for amotivation were loaded onto their respective factors. Self-determined motivation consisted of intrinsic motivation toward knowledge, intrinsic motivation toward accomplishment, intrinsic motivation toward experience stimulation, and extrinsic motivation toward identified regulation. Nonself-determined motivation consisted of extrinsic motivation toward introjected regulation and extrinsic motivation toward external regulation. In the seven-factor model, four items loaded to each of the seven types of gambling motivation. These seven types of gambling motivation were intrinsic motivation toward knowledge, intrinsic motivation toward accomplishment, intrinsic motivation toward experience stimulation, extrinsic motivation toward identified regulation,

extrinsic motivation toward introjected regulation, extrinsic motivation toward external regulation, and amotivation.

Each analysis tested the goodness of fit by comparing the two competing models, a proposed model and a null model. The proposed models were the seven-factor model, three-factor model, and one-factor model, whereas the null model hypothesized that there were zero latent variables or that no observable variables loaded onto any factor. To determine how well a model approximated the sample data, multiple goodness-of-fit indices were used. The Tucker Lewis Index (TLI), also known as Non Normed Fit Index (NNFI), was used because it was less sensitive to sample sizes whereas the Comparative Fit Index (CFI) did not have bias toward simpler models as much as the TLI (Marsh, Balla, & Mcdonald, 1988). The Root Mean Square Error of Approximation (RMSEA) was used because it did not compare an estimated model or the seven-factor model, in this case, to a baseline model that was often the worst possible model. This suggested that RMSEA only relied on the information from the estimated model and did not determine whether the estimated model was good or bad in comparison to the worst model. Therefore, RMSEA was good for determining the goodness of fit based on the available observations in the sample. In general, a model could be interpreted as a good fit if the CFI and TLI are at least .95 and if the RMSEA was at 0.06 or below. However, a model was considered an adequate fit with a reasonable error if CFI and TLI are at .90 or above and if RMSEA was at 0.08 or below (Browne & Cudeck, 1992; Hu & Bentler, 1999).

Gambling Motivation Scale and Modified Gambling Motivation Scale. In the one-factor model, the factor loadings of the 28 items ranged from .50 to .78 for GMS and .50 to .82 for MGMS, see Table 3. In the three-factor model, the factor loadings ranged from .39 to .92 for GMS and .56 to .85 for MGMS, see Table 4. It should be noted that the loadings of item two and

item 26 in nonself-determined motivation improved nearly .30 in MGMS, relatively to the loadings of items 2 and 26 in GMS. Finally, the seven-factor model had the loadings ranging from .65 to .95 for the GMS and .61 to .86 for MGMS, see Table 5. Overall, the factor loadings of GMS were relatively the same as the factor loadings of MGMS in the three models.

For the GMS, the seven-factor model, $\chi^2(329) = 818.87$, $p < .001$, fit the data better than the three-factor model, $\chi^2(347) = 1{,}563.16$, $p < .001$, and the one-factor model, $\chi^2(350) = 2{,}202.37$, $p < .001$. Similarly for the MGMS, the seven-factor model, $\chi^2(329) = 848.53$, $p < .001$, also improved a model fit in comparison to the three-factor model, $\chi^2(347) = 1{,}417.43$, $p < .001$, and the one-factor model, $\chi^2(350) = 1{,}917.58$, $p < .001$. Although the chi-squares for a goodness of fit were significant for all the GMS and MGMS models, large sample sizes tended to make chi-squares significant, even when the differences between the estimated model and the perfect model were small (Marsh et al., 1988). Yet, the chi-squares for the seven-factor models were substantially smaller than the chi-squares for the three-factor models and the one-factor models for both GMS and MGMS. The correlations of the factors for the GMS are reported on Table 6. The correlations of the factors for the MGMS are on Table 7. Table 8 showed the chi-squares and the following fit indices for the six models.

For the GMS, the fit indices indicated that the seven-factor model was the best model. The seven-factor model had .97, 0.97, and 0.07 with 90% confidence interval of 0.07 and 0.08 for the CFI, TLI, and RMSEA, in order. The three-factor model had .92, 0.91, and 0.12 with 90% confidence interval of 0.11 and 0.12 for the CFI, TLI, and RMSEA, respectively. Lastly, the one-factor model had .86, 0.85, and 0.14 with 90% confidence interval of 0.14 and 0.15 for the CFI, TLI, and RMSEA, in order. The one-factor model was a poor fit because the fit indices were below .90 and the RMSEA was greater than 0.10. The three-factor model was decent when

examining the CFI and TLI, but the RMSEA indicated a poor fit when the model was not compared to the null model. Its RMSEA had a confidence interval above 0.10. However, the fit indices of the seven-factor model showed an excellent approximation of the sample data since the CFI and TLI were greater than .95, comparing to the null model, and the RMSEA was also lower than 0.08 with an acceptable range of confidence interval.

Similar to the GMS, the fit indices for the seven-factor model of MGMS demonstrated the best fit. For the MGMS, the seven-factor model had .98 for the CFI, 0.97 for the TLI, and 0.08 for the RMSEA, 90% CI [0.07, 0.08]. The three-factor model had .93 for the CFI, 0.93 for the TLI, and 0.11 for the RMSEA, 90% CI [0.10, 0.11]. Finally, the one-factor model had .90 for the CFI, 0.89 for the TLI, and 0.13 for the RMSEA, 90% CI [0.12, 0.14]. The one-factor model was inadequate for the data with the CFI and TLI that barely reached .90. The RMSEA exceeded 0.10 as well as its confidence interval. The three-factor model appeared to be adequate, but the RMSEA suggested a poor fit. On the contrary, the seven-factor model best approximated the sample because the CFI and TLI were greater than .95 and the RMSEA was at .08 with an adequate range of confidence interval.

Table 1

Characteristics of Participants in Percentages

Variable	%
Gender	
Male	59.3
Female	40.7
Race	
Caucasian	73.9
African American	10.8
Asian	10.8
Pacific Islander	0.8
Mixed Race	2.9
Others	0.8
Gambling Frequency	
Never	22.4
Once a Year	16.2
Once a Month	21.2
Once a Week	30.3
2-3 a Week	7.5
4-5 a Week	1.7
> 5 a Week	0.8
DIGS	
With gambling disorder[a]	9.9
Without gambling disorder[b]	90.1
SOGS	
Probable pathological gamblers[c]	14.1
Problem gamblers[d]	44.4
No problem gamblers[e]	41.5

Note. DIGS = Diagnostic Interview for Gambling Severity; SOGS = South Oaks Gambling Screen.

