



## OPEN Problem gambling and subjective well-being: results of a study with a representative sample in Santiago (Chile)

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This study aimed to examine the relationship between problem gambling and subjective well-being in the general population. Previous research on the subject has shown that problem gambling has varied harmful consequences, while controlled gambling could lead to recreation, sharing with others, and achieving higher levels of well-being. A representative, probabilistic, and multistage sample of 1032 cases was used for the study (54.65% women; mean age of 44.06 years, SD = 16.84). The instruments used were the Spanish validation of the National Opinion Research Center DSM Screen for Gambling Problems (NODS) and the Personal Wellbeing Index (PWI). It is estimated that 74.98% of the population have gambled the past year and 14.28% were people who experience gambling problems at some point in their lives. Recent estimates indicate prevalence rates of gambling disorder among current adult gamblers ranging between 0.12 and 5.8% worldwide, but these figures are higher when problem gambling is also taken into consideration. Moreover, people who experience gambling problems report lower levels of life satisfaction than people who do not experience gambling problems. Participants that did not gamble during the last year and the group that did gamble, but did not qualify as problematic gambler, showed the same levels of Satisfaction With Life (SWL). At the same time, based on a multigroup analysis carried out through modeling with structural equations (SEM), it was observed that gambling had a strong direct and negative effect on SWL of the group of people who experience gambling problems ( $\lambda = -0.382$ ;  $p < 0.01$ ), while for the group of people who do not experience gambling problems, it presents a weak direct and positive effect ( $\lambda = 0.019$ ;  $p < 0.001$ ), explaining 14.6% and 0.0% of the variance of SWL (significance due only to sample size, since the strength of the association is null), respectively. Results are discussed considering the effects of gambling on life satisfaction.

Games of chance, or gambling games, correspond to a type of game that has as a distinctive feature the fact that players cannot control, or only in some way, the outcome by resorting to their skills or by finding systematic ways to win, but instead depend mainly on chance<sup>1</sup>. These games, such as lotteries, slot machines, roulettes, bingo, poker or sports betting, differ from other recreational activities in that their outcome entails either reward or loss, usually in the form of money<sup>2</sup>.

Recent estimates indicate prevalence rates of gambling disorder among current adult gamblers ranging between 0.12 and 5.8% worldwide<sup>3</sup>, but these figures are higher when problem gambling is also taken into consideration<sup>4</sup>. Gambling (not only gambling disorder, but also problem gambling, which is increasing its growing due to the spread of the Internet), can cause negative events when individuals begin to experience detrimental effects on their lives. These harmful effects can occur both at intrapersonal and interpersonal levels. In intrapersonal terms, individuals can have negative emotional experiences related mainly to craving to perform the activity, or as feelings of tension and loss of control when favorable gambling results are not obtained, and even reach levels of dependency<sup>5</sup>. In an interpersonal level, gambling can also damage family and couple relationships, financial and employment status, and can even lead to legal problems<sup>2,4,6</sup>.

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Apart from criteria for the clinical diagnosis of gambling disorder, provided by the Diagnostic and Statistical Manual (DSM) of the American Psychiatric Association<sup>7,8</sup>, it is also convenient to consider gambling as recreation, which does not create any problems (NPG), and gambling as a dependence-inducing activity (PG)<sup>4</sup>. For this reason, the term ‘problem gambling’ (PG) has often been used in the literature to refer broadly to excessive gambling, which affects the individual and social spheres, even if the activity fails to meet the DSM diagnostic criteria<sup>9</sup>.

There is concern about a trend towards diversification and easier access to gambling, due to the increase in electronic machines and online gambling<sup>2,10</sup>. Several authors suggest that sectors of the population, such as young people, whose gambling participation was previously low, now have greater access and, at the same time, increased PG rates<sup>10,11</sup>. Due to this greater access to the game, the study that examines the consequences of gambling becomes necessary.

There is a close relationship between problem gambling and subjective well-being (SWB). On the one hand, excessive gambling has a negative impact on different areas of people’s lives, including their well-being<sup>12</sup>. Problem gambling can have severe consequences on various aspects of an individual’s life, including health problems, such as depression, substance abuse, emotional distress due to financial strain, physical health issues (neglect of physical health due to a preoccupation with gambling, resulting in poor nutrition, lack of exercise, and overall neglect of one’s well-being), comorbidity with other mental disorders or even suicidal ideation. These chronic consequences are also associated to an impaired quality of life and to a social isolation<sup>5,6,13,14</sup>.

On the other hand, gambling as recreation can contribute to people having fun, socializing with others, and experiencing pleasant sensations<sup>15,16</sup>, which could have a positive impact on well-being. In the case of problem gambling, positive and negative consequences are unbalanced, and the negative consequences can affect various dimensions of the life of individuals (as previously argued), including their well-being. In this study problem gambling is studied, instead of other addictions, because there are some specific problems related to it, such as debts, unpaid loans, problems with Justice, which may not be present in other addictions and which are related to subjective well-being of the people involved<sup>5</sup>.

