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# Latent classes of gambling in youths: The role of comorbidity, alexithymia and stressful life events by sex

## Clases latentes de juego problemático en jóvenes: El papel de la comorbilidad, la alexitimia y los acontecimientos vitales estresantes en función del sexo

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## Abstract

Alexithymia is related with propensity towards impulsive behavioral responses, rather than cognitive regulation of stressful events. Youth is a particularly vulnerable time for the confluence of these variables, which may impact the severity of gambling disorders (GD). However, sex differences have hardly been explored. This study aimed, firstly, to explore the frequency of GD among young people, as well as the presence of GD with other comorbid addictions. Secondly, latent classes were examined on the basis of gambling risk and their relationship to other addictive behaviors, alexithymia and stressful life events. Thirdly, we analyzed whether class membership was predicted by sex and age. The sample was composed of 360 participants between the ages of 18 and 35, the majority female. The results obtained revealed that alcohol abuse was the most prevalent addictive behavior both for problem and non-problem gamblers of both sexes. Group membership analyses showed the presence of two latent classes based on gambling risk. One of them was characterized by gambling risk, comorbidity, alexithymia, and stressful life events, and mainly predicted by being male. The other model was characterized by no gambling risk, lower levels of stressful life events and alexithymia, and mainly predicted by being female. This second profile presents a risk of alcohol abuse and compulsive buying. We highlight the need to introduce a gender perspective both in the interpretation of research findings and in the clinical application of treatments.

*Keywords:* gambling, young adults, sex, comorbidity, alexithymia, stressful life events

## Resumen

La alexitimia se relaciona con la propensión a las respuestas conductuales impulsivas, en lugar de una regulación cognitiva de los acontecimientos estresantes. La juventud es una etapa de especial vulnerabilidad para la confluencia de estas variables, pudiendo repercutir en la severidad del trastorno de juego (TJ). No obstante, las diferencias entre sexos apenas han sido exploradas. Este estudio tuvo como objetivo, en primer lugar, explorar la frecuencia de TJ en los jóvenes, así como la presencia de TJ con otras adicciones comórbidas. En segundo lugar, se examinó el riesgo de juego y su relación con las otras conductas adictivas, la alexitimia y los acontecimientos vitales estresantes. En tercer lugar, se analizó si la pertenencia a una determinada clase latente era predicha por el sexo y la edad. La muestra estaba compuesta por 360 participantes, con edades comprendidas entre los 18 y 35 años, siendo la mayoría mujeres. Los resultados obtenidos revelaron que el abuso de alcohol era la conducta adictiva más prevalente, tanto para los jugadores problemáticos como para los no problemáticos de ambos sexos. Los análisis de pertenencia de grupo mostraron la presencia de dos clases latentes en base al riesgo de juego. El primero de ellos se caracterizaba por el riesgo de juego, la comorbilidad, la alexitimia y los acontecimientos vitales estresantes, y estaba principalmente predicho por la condición sexo-varón. El otro modelo se caracterizaba por la ausencia de riesgo de juego, niveles más bajos de acontecimientos vitales estresantes y alexitimia, y se predice principalmente por la condición sexo-mujer. En este segundo perfil se halló riesgo de abuso de alcohol y de compra compulsiva. Señalamos la necesidad de introducir una perspectiva de género tanto en la interpretación de los resultados de la investigación como en la aplicación clínica de los tratamientos.

*Palabras clave:* trastorno de juego, jóvenes, sexo, comorbilidad, alexitimia, acontecimientos vitales estresantes

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The Diagnostic and Statistical Manual of Mental Disorders, 5th edition [DSM-5] (American Psychiatric Association [APA], 2013) defines gambling disorder (GD) as a problematic, persistent, and recurrent behaviour that leads to clinically significant deterioration, and which often disrupts the person's daily life. Studies indicate that the prevalence and addictiveness of gambling disorder increase as gambling becomes more accessible, faster, more attractive, and more available, characteristics that have been specially enhanced in the new modality of online gambling (Griffiths et al., 2006). A prevalence study conducted by Chóliz et al. (2021) found that people under 35 years of age participate more in online gambling than the adult and older population, which are more prone to traditional offline gambling, indicating that online gambling is currently the main modality of problem gambling for young adults.

