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# Development and Evaluation of a Modified Gambling Motivation Scale (Japanese Version)

Yasunobu Komoto, M.D.<sup>1,3\*</sup>, Makoto Kaneko, B.A.<sup>2</sup>, Koji Nobayashi, B.A.<sup>2</sup>

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<sup>1</sup> Yoshino Hospital, Tokyo, Japan

<sup>2</sup> Sega Sammy Holdings Inc., Tokyo, Japan

<sup>3</sup> ORCID: 0000-0001-8286-9882

\*Corresponding author: Yasunobu Komoto: [aria11832013@yahoo.co.jp](mailto:aria11832013@yahoo.co.jp)

**Abstract:** The Modified Gambling Motivation Scale (MGMS) is based on Self-Determination Theory, comprises six factors: Intellectual Challenge, Social Recognition, Excitement, Socialization, Monetary Gain, and Amotivation. As currently configured, the MGMS does not directly translate into a clinical intervention strategy. To increase the value of this scale, we propose restructuring it into a new scale based on identity development theory, with four factors that each correspond to a clinical grouping according to type of gambler: Identity for Achievement (recreational gamblers), Identity for Diffusion (problem gamblers), Moratorium (pathological gamblers), and Occupational Identity (professional gamblers). We also investigated the reliability and validity of both the four- and six-factor structures of its Japanese version (J-MGMS) in the seven-point Likert format and the dichotomous (yes/no) format. Study 1 validated J-MGMS by comparing it to MGMS with 26 participants. Study 2 evaluated the score structure of the J-MGMS with 160 participants. A Wilcoxon signed-rank test found no significant difference between the MGMS and J-MGMS, while confirmatory factor analysis indicated a better fit for the four-factor dichotomous format of the J-MGMS than for others. We also identified associations between amotivation and gambling problem scores with a linear regression model. Our findings indicate that the four-factor dichotomous format can be more convenient than the current six-factor structure for assessing gamblers' identity and clinical grouping.

**Keywords:** Gambling Motivation, Japanese Modified Gambling Motivation Scale, Identity Development Theory, Pachinko, Pachi-slot gambling, The South Oaks Gambling Screening Japanese version (J-SOGS).

## Introduction

For most gamblers, gambling is a form of entertainment or pastime for relaxation, establishing and maintaining social relationships, and experiencing emotions such as excitement and thrill. On the other hand, some gamble to test their luck, or with the goal of winning big due to irrational gambling-related beliefs (Chen et al., 2015; Francis et al., 2015; Komoto, 2016; Shinaprayoon et al., 2017; Wu & Tang, 2011). Researchers in disciplines including psychology, psychopharmacology, sociology, and addiction medicine have classified these motivations in various ways (Binde, 2013).

Because gambling disorder has phenomenologically similar symptoms to addiction-related disorders (Rash et al., 2016), a psychopharmacological addiction model was first adapted to develop gambling motivation scales. Studies on alcoholism have proposed two characteristic motivations for drinking: negative reinforcement (to alleviate negative emotions) and positive reinforcement (to induce emotions; Mohr et al., 2005; Stewart & Devine, 2000). However, gambling addiction differs from alcoholism significantly in that irrational cognitions such as the illusion of control (Langer, 1975; Clark & Wohl, 2021) and other erroneous gambling-related beliefs (Ejova & Ohtsuka, 2020) play a major role. Therefore, alcoholism cannot automatically be used as a model of a behavioural addiction like gambling.

Nevertheless, because of their phenomenological similarity, this two-factor motivation model was adapted to gambling disorders. By adding social motivations to this model, the three-factor Gambling Motives Questionnaire (GMQ) was developed (Stewart & Zack, 2008). This was then expanded into the GMQ-Financial scale (GMQ-F; Dechant, 2014) by adding, economic factor of potential monetary gain, resulting in a four-factor model.

Using a similar psychopharmacological framework as a core factor, the Reason for Gambling Questionnaire (RGQ) and the Reasons for Gambling Scale (RGS) were subsequently developed (Canale et al., 2015; Luceri & Vergura, 2015). The RGQ added a fifth factor of social recognition, which denotes the desire to feel important and increase self-esteem via gambling (Canale et al., 2015). However, despite their shared provenance, GMQ-F and RGQ displayed little item overlap.

### **Gambling Motivation Scales Based on the Self-Determination Theory**

Self-Determination Theory (SDT; Deci & Ryan, 1991) is a macro-theory focused on three innate psychological needs: competence, autonomy, and relatedness. Chantal et al. (1994) developed the Gambling Motivation Scale (GMS) based on this, with seven factors of gambling motivation: intrinsic motivations related to (1) knowledge, (2) accomplishment, and (3) experience stimulation (i.e., enhancement and coping); extrinsic

motivations related to (4) identified regulation (i.e., relationship and relaxation), (5) introjected regulation (i.e., increasing self-esteem), and (6) external regulation (i.e., monetary gain); and (7) amotivation (Chantal et al., 1994).

As it is based on learning theory, the GMS is a systematic psychological scale. Most widely used in Western and Chinese literature, it has more factors and items than subsequent scales used for evaluating gambling motivation (Karli, 2008; Wu & Tang, 2011). This scale had two new intrinsic motivation factors: gaining new knowledge and feeling competent. These two factors are not pathological but, rather, are healthy motivations. Therefore, it benefits both recreational and problem gamblers for recognizing motivations without a preconception.

