



Do emotion regulation and impulsivity differ according to gambling preferences in clinical samples of gamblers?

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ABSTRACT

Background and aims: Emotion regulation (ER) and impulsivity impairments have been reported in patients with gambling disorder (GD). However, both constructs have not been studied in depth jointly in clinical samples. Therefore, the aim of this study was to analyze ER and impulsive tendencies/traits in a sample of $n = 321$ treatment-seeking individuals with GD by differentiating them according to their gambling preference ($n = 100$ strategic; $n = 221$ non-strategic).

Methods: Our sample was assessed through the DERS (ER), the UPPS-P (impulsivity), and the DSM-5 (GD severity).

Results: The non-strategic group included a higher proportion of women and reported greater ER impairments, and more impulsive traits/tendencies compared to strategic gamblers. GD severity was associated with all DERS subscale (except for awareness) and with urgency dimensions of the UPPS-P.

Discussion and conclusions: Our findings confirm that strategic and non-strategic gamblers differ in their ER processes and impulsive tendencies, showing the first clinical group a more adaptive profile. These results suggest the relevance of assessing these ER and impulsivity in order to tailor better treatment approaches.

1. Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition, Gambling disorder (GD) is the only behavioral addiction (DSM-5; American Psychiatric Association, 2013). It is characterized by recurrent gambling behaviors that persist over time despite their negative consequences and lead to social impairments (American Psychiatric Association, 2013). It has been described as a heterogeneous condition resulting in different gambler profiles. A widely used approach for the classification of gamblers is based on gambling preferences. Gambling activities have been classified into two modalities:

strategic and non-strategic gambling. In strategic gambling (e.g. poker, blackjack, sports betting, stock market investment, and animal racing), gamblers have to use their individual skills and knowledge about the game (Moragas et al., 2015; Odlaug, Marsh, Kim, & Grant, 2011). Non-strategic gambling, also named chance or passive gambling (e.g. lotteries, slot machines, and bingo) (Barrault, Mathieu, Brunault, & Varescon, 2019; Navas et al., 2017), is characterized by a lack of influence on the outcome (Grant, Odlaug, Chamberlain, & Schreiber, 2012; Odlaug et al., 2011). GD has been associated with multiple clinical factors, including emotion regulation (ER) difficulties (Mestre-Bach, Fernández-Aranda, Jiménez-Murcia, & Potenza, 2020) and impulsive

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tendencies/traits (Mallorquí-Bagué et al., 2019; Nower & Blaszczynski, 2006).

Emotion regulation (ER) is defined as the process by which individuals try to influence the experience and expression of their emotions (Gross, 1998). Emotion regulation skills are associated with good school performance and good social relationships in children and adolescents (Rawana, Flett, McPhie, Nguyen, & Norwood, 2014) and with greater well-being in adults (Hu et al., 2014). On the other hand, impaired ER is related to the development and maintenance of several mental disorders (Sheppes, Suri, & Gross, 2015), including GD (Elmas, Cesur, & Oral, 2017; Velotti, Rogier, Beomonte Zobel, & Billieux, 2021; Williams, Grisham, Erskine, & Cassidy, 2012). More specifically, previous studies found high levels of experiential avoidance of emotions in GD populations (Riley, 2014), as well as impaired abilities identifying (Rogier & Velotti, 2018) and accepting emotions (Jauregui, Estévez, & Urbiola, 2016). It has also been found that suppression, described as the attempt to eliminate emotional thoughts and expressions (Gross, 1998), was affected in these individuals (Navas et al., 2017; Rogier, Beomonte Zobel, & Velotti, 2020). A recent systematic review upholds that suppression, understood as a maladaptive strategy, is more commonly used in strategic gamblers in comparison to mixed gamblers (who use both strategic and non-strategic modalities) (Marchica, Mills, Derevensky, & Montreuil, 2019). Moreover, alexithymia, defined as difficulties in identifying and describing feelings (Preece et al., 2020) has been related to strategic gambling (Bonnaire et al., 2017). Previous studies reported that some individuals with GD may use gambling as a way to regulate or escape from unpleasant emotions (Rogier & Velotti, 2018; Wood & Griffiths, 2007). In this sense, higher ER deficits have been associated with a higher GD severity (Elmas et al., 2017; Mestre-Bach et al., 2021; Rogier & Velotti, 2018; Williams et al., 2012).