A systematic review in European countries estimates the prevalence of young people meeting the criteria for problem gambling to range between 0.2 and 12.3%, despite the variation between assessment instruments, time frames, and cut-offs (Calado et al., 2017). In Spain, the national prevalence study of behavioural addictions among people aged 15 to 64 years shows that 1.6% of them had a possible problem gambling, and 0.6% had a possible GD (Delegation of the Spanish Government for the National Plan on Drugs, 2020). In addition, men show a higher prevalence and proneness to gambling than women, with a greater propensity for sensation-seeking and risk-taking behaviours (Wong et al., 2013). Despite this fact, in gender perspective research, male gender mandates have been identified as a risk factor for addiction, not the fact of being male per se. From this viewpoint, the consequences to which young women and men are exposed in consumption spaces, as well as in relation to addictive behaviours are very different. As a result, despite the higher prevalence in men, being a woman increases the risk of being socially stigmatised (Rodríguez et al., 2019).

There is ample evidence indicating that problem gambling is more likely to occur among younger ages (Abbott et al., 2014; Calado & Griffiths, 2016; Castrén et al., 2013; Costes et al., 2011). Chóliz et al. (2021) observed that in Spain, young adults (26-35 years old) were the age group most involved in gambling behaviours, when compared to the youngest (< 26) and elderly people (> 65 years). Youths that meet the criteria for GD score higher on other comorbid addictive behaviours such as alcohol, drugs, video gaming, or compulsive spending when compared to at-risk and non-gamblers (Jauregui et al., 2016), with a particularly high prevalence between 18- to 25-year-olds (Sussman & Arnett, 2014). In fact, Estévez et al. (2021) found that the psychopathological profile is more severe among young people with co-occurring gambling and other addictive behaviours. For its part, a alcohol consumption has become a widespread and relatively normative behaviour in the youth culture, often associated with functions such as socialisation, frequent binge drinking before the age of 25 constitutes a subsequent risk factor for alcohol dependence and has also been shown to have a close positive relationship with problematic gambling behaviours (Jun et al., 2019). In this sense, studies carried out with adolescents from the general population point out that those classified as problem gamblers were more likely to be involved in all types of gambling and to report higher rates of comorbid use of tobacco, alcohol and other substances (De Luigi et al., 2018). In contrast, Sanscartier et al. (2019) found that higher-risk gamblers were more prone to report anxious-depressive symptomatology, whereas lower-risk gamblers were more likely to use drugs and alcohol. Meanwhile, Martínez-Loredo et al. (2019) explored gender-specific latent classes among adolescents based on their risk of suffering substance use and gambling activities, noting that the female class mainly comprised of gamblers, in contrast to the male class of gamblers, reported some degree of alcohol use and engaged in more chance-based gambling typologies. Therefore, previous evidence still shows mixed findings indicating the need for further studies.

On another hand, there is ample evidence supporting that alexithymia plays a central role in the aetiopathogenesis of addictive disorders, including GD (Marchetti et al., 2019). Alexithymia has been defined as a multifaceted personality construct that represents a deficit in the cognitive processing of emotions and affective awareness, highlighting the difficulty in identifying, recognizing, and describing feelings (Marchetti et al., 2019). It has been suggested that people with high levels of alexithymia may use behavioural rather than cognitive responses to manage their emotional states (Zdankiewicz-Scigala & Scigala, 2018). In this sense, gambling may arise as an attempt to regulate subjective emotional states and the loss of impulse control when gambling (Bibby & Ross, 2017). Besides, Estévez et al. (2021) found that alexithymia mediated the relationship between insecure attachment styles and addictions (i.e., gambling behaviour, spending, gaming, and the use of alcohol and drugs). However, to the best of our knowledge, alexithymia has scarcely been explored as a predictor of class membership as a function of sex in young adults with risky gambling patterns.

Likewise, stressful life events have been related to higher frequency and severity of gambling among adults diagnosed with GD (Elman et al., 2010; Stor et al., 2012). Youth with gambling-related problems have also shown a greater number of adverse life events compared to those who did not gamble (Bergevin et al., 2006). Consistently with the above, people with high levels of alexithymia have been found to experience more severe post-traumatic symptoms after events with a high emotional impact (Frewen et al.,

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2006). Moreover, post-traumatic disorders are significantly more recurrent in young people in treatment for addiction compared to those who do not gamble and they are associated with a worse prognosis and a costlier treatment (Wang et al., 2020). In turn, attempts to classify people who gamble indicate that the clusters with the highest difficulties in emotion regulation, problem-solving, and both life and emotional stress, tend to show greater psychopathological comorbidity and gambling severity than other clusters marked by traits such as excitement, socialization, or sensation-seeking (Jiménez-Murcia et al., 2019). Estévez et al. (2021), in a recent study of comorbidity in a young population with GD diagnosis, reported that higher scores in coping and emotion-regulation difficulties were closely associated with the comorbid presence of GD and other substance and behavioural addictions. However, while most of the studies have been conducted in clinical samples, little is known about whether the interrelationship of stressful life events and alexithymia would constitute a risk factor for the general population of young adults with problematic gambling use patterns.