[a]With gambling disorder = at least 4 symptoms. [b]Without gambling disorder = 0 - 3 symptoms. [c]Probable pathological gamblers = at least 5 points. [d]Problem gamblers = 1 - 4 points. [e]No problem gamblers = 0 points.

Table 2

Percentages of Participation in Gambling Activities

Gambling Activity	DIGS					SOGS		
	Never	Less than monthly	Monthly	Weekly	Daily	Not at all	Less than once a week	At least once a week
Cards	21.2	43.6	25.7	9.1	0.4	28.6	60.6	10.8
Cards at Casinos	77.2	20.7	1.2	0.8	0			
Casinos						75.5	23.7	0.8
Animals	77.2	17.4	3.7	1.7	0	81.3	17	1.7
Sports	21.6	29	26.6	20.3	2.5	26.6	49.8	23.7
Dice	71.4	20.7	5.4	1.7	0.8	75.9	22	2.1
Lotteries	36.9	36.9	14.9	10.8	0.4	44.4	46.1	9.5
Bingo	72.6	21.2	3.7	2.5	0	71	27.8	1.2
Slot Machines	65.6	28.6	4.1	1.2	0.4	71.8	27	1.2
Bowls/Golfs/Pools/Others	39.8	34	19.1	5.8	1.2	42.7	47.3	10
Tabs	91.3	7.9	0.4	0.4	0.4			
Stocks	83.8	10.4	2.9	2.1	0.8	82.2	14.1	3.7

Note. DIGS = Diagnostic Interview for Gambling Severity; SOGS = South Oaks Gambling Screen; Tabs = gambling tickets that symbols must be matched in certain combinations.

Table 3

Factor Loadings of the GMS and MGMS Items in the One-Factor Model

Item	Gambling motivation	
	GMS	MGMS
10	.71	.71
15	.76	.77
18	.74	.77
20	.77	.77
3	.71	.75
6	.65	.70
19	.78	.82
24	.73	.76
1	.60	.59
12	.74	.78
14	.77	.75
28	.74	.78
4	.59	.55
13	.63	.58
17	.65	.66
23	.56	.60
2	.61	.68
9	.70	.64
16	.67	.65
26	.68	.75
8	.53	.63
11	.59	.60
22	.52	.59
27	.56	.64
5	.59	.52
7	.54	.48
21	.50	.57
25	.54	.50

Note. GMS = Gambling Motivation Scale; MGMS = Modified Gambling Motivation Scale.

Table 4

Factor Loadings of the GMS and MGMS Items in the Three-Factor Model

Item	Self-determined motivation		Nonself-determined		Amotivation	
	GMS	MGMS	GMS	MGMS	GMS	MGMS
10	.75	.72				
15	.79	.79				
18	.78	.82				
20	.81	.79				
3	.73	.75				
6	.64	.70				
19	.81	.83				
24	.72	.77				
1	.61	.59				
12	.78	.79				
14	.80	.76				
28	.75	.78				
4	.56	.56				
13	.59	.57				
17	.65	.66				
23	.50	.61				
2			.39	.66		
9			.48	.59		
16			.55	.64		
26			.49	.73		
8			.85	.73		
11			.83	.73		
22			.84	.74		
27			.92	.76		
5					.79	.79
7					.80	.80
21					.74	.79
25					.84	.85

Note. GMS = Gambling Motivation Scale; MGMS = Modified Gambling Motivation Scale.

Table 5

Factor Loadings of the GMS and MGMS Items in the Seven-Factor Model

Item	Knowledge		Accomplish		Stimulation		Identified		Introjected		External		Amotivation	
	GMS	MGMS	GMS	MGMS	GMS	MGMS	GMS	MGMS	GMS	MGMS	GMS	MGMS	GMS	MGMS
10	.78	.78												
15	.81	.85												
18	.82	.86												
20	.84	.84												
3			.73	.75										
6			.65	.73										
19			.83	.85										
24			.72	.78										
1					.66	.61								
12					.79	.81								
14					.85	.80								
28					.82	.84								
4							.77	.74						
13							.83	.81						
17							.77	.84						
23							.73	.68						
2									.69	.74				
9									.79	.68				
16									.73	.68				
26									.75	.78				
8											.86	.83		
11											.81	.80		
22											.85	.85		
27											.95	.81		

5	.79	.79
7	.79	.80
21	.74	.79
25	.85	.85

Note. GMS = Gambling Motivation Scale; MGMS = Modified Gambling Motivation Scale; Knowledge = intrinsic motivation toward knowledge; Accomplish = intrinsic motivation toward accomplishment; Stimulation = intrinsic motivation toward experience stimulation; Identified = extrinsic motivation toward identified regulation; Introjected = extrinsic motivation toward introjected regulation.

Table 6

Correlations Between Subscales and Composite Scores for the GMS

	1	2	3	4	5	6	7	8	9	10
1. Knowledge	–									
2. Accomplish	.82	–								
3. Stimulation	.77	.75	–							
4. Identified	.54	.64	.55	–						
5. Introjected	.64	.72	.63	.65	–					
6. External	.41	.47	.48	.40	.47	–				
7. Amotivation	.42	.52	.45	.47	.58	.52	–			
8. SDM	.89	.91	.88	.80	.76	.50	.54	–		
9. NSDM	.52	.62	.55	.56	.72	.70	.96	.65	–	
10. Gambling motivation	.42	.32	.36	.26	.02[a]	-.26	-.54	.39	-.45	–

Note. Variables one to seven are subscales of the GMS. Variable eight is a self-determined motivation score. Variable nine is a nonself-determined motivation score. Variable ten is a calculated score for gambling motivation. GMS = Gambling Motivation Scale. Knowledge = intrinsic motivation toward knowledge; Accomplish = intrinsic motivation toward accomplishment; Stimulation = intrinsic motivation toward experience stimulation; Identified = extrinsic motivation toward identified regulation; Introjected = extrinsic motivation toward introjected regulation. All the correlations are at the .001 significant level.

[a]Nonsignificance.

