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Sex-comparative study of gambling disorder regarding alexithymia and symptoms of depression, anxiety and hostility

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ABSTRACT

Background and aims: Alexithymia and psychological symptomatology have been closely associated with gambling disorder (GD). However, sex differences remain underexplored. This study aims, firstly, to explore the differences between groups (GD and no-GD) and sexes (women vs. men) in alexithymia and psychological symptomatology (depression, anxiety and hostility). Secondly, the relationship between alexithymia and psychological symptomatology was analysed by gambling and sex groups. Thirdly, it examines the moderation role of sex and gambling in the relationship between alexithymia and each psychological symptom.
Method: The sample was composed of 80 people with GD diagnosis and 80 without GD (40 women and 40 men in each group).
Results: The results showed that alexithymia is positively related to depression, anxiety and hostility, with significantly higher scores in people with GD. Moderation analyses showed a threefold interaction, in which higher alexithymia was related to higher depression for men with GD but not for GD-women. However, in women with GD, depression levels are higher than in people without GD and tend to be more stable over time, despite the lack of effect of alexithymia.
Conclusions: These results provide evidence indicating that dysfunctional psychological symptomatology affects people with GD to a greater extent than people without GD, but also that the aetiology and effect of underlying vulnerability factors on gambling is different according to sex. The need of prevention and treatment programmes that consider different psychological aspects depending on sex is reinforced.

1. Introduction

The rise of dysfunctional gambling has led to a re-categorisation of Gambling Disorder (GD) as a behavioural addiction in the 5th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; [1]). GD is defined as a persistent and recurrent gambling behaviour that leads to clinically significant distress. GD prevalence is estimated between 0.12% and 5.8% [9], with higher rates in men than in women [4]. Paradoxically, some studies have found greater severity of GD in women than in men [20,41]. However, very few studies consider sex differences in addictions, so results remain limited and contradictory.

Alexithymia is one of the factors shown to be underlying GD [39]. Alexithymia is a personality construct that represents a disturbance in the affective and cognitive functions of emotion processing [51]. It is characterised by the difficulty in recognising, differentiating and describing feelings [36]. Within this theoretical context, the difficulty of people with high alexithymia to cognitively modulate their emotions could explain their attempts to self-regulate their emotional states through compulsive and impulsive acting out, highlighting addictive behaviours [52]. Previous studies suggest that people with GD show higher alexithymia levels than non-gamblers [12,15].

On the other hand, studies have indicated that people diagnosed with GD have higher psychopathological traits related to anxiety, depression or hostility, as well as more significant deficits in coping with frustration and anger when compared to people without addictive disorders [2,42]. Some authors have also found sex variations in the experience and

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expression of emotions both in community and in populations with addictive disorders [10]. The estimated lifetime prevalence of depressive symptoms is consistently reported to be higher in women than in men [14]. Furthermore, in GD-diagnosed samples, women are more likely than men to report a psychiatric diagnosis preceding GD [33]. Moreover, a study carried out by Jiménez-Murcia et al. [29], which explored the effect of sex in the clustering of patients with GD, found that women with severe gambling activity displayed higher levels of harm avoidance and stressful life events and more dysfunctional mood-related behaviours than men with moderate or severe GD.

Furhermore, studies generally agree that women and men display hostility differently [46]. Females report anger (the emotional component of hostility) more frequently, intensely and enduringly and tend to express anger through its inhibitory control [17,38]. There is evidence that internalising mechanisms (i.e., suppression, rumination, and over-control) contribute to predicting depressive symptoms in females. Women may turn anger into depression to better manage it [50]. On the contrary, men showed higher levels of aggression (i.e., the behavioural component of hostility) [54].

Alexithymia has also been associated with mental health disorders, such as depression or anxiety, frequently reported in people with GD [22]. In an attempt to conceptualize the relationship between addictive behaviours, psychological symptomatology and alexithymia, some authors have pointed out that the relationship between alexithymia and gambling risk is likely to be mediated by emotional distress [7,47]. Mood symptoms have been hypothesised to be a precipitating risk factor for GD [5]. In this regard, it has been posited that an alteration in awareness and expression of emotions could act as both predictive and maintenance factor of GD [42]. Hence, alexithymia may explain gambling behaviour as an external dysfunctional regulator of emotional states that become overwhelming to the psyche [44]. Other complementary explanations could be that psychological symptomatology develops as a consequence of GD implications [32]. To our knowledge, however, there is a lack of knowledge on whether the relationship between GD and psychological symptomatology is bidirectional, or whether it depends on different profiles of gamblers. It is also conceivable that vulnerability factors may interrelate differently according to sex.