# Objectives

In recent years, research examining predisposing risk factors for GD has gained attention due to its increased prevalence and psychosocial implications, particularly among youths. Nonetheless, we found a paucity of studies analysing latent class groups based on gambling risk and even fewer using sex as a predictor of problematic gambling. Furthermore, to the best of our knowledge, the scientific literature does not provide information about the predictive role and interaction of alexithymia, stressful life events and comorbid addictive behaviours with respect to class membership of youth gamblers from the general population. The latter is something we highlight given the benefits in terms of prevention amongst an age group that has been identified as particularly vulnerable for the onset and development of GD. Lastly, we also stress the need to explore comorbidities such as eating disorders or compulsive buying, which have been less studied to date in relation to problem gambling.

On that bases, the present research aimed, in the first place, to explore the frequency of possible GD in young people from the general population, as well as the presence of GD with other comorbid addictive behaviours (i.e., alcohol addiction, drug addiction, compulsive buying, and eating disorder). In the second place, it aimed to analyse class membership based on the risk of GD, and its relationship with the aforementioned addictive behaviours and psychological variables (i.e., alexithymia and stressful life events). Finally, we wanted to know whether class membership was predicted by sex and age.

# Method

## Participants

The sample consisted of 360 Spanish participants aged between 18 and 35 years. Their average age was 22.93 years ($SD = 3.30$) and 77.6% were women, 22.2% were men, and 0.3% were another gender. Most of the sample had university studies (72.7%), followed by General Certificate of Education (17%), Vocational training (9.4%), and, less frequently, Primary Education (0.3%) and Compulsory Secondary Education (0.6%). Participants were mainly studying (51.4%), studying and working (25%), or only working (20.2%).

## Instruments

### Problem gambling

Problematic gambling behaviour was assessed by the *South Oaks Gambling Screen* [SOGS] (Lesieur & Blume, 1987). The Spanish version was adapted by Echeburúa et al. (1994). The SOGS is a screening tool for gambling that was developed for its detection in clinical populations. It consists of 20 items, whose content is related to gambling patterns, sources of money to gamble, debt repayment, and involved emotions. Scores above 4 points suggest the possible presence of GD so answers are classified in a dichotomous variable (i.e., No risk of gambling < 4 and risk of gambling ≥ 4). Regarding its reliability, the SOGS has high internal consistency, with a Cronbach alpha of .94. Its 4-week test-retest reliability was .98 ($p < .001$), and its convergent validity with the DSM-IV criteria was .94. In this study, Cronbach's alpha for the SOGS was .60.

### Alcohol, drugs, compulsive buying, and eating disorders

*MULTICAGE CAD-4* (Pedrero-Pérez et al., 2007). This instrument assesses addictive behaviours, with or without substance. It contains 32 items, divided into eight factors of four items each, including: Alcohol Abuse or dependency, GD, drugs, Eating Disorders, Internet Addiction, Video Game Addiction, Compulsive Spending, and Sex Addiction. In this study, we used four of those eight factors (i.e., Alcohol Abuse, drugs, Compulsive Spending, and Eating Disorders). The items have a dichotomous response option (i.e., *yes* or *no*). The responses were classified as three-level variables indicating the risk of alcohol abuse, drugs abuse, compulsive spending and eating disorder (i.e., No risk = 0 or 1, Probable risk = 2 and Quite probable risk ≥ 3). The internal consistency of the MULTICAGE CAD-4 is satisfactory (Cronbach's alpha for the total scale was $a = .86$ whereas the subscales show values greater than .70). The 20-day test-retest reliability was $r = .89$. The criterion validity was also adequate (it detects between 90 and 100% of already diagnosed cases). In the current study,

Cronbach's alpha was .60 for alcohol abuse, .63 for drugs, .67 for compulsive buying, and .60 for eating disorders.

### Alexithymia

*Toronto Alexithymia Scale-20* (TAS-20; Taylor et al., 1985, adapted to Spanish by Martínez-Sánchez, 1996). Alexithymia is measured through three main factors: (1) Difficulty Identifying Feelings, which refers to problems identifying emotions, which are notoriously confused with physical symptoms, (2) Difficulty Describing Feelings, by which individuals are unable to communicate their feelings and use emotional vocabulary, (3) Externally-Oriented Thinking, by which individuals tend to neglect their inner emotional states. The scale comprises 20 items, and responses are scored on a 6-point Likert scale ranging from 0 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency is good for the overall scale (α = .83 for the original and α = .81 for the Spanish adaptation). In this study, Cronbach's alpha was .85.