Table 7

Correlations Between Subscales and Composite Scores for the MGMS

	1	2	3	4	5	6	7	8	9	10
1. Knowledge	−									
2. Accomplish	.81	−								
3. Stimulation	.76	.77	−							
4. Identified	.54	.66	.64	−						
5. Introjected	.69	.79	.73	.64	−					
6. External	.53	.57	.63	.44	.57	−				
7. Amotivation	.43	.51	.45	.40	.54	.53	−			
8. SDM	.88	.91	.90	.83	.81	.61	.51	−		
9. NSDM	.55	.64	.60	.50	.70	.71	.96	.65	−	
10. Gambling motivation	.34	.27	.30	.35	.08[a]	-.16	-.60	.36	-.48	−

Note. Variables one to seven are subscales of the GMS. Variable eight is a self-determined motivation score. Variable nine is a nonself-determined motivation score. Variable ten is a calculated score for gambling motivation. MGMS = Modified Gambling Motivation Scale. Knowledge = intrinsic motivation toward knowledge; Accomplish = intrinsic motivation toward accomplishment; Stimulation = intrinsic motivation toward experience stimulation; Identified = extrinsic motivation toward identified regulation; Introjected = extrinsic motivation toward introjected regulation. All the correlations are at the .001 significant level.

[a]Nonsignificance.

Table 8

Goodness-of-Fit Indices of the Three Models of Both Scales

Model	χ^2	df	CFI	TLI	RMSEA		
					Point estimates	90% CI	
						LL	UL
GMS							
7-factor[a]	818.87*	329	.97	0.97	0.07	0.07	0.08
3-factor[b]	1563.16*	347	.92	0.91	0.12	0.11	0.12
1-factor[c]	2202.37*	350	.86	0.85	0.14	0.14	0.15
MGMS							
7-factor[a]	848.53*	329	.98	0.97	0.08	0.07	0.08
3-factor[b]	1417.43*	347	.93	0.93	0.11	0.10	0.11
1-factor[c]	1917.58*	350	.90	0.89	0.13	0.12	0.14

Note. χ^2 = chi-square; df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Squared Error of Approximation; CI = confidence interval; LL = lower limit; UL = upper limit.

[a]Seven-factor model with intrinsic motivation toward knowledge, intrinsic motivation toward accomplishment, intrinsic motivation toward experience stimulation, extrinsic motivation toward identified regulation, extrinsic motivation toward introjected regulation, extrinsic motivation toward external regulation, and amotivation. [b]Three-factor model with self-determined gambling motivation, nonself-determined gambling motivation, and amotivation. [c]One-factor model with gambling motivation.

*$p < .001$.

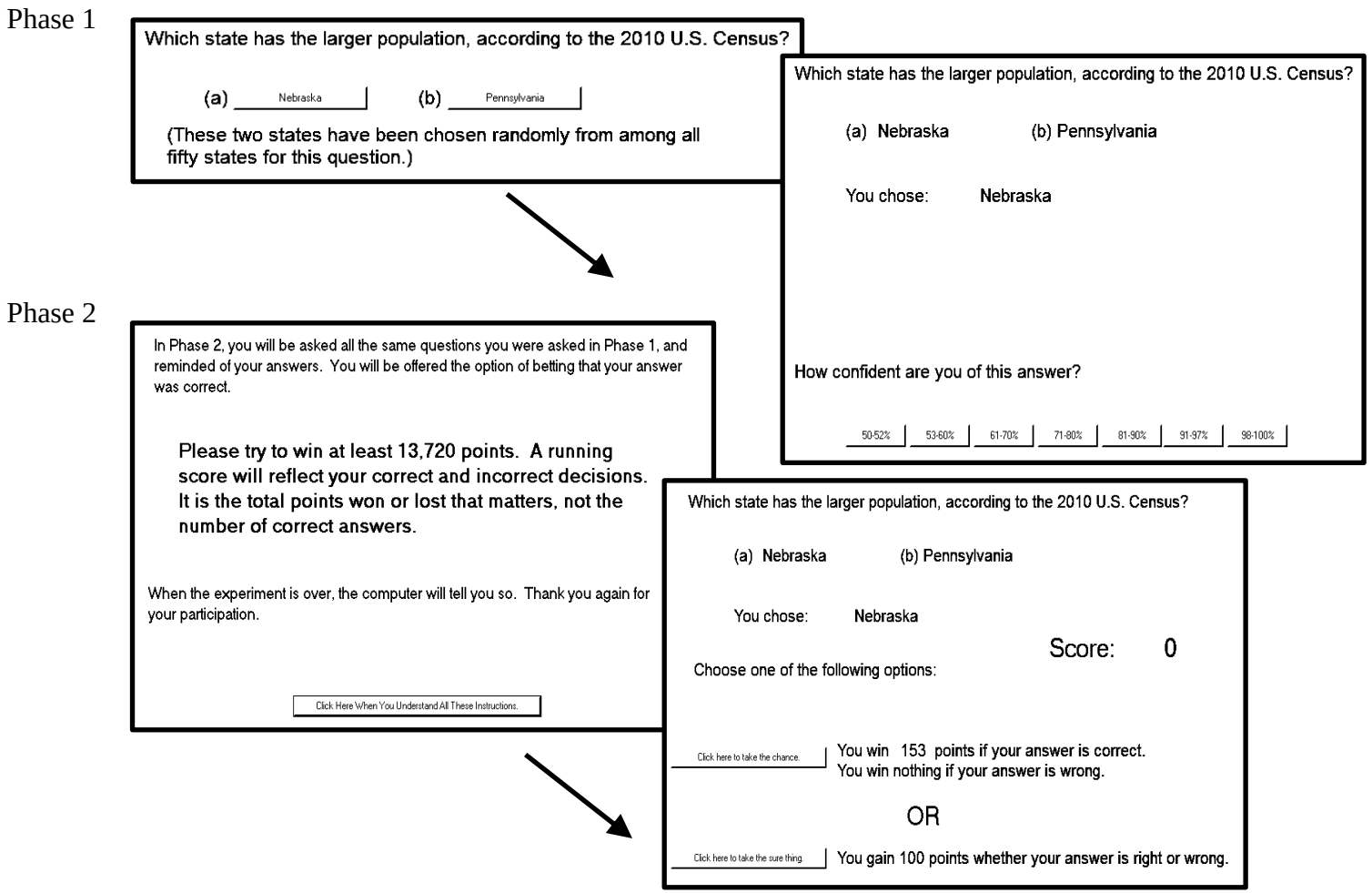

Figure 1. The Georgia Gambling Task. In Phase 1, participants were asked to select one of the two states and rate their confidence. In Phase 2, participants were asked to win at least 13,720 points, at least 5,880 points, or as many points as possible. Finally, they chose a risky bet or a sure bet.