As the GMS lacked confirmatory factor analysis (CFA) for each motivation factor, Shinaprayoon et al. (2017) developed the Modified Gambling Motivation Scale (MGMS; see Appendix A), improving the language comprehension and psychometrics of the GMS and proposing the validity of a six-factor structure instead of seven—with knowledge and accomplishment combined into “intellectual challenge.” They also modified the labeling of each factor—experience stimulation was changed to excitement, identified regulation to socialization, introjected regulation to social recognition, and external regulation to monetary gain.

Various interventions are available for problem gambling, and these can be informed by systematic gambling motivation scales to define their therapeutic targets. For example, a scale that captures physiological symptoms (irritability when not gambling, cravings) may be useful for medication studies, whereas one focusing on erroneous beliefs may be suitable for cognitive therapy. Existing motive scales do not fully capture identity-based gambling or classify subtypes of gamblers based on identity theory. Though MGMS explains gambling motivations, its results may not necessarily translate into clinical intervention strategies. More personalized interventions are needed to bridge this gap.

### **Gambling and the Identity Development Theory**

Many gamblers start gambling as adolescents—especially problem gamblers. This suggests that gambling inclination and adolescent mentality may have common psychological characteristics. The fluidity of identity typical in adolescence could be one such characteristic.

Erikson's identity development theory (Erikson, 1956; Marcia, 1966) posed two polar statuses: identity achievement and identity diffusion. The former denotes self-actualization and attempts to succeed in various activities, while the latter describes a lack of commitment or a smorgasbord approach in various activities (Marcia, 1966) such that they are considered neither important nor a matter of concern. Additionally, also the moratorium status is the identity state in this model (Marcia, 1966), with vulnerability and vague social dissatisfaction. Moratorium is therefore aptly associated with amotivation in various activities.

Rizeanu (2013) showed that a diffused identity and moratorium suggests a higher likelihood of pathological gambling. First, a diffused identity is externally oriented, characterized by impulsivity, and being easily frustrated and overwhelmed by the environment. Therefore, “the gambler for diffusion” refers to a gambler who desires diffusion and whose strategy revolves around a lack of integrity and reality. They do not have gambling strategies. They seek excitement and socialization, wishing to be overwhelmed by sensational stimulation and move away from inner to outer reality. Second, moratorium is characterized by amotivation, which could be more pathological than diffused identity.

Third, “the gambler for achievement” re-evaluates various gambling strategies repeatedly with the goal of achieving success and bolster their self-worth and self-image as a gambler with fortitude. These gamblers are motivated by intellectual challenges and social recognition, seeking a sense of fulfillment rather than monetary gain.

Monetary gain is a different, fourth motivation factor in the identity development model, distinct from desire for achievement. It is a type of occupational motivation. Accordingly, gambling motivations could be classified into four factors based on identity development theory.

### **Reconstruction of the MGMS Factor Structure Based on the Grouping of Clinical Gamblers: Recreational, Problematic, Pathological, and Professional**

Previously, two categories of gambling disorders had been used in the literature: problem gambling and pathological gambling (Stucki & Rihs-Middel, 2007). The former is typically a less severe form of gambling disorder and is not included in either the DSM-IV-TR or the DSM-5, while the latter is included as a gambling disorder (Hodgins et al., 2011). Gamblers without a gambling problem are called recreational or professional gamblers, although the latter are a small minority (Cotte, 1997) and only exist for skill-based games like poker.

The MGMS study by Shinaprayoon et al. (2017) revealed that problem gambling is related to excitement and socialization. Similarly, Stewart and Zack’s (2008) GMQ study found that excitement and coping were related to problem gambling. Additionally, a study on the Chinese version of the GMS (C-GMS) found an association between amotivation and problem gambling (Wu & Tang, 2011).

As gambling problems become severe, disordered gamblers tend to lose their original gambling motivations and strategy and start gambling with amotivation. This advanced phase corresponds to desperation or hopelessness, which is the third or fourth stage of the four-graded stage in pathological gambling process (Rosenthal, 1992).

We propose that gambling motivations in the MGMS be classified into four groups based on the grouping of clinical gamblers: (1) recreational motivations, intellectual challenge and social recognition; (2) problematic motivations, excitement and socialization; (3) pathological motivations

(i.e., amotivation), a more severe problematic type; and (4) professional motivation (i.e., monetary gain), an occupational purpose that differs from the others.

We further propose an MGMS with a four-factor structure with an equally strong content validity as the six-factor structure, with each based on these clinical groupings, respectively: (1) “identity for achievement” or “recreational gamblers,” (2) “identity for diffusion” or “problem gamblers,” (3) “moratorium” or “pathological gamblers,” and (4) “occupational identity” or “professional gamblers.” We expect this four-factor structure in the MGMS to be efficient for primary assessments according to groupings of clinical gamblers.

### **From a Problem-Focused Intervention to a Motivation-Linked Intervention**

Various interventions have been established for gambling problems, most of which target problematic outcomes caused by excessive gambling through cognitive behavioural therapy (CBT; Ginley et al., 2019). In CBT, deviated cognitions such as an illusion of control, and associated risky behaviours such as having too much cash physically, are the therapeutic targets to correct and avoid (Richard et al., 2014). Most problem gamblers already recognize these irrationalities and that they need to be corrected (Larimer et al., 2012; Wulfert et al., 2006), but some continue gambling despite this, leading to unsustainable financial losses. Moreover, they experience these losses more intensely, and it causes their gambling cravings to increase even more (Hodgins et al., 2009; Velicer et al., 1984). Because people struggling with addiction tend to have ambivalent thoughts and feelings about their addictive behaviours (Goldberg, 1981), protective and safe interventions are important—specifically those that prevent this ambivalence (Komoto, 2015).