### Stressful life events

*Centrality of Event Scale* [CES; Berntsen & Rubin, 2006, adapted to Spanish by Fernández-Alcántara et al., 2015). The scale assesses aspects directly related to the processing of traumatic events. Before completing the scale, participants were asked to write down in a space the most traumatic or stressful event in their life to base their response on that event when completing the scale. It consists of 20 items rated on a 5-point Likert-type response ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The internal consistency was satisfactory both for the original scale and the Spanish adaptation (α = .94). In the current study, Cronbach's alpha was .93.

### Procedure

This is a cross-sectional research design. There were two main ways of data collection. One of them was carried out with students from the Complutense University of Madrid. The other was carried out using non-probabilistic sampling through the snowball method, including the diffusion of the questionnaire on social networks (e.g., WhatsApp, Instagram, Facebook, journals, or websites with divulgation purposes).

For the entire sample, the survey was completed via an online link to the questionnaire or via a QR code that gave access to the same questionnaire. To access the questionnaire, participants had to be over 18 years old, have read the study information and accepted the informed consent. The duration of the questionnaire was about 30 minutes.

The questionnaire included general information about the main goals of the study. It was made clear that there were no right or wrong answers and that participants could email the main researcher if they needed further information about the study. Confidentiality, anonymity, and voluntary participation were ensured for all participants. The participants did not receive any compensation for participating. The study was approved by the Review Board.

### Analytical procedure

As preliminary analyses, missing data patterns and normality of the continuous variables were explored. The MCAR Little test for missing data was non-significant, $\chi^2(987) = 1054.04$, $p = .068$. Therefore, it was assumed that the data were missing at random and no imputation was performed. The assumption of normality of the continuous variables (i.e., age, stressful life events, and alexithymia) was explored with the skewness and kurtosis levels (see Table 2). These data showed that both indicators were lower than |2| for all three variables, which follows Cain et al.'s (2017) criteria to assume normality.

The hypotheses were tested by latent class analysis (LCA) with Mplus 7.11 (Muthén & Muthén, 1998 −2013). For this purpose, the three-step procedure described by Asparouhov and Muthén (2014) was followed. First, the number of latent classes was calculated, comparing models with 1 to 3 classes, including risk of addiction to gambling, alcohol, drugs, compulsive buying, and eating disorders. Model comparison was applied attending to Akaike's Information Criterion (AIC), the Bayesian Information Criterion (BIC), the mean-adjusted Bayesian Information Criterion (aBIC), the entropy, the Lo-Mendell-Rubin adjusted likelihood ratio test (LMRa), and the bootstrap likelihood ratio test (BLRT). AIC, BIC, and aBIc indicated model maladjustment, so lower values were considered indicators of better fit (Hu & Bentler, 1999). Specifically, BIC was observed to be the most reliable of these three indicators (Nylund et al., 2007), so it was considered as the primary indicator for decisions of model fit. LMRa and BLRT test differences on loglikelihood between models with K - 1 classes and K classes, and significant tests indicated that the K-class model increased model fit (Nylund et al., 2007). The entropy ranged between 0 and 1, so values close to 1 showed a more precise level of profile classification (Celeux & Soromenho, 1996).

Besides, a multigroup analysis was performed to test if the composition of the latent classes vary between sexes (i.e., females and males). In doing so, the final model of the first step was fixed to be equal across sex (Configural model) and that model was compared to a nested model in which classes were allowed to differ by sex (Sex-variant model). Non-invariance was assumed when the sex-variant model compared to the configural model did not show significant model fit increment based on the Satorra-Bentler scaled chi-square difference test (Satorra & Bentler, 2010).

Second, the most likely class membership was explored to describe the composition of each latent profile in the final model. To this end, the average probability of endorsing each category of each indicator variable was examined, as well as

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odd ratio tests on these probabilities across classes to examine whether they differ in regard to the degree of gambling risk, alcohol and drug abuse, compulsive buying and eating disorder (Wang & Wang, 2012). Third, the relationship of the antecedents (i.e., age and sex) and the psychological outcomes (i.e., stressful life events and alexithymia) with class membership was explored following the suggestions of Lanza et al. (2013). Thus, as the latent class is not an observed variable, this process empirically estimates the class-specific distribution of the distal variable and the latent class variable considering the logistic regression coefficients reflecting their association combined with the marginal distribution of the distal variable (Lanza et al., 2013).

# Results

The frequency of GD and the comorbidities (i.e., alcohol addiction, drug addiction, compulsive buying, and eating disorder) is displayed in Table 1. Most of the sample showed no risk of GD, and alcohol consumption risk was the most frequent comorbidity in the sample.