CHAPTER 3

RESULTS

Twenty-eight participants (10%) were excluded from the analyses because of computer error and six outliers (2%) were removed. In addition, an acceptance of risky gambles was -1.77 (*SD* = .15) skewed and the accuracy in the GGT were -0.482 (*SD* = .15) skewed. Since they were negatively skewed, any transformations to negatively skewed data would create difficulties in interpretation. They were transformed with square roots and multiplication of -1 to alleviate the skewness. The transformed and untransformed bet acceptances were highly correlated, $r(239) = .97$, $p < .001$. The transformed and untransformed accuracies were correlated .99, $p < .001$. The GGT performance also had a positive skew of 0.74 (*SD* = .15). Log transformation was applied, and the transformed and untransformed gambling outcomes were highly correlated, $r(239) = 1.00$, $p < .001$. After the transformations, Kolmogorov-Smirnov test showed the accuracy, $D(241) = .04$, $p = .200$, acceptance of risky bets, $D(241) = .05$, $p = .200$, and GGT performance, $D(241) = .04$, $p = .200$, to be nonsignificant.

Out of the remaining 241 participants, 83 were in the specific-difficult goal condition, 85 were in the specific-easy goal condition, and 73 were in the nonspecific goal condition. The possible scores for accuracy, bet acceptance, and confidence in the GGT ranged from zero to 100. On average, participants accepted risky gambles 78% ($M = 77.90$, $SD = 16.03$) of the time and were 74% ($M = 74.29$, $SD = 8.86$) accurate at answering the questions in the GGT. They were also 76% ($M = 76.24$, $SD = 8.53$) confident of their answers on average. To calculate overconfidence, accuracy was subtracted from confidence. Overall, participants were generally

overconfident with a mean of 1.95 (*SD* = 9.79), *t*(240) = 3.10, *p* = .002, in comparison to well-calibrated participants whose overconfidence would be zero. Although participants accepted risky gambles (i.e., risk seeking) more than half of the time, *t*(240) = 27.02, *p* < .001, their accuracy was better than chance, *t*(240) = 42.58, *p* < .001. On average, their GGT points were approximately the same (*M* = 10,325, *SD* = 1,079) as completely risk averse individuals, who would have only preferred all of the sure gambles (i.e., gain 100 points regardless of the accuracy) and gained 10,000 points in the GGT.

Manipulation Check

Participants in the specific-difficult goal condition were instructed to achieve higher points than participants in the specific-easy goal condition. Participants in the nonspecific goal condition were simply told to gain as many points as possible. When asked how many points they were trying to achieve in the GGT, the differences of points in the three conditions were significant, $F_W(2, 49) = 12.30$, $p < .001$. Participants in the specific-difficult goal condition (*M* = 10,834, *SD* = 4,406) strived for significantly more points than participants in the specific-easy goal condition (*M* = 2,850, *SD* = 2,850). Participants in the nonspecific goal condition reported their goal (*M* = 11,346, *SD* = 14,408) closer to participants in the specific-difficult goal condition than participants in the specific-easy goal condition. This suggested that participants in the specific-difficult goal condition aimed for higher points than participants in the specific-easy goal condition, whereas participants in the nonspecific goal condition pursued points as high as the participants in the specific-difficult condition. In addition, acceptance of risky gambles, *t*(239) = 2.34, *p* = .020, and accuracy, *t*(239) = 2.02, *p* = .045, significantly differed for the sample with the manipulation check from the sample without the manipulation check. A manipulation check vector was entered in all regression models that included these two variables.

However, this difference of bet acceptance and accuracy did not significantly predict all the dependent variables. Thus, all the regression models were re-analyzed without including the manipulation vector and its interactions with acceptance of risky gambles and accuracy.

Regression Analyses

Hierarchical regression was used for predicting gambling motivation, acceptance of risky gambles, and performance in the Georgia Gambling Task. While previous studies showed gender and gambling frequency to be predictors of gambling motivation (Chantal et al., 1995; Chantal & Vallerand, 1996), the main focus of the present study was to determine whether or not the specificity and difficulty of goals predicted gambling motivation, acceptance of risky bets, and GGT performance (i.e., gambling outcomes in the gambling activity). Therefore, gender and gambling frequency were entered prior to the other independent variables in the gambling motivation models, the bet acceptance models, the GGT performance models to investigate whether or not the other independent variables captured variances of the dependent variables above and beyond the controlled variables.

To predict gambling motivation, goal conditions and gambling pathology were the main independent variables controlling gender and gambling frequency. To predict bet acceptance, the goal conditions, gambling motivation, gambling pathology, accuracy, and overconfidence were entered after controlling for gender and gambling frequency. To predict the GGT performance, the goal conditions, gambling motivation, gambling pathology, bet acceptance, accuracy, and overconfidence were entered after controlling for gender and gambling frequency.

The data were prepared before the regression analysis due to multicollinearity. Gambling symptoms and goal conditions were centered to avoid multicollinearity since their interactions were included in all the regression models. Overconfidence and accuracy were moderately

intercorrelated, $r(239) = -.58$, $p < .001$, but they did not pose a serious multicollinearity. The tolerances of all variables were approximately .50 to .90, suggesting that the multicollinearity was not problematic since a tolerance at .20 or less indicates serious multicollinearity. The correlations of independent and dependent variables are reported on Table 9. In the following analyses, the DIGS scores for gambling problems and the GMS scores for gambling motivation were used as primary measures in all of the main analyses.

Gambling motivation. The full model using goal conditions and gambling symptoms as the main predictors was significantly better at predicting the gambling motivation above and beyond the gender and gambling frequency, R^2 change = .05, $F(5, 233) = 2.56$, $p = .028$. Both the first model, $R^2 = .05$, $F(2, 238) = 6.12$, $p = .003$, and the full model of the hierarchical regression, $R^2 = .10$, $F(7, 233) = 3.63$, $p = .001$, significantly accounted the variance of gambling motivation. Table 10 reports the gambling motivation models. In the first model, gender, $\beta = .14$, $p = .038$, was significant, and gambling frequency, $\beta = .13$, $p = .052$, was marginally significant. In the full model, gender became nonsignificant, $\beta = .11$, $p = .097$, whereas gambling frequency became significant at predicting gambling motivation, $\beta = .22$, $p = .003$. As expected, having specific goals predicted higher self-determined gambling motivation, $\beta = .12$, $p = .049$. Unexpectedly, having the specific-difficult goal, in comparison to having the specific-easy goal, did not predict higher self-determined gambling motivation, $\beta = .06$, $p = .333$. Expectedly, gambling symptoms, $\beta = -.17$, $p = .023$, significantly predicted lower self-determined gambling motivation. Importantly, the relationship of gambling symptoms and gambling motivation depended on whether the goal was specific or nonspecific, $\beta = .16$, $p = .017$. As the number of gambling symptoms increased, the self-determined motivation to gamble decreased.