Individual heterogeneity and diverse clinical profiles in gamblers challenge clinicians to shift from a “one-size-fits-all” intervention like CBT to a more tailored version (Ferrando, 1999). For example, Stewart et al. (2016) proposed a motivation-matched treatment called Brief Escape and Action Treatment for problem gambling based on two gambler types: escape-motivated and action-motivated gamblers. To proceed with the motivation-matched intervention, a practical intervention-linked motivation scale is necessary, for which the authors used the GMQ. However, the GMQ does not include the particularly important factor of intellectual challenge, therefore the MGMS represents a better practical scale for a motivation-matched intervention. In particular, the four-factor version of MGMS could be more practical than the six-factor version because it directly corresponds to the grouping of clinical gamblers and each identity’s dynamics.

## Objectives

Since the validity of the MGMS had not been established in Japan, it was necessary to develop a Japanese version and evaluate its factor structure. We used a crossover repeated-measures design in which subjects sequentially completed the MGMS and the Japanese version, the J-MGMS. In Study 1, we investigated the consistency between the MGMS and J-MGMS among the Japanese gambling population. Then, in Study 2, we evaluated the psychometric properties of the J-MGMS for the six-factor structure, with both the original seven-point Likert format and the dichotomous (yes/no) format. The four-factor structure was also investigated in the factor analysis of the J-MGMS.

## Study 1: Methods

### Participants

The market research company ASMARQ was commissioned to administer our questionnaires. Candidates were recruited from web monitors through the company's website, and their informed consent was obtained. A total of 26 participants out of 109 candidates were selected, ensuring approximately equal numbers of male and female participants from each age group. Candidates satisfied the following conditions: they were residents of the Tokyo metropolitan area, age 20 or older, had gambled once or more in the past year, were Japanese natives, and had a score of 730 or above on the Test of English for International Communication (TOEIC), which indicates functional use of the English language in the workplace.

### Measures

The Japanese version of the MGMS (J-MGMS) developed from the original MGMS (Shinaprayoon et al., 2017) was used. Higher scores on MGMS represent higher levels of gambling motivation for a specific reason, or stronger motivation to gamble in general. The fit of both the six- and four-factor models was assessed using CFA.

Notably, there is only one question in the socialization-factor group (Q23): "It is the best way to spend time with friends.", which is a type of recreational motivation and not problematic. Accordingly, we classified Q23 as recreational motivation (i.e., "identity for achievement") rather than problematic motivation (i.e., "identity for diffusion"; Appendix B).

The English items in the MGMS were translated into Japanese, proofread, and finalized by two Japanese psychiatrists who were familiar with treating gambling disorders.

### **Procedure**

The participants completed both scales ten days apart. The order was counterbalanced, as half ( $n = 13$ ) completed the MGMS first, followed by the J-MGMS, and the other half ( $n = 13$ ) completed the J-MGMS first, and then the MGMS. We also compared the demographics and the mean scores between the J-MGMS-first group and the MGMS-first group to investigate the influence of the order of presentation.

#### **Statistical Analysis**

Post-hoc power analysis was calculated to judge whether 26 participants were sufficient for detecting the differences. The difference in the distribution of scores (each item and factor) between the J-MGMS and MGMS were tested for significance with the Wilcoxon signed-rank test, with a Bonferroni-corrected significance level of .0017. The differences in demographics and mean scores were tested using the Fisher exact test and independent-samples  $t$ -test.

### **Ethics**

The administrative procedures related to the recruitment and selection of the subjects were based on ASMARQ's ethical rules. All subjects were informed about the study and provided informed consent. Research conducted with human participants was approved by the Ethical Review Board for Research. Committee approval is in accordance with the ethical guidelines detailed in the 1964 Helsinki Declaration and any of its succeeding amendments.

### **Results**

The J-MGMS-first and MGMS-first groups did not significantly differ in demographic or mean scale scores. There were no significant score differences in any item or factor (six and four) between the two. Post hoc power was .59 ( $> .50$ ).

### **Study 2: Methods**

#### **Participants**

Candidates were recruited from web monitors through the ASMARQ website, and they gave their consent to participate. A total of 160 participants out of 1,145 candidates were selected, ensuring approximately equal numbers of male and female respondents for each age group. Participants satisfied the following conditions: residents of the Tokyo metropolitan area, age 20 or older, and had gambled within the past six months.

#### **Measures**

##### ***Modified Gambling Motivation Scale***

Similar to Study 1, we used the seven-point Likert format J-MGMS with a six-factor and a four-factor structure. Additionally, we used a

dichotomous (yes/no) format, also with a six-factor or a four-factor structure.

In the case of the dichotomous J-MGMS, the total number of “yes” (agree) responses to the questions was used as the J-MGMS score. In the case of the intellectual challenge, the number of questions was doubled to eight, unlike the remaining five factors, so its score was halved.