As a first step in the LCA, the model fit indexes of the models, the entropy, and model comparisons were computed. The models with 1, 2, and 3 latent classes were compared (see Table 3). The AIC, BIC, and aBIC showed that the 2-class model reduced model error, and LMRa and BLRT were significant, indicating that this model significantly increased model fit compared to the 1-class model. Although the entropy of the 3-class model was higher than that of the 2-class model, the 3-class model significantly reduced model fit based on LMRa and BLRT, whereas AIC, BIC, and aBIC indicated a worse model fit. Consequently, the 2-class model was established as the final model    Besides, the multigroup analysis was carried out to compare the class composition by sex (i.e., females vs. males). The results of this analysis indicated that the configural model in which the composition of the classes was fixed to be equal for males and females ($\chi^2[299] = 549.70$; AIC = 2134.76, BIC = 2215.84, aBIC = 2149, 22) the sex-variant model ($\chi^2[283] = 475.71$; AIC

= 2132.63, BIC = 2283.20; 2159.48) did not significantly differ on model fit ($\chi^2[16] = 2.40$, $p = .999$) so invariance was assumed between sex groups.

As the second step in the LCA, the characteristics of each class in the final 2-class model were explored (see Table 3). Class 1 differed of Class 2 on the degree of risk of gambling, alcohol and drug abuse and compulsive buying, but not the risk of eating disorder.  eIn Class 1 there was approximately a 40% of probability of risk of gambling while, in Class 2, there were no cases of risk of gambling

**Table 1**

*Frequencies of risk of addiction to gambling, alcohol, drugs, compulsive buying, and eating disorder*

|  | Frequencies | |
| --- | --- | --- |
| **Variable** | **n** | **%** |
| Addiction to gambling | | |
| No risk | 320 | 90.9 |
| Risk | 32 | 9.1 |
| Alcohol | | |
| No risk | 232 | 68.8 |
| Probable risk | 70 | 20.8 |
| Quite probable risk | 35 | 10.4 |
| Drugs | | |
| No risk | 298 | 88.7 |
| Probable risk | 24 | 7.1 |
| Quite probable risk | 14 | 4.2 |
| Compulsive buying | | |
| No risk | 284 | 84.1 |
| Probable risk | 39 | 11.5 |
| Quite probable risk | 15 | 4.4 |
| Eating Disorder | | |
| No risk | 261 | 79.3 |
| Probable risk | 49 | 14.9 |
| Quite probable risk | 19 | 5.8 |

*Note.* The sum of alcohol, drugs, compulsive buying, and eating disorder is not exact due to missing data.

**Table 2**

*Model fit indexes and comparisons*

| Model | AIC | BIC | aBIC | Entropy | LMRa | BLRT |
| --- | --- | --- | --- | --- | --- | --- |
| 1-Profile model | 1848.04 | 1882.81 | 1854.26 | NA | NA | NA |
| 2-Profile model | 1793.37 | 1866.78 | 1806.50 | .64 | 73.41*** | 74.66*** |
| 3-Profile model | 1794.60 | 1906.65 | 1814.65 | .76 | 18.45 | 18.76 |

*Note.* AIC = Akaike's Information Criterion; BIC = Bayesian Information Criterion; aBIC = sample-size-adjusted Bayesian Information Criterion; LMRa = Lo-Mendell-Rubin adjusted likelihood ratio test of K - 1 versus K profiles; BLRT = bootstrap likelihood ratio test of K - 1 versus K profiles; NA = Not applicable.
*** $p < .001$.

**Table 3**
*Final model estimates in probabilities*

| | | Class 1 High risk (n = 68, 19%) | Class 2 Low risk (n = 284, 81%) | Odds ratio comparison |
|---|---|---|---|---|
| Addiction to gambling | | | | |
| | No risk | .62*** | 1.00*** | NC |
| | Risk | .38*** | .00 | |
| Alcohol | | | | |
| | No risk | .37*** | .79*** | 6.37* |
| | Probable risk | .41*** | .14*** | 3.90 |
| | Quite probable risk | .22** | .07** | |
| Drugs | | | | |
| | No risk | .67*** | .96*** | 11.52 |
| | Probable risk | .16** | .04* | NC |
| | Quite probable risk | .17** | .00 | |
| Compulsive buying | | | | |
| | No risk | .61*** | .85*** | 3.49* |
| | Probable risk | .32*** | .10*** | 1.22 |
| | Quite probable risk | .07 | .05** | |
| Eating disorder | | | | |
| | No risk | .54*** | .93*** | 11.26 |
| | Probable risk | .29*** | .06** | 30.88 |
| | Quite probable risk | .17** | .01 | |

*Note.* NC = Comparison was not computed, as one of the categories had a frequency of zero in one of the latent classes.
* $p < .05$. ** $p < .01$. *** $p < .001$.

