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Motives for gambling, cognitive distortions, and irresponsible gambling: Proposal for an explanatory model of gambling addiction in university students

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ABSTRACT

There are many factors that appear to be directly related to the development of gambling addiction problems, and it is important to understand these relationships from a clinical perspective in order to develop prevention and intervention programs. This research seeks to analyze the relationships these problems have with gambling motives, cognitive distortions and irresponsible gambling behavior, and proposes an explanatory model of gambling addiction. The sample was made up of 258 adults residing in the province of Valencia (59.5% women), with a mean age of 20.95 years ($SD = 2.19$). A series of questionnaires were applied to measure the variables involved, and bivariate correlations, simple and multiple linear regressions and a structural equation model were analyzed. The results indicated that gambling motives were positively related to cognitive distortions, acting as predictors of these. Additionally, the proposed theoretical model showed goodness of fit on various indices and explained 69% of variance in cognitive distortions, 37% of that in irresponsible gambling and 43% of that in gambling addiction. The main limitation of this research is that the sample belongs to a very specific population, who did not necessarily have gambling problems. The main contributions are uncovering some of the relationships between gambling motives and cognitive distortions and the proposal of a mediating role of irresponsible gambling in the relationship between cognitive distortions and the development of gambling problems. If the proposed model replicates, it can be of help to research and health professionals.

KEYWORDS

Gambling addiction; cognitive distortions; responsible gambling; structural equations model; SEM

Gambling addiction is the first disorder recognized as an addiction in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)¹ that is not related to substance misuse.²

Financial problems are some of the direct consequences of gambling addiction, and both problem gamblers and individuals with a gambling use disorder report having allocated greater amounts of money in a single day to gambling.³ Regulatory authorities and some gambling operators have established a series of responsible gambling measures that seek to reduce economic and other negative consequences.⁴ Many gambling platforms use tools that limit the maximum amount of money that players can bet, in order to favor responsible gambling, and these can be

effective for their purpose.⁵ Such tools are based on the evidence that responsible gambling is a predictor variable for gambling addiction.⁶

This addiction is directly related to the presence of cognitive biases and distortions in relation to gambling behavior, which promote problematic gambling.^{7,8} Such cognitive distortions alter the perceptions that people have about gambling behavior, and act as predictors of gambling addiction itself, its various symptoms, and the frequency of gambling.⁹ In addition to cognitive distortions, the motives for which people gamble are also related to the development of gambling problems.¹⁰

Some research has analyzed the relationship between these variables using structural equation models (SEM), finding that gambling motives are

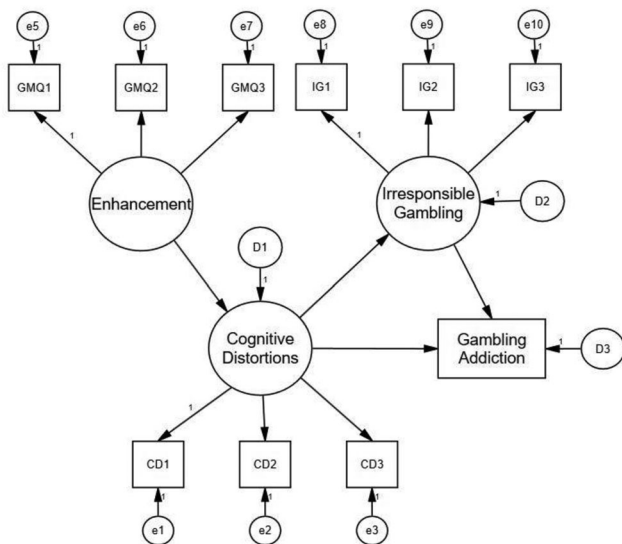


Figure 1. Theoretical model proposed. GMQ: groupings of items used as enhancement indicators; IG: irresponsible gambling indicators; CD: indicators of cognitive distortions; Gambling Addiction: direct score from the South Oaks Gambling Screen.

predictors of addiction problems.⁶ This type of analysis arises to solve some limitations of regression models by including measurement errors. SEM are more complex than regressions or exploratory factor analyses, and allow analysis of the type and direction of the relationships that are expected to be found between the variables they include, which makes them very useful.¹¹