### ***The South Oaks Gambling Screening.***

The 20-item South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) was used to assess the participants’ gambling-related problems in the previous year. We used the modified Japanese version of the SOGS (J-SOGS), which showed reliability and validity in differentiating the university student group from the gambler group, although it was based on old criteria for problem gambling (i.e., DSM-III; Kido & Shimazaki, 2007). The participants answered the scale items with “yes” or “no,” resulting in a score between 0 and 20.

### **Procedure**

As with Study 1, the participants completed both the Likert and dichotomous formats of the J-MGMS, ten days apart, with their order of presentation counterbalanced. Half ( $n = 80$ ) completed the seven-point Likert format first, while the other 80 completed the dichotomous format first.

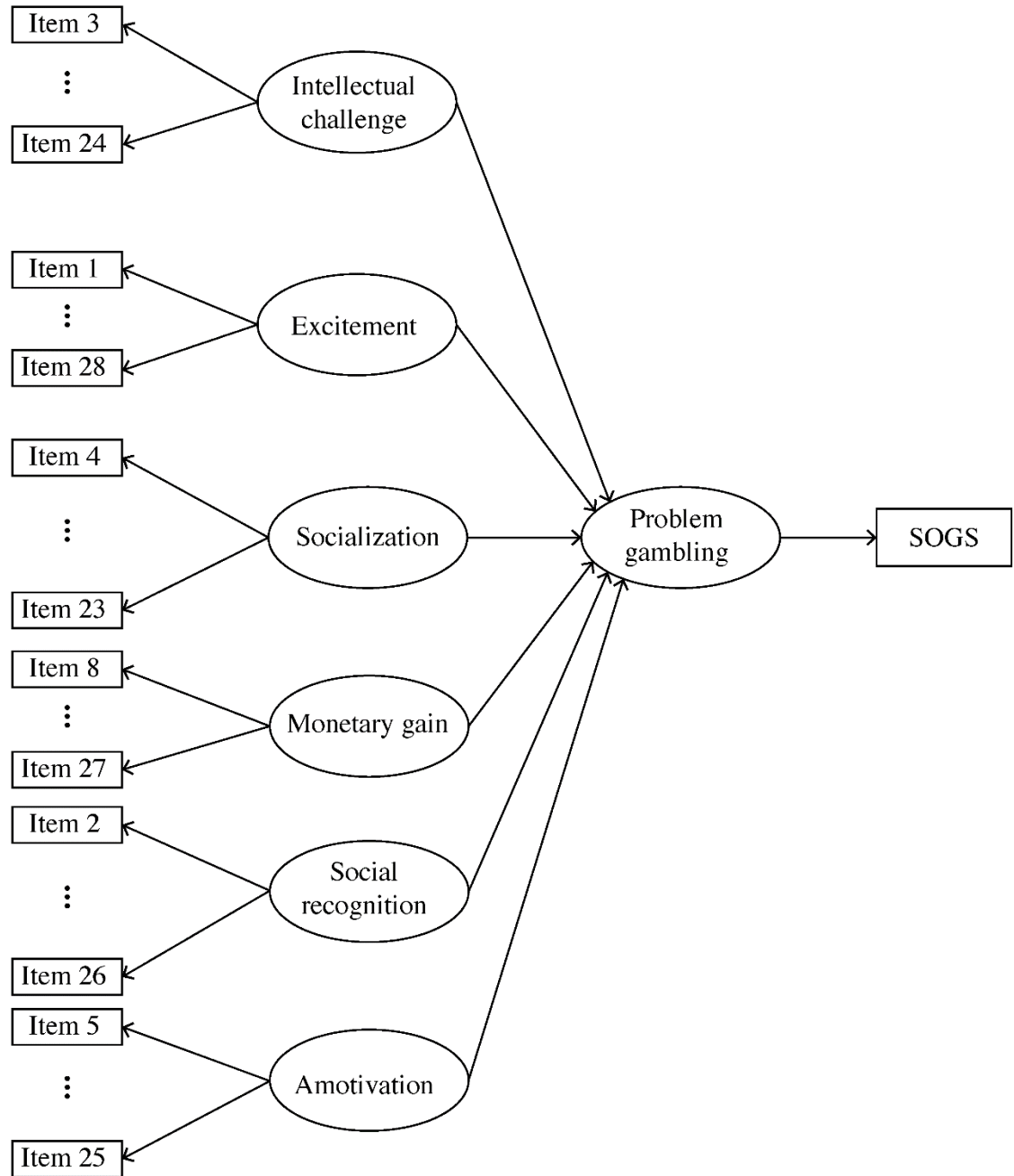
### **Statistical Analysis**

The reliability and validity of both formats of the J-MGMS were investigated (Appendix B). Cronbach's alpha was calculated to verify the internal consistency of each (Tavakol & Dennick, 2011), and structural equation modeling (SEM) was used to evaluate their validity, with six factors (Figure 1), and with four. These two-factor structures were evaluated using confirmatory factor analysis (CFA). Each model was evaluated with several fit indices. Hu and Bentler (1998) recommend using standardized root mean square residual (SRMR), supplemented by comparative fit index (CFI) or root mean square error of approximation (RMSEA). We also used the Tucker–Lewis index (TLI), Akaike information criterion (AIC), and Bayesian information criterion (BIC). According to conventional criteria,  $SRMR < .1$ ,  $RMSEA < .08$ ,  $CFI > .95$ , and  $TLI > .95$  indicate an acceptable fit. Based on AIC or BIC, the smallest model was the best-fit model (Schermelleh-Engel et al., 2003).