Conceptually, SWB refers to the hedonic dimension of well-being and has two components: one cognitive and one affective<sup>17</sup>. The cognitive component is satisfaction with life (SWL), defined as the cognitive evaluation an individual makes of their general quality of life. The second component refers to the balance between positive and negative affect<sup>17</sup>. The present study will focus on SWB in terms of the former (SWL).

Several studies have found that SWL is lower in people with problem gambling than in people without these issues<sup>16,18</sup>. Studies in older adults have shown that the probability of gambling is lower as SWL increases<sup>19</sup>. However, older adults who gambled reported greater well-being than older adults who did not participate in games of chance. In addition, there were differences compared with younger groups, for whom gambling is associated with reduced well-being<sup>15</sup>.

Entertainment is the main objective of gambling, while losses do not exceed the budget that is taken to gamble<sup>20</sup> and may neutralize possible negative associations between gambling and SWB. Desai et al<sup>15</sup>, in a study conducted with older adults who participated in gambling for recreational purposes, found that gambling could have beneficial effects, such as providing the opportunity to share with others, as well as sensory and cognitive stimulation. Thus, as long as people obtain the positive aspects of participating in gambling without falling into problematic gambling, they can make positive assessments regarding their lives and well-being. However, problematic gambling can probably erode this potential increase in social integration, because of the conflicts associated with excessive gambling mentioned above. Going deeper, problematic gambling has been identified as a significant factor in the deterioration of social integration, often leading individuals to isolation and loneliness. This occurs because people who experience gambling problems tend to become absorbed in gambling activities, neglecting their social relationships and responsibilities. Research suggests that problem gambling is associated with increased feelings of guilt, depression, and social isolation, which negatively impact an individual’s ability to maintain social support networks<sup>21</sup>. Additionally, problematic gambling can strain interpersonal relationships due to financial losses and emotional dependence on gambling<sup>22</sup>. On the other hand, recreational and controlled gambling, when managed responsibly, can promote social integration and provide emotional benefits. Participating in moderate gambling activities within social settings, such as casinos or community games, can foster social interactions and offer opportunities for individuals to enjoy companionship and share experiences. Such interaction fosters social support, which is critical for emotional well-being, as individuals feel supported and have someone to turn to during times of need<sup>23</sup>.

Finally, it is important to remark that gamblers report higher levels of illusion of control, not only in respect to gambling<sup>24</sup>, and that positive illusions are positively related to well-being, because they reinforce self-esteem and efficacy<sup>25</sup>.

The topic addressed in this study is important because there is little research that relates problematic gambling (not pathological gambling) with subjective well-being, the sample is large and it is the first epidemiological study carried out in Chile on this topic.

Considering that there are other relevant variables (health, sociodemographic variables, individual characteristics, behavioral variables and life events), the purpose of this article is to analyze the specific association between problematic gambling and SWL. Using a representative sample of the population over 18 years of age in Santiago of Chile, the following hypotheses were tested:

**Hypothesis 1** Individuals who are categorized as people who experience gambling problems (PGs) will show lower levels of SWL than those classified as people who do not experience gambling problems (NPGs).

**Hypothesis 2** Individuals who declared not to gamble in the last year show similar levels of SWL as individuals who declared to gamble and qualify as NPGs.

**Hypothesis 3** Individuals categorized as NPGs who declare gambling in the company of others will have higher levels of SWL than those who declare doing so by themselves.

**Hypothesis 4** Problem gambling will mainly affect SWL domains that are related to social, such as personal relationship and community connection domains. On the other hand, personal security, life achievement, and future security will be less negatively impacted.

**Hypothesis 5** Gambling has a negative effect on SWL of PGs, while it has no effect on SWL of NPGs<sup>12,15,16</sup>.

The present study examines the impact of gambling on subjective well-being (SWB) and life satisfaction (SWL), highlighting the distinct effects between people who experience gambling problems (PGs) and people who do not experience gambling problems (NPGs). It would be expected that excessive gambling would negatively affect multiple life domains, including emotional health, relationships, and financial stability, contributing to lower SWL among PGs compared to NPGs (Hypothesis 1). Conversely, individuals who did not gamble in the last year would be expected to demonstrate similar SWL levels to NPGs, suggesting that recreational gambling, when not excessive, would not harm well-being (Hypothesis 2). Moreover, NPGs who would gamble socially would be expected to experience enhanced SWL due to the socialization and positive affect associated with group activities, unlike those who would gamble alone (Hypothesis 3). Problem gambling would particularly deteriorate SWL in social domains like personal relationships and community connections, while areas such as personal security and life achievements would remain less impacted (Hypothesis 4). Finally, the study would underscore that while gambling would diminish SWL among PGs, it would not significantly affect the SWL of NPGs, reflecting the balance of positive recreational effects and negative outcomes associated with excessive gambling (Hypothesis 5).

## Methods

### Sample

A multi-stage random sample was used, in which 1032 individuals were surveyed. In the first stage, 140 blocks were randomly selected from all counties of Santiago. Then, using systematic sampling, 10 houses were chosen. Finally, in each house an individual was selected according to a Kish-table. The rate of acceptance to participate in the study was 36,33% from a total of 2,840 people initially contacted.