Impulsive tendencies/traits have also been described as a hallmark of GD (Aragay et al., 2018; Canale, Vieno, Bowden-Jones, & Billieux, 2017; Savvidou et al., 2017). In general terms, impulsive tendencies/traits allow quick decisions to be made in situations that require it and tend to be more accentuated in the young population and in the male gender (Chamorro et al., 2012). The UPPS-P theoretical model proposes five dimensions of impulsivity: lack of premeditation (the tendency to act without considering the consequences of behavior), lack of perseverance (the disposition to fail to maintain focus on difficult or boring tasks), positive and negative urgency (the tendency to perform impulsive behaviors when experiencing highly pleasant or unpleasant emotions, respectively), and sensation seeking (the disposition to engage in exciting and new experiences) (Whiteside, Lynam, Miller, & Reynolds, 2005). Among them, it has been observed that especially the urgency levels are associated with GD severity (Billieux et al., 2012; Grall-Bronnec et al., 2012; Yan, Zhang, Lan, Li, & Sui, 2016). Urgency has also been associated with affective and executive mechanisms, both relevant factors in GD (Amlung, Vedelago, Acker, Balodis, & MacKillop, 2017; Lannoy et al., 2014; Wilbertz et al., 2014). Therefore, it has been suggested that urgency and high lack of perseverance are the dimensions that best distinguish individuals with GD from controls (Billieux et al., 2012; Michalczyk, Bowden-Jones, Verdejo-Garcia, & Clark, 2011). Finally, the dimension of lack of premeditation may be associated with poor decision making processes, another typical clinical feature of GD (Mallorquí-Bagué et al., 2016; Navas, Verdejo-García, López-Gómez, Maldonado, & Perales, 2016).

Although both ER and impulsivity have been proposed as two independent constructs associated with GD, there is a possible link between them (Navas et al., 2017). In fact, it is well known that emotion facilitates action and, consequently, experiencing intense emotions may be associated with the tendency to focus on immediate situations (Cyders & Smith, 2008). On this basis, some authors have defined the dimensions of positive and negative urgency as “emotional impulsivity” (Whiteside et al., 2005). That is, in the face of intense emotions, individuals with GD would present a greater tendency to act impulsively. However, although an association between ER and impulsivity has been

suggested, it has not been studied in depth in GD. In other disorders, such as alcohol use disorder, it has been observed that high levels of impulsivity and difficulties in ER were factors derived from the disorder and predicted relapse rates in individuals with this pathology (Jakubczyk et al., 2018). In other studies, negative urgency and ER difficulties have been found to be predictors of problematic behaviors (Hasking & Claes, 2020). It is essential, therefore, to delve deeper into how the two transdiagnostic factors work together.

To address this limitation, the purpose of this study was two-fold. Our first aim was to examine whether ER and impulsive tendencies/traits varied between strategic and non-strategic treatment-seeking adults with GD. Our second aim was to explore the association between ER, impulsive tendencies/traits, and GD severity. Based on previous studies (Mallorquí-Bagué et al., 2019; Sancho et al., 2019), we hypothesized that strategic and non-strategic gamblers will present similar ER skills, whereas higher impulsive traits will be reported by those patients with a preference for strategic gambling. In addition, we consider that especially positive and negative urgency will be linked to the different facets of ER.

2. Methods

2.1. Participants and procedure

The sample included $n = 321$ consecutive treatment-seeking adults with a GD diagnosis recruited from the Behavioral Addictions Unit within the Department of Psychiatry of Bellvitge University Hospital (Barcelona) between March 2016 and February 2021. This public hospital is certified as a tertiary care center (high specialization) for the treatment of psychological addictive behaviors and oversees the treatment of very complex cases. The catchment area of the hospital includes over two million people in the south of the metropolitan area of Barcelona.

Diagnoses were determined by psychologists and psychiatrists with >20 years of clinical experience in both the assessment and treatment of GD. Only patients who sought treatment for GD as their primary mental health concern were included in our sample.

Two different groups were made according to gambling preferences: strategic vs. non-strategic. Those patients who gambled more than one typology were classified based on the main gambling problem, i.e., that gambling activity that caused them the most distress and in which they spent the greatest amount of time. Inclusion criteria were: (1) being older than 18 years old; (2) both genders; and (3) having GD as their primary health concern. Exclusion criteria were: (1) having a history of brain injury or neurological disease; and (2) reporting an organic medical illness or neurodegenerative condition.

2.2. Measures

2.2.1. South Oaks gambling screen (SOGS; Lesieur & Blume, 1987)

This is a self-reported screening questionnaire structured in 20 items. It discriminates between non-problem, probable pathological, and problem gamblers. In this work, the Spanish validation (Echeburúa, Báez, Fernández-Montalvo, & Páez, 1994) was used which showed excellent internal consistency ($\alpha = 0.94$) and test-retest reliability ($r = 0.98$). In the present sample, internal consistency was adequate ($\alpha = 0.78$).