In sum, the literature provides abundant evidence about the links between alexithymia, mood symptoms and GD. However, there are no studies that interrelate these variables, but rather analyse these phenomena in a segmented way. Moreover, there is a paucity of knowledge about sex differences in the interrelationship between alexithymia and psychological syomtomatology in GD population particularly. Most studies, including social and health care recommendations, are carried out exclusively with male samples. Clinical characteristics of women suffering from GD are still underexplored.

1.1. Objectives

Based on the above, this paper pursues three objectives using a sample of female and male adults with and without GD. First, it explores the differences between groups (GD group vs. no-GD group) and the sexes (women vs. men) in sociodemographic variables, symptoms of depression, anxiety and hostility, and alexithymia. Second, it analyses the relationship between alexithymia and symptoms of depression, anxiety and hostility by gambling and sex groups. Third, it examines the moderation role of sex and gambling in the relationship between alexithymia and each psychological symptom (i.e., depression, anxiety and hostility).

1.2. Hypotheses

We hypothesised that alexithymia will predict symptoms of depression, anxiety and hostility in a different way depending on sex and the presence or absence of GD. More specifically, we hypothesise that alexithymia will not play such an important role in the case of females suffering from GD.

2. Method

2.1. Participants and procedure

Clinical participants with GD diagnosis were recruited through GD treatment associations belonging to FEJAR (Spanish Federation of Rehabilitated Gamblers). More specifically, they were out-patients diagnosed with GD receiving gambling treatment in rehabilitation centres.

The non-clinical sample (i.e., without GD) was recruited from the general population using non-probabilistic sampling. The questionnaire was diffused on social networks (e.g., WhatsApp, Instagram, e-mail, Facebook, Linkedln, university bulletin boards, journals for the diffusion of divulgative scientific articles, and websites with divulgation purposes, such as the official college of psychologists). The inclusion criterion in the non-clinical sample was not having GD, indicated by no risk in the South Oaks Gambling Screen (SOGS; [34]). Based on the SOGS criterion, 32 people were excluded from the non-clinical sample. According to this tool, scores between 2 and 3 indicate gambling risk, scores of 4 or more indicate potential gambler, while scores between 0 and 1 indicate no gambling risk. Therefore, to belong to this group (non-GD group), all participants had to score between 0 or 1 point, otherwise, they were excluded from the general sample (see instruments section for more information).

The final sample comprised 160 people, of whom 80 had clinical diagnosis of GD, and 80 had neither risk of GD nor GD. Fifty per cent of the participants of each group were women, and 50% were men (i.e., 40 women and 40 men in each group). The mean age of the participants was 36.47 years ($SD = 15.26$), with an age range of 16 to 72. Half of the sample was working, and about one-fifth was studying. The most predominant educational level was university studies (38.1%), followed by vocational studies (28.1%), high school (14.4%) and primary studies (12.5%). Most of the sample were single (37.5%) or married (26.9%).

The clinical sample with GD and the non-GD sample differed significantly in the frequency of gambling addiction ($\chi^2[1] = 152.19$, $p < .001$) based on the SOGS [34]. Participants with GD showed a higher frequency of risk of problematic gambling (97.5%) than participants without GD (0%).

The non-GD sample completed the survey via an online link to the questionnaire or a QR code that accessed the questionnaire. The GD clinical sample completed the questionnaires both online and offline (pen and paper). According to Herrero-Fernández [25], the method of application of the questionnaires (pencil and paper vs online) does not affect the results obtained.

The questionnaire included general information about the main goals of the study. It was compulsory to read the study information and provide informed consent to access the questionnaire. We ensured participants of their responses' confidentiality and anonymity and their voluntary participation. No compensation was provided for participation in this study.

2.2. Ethics

The research obtained the ethics committee's approval from the first author's university (ref: ETK-17/20–21). This study was performed in line with the principles of the Declaration of Helsinki.

2.3. Instruments

2.3.1. Sociodemographic data

Sex, age, employment, educational level, civil status, and consumption of anxiolytics or similar drugs.

2.3.2. Gambling

The South Oaks Gambling Screen (SOGS; [34], adapted to Spanish by [13]). The SOGS is a screening tool to detect GD in clinical populations. The scale contains 20 items related to gambling behaviours, sources of money to gamble or pay debts, and emotions involved. Items are rated on a dichotomous scale (Yes/No). Scores above 4 suggest the highly likely presence of GD. Regarding its reliability, the SOGS has optimum internal consistency, with a Cronbach *alpha* of 0.94. In this study, the SOGS was a screening tool to exclude people in the general population who might be at risk of GD or present GD.