Among the motives for gambling that are associated with the development of problems, those who play looking for internal positive reinforcement (enhancement) stand out; that is, those who play for the sensations and emotions generated by gambling and not for external reasons, such as monetary reward or socializing.^{12,13}

Although the relationship between cognitive distortions about gambling and gambling motives has not been much studied, some distortions (such as superstitions, lack of knowledge about statistics and the illusion of control) positively correlate with playing to relax, feel better, earn money or be better at the game.¹⁴ Mathieu et al.⁷ found that cognitive distortions were directly correlated with playing for enhancement, such as coping with stress and for financial reasons; while, on the other hand, they were not related to playing for social reasons. Of the four types of reasons analyzed, only enhancement was predictive of cognitive distortions about the game.

Table 1. Sociodemographic characteristics.

Characteristics	Total (n = 258)
Women (%)	153 (59.5%)
Mean age (SD)	20.95 (2.19)
Nationality (%)	
Spanish	249 (96.5%)
Other	9 (3.5%)
Marital status (%)	
Single	150 (58.2%)
In a relationship	102 (39.5%)
Married	6 (2.3%)
Work status (%)	
Without work	183 (71%)
In part-time work	66 (25.6%)
In full-time work	9 (3.5%)

The main objective of this research is to analyze the way in which gambling addiction is related to irresponsible gambling, cognitive distortions about gambling, and gambling motives, by means of an SEM, since there are not many studies that have applied such a complex methodology to the study of gambling addiction. In addition, a secondary objective is to study the relations between cognitive distortions about gambling and gambling motives.

Hypothesis 1 is that cognitive distortions and gambling motives will correlate positively, with the latter being also predictors of distortions.

Hypothesis 2 is that enhancement will act as an independent variable (IV) and cognitive distortions, irresponsible gambling and gambling addiction will act as dependent variables (DV). Likewise, within this relationship, cognitive distortions will be predictors of gambling addiction, with irresponsible gambling mediating that relationship. The proposed theoretical model is presented in Figure 1.

Method

Participants

The final sample consisted of 258 participants between 18 and 26 years old. 59.5% of the participants were women ($n=153$), the mean age of the total sample being 20.95 years ($SD=2.19$). The complete sociodemographic characteristics of the sample are displayed in Table 1.

Measures

To measure gambling addiction, the South Oaks Gambling Screen (SOGS)¹⁵ was applied in a

version previously validated in Spanish.¹⁶ It is made up of 20 items (mostly dichotomous) and the score ranges from 0 to 19; a score higher than four indicates possible gambling problems. This version evaluates the addiction throughout the entire lifetime of the subject. The Cronbach's alpha value for this questionnaire was .80. The maximum amount of money wagered, the frequency of gambling and the number of gambling activities were also collected, as indicators of irresponsible gambling.

The Gambling-Related Cognition Scale in its Spanish version (GRCS)¹⁷ was used to evaluate participants' cognitive distortions about their gambling behavior. This scale is made up of 23 Likert-type items with 7 alternatives ranging from 1 (completely disagree) to 7 (completely agree). It is divided into 5 subscales that assess cognitive biases associated with gambling (game expectations [EJ], illusion of control [IC], prediction of control [PC], inability to stop playing [IDJ] and interpretive bias [SI]) and a total score. For both the subscales and the total score, higher scores indicate greater cognitive distortions. In this research, after performing a confirmatory factor analysis (CFA), 5 items were eliminated and the factors of EJ and SI were grouped. The Cronbach's alpha value for this new factor was .89, .72 for PC, .68 for IDJ, .59 for IC, and .90 for the full scale.

To measure gambling motives, the Gambling Motives Questionnaire (GMQ)¹⁸ was applied in its version validated in the Spanish population.¹⁹ This Likert-type scale is made up of 15 items that are grouped into 3 factors: *enhancement*, *social*, and *coping*. After the CFA was performed, the factorial structure was the same as that of Grande-Gosende et al.¹³ The Cronbach's alpha value was .90 for the enhancement subscale, .90 for the coping subscale, and .79 for social reasons.