The study was carried out door to door, where the objectives of the study were explained to each person and that their data would be treated confidentially. Subsequently, they were asked if they wanted to participate in the study and only once they accepted were the questions started. The consent was verbal. No participants under age 18 were included in this study, as this is the legal age for gambling in Chile.

Women composed 54.65% of the sample. Over one third (37.70%) were of medium-high socioeconomic status, 28.00% were medium-low, 20.06% were high, and 14.24% were low. The mean age of the sample was 44.06 years (SD = 16.84).

### Instruments

#### *National opinion research center DSM-IV screen for gambling problems (NODS)*

The NODS screening is composed of 34 questions about gambling problems, and its English version has been validated<sup>26</sup>. There is also a validated version in Spanish<sup>27</sup>, but it corresponds to the Spanish context and not the Chilean one, as in this case. Half of the questions are related to the past year, while the other half refer to the lifetime. In this study, only the information regarding the whole lifetime was considered. Items ask about gambling problematic behavior (e.g.: "Have you had periods of two or more weeks in which you spent a great deal of time thinking about your experiences with the game or planning in detail future gaming or betting episodes?"). Possible answers were "yes" and "no" (coded "1" and "0", respectively), where the former indicates gambling problems. The instrument used was the Spanish version<sup>28</sup>, adapted in this study to the Chilean context. According to the questionnaire guidelines, the resulting variable, which is the sum of all item scores (for each period evaluated), allows for categorizing individuals as: low risk gambler (score 0), at risk gambler (scores 1 or 2), people who experience gambling problems (scores 3 or 4), and pathological gambler (scores 5 or higher). In this study, reliability was excellent, with Cronbach's  $\alpha = 0.90$  for the "lifetime" section. Also, confirmatory factor analysis for this section presents a high goodness of fit ( $\chi^2(119) = 146.29, p < 0.05$ ; CFI = 0.98; TLI = 0.98, RMSEA = 0.02), and all factor loadings were significant and higher than 0.30. The original categories of the instrument were recategorized into two non-clinical categories: People who do not experience gambling problems (NPGs, which includes the original category "low risk gambler") and people who experience gambling problems (PGs, which includes the original categories "at risk gambler", "problem gambler" and "pathological gambler").

#### *Personal or subjective wellbeing index (PWI)*

This scale measures SWL of individuals using seven items related to: standard of living, personal health, achieving in life, personal relationships, personal safety, community-connectedness, and future security<sup>29</sup>. These items are measured on a range from 0 ("completely dissatisfied") to 6 ("completely satisfied"). For the present study, the Spanish version validated in Chile was used<sup>30,31</sup>. The reliability of this indicator is good in general, and also in this study, with Cronbach's  $\alpha = 0.87$  for the total sample, 0.85 for the NPGs, and 0.90 for at PGs. The total score of the scale was calculated as the simple average of the score obtained in the seven items that conform it.

### Socioeconomic status and income level

Socioeconomic status was estimated based on housing characteristics, using the categories ABC1, C2, C3 and D (assigned according to the block in which the participant lived), with the first category corresponding to the highest income level (value = 4) and the last one to the lowest income level (value = 1). The income level was estimated based on the type of work performed by the head of the household, rated on a hierarchical scale. Both variables were strongly, positively, and statistically significant (Spearman's  $Rho = 0.63$ ,  $p$ -value  $< 0.001$ ).

### Procedures

A team of pollsters was given instructions about the objective of the study, sample selection and survey application, to ensure standardized procedures in the collection of data. In each home, after individual selection, the interviewer explained the objective of the survey and provided the necessary information about the study, to obtain informed consent. After that, a questionnaire with 70 variables was then administered.

### Analysis

First, the frequencies of the NPGs and PGs groups were calculated, for the total sample and for the different subgroups, according to their sociodemographic characteristics. In addition, the percentage of the population that has gambled during the last year and the percentage of the population that bets alone, accompanied or both alone and accompanied, were estimated.

Subsequently, it was analyzed through multigroup confirmatory factor analysis (CFA) whether the PWI is invariant among the NPGs and the PGs. According to this analysis, if it is possible to prove both weak invariance (which is defined by the invariance of the factor loads) and strong invariance (which also considers item intercepts), the means of the latent factors are comparable between these two groups<sup>32,33</sup>.

After that, Analysis of Variance (ANOVA) was used to contrast the first three hypotheses, using Levene's test to corroborate the variance homogeneity assumptions.

To test the fourth hypothesis, a multiple linear regression analysis was performed, which considered SWL as a dependent variable and the score obtained on the NODS scale and the sociodemographic characteristics as independent variables (sex, age, and income level, as control variables). Subsequently, this regression analysis was replicated, considering the seven items of the PWI scale referring to satisfaction with seven different domains of life as dependent variables, to identify which of these domains were most affected by the problematic gambling.

Finally, to contrast hypothesis 5, a multigroup analysis was performed based on Structural Equations Modeling (SEM), considering SWL as the dependent variable and NODS as the independent variable, and the subsample of PGs and NPGs as groups.