2.3.3. Alexithymia

Toronto Alexithymia Scale-20 (TAS-20; [53], adapted to Spanish by [40]). This scale measures alexithymia through 20 items. The TAS-20 comprises three main factors: (1) Difficulty Identifying Feelings, which refers to difficulties in identifying emotions, often confusing them with physical symptoms; (2) Difficulty Describing Feelings, whereby individuals have significant difficulties in communicating their feelings and using emotional vocabulary.; (3) Externally-Oriented Thinking refers to a cognitive style oriented toward concrete and external details. All items are rated on a 6-point Likert response format ranging from 0 ("*Strongly disagree*") to 5 (" *Strongly agree*"). Internal consistency is very good for the overall scale ($\alpha = 0.83$ for the original and 0.81 for the Spanish adaptation). Cronbach's *alpha* was 0.86 in this study.

2.3.4. Psychological symptomatology: depression, anxiety, and hostility

Symptom Checklist-90-Revised (SCL-90-R; [11], adapted to Spanish by [19]). The SCL-90-R is a self-administered questionnaire that assesses 90 symptoms classified into nine psychopathology symptoms and three global distress indices. In this study, three psychological symptoms were used: (1) Depression, composed of 13 items that tap signs and symptoms characteristic of depressive disorder (e.g., despondency, anhedonia, self-destructive thoughts, etc.); (2) Anxiety, composed of 10 items that refer to clinical manifestations of both acute and generalised anxiety, as well as signs of emotional stress or psychosomatic manifestations; and (3) Hostility, composed of 6 items that refer to thoughts, feelings and behaviours concerning aggression, rage, resentment or anger. The severity of suffering caused by each symptom is rated on a 5-point Likert scale ranging from 0 (*no symptom-related distress*) to 4 (*maximum distress*). Internal consistency is very good for the overall scale (higher than 0.70 for all subscales). In the current study, Cronbach's *alpha* was 0.94 for the Depression and Anxiety subscales and 0.90 for the dimension of Hostility.

2.4. Statistical analyses

We used a cross-sectional research design. Analyses were developed with SPSS 27.0 [26]. First, we explored the continuous variables' descriptive statistics, correlations, and normality. Following Cain [8] indications, we assumed normality when the skewness and kurtosis levels were between −2 and + 2. We examined dysfunctional psychological symptomatology risk through the number of people with a value over the 90th percentile in depression, anxiety or hostility.

Second, we tested the differences in the sociodemographic and psychological variables by gambling group (i.e., GD group and no-GD goup) and sex (i.e., women and men). We performed chi-square tests for dependent categorical variables and applied Student's *t*-test for independent samples in the case of continuous dependent variables. Regarding symptoms of depression, anxiety and hostility, two different types of analyses were developed. First, the differences in the symptomatology levels (i.e., anxiety, depression and hostility) as continuous variables were examined. Second, the differences in the psychological symptomatology risk (i.e., high risk vs. low risk of anxiety, depression and hostility) as categorical variable were explored.

Third, we examined whether the relationship between alexithymia and the psychological symptomatology levels (i.e., depression, anxiety and hostility) depended on the gambling and sex groups. For this purpose, we tested three moderation regression models, one per each dependent variable (i.e., anxiety, depression and hostility), with the model 3 template of macro PROCESS [23]. In all models, alexithymia was the independent variable, and sex and gambling were included as moderators. Due to the differences between the GD and no-GD groups in the sociodemographic variables (i.e., age, employment, educational level, civil status, and consumption of anxiolytics or similar drugs), all of them were included as covariates to control for their confounding effects. Thus, we included dummy variables in the categories with at least 5 participants per group. All continuous variables were mean-centered before creating the moderations, and the dichotomous variables were coded as dummy variables (Sex: 0 = women, 1 = men; Gambling: no-GD = 0; GD group = 1). We explored the simple slopes of the significant moderations at both levels of each of the dichotomous moderators.

3. Results

3.1. Frequencies, descriptive statistics and correlations in the global sample

The descriptive statistics and correlations of the psychological study variables are shown in Table 1. The skewness and kurtosis levels of all these variables were between +2 and − 2, so normality was assumed [8]. Correlations showed that alexithymia was significantly associated with all three psychological symptoms such that higher levels of alexithymia were related to higher levels of depression, anxiety and hostility. Regarding psychological symptomatology risk, about half of the sample had high risk of depression, anxiety, or hostility (see Table 2).

3.2. Differences in sociodemographic variables by gambling group and sex

As displayed in Table 2, the GD group differed significantly in all the demographic variables compared to the no-GD group. For example, the GD group was significantly older and included significantly more employed, unemployed or retired participants than the no-GD group. In contrast, the latter group had mainly students or participants studying and working.

Regarding educational level, the GD group contained mainly people with primary studies or vocational training, whereas the no-GD group was primordially composed of participants with university studies or high school.