Since gender and the difficulty of goal were nonsignificant, they were dropped from the model. A full model with gambling frequency, specificity of goal, gambling symptoms, and the interaction of goal specificity and gambling symptoms was still significant, $R^2 = .08$, $F(4, 236) = 5.31$, $p < .001$. The coefficients of independent variables in this new full model were used to calculate simple slopes, see Figure 2. When the participants strived for the nonspecific goal, their self-determined gambling motivation decreased as the number of their gambling symptoms increased, $t(236) = 3.86$, $p < .001$. However, the relationship of gambling symptoms and self-determined gambling motivation did not differ significantly in the specific goal conditions, $t(236) = 0.12$, $p = .906$.

The results using the SOGS scores as a measure of gambling symptoms were quantitatively similar to the results using the DIGS scores except nonsignificance of the SOGS scores, $\beta = -.12$, $p = .102$, and marginal significance of specific goal, $\beta = .12$, $p = .054$. When the same set of independent variables predicted gambling motivation with the MGMS scores instead of the GMS scores, only gambling frequency significantly predicted the MGMS scores whether the DIGS scores or the SOGS scores were included in the models. The complete results for the SOGS scores and the MGMS scores are reported on Table 10 and 11.

GGT performance. The goal conditions, gambling motivation, gambling symptoms, accuracy, overconfidence, and acceptance of risky gambles were entered simultaneously after controlling for gender and gambling frequency in a regression model to predict the gambling points in GGT. Gender significantly predicted the GGT performance, $\beta = .14$, $p = .049$. However, the model with only gender was nonsignificant, $R^2 = .02$, $F(2, 238) = 2.14$, $p = .120$. The full model significantly predicted the performance, $R^2 = .85$, $F(11, 229) = 118.36$, $p < .001$, and significantly predicted the GGT performance beyond gender, R^2 change = .83, $F(9, 229) =$

118.36, $p < .001$. Overconfidence strongly predicted fewer points in the GGT, $\beta = -.96$, $p < .001$. Acceptance of risky gambles also significantly predicted fewer points, $\beta = -.16$, $p < .001$. The same results were also obtained quantitatively when the SOGS scores were used as a measure of gambling problems, and when the MGMS scores were used as a measure of the gambling motivation, see Table 10 and 1

Bet acceptance. Males were more likely to bet on risky gambles than females, $\beta = .21$, $p = .003$. However, the full model containing the goal conditions, gambling motivation, gambling pathology, accuracy, and overconfidence significantly accounted for variance above and beyond the variances of gender and gambling frequency, R^2 change = .29, $F(8, 230) = 12.35$, $p < .001$. The model of gender and gambling frequency, $R^2 = .04$, $F(2, 238) = 5.14$, $p = .007$, and the model of the other independent variables, $R^2 = .33$, $F(10, 230) = 11.30$, $p < .001$, significantly predicted acceptance of risky gambles. Accuracy was the only independent variable that significantly predicted acceptance of risky gambles, $\beta = .62$, $p < .001$. When the SOGS scores was entered in the regression model as a measure of the gambling symptoms, all the results were quantitatively the same, see Table 10. When the MGMS scores were used as a measure of the gambling motivation, the results for predicting bet acceptance were quantitatively similar to the main analysis as well, see Table 11.

Table 9

Correlations of Scales and Variables

	1	2	3	4	5	6	7	8	9	10	11
1. MGMS	–										
2. GMS	.75***	–									
3. SOGS	-.02	-.05	–								
4. DIGS	-.01	-.02	.68***	–							
5. Gender	.17*	.18**	.03	.11	–						
6. Gamble frequency	.18**	.18**	.36***	.42***	.33***	–					
7. Accuracy	.10	.09	-.10	-.15*	.34***	.12	–				
8. Points	.13	.10	-.19**	-.18**	.11	-.04	.45***	–			
9. Confidence	-.03	-.04	.08	.02	.21**	.15*	.37***	-.58***	–		
10. Overconfidence	-.12	-.12	.18**	.17**	-.13	.02	-.58***	-.91***	.54***	–	
11. Bet acceptance	.03	.04	-.10	-.10	.20**	.06	.56***	.08	.29***	-.27***	–

Note. MGMS = Modified Gambling Motivation Scale; GMS = Gambling Motivation Scale; SOGS = South Oaks Gambling Screen; DIGS = Diagnostic Interview for Gambling Severity; Points = gambling outcomes or GGT performance; Bet acceptance = acceptance of risky bets.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 10

Hierarchical Regression Models Including Scores from the GMS, DIGS, and SOGS

DV	IV	DIGS		SOGS	
		β	*p*	β	*p*
Gambling motivation					
Step 1					
	Gender	.14*	.038	.14*	.038
	Gamble frequency	.13	.052	.13	.052
	R^2	.05**		.049**	
	F	6.12**	.003	6.12**	.003
Step 2					
	Gender	.11	.097	.12	.084
	Gamble frequency	.22**	.003	.19**	.009
	Difficult goals	.06	.333	.06	.343
	Specific goals	.12*	.049	.12	.054
	Gambling problems	-.17*	.023	-.12	.102
	Difficult goals*Gambling problems	-.01	.847	.04	.565
	Specific goals*Gambling problems	.16*	.017	.06	.400
	R^2	.10**		.08**	
	F	3.63**	.001	2.93**	.006
	ΔR^2	.05*		.032	
	ΔF	2.56*	.028	1.63	.154
GGT Performance					
Step 1					
	Gender	0.14*	.049	.14*	.049
	Gamble frequency	-.08	.220	-.08	.220
	R^2	.02	.120	.02	
	F	2.14	.120	2.14	.120
Step 2					
	Gender	.04	.210	.03	.259
	Gamble frequency	.00	.974	.00	.899
	Difficult goals	-.01	.632	-.02	.548
	Specific goals	-.00	.896	-.00	.952
	Gambling problems	-.03	.315	-.04	.147
	Difficult goals*Gambling problems	.03	.350	-.00	.907
	Specific goals*Gambling problems	-.01	.865	.03	.349
	Gambling motivation	-.01	.728	-.01	.647
	Overconfidence	-.96***	< .001	-.96***	< .001