Procedure

This cross-sectional study is part of a larger study that seeks to explain the functioning of gambling addiction and its consequences. This has the approval of the ethics committee of the Universitat de València (procedure number

1040164). The questionnaires were applied between May and December 2019 on paper and in the presence of one of the researchers, with a duration of about 50-60 minutes. The sample was collected at the Universitat de València, all the participants being university students. Participants received no incentives and signed an informed consent form before starting indicating the conditions of the research and that they understood that the data collected would be completely anonymized. No incentives were offered to participants.

Analysis

First of all, the distribution and response frequency of each of the measured variables were analyzed. Next, CFA for each measured factor, Pearson correlations, simple and multiple linear regressions were performed; and finally, an SEM was tested following the steps proposed by Medrano and Muñoz-Navarro.²⁰ The maximum likelihood method was used, having previously eliminated the cases with atypical and missing values and examining multivariate normality following the recommendations of Manzano.²¹ The indicators of each latent factor were selected according to the recommendations of Hall et al.²²

To evaluate the fit of the empirical SEM with the proposed theoretical model, the goodness of fit indices of χ^2/df , the comparative fit index (CFI), the goodness of fit index (GFI), the increase index of fit (IFI), non-normalized fit index (TLI), normalized fit index (NFI), and root mean square error of approximation (RMSEA); the rest of the indices were examined but not presented in this investigation. The χ^2/df value is considered as an alternative to the use of simply χ^2 to avoid alterations due to the size of the sample; values of less than 3 are considered a good fit.²³ The cutoff points for the rest of the indices were established based on one of the most accepted proposals;^{24,25} Values greater than .95 in CFI, GFI, IFI and TLI show an optimal fit and values greater than .90 an acceptable fit; the NFI value must be greater than .90; and for RMSEA, values less than .06 are considered an optimal fit and less than .08 an acceptable fit.

Table 2. Correlations between cognitive distortions and gambling motives.

	GRCS total	EJ & SI	PC	IDJ	IC
Enhancement	.72**	.69**	.53**	.43**	.41**
Coping	.58**	.53**	.38**	.52**	.36**
Social	.61**	.56**	.57**	.23**	.39**

Note: significant correlations are in bold; GRCS Total = total score obtained on the cognitive distortions scale; ** $p < .01$.

All analyses were carried out using the SPSS 20.0 statistical program, except for the SEM, which was carried out with AMOS 24.

Results

Relationship between cognitive distortions and gambling motives

Table 2 shows the results of the analysis of Pearson's correlations between cognitive distortions and gambling motives. It can be observed that gambling, whether for enhancement, coping or for social reasons, correlates in a positive and statistically significant way both with the total score obtained on the cognitive distortions scale (GRCS) and with each of the different cognitive distortions collected.

Next, a series of simple linear regression models were tested in which the DV was the total score obtained on the GRCS and the IVs were each of the motives that people had for gambling. Enhancement was the variable that predicted the highest proportion of variance in cognitive distortions: the regression predictor was significant, $\beta = .72$, $t(1) = 16.81$, $p < .001$, and the corrected R^2 value was 52.3%. Next was gambling for social reasons; this predictor was also significant, $\beta = .61$, $t(1) = 12.37$, $p < .001$ and the corrected R^2 value was 37.2%. Finally, the IV of gambling for motives of coping was also a statistically significant predictor, $\beta = .58$, $t(1) = 11.49$, $I < .001$ with an R^2 of 33.8%.

Finally, a multiple regression model was tested in which the DV were again the cognitive distortions and the VI the gambling motifs, but in this case the effect of the three motifs collected was analyzed together. The model $F(3) = 115.24$, $p < .001$ was statistically significant and all the predictor variables (Table 3) were significant in this model. The corrected R^2 value was 57.1%, indicating that this is the proportion of the variance

Table 3. Multiple linear regression model.

Variable	β	t	Sig.
Enhancement	.47	7.40	$p < .001$
Coping	.22	4.29	$p < .001$
Social	.18	3.13	$p < .05$

of gambling addiction that was explained by the variance in the predictor variables. Analysis of the residuals indicates that the data fit well the assumptions of the linear regression model.