There was a similar percentage of single people in both groups but a higher percentage of divorced or married people in the GD group. Concerning the consumption of anxiolytics, sleeping pills or similar drugs, the group comparisons showed that the GD consumed significantly more of these drugs daily, while the no-GD group more frequently reported never having taken these drugs.

Regarding sex differences, women and men differed in their educational levels, as men were more likely than women to have primary studies (see Table 3). There were no other differences in the demographic variables.

3.3. Differences in alexithymia and symptoms of depression, anxiety and hostility by gambling group and sex

The GD group showed significantly higher levels of psychological symptomatology in all indicators (i.e., anxiety, depression and hostility) (see Table 4). Likewise, GD group was five times more likely to have risk of depression, six and a half times more likely to have symptoms of anxiety, and eight times more likely to have hostility symptoms (see Table 6). According to the effect sizes, the most significant differences were in depression levels.

Concerning sex differences in alexithymia and symptoms of depression, anxiety and hostility (see Table 5), men showed higher levels of all indicators, but women and men only differed significantly in their levels

Table 1
Descriptive statistics and correlations of the psychological variables and age.

	Descriptive statistics				Correlations			
Continuous variable	*M*	*SD*	*Sk*	*Kr*	1	2	3	4
1. Age	36.47	15.26	0.46	−1.08				
2. Alexithymia	51.65	17.68	0.17	−1.00	0.09			
3. Depression	1.69	1.04	0.67	−0.05	0.17*	0.63***		
4. Anxiety	1.49	1.11	0.85	0.27	0.05	0.61***	0.77***	
5. Hostility	1.19	0.98	0.98	0.45	0.12	0.53***	0.69***	0.72***

Note. High risk = percentile >90; *Sk* = Skewness; Kr = Kurtosis.
* $p < .05$. *** $p < .001$.

Table 2
Frequencies of sociodemographic variables and comparison between the GD and no-GD groups.

	Total sample		No-GD group		GD group		Comparisons of groups	
Variable	*n*	%	*n*	%	*n*	%	χ^2	η
Employment							55.97***	0.58
Employed	80	50	30_a	37.5	50_b	62.5		
Unemployed	13	8.1	3_a	3.8	10_b	12.5		
Student	34	21.2	29_a	36.2	5_b	6.2		
Retired	11	6.9	1_a	1.2	10_b	12.5		
Student and employed	17	10.6	17_a	21.2	0_b	0.9		
Not working/studying	1	0.6	0_a	0.0	1_a	1.2		
Other	4	2.5	0_a	0.0	4_b	5.0		
Educational level							55.31***	0.58
No studies	5	3.1	0_a	0.0	5_b	6.2		
Primary studies	20	12.5	1_a	1.2	19_b	23.8		
Obligatory studies	5	3.1	0_a	0.0	5_b	6.2		
High school	23	14.4	17_a	21.2	6_b	7.5		
Vocational training	45	28.1	15_a	18.8	30_b	37.5		
University studies	61	38.1	47_a	58.8	14_b	17.5		
Other	1	0.6	0_a	0.0	1_a	1.2		
Civil status							46.35***	0.53
Single	60	37.5	32_a	40.0	28_a	35.0		
Married	43	26.9	12_a	15.0	31_b	28.8		
Civil partner	8	5	2_a	2.5	6_a	7.5		
Divorced	14	8.8	3_a	3.8	11_b	13.8		
Widowed	3	1.9	0_a	0.0	3_a	3.8		
Other	32	20	31_a	38.8	1_b	1.2		
Anxiolytic, sleeping pill or sedative consumption							18.15**	0.33
Never	78	48.8	49_a	61.3	29_b	36.2		
Sometime in my lifetime	40	25.0	21_a	26.2	19_a	23.8		
In the last 12 months	12	7.5	3_a	3.8	9_a	11.2		
In the last 30 days	7	4.4	3_a	3.8	4_a	5.0		
Daily in the last 30 days	23	14.4	4_a	5.0	19_b	23.8		

Note. Subindexes "a" and "b" indicate significantly different column proportions between the groups.
** $p < .01$. * $p < .001$.

of hostility, with men presenting higher levels than women.

These results differ to those regarding risk of psychological symptomatology (i.e., depression, anxiety and hostility) as a function of gambling and sexAlthough men with GD also showed higher risk of anxiety, depression and hostility, the differences were only significant rearding anxiety and depression risk. Concretely, men with GD were four times more likely than women with GD to have symptoms of anxiety and depression, but we observed no significant differences in hostility symptoms (see Table 6).

3.4. Relationship of alexithymia and symptoms of depression, anxiety and hostility as a function of gambling and sex groups

As the last step, we examined whether the relationship between alexithymia and symptoms of depression, anxiety and hostility differed as a function of the gambling group (GD vs. no-GD) and sex (women vs. men).