For the invariance and multigroup analysis, the Mplus program v. 6.12<sup>34</sup> was used. For the rest of the analyzes IBM-SPSS v.21 program was used.

### Ethical statement

All methods in this study were carried out in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants.

All protocols have been approved by the Economics and Business Faculty Bioethics Committee, Andres Bello University.

### Results

Considering the original categories of the NODS instrument, the sample included 91.5% low risk gamblers, 5.3% at risk gamblers, 2.4% problematic gamblers, and 0.8% pathological gamblers when evaluating the last year as the time frame. When considering lifetime, the sample consisted of 85.7% low risk gamblers, 8.9% at risk gamblers, 2.9% problematic gamblers, and 2.4% pathological gamblers.

Table 1 presents the frequencies of NPGs and PGs for the total sample ( $N = 1032$ ) and the population subgroups of interest. All results are weighed according to the distribution of these groups in the population.

Furthermore, the results showed that 74.98% of the population has gambled in the last year, while 45.12% of those who gamble do so alone, 38.37% do so accompanied; and 16.51% do it both alone and accompanied. The multigroup CFA (Tables 2 and 3) obtained an adequate adjustment,  $\chi^2(38) = 208.22$ ;  $p < 0.05$ ; CFI = 0.95; TLI = 0.94, with high and statistically significant factor loads. Invariance at the configural level means that the basic organization of the scale (i.e. only one dimension and all items loading positively in this dimension) is supported in the two groups<sup>35</sup>. Metric invariance means that each item contributes to the latent construct to a similar degree across groups. Metric invariance is tested by constraining factor loadings (i.e., the loadings of the items on the constructs) to be equivalent in the two groups. The metric invariance model is then compared to the configural invariance model. If the overall model fit is significantly worse in the metric second model compared to the first, this indicates that at least one item loading on the factor is not equivalent across the groups- and metric invariance is rejected (see in Table 4 that Chi squared is not significant and CFI and TLI fit index are not worse than in the first model). Scalar invariance means that mean differences in the latent construct capture all mean differences in the shared variance of the items. Scalar invariance is tested by constraining the item intercepts to be equivalent in the two groups. The constraints applied in the metric invariance model are retained. If the overall model fit is not significantly worse in the third model compared to the second model, it indicates that constraining the item intercepts across groups does not significantly affect the model fit, and scalar invariance is supported (note in Table 3 that chi square is not significant, and CFI and TLI fit index are not worse in the third than in the second model). Finally, residual invariance, or equivalence of item residuals of metric and scalar invariant items was examined. Residual invariance means that the sum of specific variance (variance of the item that is not shared with the factor), and error variance (measurement error) is similar across groups. In this case chi square change was significant but decrease in CFI was low. Although a required component for full

	Sex		Age (years old)						Socioeconomic status			
	M	F	18–30	31–40	41–50	51–60	61+	ABC1 (highest income level)	C2	C3	D (lowest income level)	Total
People who do not experience gambling problems	86.50%	85.07%	87.98%	82.60%	79.55%	86.13%	90.16%	85.16%	85.54%	87.23%	85.14%	85.72%
People at risk who experience gambling problems (at risk, problematic, and pathological gamblers).	13.50%	14.93%	12.02%	17.40%	20.45%	13.87%	9.84%	14.84%	14.46%	12.77%	14.86%	14.28%

**Table 1.** People who experience gambling problems and people who do not experience gambling problems by sex, age, and socioeconomic status.

	People who do not experience gambling problems		People at risk who experience gambling problems (at risk, problematic, and pathological gamblers).	
	Coef. St.	<i>p</i>	Coef. St.	<i>P</i>
1. Standard of living	0.77	<0.001	0.77	<0.001
2. Personal health	0.68	<0.001	0.63	<0.001
3. Achieving in life	0.78	<0.001	0.78	<0.001
4. Personal relationships	0.75	<0.001	0.67	<0.001
5. Personal safety	0.66	<0.001	0.69	<0.001
6. Community-connectedness	0.63	<0.001	0.63	<0.001
7. Future security	0.61	<0.001	0.65	<0.001
Cov. 5–7	0.50	<0.001	0.56	<0.001

**Table 2.** Multigroup confirmatory factor analysis.

	$\chi^2$ (gl)	Dif $\chi^2$ (gl)	<i>P</i>	CFI	TLI	$\Delta$ CFI
Configural model	196.68 (26)			0.95	0.92	
Weak or metric invariance	202.44 (32)	5.77 (6)	0.45	0.95	0.93	0.00
Strong or scalar invariance	217.49 (39)	20.81 (13)	0.08	0.94	0.94	-0.01
Strict or residual invariance	244.77 (46)	48.09 (20)	<0.001	0.94	0.94	0.01