Structural equation model

All the evaluated goodness-of-fit indices showed a good fit of the proposed model. The chi-squared test, $\chi^2(30) = 63.21$, $p < .001$ was significant, but to avoid some alterations such as those caused by the sample size, the corrected measure was used taking into account the degrees of freedom ($\chi^2/df = 2.11$), which showed a good fit as it was less than 3. Likewise, other fit indices less sensitive to the sample size were used. The CFI showed a value of .98, the GFI of .95, the IFI of .98 and the TLI of .97, which reflect an excellent fit. Finally, the NFI showed a value of .96, higher than the established cutoff point, and the RMSEA showed a value of .07, which reflects an acceptable model fit.

Figure 2 shows the values of the estimated parameters in the model after its re-specification. The parameters of the correlations, the standardized regression weights and the percentage of the variance explained of the DVs are collected. All the relationships represented in this model were significantly different from zero.

Table 4 shows the weights of the hypothesized regressions in detail. All these direct relationships were statistically significant, meaning that enhancement was a predictor of cognitive distortions; both of these were predictors of both irresponsible gambling and gambling addiction; and irresponsible gambling, in turn, was a predictor of gambling addiction. The analysis of the relationship between cognitive distortions on gambling and addiction to this, with irresponsible gambling behavior as mediator, reflected that in addition to the direct relationships collected in Table 4, cognitive distortions had a standardized indirect effect on the gambling addiction of .25,

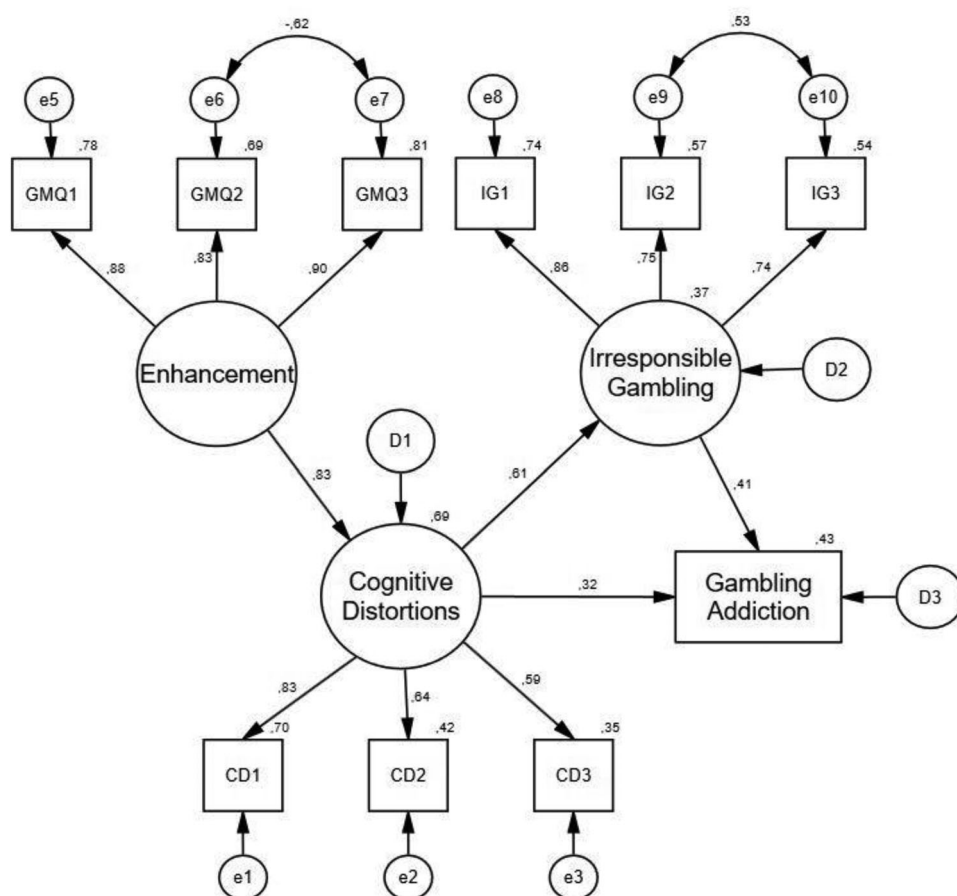


Figure 2. Final, respecified SEM. All the represented relationships were statistically significant ($p < .001$).

Table 4. Regression weights of the hypothesized relationships.