The results displayed in Table 7 show that, in the depression model, the triple interaction between alexithymia, sex and gambling group was significant. Concretely, the simple slopes (see Fig. 1) showed that higher alexithymia was related to higher symptoms of depression both for men ($\beta = 0.02$, $SE = 0.006$, $t = 3.56$, $p < .001$) and women ($\beta = 0.02$, $SE = 0.008$, $t = 3.01$, $p = .003$) from the no-GD group, and that this relationship was even stronger for men from the GD group ($\beta = 0.03$, $SE = 0.006$, $t = 5.89$, $p < .001$). Nevertheless, although women in the GD group scored higher in depression than women or men in the no-GD group, alexithymia was not related to depression in women with GD ($\beta < 0.01$, $SE = 0.007$, $t = 0.95$, $p = .340$). This model explained 62.7% of the variance of depression.

The effect of alexithymia on anxiety and hostility was significantly moderated by the gambling group, but not by sex (Table 7). In both cases (see Fig. 2), the simple slopes showed that alexithymia was a significant predictor of anxiety ($\beta = 0.03$, $SE = 0.007$, $t = 4.27$, $p < .001$) and hostility ($\beta = 0.02$, $SE = 0.006$, $t = 3.14$, $p = .002$) for the no-GD participants, whereas alexithymia was not related to either of these psycological symptoms for the GD group (anxiety: $\beta < 0.01$, $SE = 0.008$, $t = 0.52$, $p = .601$; hostility: $\beta > -0.01$, $SE = 0.007$, $t = -0.21$, $p = .834$). These models explained 63.3% of the variance of anxiety and 59% of the variance of hostility.

Table 3
Frequencies of sociodemographic variables by sex.

	Total sample		Men		Women		Comparisons of groups	
Variable	*n*	%	*n*	%	*n*	%	χ^2	η
Employment							9.16	0.23
Employed	80	50	34_a	42.5	46_a	57.5		
Unemployed	13	8.1	9_a	11.2	4_a	5.0		
Student	34	21.2	21_a	26.2	13_a	16.2		
Retired	11	6.9	6_a	7.5	5_a	6.2		
Student and employed	17	10.6	6_a	7.5	11_a	13.0		
Not working/studying	1	0.6	1_a	1.2	0_a	0.0		
Other	4	2.5	3_a	3.8	1_a	1.2		
Educational level							14.54*	0.30
No studies	5	3.1	1_a	1.2	4_a	5.0		
Primary studies	20	12.5	16_a	20.0	4_b	5.0		
Obligatory studies	5	3.1	2_a	2.5	3_a	3.8		
High school	23	14.4	15_a	18.8	8_a	10.0		
Vocational training	45	28.1	18_a	22.5	27_a	33.8		
University studies	61	38.1	28_a	35.0	33_a	41.2		
Other	1	0.6	0_a	0.0	1_a	1.2		
Civil status							7.04	0.21
Single	60	37.5	30_a	37.5	30_a	37.5		
Married	43	26.9	20_a	25.0	23_a	28.7		
Civil partner	8	5	1_a	1.2	7_b	8.8		
Divorced	14	8.8	7_a	8.8	7_a	8.8		
Widowed	3	1.9	2_a	2.5	1_a	1.2		
Other	32	20	20_a	25.0	12_b	15.0		
Anxiolytic, sleeping pill or sedative consumption							3.80	0.13
Never	78	48.8	33_a	41.2	45_a	56.2		
Sometime in my lifetime	40	25.0	22_a	27.5	18_a	22.5		
In the last 12 months	12	7.5	7_a	8.8	5_a	6.2		
In the last 30 days	7	4.4	4_a	5.0	3_a	3.8		
Daily in the last 30 days	23	14.4	14_a	17.5	9_a	11.2		

Note. Subindexes "a" and "b" indicate significantly different column proportions between groups.
** $p < .01$. * $p < .001$.

Table 4
Descriptive statistics of age, alexithymia and psychological symptomatology, and comparison between the GD and no-GD groups.

	Total sample		GD group		No-GD group		Comparisons of groups	
Continuous variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*t*	*d*
Age	36.47	15.26	44.24	13.35	28.70	12.98	−7.46***	1.18
Alexithymia	51.65	17.68	58.49	17.96	45.58	15.12	−4.74***	0.77
Depression	1.69	1.04	2.32	0.98	1.11	0.71	−8.59***	1.41
Anxiety	1.49	1.11	2.06	1.05	0.97	0.90	−6.88***	1.11
Hostility	1.19	0.98	1.72	0.88	0.72	0.82	−7.19***	1.17

*** $p < .001$.

Table 5
Differences in age, alexithymia and psychological symptomatology as a function of sex.