**Figure 1**

*Structural Equation Modeling (SEM) in MGMS with Six Factors and Predictions for Problem Gambling (SOGS)*



*Note.* MGMS = Modified Gambling Motivation Scale; SOGS = South Oaks Gambling Screen.

The four-factor dichotomous version needs to be simpler for brief interventions, such as a motivation-linked intervention. Therefore, we also

developed the J-MGMS-Intervention version (J-MGMS-I ver.), by reducing the number of items of the four-factor J-MGMS with backward stepwise model selection based on AIC.

Next, to evaluate the concurrent validity between the SOGS scores and the four-factor dichotomous scale J-MGMS scores, multivariate linear regression was used with SOGS as the dependent variable. The explanatory variables were gender and the average of the scores for the four-factor dichotomous scale.

Similarly, the relationships between all types of gambling frequencies and J-MGMS scores were investigated. The relationship between Pachinko and Pachi-slot frequencies and J-MGMS scores was also investigated because these are major forms of non-strategic gambling in Japan, played individually in parlors using an arcade-like machine.

These statistical analyses were commissioned to the Statistical Analysis Business Dept. of Stagen Co., Ltd., using R version 3.6.2 (R Core Team 2019).

### **Ethics**

The administrative procedures for recruiting and selecting subjects were based on ASMARQ's ethical rules. All subjects were informed about the study and they provided informed consent. Research conducted with human participants was approved by the Ethical Review Board for Research. Committee approval was granted in accordance with the ethical guidelines detailed in the 1964 Helsinki Declaration and its succeeding amendments.

## **Results**

### **Demographic Description**

Participants' demographics are shown in Table 1. Majorities of the participants were aged 40 years or above, married, employed, had a middle-class income, and played Pachinko & Pachi-slots more than once a week. The two crossover groups did not significantly differ in demographics.

**Table 1**  
*Demographics for Study 2 Participants*

Variables	Levels	Total (N = 160) Frequency (%)
Gender	Male	80 (50.0)
	Female	80 (50.0)
Age	Under 39	64 (40.0)
	40 or over	96 (60.0)
Marital Status	Married	98 (61.3)
	Unmarried/Separated/ Bereaved	62 (38.8)
Employment	Employed	98 (61.3)
	Unemployed	62 (38.8)
Household Income	Less than six million yen	64 (47.8)
	More than six million yen	70 (52.2)
	NA	26
Individual Income	Less than two million yen	42 (29.8)
	More than two million yen	99 (70.2)
	NA	19
Gambling Type	Pachinko & Pachi-slot	85 (53.1)
	The others	75 (46.9)
Gambling Frequency	At least once a week	88 (55.0)
	Less than once a week	72 (45.0)

*Note.* NA= No answer.

### **Reliability**

Internal consistency was verified based on Cronbach's alpha for the Likert and dichotomous J-MGMS, which was excellent in both cases ( $\alpha = .96$  and  $.91$ , respectively). Good or acceptable reliability was also found for each factor in the six-factor structure and the four-factor structure (Table 2).

**Table 2***Cronbach's Alpha for the Overall J-MGMS*

	Factor	Cronbach's alpha
J-MGMS (dichotomous scale)	Total	.918
Six-factor structure	Intellectual challenge	.808
	Social recognition	.807
	Excitement	.655
	Socialization	.727
	Monetary gain	.768
	Amotivation	.812
Four-factor structure	Achievement identity	.878
	Diffusion identity	.725
	Monetary gain	.768
	Amotivation	.812
J-MGMS (7-point Likert scale)	Total	.960
Six-factor structure	Intellectual challenge	.893
	Social recognition	.880
	Excitement	.865
	Socialization	.861
	Amotivation	.888
	Monetary gain	.892
Four-factor structure	Achievement identity	.937
	Diffusion identity	.890
	Amotivation	.888
	Monetary gain	.892

*Notes.* The overall internal consistency was high for J-MGMS (seven-point Likert scale, dichotomous for both the six-factor structure and the four-factor structure), which was verified based on Cronbach's alpha.

### Factor-Structure Validity

The confirmatory factor analysis (i.e., SEM) showed that none of the four models exceeded the acceptable cut-off point of .90 on CFI and TLI values. However, other fit indices indicated a good fit for the six-factor dichotomous J-MGMS (SRMR = .072; RMSEA = .063) and the four-factor dichotomous J-MGMS (SRMR = .076; RMSEA = .069). Moreover, AIC and BIC for the four-factor dichotomous version were smaller than for the six-factor dichotomous version. Meanwhile, the fit indices of the original six-factor seven-point Likert format J-MGMS and the four-factor seven-point Likert format J-MGMS were not a good fit. Therefore, of the four analyzed models, the four-factor dichotomous J-MGMS was a relatively acceptable model.

To develop the J-MGMS-I ver. from the four-factor dichotomous J-MGMS, SEM was constructed with four groups as latent variables. Furthermore, five variables—Q4, Q8, Q15, Q20, and Q21—were removed using backward stepwise model selection based on AIC. The fit indices of the J-MGMS-I ver., which consisted of 23 items, displayed a better fit (SRMR = .070; RMSEA = .063; CFI = .898; TLI = .884), and AIC and BIC were the smallest of those of the five J-MGMS models (see Tables 3 and 4).