Relations between variables	Regression weight				
	Estimate	S.E.	C.R.	p	Standardized beta
Cognitive distortions ← Enhancement	1.12	.08	13.52	***	.83
Irresponsible gambling ← Cognitive distortions	.65	.08	8.27	***	.61
Gambling addiction ← Cognitive distortions	.62	.15	4.24	***	.32
Gambling addiction ← Irresponsible gambling	.73	.14	5.13	***	.41

*** $p < .001$. S.E.: standard error; C.R.: critical ratio.

with the total standardized effect of the ratio being .57.

The variance estimated for the IV of the model, enhancement, was .33 ($p < .001$). and the model explained 69.3% of the variance of cognitive distortions, 36.7% of the variance of irresponsible gambling behavior and 43.2% of the variance of gambling addiction.

Discussion

This research aimed to analyze the way in which different dimensions of problematic gambling (gambling addiction, irresponsible gambling, cognitive distortions about gambling, and gambling

motives) are related, and to study the effect of different gambling motives on cognitive distortions about gambling.

Hypothesis 1 stated that cognitive distortions and gambling motives would be directly related; Furthermore, it was hypothesized that the different gambling motives would be predictors of cognitive distortions. The results obtained in this investigation are congruent with Hypothesis 1. As in previous studies, the three evaluated motives correlated directly with cognitive distortions¹⁴ and were significant predictors of them.

Enhancement is the gambling motive that showed the most predictive capacity, explaining 52.3% of the variance in cognitive distortions;

next was gambling for social reasons, which explained 37.2% of the variance; and, finally, gambling for coping, which explained 33.8% of the variance. Together, the three gambling motives were also statistically significant predictors of cognitive distortions, explaining 57.1% of the variance. These results partly contradict those of some previous research,⁷ which found that gambling for social reasons was not related to cognitive distortions and that only enhancement acted as a predictor. These differences could be due to the fact that in those studies the sample consisted only of poker players, meaning that the type of gambling could have an effect on this relationship.

The results obtained in the SEM corroborate Hypothesis 2. First, enhancement acts as a good predictor of cognitive distortions about the game, as in previous research.⁷ Secondly, the relationship between cognitive distortions and gambling addiction mediated by irresponsible gambling has been significant. Cognitive distortions function as predictors of both gambling addiction, and irresponsible gambling behaviors, as previous studies⁹ that found cognitive distortions were predictors of addiction and gambling frequency (an example of irresponsible gambling behavior). Irresponsible gambling acts as a predictor of gambling addiction as suggested by some authors.⁶ The role of irresponsible gambling as a mediator between cognitive distortions and addiction has not been studied previously and represents a novelty in the study of this problem.

The model proposed in [Figure 1](#) based on the theoretical framework of these variables, once re-specified, showed a good fit with our empirical data and largely explained the variance of the different DVs that it contained: 69% of variance in cognitive distortions, 37% of that in irresponsible gambling and 43% of that in gambling addiction.

One of the novel aspects of this research is the effect that gambling motives have on people's ideas about gambling. There is little research on this relationship, and this study presents a theory about how they are related. Similarly, we have not found any research that analyzes the ways in which irresponsible gambling can play a mediating role between cognitive distortions and gambling addiction. The model presented in the

current study is based on the idea that problematic thoughts about gambling generate problems in gambling behavior, which can lead to aggravated issues with gambling addiction.

Finally, the application of an SEM that combines these variables had not been considered until now. The model resulting from the current study may be of great help both for future investigative research on this problem and in the clinical field, serving as a support for clinical professionals in the elaboration and application of intervention programs that aim to treat gambling addiction and the problems associated with it.

The main limitation of this research is that the sample belongs to a very specific population, the participants being young university students in a single region in Spain who did not necessarily have gambling problems. For future research, it would be interesting to replicate this model in different populations (differing by age, nationality, and clinical condition) in order to test whether the model behaves similarly in those.

Ultimately, this study worked on a set of aspects of gambling problems that have been little studied previously. It presented a model that, if it can be replicated and generalized, can help research and clinical professionals to develop and carry out interventions in people at risk of gambling addiction problems, either to prevent their appearance or reduce them if they are already present. Knowing the mechanisms underlying gambling addiction is a key step in reinforcing the work of such professionals.

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