	Men		Women		Comparisons of groups	
Continuous variable	*M*	*SD*	*M*	*SD*	*t*	*d*
Age	36.10	14.07	36.84	16.45	−0.30	0.04
Alexithymia	51.47	17.47	51.84	18.01	−0.12	0.02
Depression	1.71	1.09	1.67	0.99	0.23	0.03
Anxiety	1.53	1.15	1.45	1.08	0.43	0.07
Hostility	1.37	1.10	1.00	0.81	−2.29*	0.38

* $p < .05$.

4. Discussion

The present study examined the differences between women and men with and without GD in alexithymia and psychological symptomatology (i.e., depression, anxiety and hostility). The results show that alexithymia was positively associated with depression, anxiety and hostility. In this study, people with GD obtained higher scores in alexithymia and had grater psychological symptomatology than people without GD. They scored higher in depression, anxiety and hostility, with depressive symptoms showing the most significant differences between the two groups. These results are in line with previous literature on the area. According to a systematic review by Marchetti et al. [39], alexithymic features are significantly more prevalent both in general and clinical samples with problematic gambling behaviours. Likewise, alexithymia was also related to gambling severity and interacted with psychiatric factors. In this sense, Lumley et al. [37] suggested that the impact of alexithymia on emotional processing may affect mental and somatic health through behavioural actions as an important way to regulate affective states.

Sex differences were analysed for all psychological study variables (i.e., alexithymia, depression, anxiety and hostility) regardless of GD. Results showed that men only differed from women in hostility levels. Regarding sex differences in the GD group, men showed higher anxiety and depression risk levels than women, but no significant differences in risk were observed in hostility. However, women (both with and without GD) presented a lower standard deviation in all psychological symptomatology scores (i.e., anxiety, depression and hostility) than men, although men had higher scores. That is, women showed a smaller difference from each other in all psychological symptoms regardless of

Table 6
Psychological symptomatology as a function of gambling group and sex.

	Depression						Anxiety						Hostility					
	Low risk		High risk		OR	χ^2	Low risk		High risk		OR	χ^2	Low risk		High risk		OR	χ^2
	n	(%)	n	(%)			n	(%)	n	(%)			n	(%)	n	(%)		
Total sample	79	(49.4)	81	(50.6)			73	(45.6)	87	(54.4)			95	(59.4)	65	(40.6)		
Gambling group					5.13	24.02***					6.66	30.86***					8.29	35.47***
Gambling addiction	24	(30.0)	56	(70.0)			19	(23.8)	61	(76.2)			29	(36.2)	51	(63.7)		
No gambling addiction	55	(68.8)	25	(31.2)			54	(67.5)	26	(32.5)			66	(82.5)	14	(17.5)		
Sex					1.92	4.22*					1.93	4.25*					1.77	3.13
Men	33	(41.2)	47	(58.8)			30	(37.5)	50	(62.5)			42	(52.5)	38	(47.5)		
Women	46	(57.5)	34	(42.5)			43	(53.8)	37	(46.2)			53	(66.2)	27	(33.8)		

Note. High risk = percentile >90; OR = Odds ratio.
* $p < .05$; *** $p < .001$.

addiction. These results may indicate that women tend to be more stable in their levels of psychological symptomatology. Several studies have argued that women suffer from a higher lifetime prevalence of mood- and anxiety-related disorders [31,49]. This issue is relevant for health because it suggests that women may be more vulnerable to worse mental health over time. They could be at a higher risk of developing other pathologies, given the high association of psychological symptomatology with the predisposition to other psychological and somatic illnesses [27].

Lastly, we examined the relationship between alexithymia and psychological symptomatology (depression, anxiety and hostility) as a function of the gambling group (GD group vs. no-GD group) and sex (women vs. men). To this end, three interaction models were created to explore the moderating role of sex and gambling in the relationship between alexithymia and each psycholigacal symptom (i.e., depression, anxiety and hostility). The results showed two main patterns of interaction.

The first model, called the 'depression model', presented a threefold interaction. Concretely, the results showed that higher alexithymia was related to higher depression for women and men in the no-GD group, but this relationship was stronger for men with GD. In the case of women with GD, they showed higher levels of depression than women and men without GD, but alexithymia did not seem to affect their depression levels. One possible explanation for these results could be supported by previous studies that have noted that the relationship between alexithymia and depression could depend on the gambling type [7]. Whereas alexithymia is related to strategic gamblers, depression seems to be related to non-strategic gamblers [6,47]. In this line, the evidence indicated that men show a greater tendency toward strategic games (e.g., sports betting), whereas women are more likely to engage in non-strategic games (e.g., bingo) [28]. Our results show that alexithymia is related to depression in male gamblers, whereas alexithymia does not predict depression in female gamblers. However, more research is needed to explore whether there are sex differences in the relationship between gambling type, alexithymia and psychological symptomatology. Moreover, longitudinal studies are required to determine whether men's alexithymia is a primary personality trait that can foster depression or a secondary response to a primary depressive state to cope with painful affect. In the case of women with GD, it has been observed that they undergo more stressful life events than men [21,28]. Therefore, one alternative hypothesis could be that, for women suffering from GD, stressful life events rather than alexithymia are more likely to be the strongest predictor of the depression model. However, in future research it would be interesting to clarify the factors that might be preceding depression in female gamblers.