**Table 3**

*Fit Indices of the Measurement Models*

Model	Chi-square	p-value	df	RMSEA		TLI	CFI	SRMR	AIC	BIC
				Est	90% CI					
J-MGMS, six-factor, seven-point Likert	1112.765	0	384	.109	[.101, .116]	.792	.817	.106	16329.362	16578.451
J-MGMS, six-factor, dichotomous	630.619	2.84E-14	384	.063	[.054, .072]	.855	.872	.072	6182.827	6431.916
J-MGMS, four-factor, seven-point Likert	1131.513	0	367	.114	[.107, .122]	.777	.799	.116	15916.495	16125.607
J-MGMS, four-factor, dichotomous	649.597	0	367	.069	[.061, .078]	.829	.846	.076	6080.645	6289.756
J-MGMS-I ver., four-factor, dichotomous, after the selection of questions	394.550	2.02E-09	242	.063	[.051, .074]	.884	.898	.070	5157.239	5335.599

*Notes.* The fit indices of the six-factor and four-factor dichotomous J-MGMS indicated a good fit. Conversely, the fit indices of the original six-factor Likert format J-MGMS version were not a good fit. SRMR: Standardized Root Mean Square Residual; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation; TLI: Tucker–Lewis Index; AIC: Akaike information criterion; BIC: Bayesian information criterion; 90% CI: 90% Confidence Interval

**Table 4***Removed Items via Backward Stepwise Model Selection Based on AIC*

Factor Name	Selected questions	Removed questions
Identity for achievement	Q3, Q6, Q10, Q18, Q19, Q24, Q2, Q9, Q16, Q26, Q23	Q15, Q20
Identity for diffusion	Q1, Q12, Q14, Q28, Q17	Q4
Moratorium (amotivation)	Q5, Q7, Q25	Q21
Monetary gain	Q11, Q22, Q27	Q8

*Notes.* To develop the J-MGMS-I ver. from the dichotomous J-MGMS, five variables (Q4, Q8, Q15, Q20, and Q21) were removed using the backward stepwise model selection based on AIC. The fit indices of the J-MGMS-I ver., which consisted of 23 items, indicated the best fit.

J-MGMS-I: Modified Gambling Motivation Scale Japanese and Intervention version; AIC: Akaike information criterion

### Related (Concurrent) Validity

Linear regression analysis of the four-factor dichotomous version of the J-MGMS found only amotivation to be significantly associated with the J-SOGS scores (Table 5).

**Table 5**

*Linear Regression Analysis with J-SOGS Scores Pertaining to the Four-Factor Dichotomous Format J-MGMS*

No.	Variables	Levels	Coefficients	95% CI	Contribution	p-value
1	Intercept	-	6.271	[3.265, 9.278]	-	-
2	Identity for achievement	-	0.478	[-0.054, 1.011]	0.0158	.0802
3	Identity for diffusion	-	0.340	[-0.601, 1.282]	0.0026	.4800
3	Monetary gain	-	0.670	[-0.472, 1.812]	0.0068	.2519
4	Amotivation*	-	2.040	[1.074, 3.006]	0.0876	<b>.0001</b>
5	Gender	Male	2.333	[-0.314, 4.980]	0.0152	.0860

*Notes.* \* Only amotivation was significantly associated with the J-SOGS scores. J-SOGS: South Oaks Gambling Screen (Japanese version).

Conversely, no significant association was found between any type of gambling frequency and scores in the four-factor dichotomous J-MGMS.

On the other hand, a significant relationship was observed between the Pachinko and Pachi-slot frequencies, amotivation, and “Identity for achievement” scores in the four-factor dichotomous J-MGMS ( $p < .05$ ).

## Discussion and Conclusions

This study developed the Japanese version of the MGMS (J-MGMS). The original version consisted of a six-factor structure with a seven-point Likert scale response format. In this study, along with the original version, three new versions were evaluated: a six-factor structure with a dichotomous (yes/no) format, a four-factor structure with a seven-point Likert format, and a four-factor structure with a dichotomous format. All four versions had good reliability, but the results of the confirmatory factor analysis were questionable.

### Seven-Point Likert vs. Dichotomous Scale

In the original seven-point Likert format, the CFA results for the J-MGMS were not a good fit among Japanese gamblers. However, the CFA yielded a better fit for the dichotomous format than the seven-point Likert format.

Generally, a Likert scale format is more appropriate as a psychological questionnaire than a dichotomous scale format (Velicer et al., 1984). Goldberg (1981) showed that using several categories instead of two enables a more realistic self-assessment by subjects because the Likert format has better resolution for detecting differences. Therefore, a Likert scale format is suitable for assessing intervention-induced changes because of its sensitivity. In this study, the seven-point Likert format J-MGMS also showed more sensitivity to SOGS scores than the dichotomous J-MGMS. However, a Likert scale format has weaker stability for the factor structures, as was revealed in this study.

Meanwhile, some studies did not find any difference in the quality of various choice formats (Ferrando, 1999). A study by Maurer & Andrews (2000) used three different choice formats for measuring self-efficacy: a traditional ten-point Likert scale format, a five-point Likert scale format, and a simplified, three-point scale format, and found the three formats to have similar psychometric indicators of reliability and validity.