	Accuracy	-.04	.377	-.02	.538
	Bet acceptance	-.16***	< .001	-.17***	< .001
	R^2	.85***		.85***	
	F	118.36***	< .001	118.36***	< .001
	ΔR^2	.83***		.83***	
	ΔF	141.67***	< .001	141.66***	< .001
Bet acceptance					
Step 1					
	Gender	.21**	.003	.21**	.003
	Gamble frequency	-.00	.953	-.00	.953
	R^2	0.04**		.04**	
	F	5.14**	0.007	5.14**	.007
Step 2					
	Gender	.01	.842	.01	.906
	Gamble frequency	-.01	.910	.01	.841
	Difficult goals	-.07	.212	-.07	.182
	Specific goals	.08	.173	.08	.155
	Gambling problems	-.02	.795	-.07	.257
	Difficult goals*Gambling problems	.04	.473	.00	.997
	Specific goals*Gambling problems	-.00	.967	.06	.283
	Gambling motivation	-.01	.894	-.02	.787
	Overconfidence	.10	.162	.10	.144
	Accuracy	.62***	< .001	.63***	< .001
	R^2	.33***		.33***	
	F	11.30***	< .001	11.51***	< .001
	ΔR^2	.29***		.29***	
	ΔF	12.35***	< .001	12.60***	< .001

Note. GMS = Gambling Motivation Scale; DIGS = Diagnostic Interview for Gambling Severity; SOGS = South Oaks Gambling Screen; Accuracy = the number of correct answers; Bet acceptance = acceptance of risky bets.

*p < .05. **p < .01. ***p < .001.

Table 11

Hierarchical Regression Models Including Scores from the MGMS, DIGS, and SOGS

		DIGS		SOGS	
DV	IV	β	*p*	β	*p*
Gambling motivation					
Step 1					
	Gender	.12	.079	.12	.079
	Gamble frequency	.14*	.033	.14*	.033
	R^2	.05**		.05**	
	F	5.74**	.004	5.73**	.004
Step 2					
	Gender	.10	.157	.10	.161
	Gamble frequency	.20**	.008	.19*	.010
	Difficult goals	.10	.118	.10	.104
	Specific goals	.11	.101	.10	.113
	Gambling problems	-.10	.181	-.08	.278
	Difficult goals*Gambling problems	.03	.613	.05	.478
	Specific goals*Gambling problems	.05	.433	.03	.605
	R^2	.08*		.07*	
	F	2.71*	.010	2.67*	.011
	ΔR^2	.03		.03	
	ΔF	1.47	.199	1.42	.217
GGT Performance					
Step 1					
	Gender	.14*	.049	.14*	.049
	Gamble frequency	-.08	.220	-.08	.220
	R^2	.02		.02	
	F	2.14	.120	2.14	.120
Step 2					
	Gender	.03	.241	.03	.301
	Gamble frequency	-.00	.897	-.00	.966
	Difficult goals	-.02	.577	-.02	.493
	Specific goals	-.01	.814	-.01	.858
	Gambling problems	-.03	.354	-.04	.168
	Difficult goals*Gambling problems	.02	.356	-.00	.882
	Specific goals*Gambling problems	-.01	.805	.02	.373
	Gambling motivation	.01	.598	.01	.598
	Overconfidence	-.96***	< .001	-.95***	< .001

	Accuracy	-.03	.389	-.02	.554
	Bet acceptance	-.16***	< .001	-.17***	< .001
	R^2	.85***		.85***	
	F	118.46***	< .001	118.40***	< .001
	ΔR^2	.83***		.83***	
	ΔF	141.78***	< .001	141.71***	< .001
Bet acceptance					
Step 1					
	Gender	.21**	.003	.21**	.003
	Gamble frequency	-.00	.953	-.00	.953
	R^2	.04**		.04**	
	F	5.14**	.007	5.14**	.007
Step 2					
	Gender	.01	.819	.01	.894
	Gamble frequency	-.00	.954	.02	.808
	Difficult goals	-.07	.230	-.07	.197
	Specific goals	.08	.161	.08	.148
	Gambling problems	-.02	.781	-.07	.254
	Difficult goals*Gambling problems	.04	.463	.00	.988
	Specific goals*Gambling problems	-.00	.967	.06	.281
	Gambling motivation	-.03	.640	-.03	.607
	Overconfidence	.09	.174	.10	.151
	Accuracy	.62***	< .001	.63***	< .001
	R^2	.33***		.33***	
	F	11.33***	< .001	5.14***	.007
	ΔR^2	.29***		.29***	
	ΔF	12.38***	< .001	12.63***	< .001

Note. MGMS = Modified Gambling Motivation Scale; DIGS = Diagnostic Interview for Gambling Severity; SOGS = South Oaks Gambling Screen; Accuracy = the number of correct answers; Bet acceptance = acceptance of risky bets.

*p < .05. **p < .01. ***p < .001.