In the second interaction model, we observed the effect of alexithymia on anxiety and hostility. The relationship between alexithymia and anxiety and hostility was significantly moderated by the gambling group but not by sex. Moreover, results showed that alexithymia was a significant predictor of anxiety and hostility for non-GD participants but not for GD participants. In published research, results are still ambiguous. On the one hand, numerous studies have found positive associations between alexithymia and anxious symptomatology and aggressiveness [16,30]. However, the results do not contradict previous findings. Our results align with authors who have observed a significant contribution of anger in predicting GD independently, even when controlling for the effect of alexithymia [38]. Some authors have even argued that high levels of social support or a secure attachment style may inhibit the relationship between alexithymia and aggression [3,24]. On the other hand, Garofalo et al. [18] postulated that the relationship between alexithymia and aggression is mediated by emotional dysregulation. Moreover, the general sample of the present article is significantly younger than the clinical sample. There is evidence that alexithymia is generally more prevalent among young people and adolescents [45,48], which would partially justify our results. Finally, when interpreting the results, it should be noted that the sample was collected

Table 7
Moderation regression models of the effect of alexithymia on depression, anxiety and hostility as a function of sex and gambling group.

	Dependent variable								
	Depression			Anxiety			Hostility		
Independent variable	β	SE	95% CI	β	SE	95% CI	β	SE	95% CI
Alexithymia	0.02***	< 0.01	[0.01, 0.03]	0.03***	< 0.01	[0.01, 0.04]	0.02**	< 0.01	[< 0.01, 0.03]
Sex	−0.15	0.17	[−0.49, 0.18]	−0.04	0.18	[−0.39, 0.31]	0.18	0.16	[−0.14, 0.52]
Gambling group	0.72**	0.21	[0.29, 1.14]	0.67**	0.22	[0.22, 1.12]	0.56**	0.21	[0.14, 0.97]
Alex*S	< 0.01	0.01	[−0.01, 0.02]	< 0.01	0.01	[−0.01, 0.02]	0.01	0.01	[> − 0.01, 0.03]
Alex*GG	−0.01	< 0.01	[−0.03, < 0.01]	−0.02***	0.01	[−0.04, > − 0.01]	−0.02**	< 0.01	[−0.04, > − 0.01]
S*GG	0.34	0.25	[−0.16, 0.85]	0.38	0.27	[−0.15, 0.92]	0.49	0.25	[−3.82, 0.99]
Alex*S*GG	0.03*	0.01	[<0.01, 0.05]	0.01	0.01	[−0.01, 0.04]	< 0.01	0.01	[−0.01, 0.03]

Note. Alex = Alexithymia; S = Sex; GG = Gambling group.

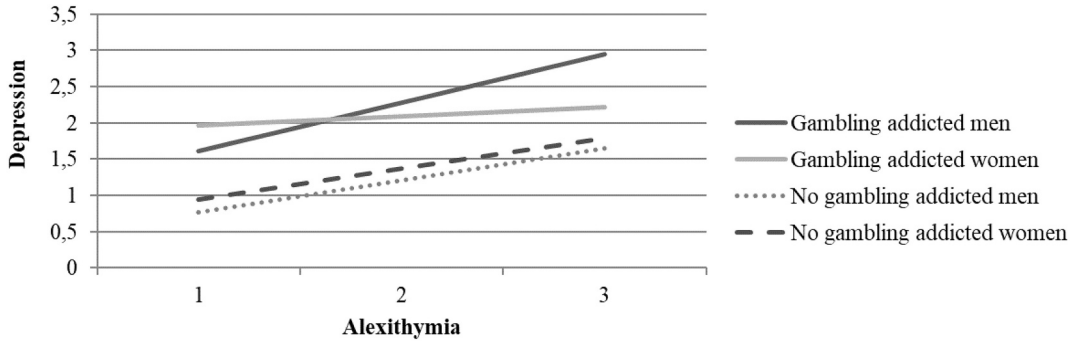

Fig. 1. Effect of alexithymia on depression as a function of sex and addiction to gambling (GD).