**Table 3.** Personal Wellbeing Index Invariance.

Dependent variable	Personal relationships			Personal safety			Community-connectedness			Future security		
	B	T	<i>P</i>	B	T	<i>P</i>	B	T	<i>P</i>	B	T	<i>P</i>
Constant	3.25	13.43	<0.001	3.21	11.77	<0.001	2.85	10.82	<0.001	3.34	12.28	<0.001
NODS	-0.25	-5.38	<0.001	-0.13	-2.50	<0.05	-0.20	-3.96	<0.001	-0.17	-3.27	<0.001
Sex	-0.14	-1.23	0.22	-0.02	-0.16	0.87	-0.28	-2.28	<0.05	0.13	0.98	0.33
Age	0.00	-0.75	0.46	-0.02	-4.07	<0.001	0.00	-0.03	0.98	-0.02	-5.05	<0.001
Socioeconomic level	0.25	4.62	<0.001	0.18	3.05	<0.01	0.16	2.76	<0.01	0.13	2.21	<0.05
Adjusted $R^2$	0.05			0.03			0.02			0.04		
Model's significance	<0.001			<0.001			<0.001			<0.001		

**Table 4.** Multiple linear regression analysis (part one) considering NODS as independent variable and SWL domains as dependent variable ( $N = 1032$ ).

factorial invariance<sup>35</sup>, testing for residual invariance is not a prerequisite for testing mean differences because the residuals are not part of the latent factor, so invariance of the item residuals is inconsequential to interpretation of latent mean differences.

The above results on configural, metric and scalar invariance imply that the means of the latent factors are comparable between the two groups<sup>32,35</sup>, i.e. according to the typology of the NODS questionnaire.

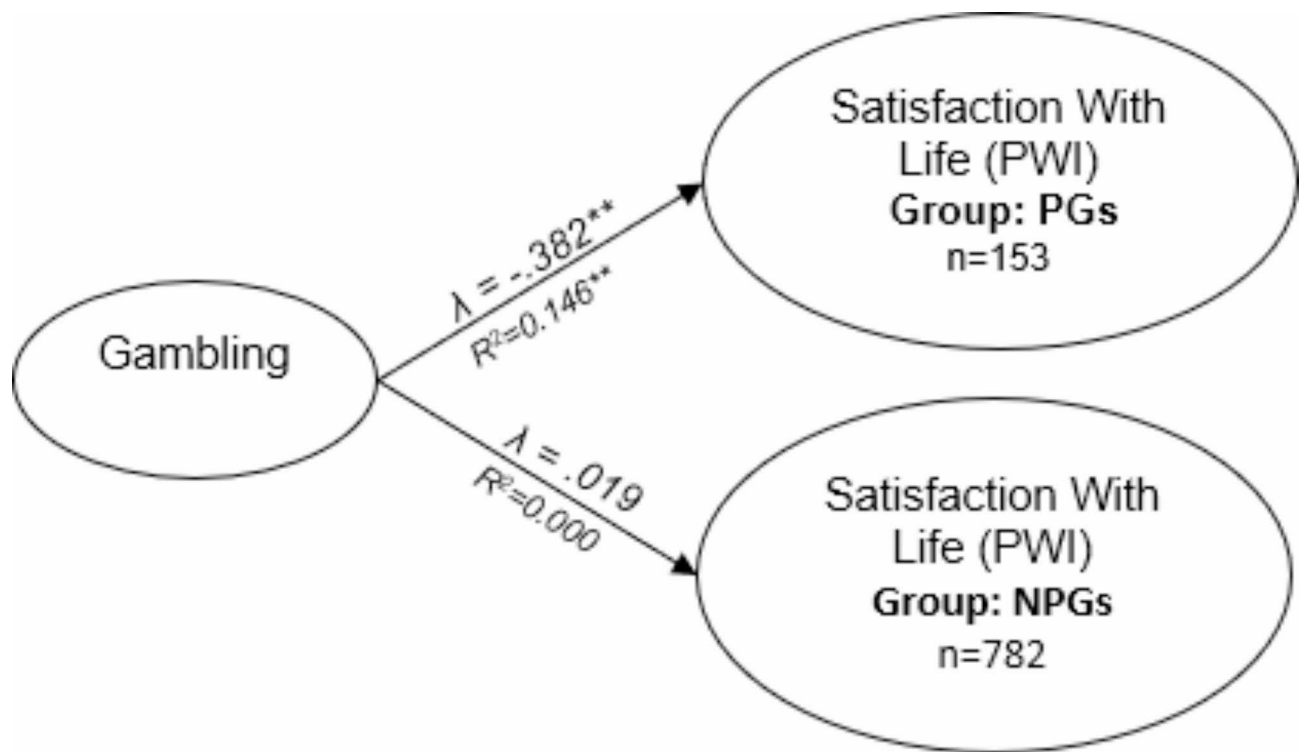
When testing the first hypothesis regarding the association between lifetime PG and low well-being, by establishing two categories according to the NODS questionnaire, the mean of the PWI reaches 3.49 (SD = 1.40) for the NPGs, and 3.11 (SD = 1.66) for the PGs. The differences are statistically significant,  $F(1, 1,028) = 11.64$ ,  $p < 0.001$ . Levene's test allowed assuming homogeneity of variances,  $F(1, 1,028) = 0.99$ ,  $p = 0.32$ .