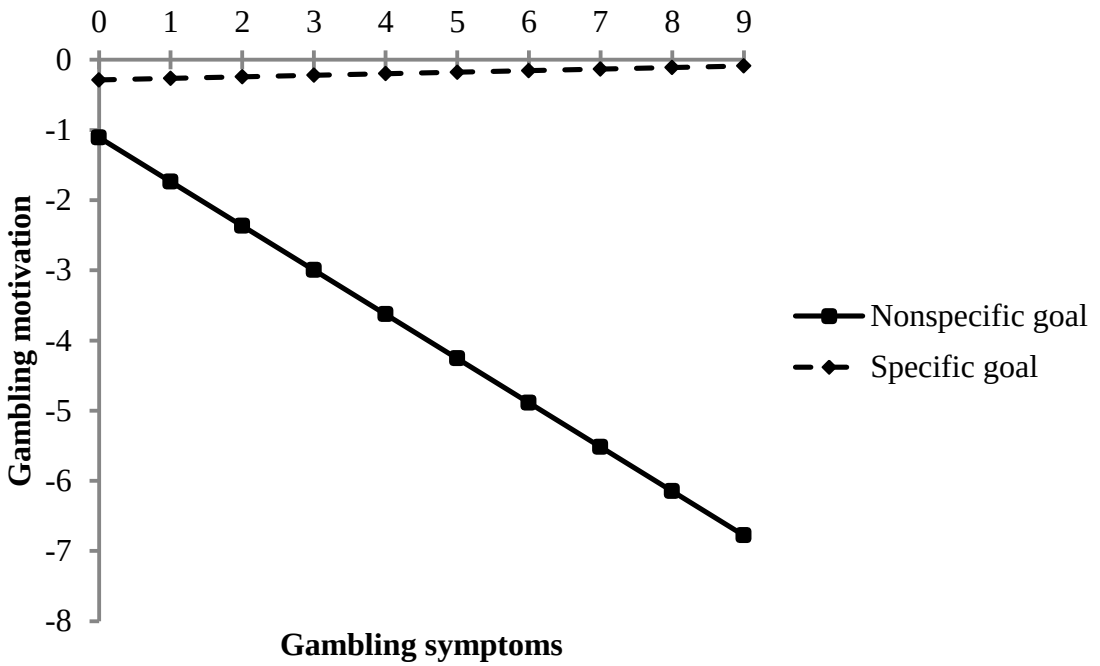

Figure 2. The interaction of the specificity of goals and gambling symptoms. The y-axis indicates gambling motivation scores of the Gambling Motivation Scale. The more negative a score is, the more nonself-determined motivation is. The x-axis indicates gambling symptoms from the Diagnostic Interview of Gambling Severity. In the nonspecific goals, gamblers with more gambling symptoms had more nonself-determined motivation to gamble or were more motivated to gamble by money, social rewards, and a lack of gambling purpose. In the specific goals, gamblers had neither self-determined gambling motivation nor nonself-determined gambling motivation regardless of the number of gambling symptoms. In other words, they were not motivated by knowing the games, winning money, and others in particular.

CHAPTER 4

DISCUSSION

Gambling Motivation

What determined the degree of self-determined gambling motivation were specific goals and gambling symptoms. Problem gamblers and nongamblers with the specific goal in the gambling task had higher self-determined motivation to gamble than those with the nonspecific goal (H1). Moreover, people with more gambling symptoms had lower self-determined motivation to gamble (H3). These supported H1 and H3. In addition, gambling symptoms affected gambling motivation differently depending on whether goals were specific or nonspecific. When participants were told to achieve the nonspecific goal (i.e., try to gain as many points as possible), gamblers with more gambling problems had greater nonself-determined gambling motivation. This suggested that people, who had nonspecific goals and had more gambling symptoms, were more motivated to gamble by external sources (e.g., monetary gain and peer review) and aimless gambling behaviors. Lastly, the difficulty of goals did not increase self-determined gambling motivation, and this rejected H2.

These results provide an insight for the reasons why problem gamblers and nongamblers may want to continue gambling. They are consistent with the previous studies on gambling motivation that money, social rewards, and compulsivity play roles in problematic gambling (Binde, 2013; Carruthers et al., 2006). However, this study is unique because of the manipulation of goals on gambling motivation. As gambling behaviors become more problematic, they are more motivated by external influences (e.g., money and peers) and purposeless gambling when

pursuing nonspecific goals. It suggests that people who try to win as much money as possible may start gambling recreationally because they are motivated to learn new strategies and to win money. However, they are more motivated by money and ego enhancement (e.g., to feel important among their peers) as they become more obsessed with gambling. If more problematic gamblers become more motivated to gamble by external sources and a lack of purpose, this may suggest a loss of control. They may be less capable of controlling their gambling behaviors. Therefore, studying how goals can influence motivation to gamble is important for understanding motives behind problem gambling.

GGT Performance

In the gambling task, lower outcomes or payoffs were strongly predicted by overconfidence and acceptance of risky bets (i.e., risk seeking). This supported H4. Problem gamblers and nongamblers gained fewer points when they were more overconfident in their answers and were accepting risky bets more often. Overconfidence strongly influenced worse outcomes in the gambling task even more than acceptance of risky bets. Therefore, it was important for gamblers and nongamblers to adjust their confidence to match their accuracy in order to gain better outcomes when they decided to accept risky gambles. It was because they could only receive higher outcome for each question when their answer was correct. Instead, gamblers and nongamblers failed to adjust their confidence to represent their accuracy, which then led to lower gambling outcomes. Thus, being overconfident did hurt the gambling payoffs more than being risky.

Besides the effects of overconfidence and bet acceptance, having specific goals was hypothesized to increase performance in the gambling task. However, the results failed to support H5 because specific goals did not predict higher outcomes in the gambling task. It is

possible that the effect of goals in a general task performance may not apply to a gambling-related performance in this study. When gamblers and nongamblers aimed for the difficult goal, they did not have significantly worse gambling payoffs than people who strived for the easy goal. This finding also did not support H6. The overall results suggested that payoffs were not affected by the specificity or difficulty of goals, but by the degree of overconfidence and risk taking. In addition, the effects of overconfidence and bet acceptance occurred among both gamblers and nongamblers suggesting that the overconfidence bias and the tendency to be risk seeking were not limited to only gamblers.

Overconfidence and acceptance of risky gambles were negatively related to gambling payoffs in the GGT, consistent with previous studies (Goodie, 2003, 2005). Even though the effects of goals and gambling symptoms were not found, this study succeeded at showing that overconfidence and acceptance of risky gambles were causally related to how many points people make in the gambling task. In real gambling games, the overconfidence bias and tendency to accept risky gambles are harmful to gamblers and nongamblers because they will lose more money. This loss will especially exacerbate more when the probability of winning is extremely small such as lotteries and slot machines.

Bet Acceptance

The results showed that accuracy influenced gamblers and nongamblers to accept risky bets more often in the gambling task. This partially supported H5 since only accuracy led to greater bet acceptance or risk seeking. Even though people accepted risky bets more as their confidence increased, they actually accepted risky bets more frequently because of their knowledge in the gambling task. This could be supported as the correlation between accuracy and acceptance of risky bets was stronger than the correlation between confidence and

acceptance of risky bets, see Table 9. Though both gamblers and nongamblers were generally overconfident in their answers, they relied mostly on their accuracy in betting on risky gambles. In addition, setting a goal based on its specificity or difficulty did not increase the acceptance of risky bets, thus, rejecting H8 and H9. In other words, it did not matter whether their goals were specific or difficult, gamblers and nongamblers accepted risky bets more often because of their accuracy or knowledge in the gambling task.

These results are applicable to many knowledge-based gambling or skilled gambling games such as sport betting that requires some knowledge in a specific sport. Gamblers and nongamblers will be more likely to seek risky gambles (i.e., larger rewards and low probability to win) in games of skill than in games of luck because selecting bets will require the knowledge of the games. For example, people may place their money on riskier bets in the football betting because they are knowledgeable in predicting winners or scores of football matches. This tendency to take risks may appear less harmful because peopke generally take risks when they are right about their betting. However, this acceptance of risky gambles also leads to lower gambling payoffs.