Muñiz et al. (2005) systematically researched the variability, reliability, and validity modifying the choice format of the Eysenck Personality Questionnaire (EPQ), which consists of three subscales (Extraversion, Neuroticism, and Psychoticism), from the original dichotomous (yes/no) format into a nine-point Likert scale. The results regarding variability, reliability, and validity were contradictory. While the original dichotomous format was more practical in terms of variability, the

Likert scale format was better in terms of both reliability and validity. The dichotomous format also had more advantages in the psychometrics of the Psychoticism subscale than in the other two subscales. Because evidence has indicated that Psychoticism is the least unambiguous subscale of three (Howarth, 1986), we conjecture that the dichotomous format provides a more stable structure and better psychometrics than the Likert format when equivocal psychological findings are assessed using a self-report scale. The Extraversion and Neuroticism subscales of the EPQ are trait scales—that is, invariant over time. In contrast, self-assessed gambling motivation scales are substantially fluid and variant over time (McGrath & Thege, 2018), being more susceptible to influence from various temporary environmental factors. Accordingly, especially at the primary intervention, the dichotomous format could have better psychometrics than the Likert scale format in the assessment of gambling motivation, which aligns with the results of this study.

There is another possible reason for gambling motivation being more equivocal in Japanese gamblers. Pachinko and Pachis-slots, the most prevalent forms of gambling in Japan, are not recognized legally as gambling but rather as leisure activities (Komoto, 2014). Pachinko and Pachis-slot players visit parlors on their way home from work or when shopping, even without an apparent conscious motivation for gambling. Additionally, the “skill component” is obvious, and tokens (balls) are used instead of physical coins (Shoun, 2020), disconnecting it from the idea of money. Therefore, motivation for winning money may be relatively less prominent among the Japanese Pachinko and Pachis-slot players. Accordingly, self-conscious gambling motivation in Japanese gamblers might be more vague and fluid than in other countries. Our study supported this speculation and revealed that Pachinko and Pachis-slot frequencies were associated with equivocal motivation (i.e., amotivation). This cultural difference in gambling motivation has rarely been investigated and should be addressed in future studies.

#### **Four-Factor vs. Six-Factor Structure**

The CFA in this study showed that the six-factor version of the J-MGMS could be changed into a four-factor version. This change can be explained by both identity development theory and clinical grouping of types of gamblers. This four-factor structure had sufficient content validity in the J-MGMS based on the following findings: (1) identity could be classified into achievement identity, diffuse identity, and moratorium; (2) pathological gamblers are associated with diffused and moratorium identity; (3) specified motivation, excitement, socialization, and amotivation significantly predict problem and pathological gambling; and (4) division of gamblers into two categories is practical in an intervention—that is, “escape-motivated” versus “action-motivated” (Erikson, 1956; Rizeanu, 2013; Shinaprayoon et al., 2017; Stewart et al., 2008; Stewart et al., 2016).



Accordingly, we proposed four factors of gambling motivation. The first is identity for achievement, which comprises intellectual challenge and social recognition; the second is identity for diffusion, which consists of excitement and socialization; and the third is gambling with amotivation, which is half-hearted and ambivalent gambling (i.e., a moratorium state). These three motivations originate from respective identity states. Meanwhile, the fourth is motivation for monetary gain, an occupational motivation for professional or semi-professional gamblers. This motivation is based not on psychological but sociological and/or economic dynamics, and therefore differs from the identity-related motivations. In this study, the reliability and validity of the four-factor structure in J-MGMS were certified, although they were not very strong.

Subsequently, each item was selected using the AIC, and the J-MGMS-I ver. was developed with suitable and minimal items (Appendix C).

### **Predictive Motivation for Problem Gambling**

In this study, amotivation was significantly related to SOGS scores and frequency of playing Pachinko and Pachi-slots, presumably problem gambling at the higher frequencies. This result is consistent with a previous study of the C-GMS, which revealed that problem gamblers are characterized primarily by amotivation, and is therefore a significant predictor of problem gambling (Wu & Tang, 2011). On the other hand, Shinaprayoon et al. (2017) showed that excitement and socialization significantly predicted problem gambling in the MGMS, which is not entirely consistent with our results.

This difference may depend on cultural differences. In Japanese and some other Asian cultures, gambling motivation includes sociability, such as modeling the behaviour of family or friends (Situ & Mo, 2016). Collectivist cultures like that of Japan may attribute a greater influence of gambling behaviour to its family members (Keen, 2015). Additionally, an affinity for good karma or luck as a reason for winning is more dominant in Asian cultures than in the West, revealing a superiority of non-linear thinking among Chinese versus Euro-Canadian people (Ji, 2015). Therefore, Japanese and other Asian gamblers may be easily influenced by surrounding gambling culture and feel conflicted and ambivalent when gambling problems appear. Meanwhile, Western gamblers tend to have more linear thinking (Ji, 2015), and rely on an illusion of control, knowledge and skills, to try to win at gambling (Clark & Wohl, 2021; Langer, 1975). Western gamblers may therefore have more self-reliant motivations such as excitement than Japanese gamblers. This speculation is based on the relationship between amotivation scores and Pachinko and Pachi-slot frequencies found in this study.