When testing the second hypothesis, the results showed that, as hypothesized, there were no statistically significant differences between the SWL levels of the group of participants that did not gamble during the last year ( $M = 3.48$ ,  $SD = 1.49$ ) and the group that did gamble and did not qualify as problematic gambler ( $M = 3.54$ ,  $SD = 1.37$ ),  $F(1, 886) = 0.27$ ,  $p = 0.61$ . The Levene's test allowed assuming homogeneity of variances,  $F(1, 886) = 2.93$ ,  $p = 0.09$ .

To test the third hypothesis, a variable was created that distinguished other characteristics related to gambling. Three categories were created, according to the average behavior reported by the respondents: those who gamble by themselves (40.16%), those who gamble in the company of others (34.81%) and those who gamble either by themselves or in the company of others (13.18%). The rest of the participants (11.85%) declared that they had never gambled, so they were not considered in this comparison. The results show that the participants who bet

Dependent variable	Average SWL score			Standard of living			Personal health			Achieving in life		
	B	t	P	B	T	p	B	t	P	B	t	p
Constant	3.31	17.82	<0.001	2.89	13.26	<0.001	4.63	18.67	<0.001	2.91	12.64	<0.001
NODS	-0.18	-5.04	<0.001	-0.16	-3.74	<0.001	-0.26	-5.56	<0.001	-0.09	-2.15	<0.05
Sex	-0.07	-0.81	0.42	-0.11	-1.10	0.27	0.18	1.52	0.13	-0.22	-2.00	<0.05
Age	-0.01	-3.99	<0.001	0.00	-1.15	0.25	-0.03	-9.04	<0.001	0.00	-0.13	0.90
Socioeconomic level	0.20	4.88	<0.001	0.30	6.26	<0.001	0.12	2.18	<0.05	0.28	5.59	<0.001
Adjusted R <sup>2</sup>	0.05			0.05			0.10			0.04		
Model's significance	<0.001			<0.001			<0.001			<0.001		

**Table 5.** Multiple linear regression analysis (part one) considering NODS as independent variable and SWL domains as dependent variable (N = 1032).



**Fig. 1.** SEM Multigroup analysis diagram.

accompanied had the highest levels of SWL ( $M = 3.51$ ,  $SD = 1.32$ ), followed by the group of those who play alone ( $M = 3.45$ ,  $SD = 1.44$ ) and, in the last place, by the group who play either by themselves or in the company of others ( $M = 3.42$ ,  $SD = 1.49$ ). However, the differences between the groups are not statistically significant,  $F(2, 906) = 0.25$ ,  $p = 0.78$ . Levene's test allowed assuming homogeneity of variances,  $F(2, 905) = 1.24$ ,  $p = 0.29$ .

To test the fourth hypothesis, multiple linear regression analyses were performed, which considered the NODS score and sociodemographic as independent variables, while the average score of the PWI instrument (SWL) and each of the seven items that compose it were considered as dependent variables. Age was measured in years and sex as a dichotomous variable (0 = men; 1 = women). The level income was measured as indicated in the instruments section.

As Tables 5 and 4 show, all models were statistically significant ( $p$ -value  $< 0.001$ ), explaining between 2% and 10% of the variance of the dependent variable. The score obtained on the NODS screen was statistically significant for all models ( $p$ -value  $< 0.001$  or  $< 0.05$ ). The models that explained the highest percentage of the variance of the dependent variable were those that considered satisfaction with personal health and standard of living as the dependent variables, while those that explained the least were those that considered satisfaction with community connectedness and personal safety as dependent variables.

Finally, to test the fifth hypothesis, a multigroup analysis (SEM) was carried out (Fig. 1). Based on the literature<sup>25,26</sup>, the results showed adequate adjustment indices ( $\chi^2 = 47.556$ ,  $df = 36$ ,  $p = 0.094$ ;  $RMSEA = 0.026$ ,  $p = 0.986$ ,  $IC90\% 0.000-0.045$ ;  $CFI = 0.996$ ;  $TLI = 0.994$ ;  $SRMR = 0.020$ ).

Dependent variable	Average SWL score	Standard of living	Personal health	Achieving in life
Adjusted $R^2$	0.05	0.05	0.1	0.04
Effect size $f^2$	0.05263	0.05263	0.11111	0.04167
$\alpha$ err prob	0.0009	0.0009	0.0009	0.0009
Total sample size	1032	1032	1032	1032
Number of predictors	4	4	4	4
Noncentrality parameter $\lambda$	54.31416	54.31416	114.6666	43.00344
Critical $F$	4.7132573	4.7132573	4.7132573	4.7132573
Numerator $df$	4	4	4	4
Denominator $df$	1027	1027	1027	1027
Power ( $1-\beta$ err prob)	0.9999	0.9999	1.0000	0.9935

**Table 6.** Post-hoc power análisis linear regression models.

Dependent variable	SWL
$n$ PGs group	153
$n$ NPGs group	782
$n$ total	935
$df$ adjusted model	36
RMSEA multi-group	0.026
RMSEA baseline model	0.5898
Critical <i>Chi-Cuadrado</i>	22.73
Noncentrality parameter $\lambda$	11696.58
Power ( $1-\beta$ err prob)	1.000

**Table 7.** Post-hoc power análisis SEM model.

Regarding the effect sizes based on  $R^2$ , in the group of PGs the results of the tested model are statistically significant, explaining 14.6% of the variance of PWI (SWL), while, for the group of NPGs, the results are not statistically significant.