Gambling Motivation Scale and Modified Gambling Motivation Scale

According to the fit indices, the seven-factor models fit the sample data best, compared to the three-factor models and the one-factor models for the GMS and MGMS. Although the CFI and TLI suggested that the three-factor models for the GMS and MGMS might adequately fit the data, their RMSEA values demonstrated poor fits when the models were not compared to the null models. This further supported the seven-factor models to be the most appropriate models for the GMS and MGMS. In other words, the seven types of motivation captured the gambling motivation construct better than the three types of gambling motivation (i.e., self-determined

gambling motivation, nonself-determined gambling motivation, and amotivation) or a single motivation to gamble. Thus, confirmatory factor analysis showed that the MGMS still measured the seven types of gambling motivation just as well as the GMS did, even though the MGMS was rewritten in a more comprehensible language.

This study tests for factor structures of the English GMS and provides the MGMS as an alternative measure in a college sample. This offers an alternative option for researchers to use the MGMS as an augmented English version of the GMS. This study also provides a greater confidence in the measurement of gambling motivation that the English GMS and MGMS have the same factor structure as the French GMS as suggested in the previous study (Chantal et al., 1994). It also offers a useful tool for researchers who may be interested in motivation to gamble in college samples.

Limitations and Future Direction

The GMS and MGMS were tested in a college sample. This may limit the generalizability to an older sample. However, previous studies found the GMS to successfully measure the gambling motivation in both younger and older populations (Chantal et al., 1995; Clarke, 2005, 2008). The GMS has also been used to correlate with the new scale, called the Gambling Related Cognitions Scale (GRCS; Raylu & Oei, 2004), because the gambling-related cognitions were related to the gambling motivation. The GRSC scores were significantly correlated to the subscales of the GMS suggesting that the GMS might have captured the gambling motivation construct. Moreover, gambling motivation should be interpreted cautiously. Since the GMS and MGMS may measure a general motivation to gamble, the inferences of gambling motivation that was manipulated in the GGT may be limited.

The inferences to problem gambling are limited since nongamblers were included in the analyses. However, nongamblers still represent a younger population. It is not possible to screen nongamblers out using the research pool to ensure the eligibility within a time constraint. If participants who gambled less frequently than once a week were removed, there would have been only approximately ninety six participants or thirty two participants in each goal condition. The analyses would lose power, which would be more fetal to the results and interpretations.

Conclusion

The more comprehensible English in the MGMS captured the same construct as well as the English GMS. The MGMS is an alternative instrument that is useful at measuring gambling motivation. In addition, people are driven by money, peer reviews, and a lack of purpose when they gamble with nonspecific goals (e.g., to win as much money as possible) and have more problematic gambling behaviors. People also lose more money as they are overconfident and risk seeking. Finally, knowledge of the gambling games is a double-edged sword since knowledge can lead people to accept risky gambles, which have lower probabilities of winning.

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APPENDIX A

GAMBLING MOTIVATION SCALE

Why do you play for money (bet) at your favorite game?

1. Because it is exciting to play for money.
2. Because it makes me feel like somebody important.
3. For the feeling of efficacy that I get when I play my favorite game.
4. Because, for me, it is the best way to relax completely.
5. I play for money, but sometimes I ask myself if I should continue to play my favorite game.
6. Because playing for money allows me to test my capacity to control myself.
7. I play for money, but sometimes I ask myself what I get out of it.
8. To get rich.
9. To show others that I am a dynamic person.
10. For the pleasure I get at improving my knowledge of the game.
11. To buy something that I dream of.
12. Because it allows me to enjoy myself enormously.
13. Because it is the best way I know of to eliminate tension.
14. For the strong sensations I feel when I play my favorite game.
15. For the satisfaction of learning new ways of playing my favorite game.
16. To be envied by others.
17. Because it is the hobby I have chosen to clear my mind.
18. For the pleasure of knowing my abilities at this game.

19. For the satisfaction I feel when I can control the game.
20. For the curiosity of knowing what can happen in the game.
21. I play for money but sometimes I feel I am not getting a lot out of it.
22. To make money quickly and easily.
23. Because it's the best way I know of to meet my friends.
24. For the feeling of control it gives me.
25. I play for money but I sometimes ask myself if it is good for me.
26. Because when I win, I feel like someone important.
27. To make a lot of money.
28. For the thrill or the strong sensations it gives me.

Items for each subscale:

Intrinsic motivation toward knowledge	10, 15, 18, 20
Intrinsic motivation toward accomplishment	3, 6, 19, 24
Intrinsic motivation toward stimulation	1, 12, 14, 28
Extrinsic motivation toward identified regulation	4, 13, 17, 23
Extrinsic motivation toward external regulation	8, 11, 22, 27
Extrinsic motivation toward introjected regulation	2, 9, 16, 26
Amotivation	5, 7, 21, 25

APPENDIX B

MODIFIED GAMBLING MOTIVATION SCALE

Why do you gamble at your favorite game?

1. It is exciting to gamble.
2. It makes me feel important.
3. I feel competent when I gamble.
4. It is the best way to relax.
5. I play for money, but I sometimes worry if I should continue playing.
6. Gambling allows me to test my control.
7. I play for money, but I sometimes wonder what I get out of gambling.
8. I play for money.
9. To show others that I am a dynamic person.
10. I enjoy improving my knowledge of the game.
11. I play for money to buy what I desire.
12. It allows me to enjoy myself enormously.
13. It is the best way I know to eliminate tension.
14. I experience strong sensations when I gamble.
15. I enjoy learning new strategies.
16. I want to be envied by others.
17. It is my hobby to clear my mind.
18. I enjoy knowing my ability in this game.

19. I like it when I can control the game.
20. I am curious to know what will happen in the game.
21. I play for money, but I sometimes feel I do not get a lot out of it.
22. It is quick and easy money.
23. It is the best way to spend time with friends.
24. It gives me a feeling of control.
25. I play for money, but I sometimes wonder if it is good for me.
26. I feel important when I win.
27. It makes me a lot of money.
28. It gives me a thrill or strong sensation.

Items for each subscale:

Intrinsic motivation toward knowledge	10, 15, 18, 20
Intrinsic motivation toward accomplishment	3, 6, 19, 24
Intrinsic motivation toward stimulation	1, 12, 14, 28
Extrinsic motivation toward identified regulation	4, 13, 17, 23
Extrinsic motivation toward external regulation	8, 11, 22, 27
Extrinsic motivation toward introjected regulation	2, 9, 16, 26
Amotivation	5, 7, 21, 25