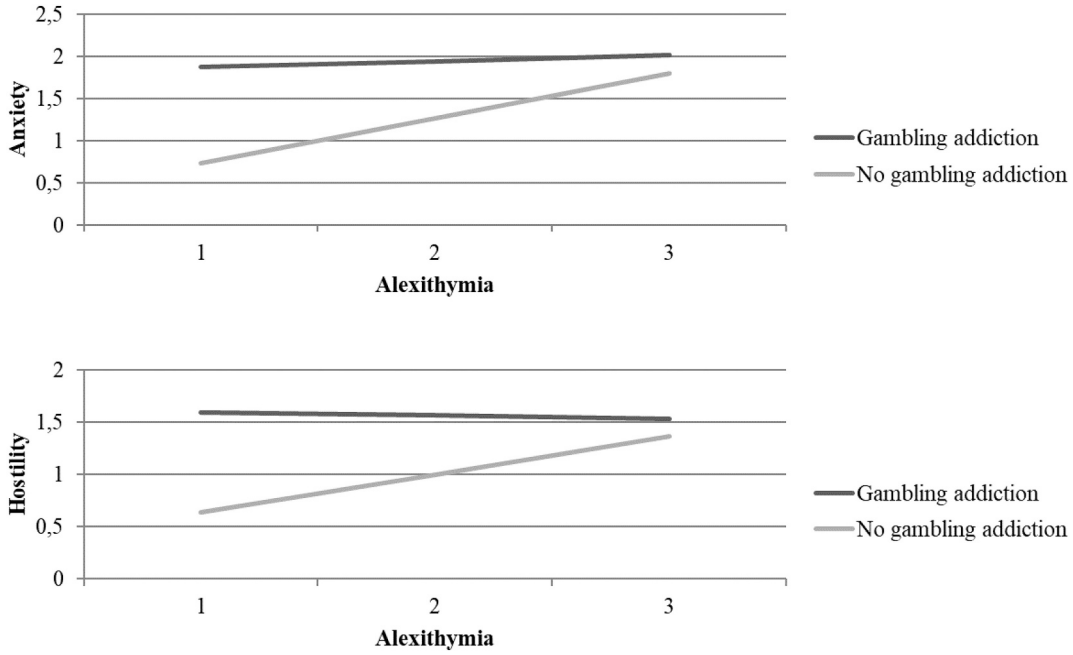

Fig. 2. Effect of alexithymia on anxiety and hostility as a function of the group with gambling addiction (GD group).

during a pandemic period, which may have affected the mental health of the general population, increasing levels of anxiety, anger, hopelessness or frustration, especially in younger people [43].

4.1. Limitations

A series of limitations in this study must be acknowledged. Firstly, the study's cross-sectional design does not support the establishment of causal relationships. We recommend that future lines of research use longitudinal methodologies to control the interaction of the target variables over time. This would allow us to deepen our understanding of the directionality of the relationship between alexithymia and dysfunctional psychological symptomatology in GD patients. On the other hand, the findings obtained in this study are based on sex differences, so it would be appropriate to carry out studies based on gender differences. There is literature highlighting the need to consider gender issues when subgrouping problem gamblers [35]. Nevertheless, we sought to interpret the results and previous literature considering socialisation processes

and the gender perspective. Concerning the clinical sample, we note these people are undergoing treatment in GD associations for rehabilitation. Therefore, their profile might differ from other clinical samples (e.g., untreated persons, public hospitals, private therapy centres). Regarding the community sample, two limitations must be acknowledged. On the one hand, the community sample is younger than the clinical sample. Consequently, there could be age-related psychological issues (e.g., generally increased alexithymia at younger ages). On the other hand, the sample was collected during a pandemic period. Therefore, psychological symptomatology may be higher than usual for this group. Finally, it would be advisable to increase the clinical sample in future research in order to be able to conclude more meaningful generalisations.

5. Conclusion

In sum, the results of this study showed that the psychological and emotional vulnerability factors underlying GD are different for women and men. Whereas we observed that alexithymic traits predict depressive symptomatology in men with GD, alexithymia did not play a major role in women's depression. Consequently, in the light of the results of this study, treatment and prevention programmes should consider different psychological aspects depending on sex. However, in future lines, studies that include gender issues are needed to provide a deeper understanding of the impact of GD on women's health.

5.1. Clinical recommendations

Based on the above, we provide some clinical recommendations that could benefit health and social care settings. In the case of men with GD, we propose psychological techniques and tools that promote symbolisation and facilitate a symbolic emotional language, enhancing emotional representation and expression. For example, body-centred psychotherapy techniques could help men differentiate feelings from bodily sensations. However, in women, we propose enhancing the emotional processing of potentially traumatic events or everyday events that are difficult to manage.

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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.

Declaration of Competing Interest

All authors declare nor conflicts of interest neither financial interest.

Data availability

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

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