### Statistical power analysis

This section discusses the controversial topic of post-hoc statistical power analysis (PHPA) in scientific research. While some argue that PHPA has limited utility after data has been collected and analyzed, others defend its use as a tool to interpret results and evaluate the robustness of findings.

Methodologically, the analysis is focused on effect size (ES) estimators, particularly those that measure the proportion of explained variance in the dependent variable, such as the  $f^2$  index for multiple regression analysis.

The study uses the  $f^2$  index, calculated as  $f^2 = R^2 / (1 - R^2)$ , where  $R^2$  represents the proportion of variance explained by the model. This index is particularly useful in SEM contexts as it provides a standardized measure of effect size, facilitating comparisons across studies<sup>36,37</sup>.

The results for the four linear regression models with a sample size of 1032, the post-hoc power analysis (Table 6) showed a high power ( $1-\beta$ ) value of  $>0.993$ , suggesting a high capacity to detect real effects and minimize the risk of Type II errors.

For the SEM model, the post-hoc power analysis (Table 7) revealed a power of 1.000 for the multigroup model. This result indicates that the model has a high capacity to detect significant differences between the NPG and PG groups, as well as to evaluate the overall model fit<sup>38</sup>.

The high-power values obtained for both the regression models and the SEM model suggest that the studies are well-powered and have a high capacity to detect significant effects.

The clear differentiation of effects between the PG and NPG groups in the SEM model reinforces the validity of the model and its ability to capture the underlying dynamics in the relationship between gaming and life satisfaction.

The authors align their analysis with the recommendations of<sup>39</sup> for power analysis in multigroup models, ensuring that differences between groups are effectively detected.

The use of the  $f^2$  index is justified as it provides a clear measure of effect size, crucial for interpreting the magnitude of effects in SEM models, where multiple predictors are involved.

While post-hoc power analysis is often criticized for its retrospective nature, this study addresses these limitations by using it to confirm the robustness of findings and guide future research directions.

The analysis was conducted using G\*Power V3.1 for linear regression models and specific python routine for the SEM model, ensuring that the results are reproducible and transparent.

The high-power values imply that the study's findings are reliable and can be generalized to similar contexts, providing a strong foundation for future research.



## Discussion

This research found that three quarters of the studied population have gambled in the past year (74.98%). A little more than half of them either always or sometimes, in company of others (54.88%) and almost half of them always did it alone (45.12%). In addition, it was estimated that 15.0% of the population correspond to the category of people who experience gambling problems, with this percentage suffering minimal differences when comparing the gender or socioeconomic status groups. In the case of age, the highest percentage of people who qualified as people who experience gambling problems occurred for the section of 41–50 years (20.45%) and the lowest percentage for the section of 61 years or more (9.84%).

The results presented empirically support two of the first three hypotheses raised. They show that individuals with gambling problems reported lower levels of SWL. This is consistent with previous research in the area<sup>15</sup> and supports what was argued in the first hypothesis. Moreover, it should be noted that people who do not experience gambling problems who have bet in the past year have, on average, high well-being, and similar to the individuals that declared not to gamble in that period, as stated in the second hypothesis. These results are congruent with previous studies showing that gambling per se is unrelated to well-being sensations<sup>15,16</sup>. Besides, playing in the company of others, is not a factor that established differences in SWL. This refutes the third hypothesis: namely, that moderate gambling may have the positive effect of helping people obtain social support. This result is at odds with other studies showing that (non-problematic) gambling reinforces social integration<sup>15</sup>.

Results also partially supports hypothesis 4, because the stronger coefficients were, as expected, related to personal relationships and community connectedness, while the lowest were (also as expected) for achieving in life, personal safety, and future security. These results are congruent with other studies integrated in a meta-analysis<sup>24</sup> confirming that problematic gamblers report not only high illusory control of gambling or gambler's fallacy (the belief that after a string of one event, such as a coin landing heads, an alternative event, such as the coin landing tails, becomes more likely) but also report higher level of illusion of control, perceiving more personal control over events than is warranted, a positivistic bias that is associated to well-being<sup>25</sup>. Improving self-perception can buffer and neutralize negative effects of losses and helps to maintain a benevolent representation of self.

On the other hand, it is also important to remark that the highest coefficient was for personal health, in concordance with negative effects of gambling in mental health. Results are congruent with a study by Afifi et al<sup>13</sup>, that found that problem gambling in the past year was associated with a significantly higher probability of current lower general health, decreased psychological well-being, increased distress, and depression<sup>4,5,14</sup>.