**Table 4**
*Differential relationship with psychological variables by class membership*

| Psychological variable | High-risk class | | Low-risk class | | Class comparisons | |
|---|---|---|---|---|---|---|
| | M | SE | M | SE | $\chi^2$ | p |
| Alexithymia | 53.07 | 1.96 | 46.69 | 1.06 | 7.27 | .007 |
| Stressful life events | 3.59 | 0.09 | 3.31 | 0.05 | 6.01 | .014 |

Probable and quite probable risk of addiction to alcohol and compulsive buying were more prevalent in Class 1 than in Class 2. Concretely, people of Class 1 had 63% odds of probable and quite probable risk of alcohol, while people of Class 2 had a 21% of probability of these levels of risk of alcohol abuse. Regarding compulsive buying, the odds of Class 1 of probable or quite probable compulsive buying were 39% against 15% of Class 2. Class 1 and Class 2 also significantly differed in the prevalence of quite probable risk and of drug abuse. While Class 1 had a 17% of probability of quite probable risk of drug abuse, the probability in Class 2 was zero. Based on these results, Class 1 was called "Higher risk of behavioural and substance addiction; High risk" and Class 2 was called "Lower risk of behavioural and substance addiction; Low risk".

Third, the relationship between the antecedents and class membership and between class membership and the psychological variables was explored. Regarding the antecedents, multinomial logistic regressions using the three-step procedure showed that age was not related to class membership ($\beta = -0.12$, SE = 0.06, $p = .059$, $d = -.10$). Class membership was predicted by sex because males were significantly more likely to belong to Class 1 than to Class 2 than females ($\beta = 2.39$, SE = 0.52, $p < .001$, $d = .24$).

Regarding the psychological variables, the multinomial logistic regressions showed that belonging to the High-risk class was significantly related to higher alexithymia ($\beta = -0.02$, SE = 0.01, $p = .021$, $d = .20$) and stressful life events events ($\beta = 0.92$, SE = 0.28, $p = .001$, $d = .19$) than belonging to the Low-risk class (see Table 4).

**Figure 1**
*Probabilities of each category by class. AD = Alimentary disorder*
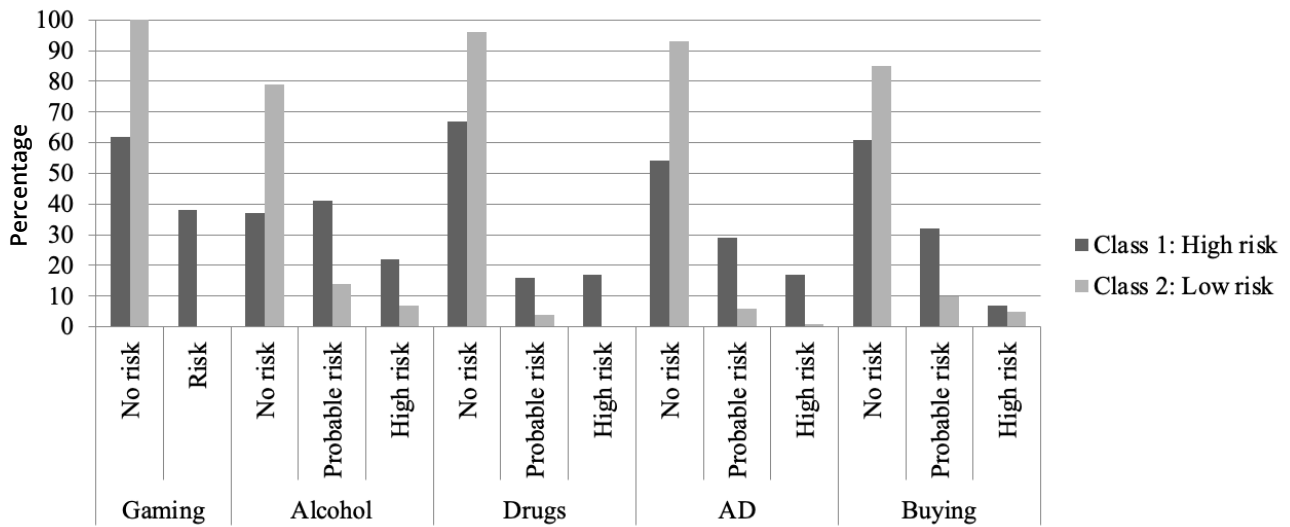


## Discussion

The present study aimed to examine the possible presence of problem- and non-problem gambling, as well as the frequency of drug use, compulsive buying, alcohol abuse, and eating disorders in a sample of young adults of the general population. According to the results, the great majority showed no risk of gambling. In contrast, alcohol consumption risk was the most frequent comorbidity in the sample. These results are in line with previous literature in the area, which points out that men are more likely to show the first gambling behaviours at earlier ages than women, who start gambling at a significantly older age (Lamas et al., 2018). This could largely explain why, in a predominantly female sample such as the one in this study, most of the participants do not present at-risk- or possible-problem gambling.