### **Limitations**

First, because a convenience sample of limited internet users was employed, this study should be generalized with caution. Second, due to the self-reporting nature of the research design, the findings of this study are vulnerable to social desirability bias. Third, in the CFA of the original J-MGMS, some fit indices were not satisfactory, so we needed to convert it to the dichotomous format and select each item via AIC in a four-factor structure to satisfy the fit indices better. Fourth, the SEM model fit (four-factor vs. six-factor) to the seven-point Likert scale versus the dichotomous format could be an artefact of response variabilities between the two formats. Fifth, because of the study's cross-sectional nature, no causal link can be drawn between gambling motivation and problem gambling. Finally, the Japanese SOGS used in this study was based on the DSM-III, which is two editions out of date from the current manual.

Despite these limitations, this study indicates that the J-MGMS is an appropriate tool for assessing the motivation of Japanese gamblers. Moreover, the four-factor J-MGMS could be used to assess not only motivations but also the gamblers' identity (identity for achievement, diffusion, moratorium, and professionalism) and clinical gamblers' grouping (recreational, problematic, pathological, and professional).

### **Future Direction**

In this study, only amotivation reliably predicted problem gambling on J-SOGS. Therefore, J-MGMS should be considered insufficient to assess problem gambling. Instead, this scale may be useful for recreational gamblers to realize their own motivations and thus improve their gambling strategies.

In Japan, motivation-focused intervention has been tested in practical use as a "desire-targeted intervention" (Komoto, 2015, 2016). This intervention consists of three steps:

- 1) Identifying the individual's original desires that have been suppressed by the obsessive thought to pursue a loss (desires for fame, escape, and money).
- 2) Gambling to satisfy only a single desire if a gambler hopes to continue gambling.
- 3) Facilitating the individual's challenge for alternative behaviours that directly satisfy their original desires (Komoto, 2015, pp. 42–43).

Alternative behaviours are classified according to three dominant original desires. A desire for fame is replaced by "stimulating or focal" behaviours on gaming, collecting, attending lectures, and participating in various competitions. In contrast, a desire for escape is replaced by "relaxing" behaviours such as karaoke singing, reading comics, fishing, or meditation. Meanwhile, a desire for monetary gain could be replaced by various investment activities. Therefore, the J-MGMS-I ver. may be useful

to discover adequate substitute behaviours corresponding to each clinical type based on identity development theory.

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**Declaration of conflict of interest:**

Two of the authors (Makoto Kaneko & Koji Nobayashi) are employed by Sega Sammy Holdings Inc, which is the same agency that funded this study. Yasunobu Komoto declares no conflicts of interest.

**Availability of data and material:**

The datasets generated or analyzed during this study are available from the corresponding author upon request.

**Author's contributions:**

All authors designed the study and reviewed the manuscript. YK proposed the study concept and wrote the first draft, MK and KN monitored data collection and performed the statistical analysis.

**Ethics and informed consent:**

This study was approved by the Ethical Review Board for Research at Yoshino Hospital (approval No.2019-01. 2019/7/1) and registered at the UMIN Clinical Trials Registry (R000042415). All subjects were informed about the study and all provided informed consent.

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**Appendix A****Modified Gambling Motivation Scale (MGMS)**

“Why do you gamble at your favorite game?”

Respond with one of the following: Strongly disagree/Disagree/Slightly disagree/Neutral/Slightly agree/Agree/Strongly agree.

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.

**Appendix B****Two types of Factor Structure in Modified Gambling Motivation Scale (MGMS)**

Items for each factor structure

1) Six-factor structure:

Intellectual challenge 3, 6, 10, 15, 18, 19, 20, 24

Social recognition 2, 9, 16, 26

Excitement 1, 12, 14, 28

Socialization 4, 13, 17, 23

Monetary gain 8, 11, 22, 27

Amotivation 5, 7, 21, 25

2) Four-factor structure:



Identity for achievement 2, 3, 6, 9, 10, 15, 16, 18, 19, 20, 23, 24, 26  
 Identity for diffusion 1, 4, 12, 13, 14, 17, 28  
 Moratorium (amotivation) 5, 7, 21, 25  
 Monetary gain 8, 11, 22, 27

### Appendix C

#### Japanese-Modified Gambling Motivation Scale-Intervention version (J-MGMS-I ver.)

“Why do you gamble at your favorite game?”

Response: Yes/No.

1. It is exciting to gamble.
2. It makes me feel important.
3. I feel competent when I gamble.
4. I play for money, but I sometimes worry if I should continue playing.
5. Gambling allows me to test my control.
6. I play for money, but I sometimes wonder what I get out of gambling.
7. To show others that I am a dynamic person.
8. I enjoy improving my knowledge of the game.
9. I play for money to buy what I desire.
10. It allows me to enjoy myself enormously.
11. It is the best way I know to eliminate tension.
12. I experience strong sensations when I gamble.
13. I want to be envied by others.
14. It is my hobby to clear my mind.
15. I enjoy knowing my ability in this game.
16. I like it when I can control the game.
17. It is quick and easy money.
18. It is the best way to spend time with friends.
19. It gives me a feeling of control.
20. I play for money, but I sometimes wonder if it is good for me.
21. I feel important when I win.
22. It makes me a lot of money.
23. It gives me a thrill or strong sensation.

Items for each factor structure:

Identity for achievement (recreational gambling) 2, 3, 5, 7, 8, 13, 15, 16, 18, 19, 21  
 Identity for diffusion (Problem gambling) 1, 10, 11, 12, 14, 23  
 Moratorium (Amotivation; pathological gambling) 4, 6, 20  
 Monetary gain (Professional gambling) 9, 17, 22