Based on the multigroup analysis, it is possible to conclude that the effect of gambling on subjective well-being is almost null for the group of NPGs, but quite considerable and negative for the group of PGs. This tends to support the hypothesis that, as long as there is no problematic gambling, the positive and negative effects of gambling tend to cancel out, while when there is problematic gambling, gambling has a negative effect on life satisfaction of individuals. This follows the findings of<sup>16</sup> who concluded that people who gamble moderately and without serious problems tend to report levels of subjective well-being similar to those who do not gamble at all.

Considering the overall results of the study, although gambling in people who do not experience gambling problems shows a significant positive effect, the amount of the effect is rather low, thus is not possible to ensure that, in general, gambling contributes to well-being in all cases. In relation to this, more studies should delve into this aspect. However, when people struggle to control gambling, the opposite effect emerges. Additionally, the gambling environment does not explain this relationship, which occurs whether individuals gamble by themselves or in company of others. However, activities carried out in the company of others generally reinforce well-being more than the same activities carried out in isolation<sup>17</sup>. Therefore, it is likely that our categories (playing alone, accompanied, or sometimes alone and sometimes accompanied) are too broad to isolate the influence of social support obtained from recreational activities.

The findings also lead us to think about the potential impact of technological advances on gambling behaviour, particularly with the rise of online and mobile gambling platforms. These digital avenues provide constant access, which may exacerbate problematic gambling behaviors due to the ease and anonymity they offer. This emerging trend underscores the need to explore the role of digital environments in shaping gambling habits, especially among younger populations who are more likely to engage in online gambling. Future research should investigate how these technological factors interact with traditional gambling motivators, potentially creating new patterns of risk and resilience in gambling behavior.

Moreover, the influence of cultural and societal attitudes towards gambling warrants further exploration. Cultural norms and social acceptance of gambling can significantly affect both participation rates and the perception of gambling-related problems. For instance, in societies where gambling is viewed as a normal social activity, individuals may be less likely to recognize or seek help for gambling-related issues. Understanding these cultural dimensions could help tailor preventive and intervention strategies that are culturally sensitive and more effective in mitigating the negative impacts of gambling. Future studies could benefit from examining cross-cultural differences in gambling behaviors and their implications for public health policies.

The main strength of the results presented is the use of a representative sample from a national capital city, Santiago de Chile. This allowed for the estimation of the relationship between the variables and then scale it to the population level. However, there is also an important limitation associated with sample size in the categories referring to problematic gambling: only a small percentage of the respondents are people who experience gambling problems (although this is consistent with international epidemiological studies). Moreover, this study considered a cross-sectional design, which constitutes a limitation because it is not possible to empirically observe which variables predict others (in this case, it was only theoretically assumed that the gambling problem could affect SWL).

As a limitation of the study, it should be said that the use of self-report scales is pragmatic, but it is not the most appropriate procedure to evaluate problem behaviors (such as gambling problems), due to social

desirability. These limitations should be considered in future research. Another limitation of this study is the variability in the degrees of freedom of the error across analyses, reflecting the inclusion of different subgroups of participants. Although these changes are methodologically justified, they may affect the direct comparison of some results. Future research should consider a more consistent approach in sample selection to reduce this variability and facilitate the interpretation of the analyses.

In summary, for some individuals engaging in recreational gambling may be a form of entertainment and social activity. In moderation, it might not necessarily have a negative impact on subjective well-being. Recreational gamblers may view gambling as a leisure activity, much like going to the movies or playing sports. As long as it remains within healthy limits, it may contribute positively to overall well-being. Problematic gambling, on the other hand, is associated with negative consequences and can have a detrimental impact on subjective well-being. Individuals experiencing gambling problems may face financial difficulties, relationship strain, and psychological distress, all of which can contribute to lower levels of life satisfaction and well-being<sup>6,13,14</sup>. The impact of gambling on well-being can vary based on individual factors such as personality, coping mechanisms, and the presence of underlying mental health issues. Some individuals may be more resilient to the negative effects of gambling, while others may be more vulnerable. Further investigation about this topic is required.

## Data availability

The datasets generated and/or analyzed during the current study are not publicly available due to confidentiality guarantee for participants but are available from the corresponding author on reasonable request.

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## Author contributions

Conceptualization, J.C.O. and M.H.; methodology, E.E. and D.P.; formal analysis, E.E, A.R. and A.M.S.; writing—original draft preparation, J.C.O.; writing—review and editing, E.A.D. All authors reviewed the manuscript. The funder had no role either in the conceptualisation, design, data collection or analysis, which was fully carried out by UNAB team. The Chilean Association of Responsible Gambling has not reviewed the manuscript.

## Declarations

### Competing interests

Author Mariela Huenchumilla is Corporate Manager of SunDreams Latam (a company that has operated since 2008 in Chile in the construction and operation of casinos, hotels and restaurants). However, she did not participate in the data analysis phase or in the design of the study. Mariela Huenchumilla is also the president of the Chilean Association of Responsible Gambling, which is one of the funding institutions of this study. The rest of the authors declare no competing interests.

### Additional information

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