Based on the results of the study, we hypothesised that males and females would differ in terms of the developmental stages that predispose to a greater vulnerability for the initiation of gambling risk behaviours. It has been stated that people are more prone to developing gambling behaviours when coping with a major life change or circumstances involving significant grief in one's life stage (Wong et al., 2013). That is, men and women could see their personal and social identities compromised at different stages of life and may, therefore, be more susceptible to the development of a gambling problem at different ages. In this sense, women's gambling behaviour has been identified as a way of avoiding or coping with their emotional states, and it has been also observed that they tend to start gambling later in life (González-Ortega et al., 2013). By contrast, males appear to be more prone to early gambling behaviours, towards adolescence, with greater difficulties in impulse control, and a strong tendency towards financial gain, competitiveness, and sensation-seeking, as well as socialisation gambling motives (Ellenbogen et al., 2007). Young adult men, compared to young women, have also been shown to experience their unique social anxieties and pressures related to sexual competition, male rivalry, and heightened concerns about their social image, which, in turn, has been linked to the involvement in addictive behaviours in youths (Wong et al., 2013).

On the other hand, alcohol was the comorbidity with the highest prevalence and risk in this study for both problem gamblers (who were predominantly male) and non-problem gamblers (who were mostly women). advaAlcohol, is one of the substances most consumed by young women, which is easy to obtain and of legal consumption, making it more socially normalised behaviour among female youth population (National Institute on Drug Abuse [NIDA], 2021; Rodríguez et al., 2019). A recent study examining the impact of gender on substance abuse in young people, found that alcohol abuse was slightly higher among females than males, which was not the case for cannabis (Pérez de Albéniz-Garrote et al., 2021). Moreover, Jauregui et al. (2016) concluded that the sample of people with GD scored significantly higher in all study variables (i.e., anxious-depressive symptomatology, emotion dysregulation, and drugs) except for alcohol, which had similar rates among non-gamblers. Meanwhile, a recent study by Martinez-Loredo et al. (2019) explored latent classes as a function of gambling and substance use in adolescents, pointing out that female adolescents with gambling problems also reported some degree of alcohol use unlike the boys. However, we have not found studies exploring latent classes based exclusively on gambling risk considering young adult female population, which could constitute a different profile

of both adolescents and women with GD. In the second place, a profile model analysis was carried out, using as a clustering measure the scores obtained in gambling behaviour (i.e., presence or non-risk of problem gambling). The results have shown the existence of two groups. The first group, which we called the "High-risk" profile (Class 1), is made up of participants with possible gambling problems, higher comorbidity with other addictive behaviours (i.e., alcohol, eating disorder, compulsive buying, and drug abuse), as well as higher rates in alexithymia and stressful life events. In contrast, the second group, which we called the "Low-risk" profile (Class 2), is composed of participants without risk of gambling, drug abuse, or eating disorders, as well as significantly lower scores in stressful life events and, particularly, in alexithymia. In this second group, there were some cases of risk or possible alcohol abuse and compulsive buying, but they were fewer compared with the High-risk profile. When we introduced sex as a predictive variable of the latent class model, we observed that being male led to a higher probability of belonging to the High-risk profile (Class 1), whereas being female was more predictive of the Low-risk profile (Class 2). Age was not found to be a predictor of the profile model.

The results are in line with previous literature. For instance, Jiménez-Murcia et al. (2020), in a study of clustering of treatment-seeking patients, found that the most severe GD profiles showed a higher impact and number of stressful life events, as well as an earlier onset of gambling activity. In addition, Estévez et al. (2021) observed that the group of at-risk problem gamblers, compared to the group of non-problem gamblers, revealed higher scores of alexithymia, which has been also associated by other authors with greater severity and intensity of gambling behaviour (Maniaci et al., 2017). Concerning comorbidity, Kovács et al. (2020) proved that the comorbid presence of GD and alcohol use disorder expressed a more maladaptive personality profile than the exclusive presence of alcohol abuse. Moreover, Svensson and Sundqvist (2019) mentioned in their study certain risk factors that predict GD in students: being male, stressful life events, impulsivity, depression, drug abuse, and escape-avoidant coping (Elman et al., 2010; Sharman et al., 2019). Other studies have also shown the co-existence of gambling and sex addiction, overeating, or shopping (Etxandi et al., 2021). According to Griffiths (1994), cross-addiction (i.e., a concept that implies that if a person has developed an addictive disorder, that person is at a higher risk of developing another addiction) occurs both in adolescents and adults, and it is mostly a male condition, which the results of this study also reinforce. However, the findings of the present study are novel because, to the best of our knowledge, no studies have examined the comorbidity of problem gambling in relation to eating disorders, compulsive shopping and substance use in young boys.

The study also explored a second profile, which we called "Low-risk" profile (Class 2), with no risk of gambling or drug use, lower scores in stressful life events and, even lower scores in alexithymia, and predominantly composed of women. However, although at a slightly lower degree than in the "High-risk" profile (Class 1), we also found cases of possible shopping and alcohol addiction in this group. Indeed, these results are quite consistent with studies on addictive behaviours in young women, which reveal that compulsive buying is mostly a female pathology (Pérez de Albéniz-Garrote et al., 2021). Nevertheless, some studies have found a similar prevalence in both sexes (Roberts & Roberts, 2012). Further studies are therefore needed to clarify this issue. Moreover, Macía et al. (2023) through a study of latent classes based on risk for eating disorders and addictions in youths observed that young women with eating disorders had the highest scores on alexithymia and stressful life events compared to the other two groups: "men with addictions" and "healthy women". The findings of this study, in contrast, suggest that men with gambling problems have the highest comorbidity, alexithymia and stressful life events. Therefore, based on what has been mentioned in the previous literature, as well as in the results of this study, alexithymia and stressful life events are likely to constitute a transdiagnostic risk for the development and maintenance of impulsive risk behaviour for both sexes. However, we hypothesise that if we had taken shopping, eating disorders or alcohol as profile grouping variables rather than gambling, the female sex condition might have been a predictor of the "higher-risk" group (rather than the male sex, as in this study), an aspect we certainly suggest exploring for future lines.

## Limitations

The present paper is not without some limitations. Firstly, the cross-sectional design of the present study does not allow establishing causal interpretations and the direction of the effects, so longitudinal designs are needed in future research to achieve an in-depth understanding of the interaction between the variables. Moreover, the findings obtained in this study are based on sex differences, so it would be appropriate to carry out studies based on gender differences for a better understanding of the social conditions, consequences, and particular needs of women and men when dealing with addiction, and not only the biological differences between the sexes. Despite this, although the results are based on sex, we have attempted to disaggregate and discuss the results with a gender perspective  On the other hand, considering that the sample was obtained via online, there could be biases related to social desirability (especially high in young people), low effort or attention when answering and/or random responses. Lastly, latent class analyses have been conducted with a general and young sample, therefore, the results are neither generalisable to young people in treatment

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for severe problem gambling nor to older people. However, the subclinical sample of this study does allow us to observe vulnerability factors in youths, which may precede the development of more severe addictive behaviors in the future. This is particularly beneficial for preventive purposes.

## Conclusion

As a conclusion, these results may be of interest for developing prevention programs and policies in youth population. On the one hand, this study highlights that alcohol consumption is the most prevalent risk behaviour among young women and men, both for problem and non-problem gamblers. On the other hand, according to these results, young men are more prone to problem gambling and simultaneous co-morbid addictive behaviours, especially drug consumption, compared to young women. In contrast, young women are slightly less predisposed to addictive behaviours in general, but the results of this study suggest that there is also a risk of alcohol abuse and compulsive buying among women. This has important ramifications because it is not the addiction itself a pathology to which men are more naturally predisposed than women, but rather the more normalised, accessible, and less socially sanctioned an addictive behaviour is, the more likely might be to occur in women.

In this line, we propose that treatments should consider social stigmatisation, the difficulty of recognising the problem and the negative consequences for youth men and women when an addictive behaviour is considered masculine (e.g. gambling) or feminine (e.g. compulsive shopping). Finally, on the basis of the results of this study, we conclude that alexithymia and stressful life events in young people are associated with problem gambling behaviours. The onset of gambling in young people has been associated with an increased likelihood of developing GD in adulthood, as well as with greater severity of the disorder. Therefore, targeting and preventing predisposing risk factors in young age groups could be a protective factor for the future development of GD and its comorbid addictive behaviours (i.e., drugs, alcohol, compulsive shopping and/or eating disorders).

## Conflict of interests

All authors declare nor conflicts of interest neither financial interest.

## Ethics approval

The Institutional Review Board of the University of Deusto approved the study (ETK-17/20-21). This study was performed in line with the principles of the Declaration of Helsinki.

## Consent

Informed consent was obtained from all individual participants included in the study.

## Data

The datasets generated during and/or analysed during the current study are not publicly available due to confidentially reasons.

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