2.2.2. DSM-5 criteria (American Psychiatric Association, 2013)

Patients were diagnosed with GD if they met four or more criteria for this disorder according to the DSM-5 (American Psychiatric Association, 2013). The internal consistency in this study was good ($\alpha = 0.812$).

2.2.3. Difficulties in emotion regulation scale (DERS; Gratz & Roemer, 2004)

This self-report questionnaire includes 36 items divided into six

subscales that measure emotional dysregulation: (1) lack of emotional awareness (difficulties attending to emotional states), (2) lack of emotional clarity (impairments related to recognizing emotional experiences), (3) non-acceptance of emotional responses (the tendency to experience negative secondary emotional responses), (4) difficulties engaging in goal-directed behavior (difficulties accomplishing tasks in the presence of intense emotional states) (5) limited access to ER strategies (this dimension reflects the belief that there is little that can be done to effectively regulate emotions when experiencing upset) and (6) impulse control difficulties (meaning an impairment in remaining in control of one's behavior under negative emotional states). This work used the Spanish version of the questionnaire (Hervás & Jódar, 2008; Wolz et al., 2015). The internal consistency of our sample ranged from $\alpha = 0.76$ to $\alpha = 0.93$.

2.2.4. Impulsive behavior scale (UPPS-P; Whiteside et al., 2005)

The UPPS-P is a 59-item self-report questionnaire developed for assessing five impulsive traits: (1) lack of perseverance, (2) lack of premeditation, (3) sensation seeking, (4) negative urgency, and (5) positive urgency. The Spanish adaptation of this instrument, which was used in the present study, showed adequate psychometric properties (Verdejo-García, Lozano, Moya, Alcázar, & Pérez-García, 2010). In our sample, internal consistency ranged from adequate ($\alpha = 0.75$ for lack of perseverance) to excellent ($\alpha = 0.92$ or the negative urgency subscale).

2.2.5. Other clinical and Sociodemographic variables

A semi-structured face-to-face clinical interview was used in the present study to analyze additional data such as age, gender, education level, civil status, employment status, and social status. This last variable was defined with Hollingshead's algorithm, which provides a global measurement based on the patients' education level, the profession and the employment status (Hollingshead, 2011). Other gambling-related variables [the age of onset of the GD and the duration of this disorder, as well as the main gambling activity (strategic versus non-strategic)] were also analyzed in this work.

2.3. Statistical analysis

The statistical analysis was performed with Stata17 for Windows (Stata-Corp., 2021). First, the comparison between the groups defined by the gambling preference was done with chi-square tests (χ^2) for categorical variables and T-TEST for quantitative measures. The comparison between the groups for the ER and the impulsive tendencies/traits scores was adjusted by the covariates' age, gender and social position, through analysis of covariance (ANCOVA). All these comparisons included Cohen's-*h* and Cohen's-*d* coefficients for estimating the effect size of the proportion differences and the mean differences (null effect size was considered for values $|h| < 0.20$ or $|d| < 0.20$, low-poor for $|h| > 0.20$ or $|d| > 0.20$, moderate-medium for $|h| > 0.50$ or $|d| > 0.50$, and large-high for $|h| > 0.80$ or $|d| > 0.80$) (Cohen, 1988). In addition, the Finner's-method (a family-wise error rate stepwise procedure which has proved more powerful results than the classical Bonferroni correction) was used to control Type-I error due to the application of multiple statistical comparisons (Finner & Roters, 2001).

Second, the partial correlation matrix for ER (DERS scores) and impulsive tendencies/traits (UPPS-P scores) was obtained (correlations estimates were adjusted by gender, age, and social position). Due to the strong association between the result of the significance test for the correlation coefficient and the sample size, the next cut-off points were considered for interpreting the effect size: null for $|R| < 0.10$, low-poor for $|R| > 0.10$, moderate-medium for $|R| > 0.24$ and large-high for $|R| > 0.30$ (these values correspond to Cohen's-*d* equal to 0.20, 0.50 and 0.80) (Kelley & Preacher, 2012).

Finally, regression models were obtained to assess the specific contribution of each ER dimension (DERS scores) and each impulsivity dimension (UPPS-P scores) on the GD severity (defined as the number of

DSM-5 criteria and SOGS-total). Two estimation methods were employed: enter procedure and stepwise procedure.

2.4. Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The University Hospital Clinical Research Ethics Committee approved the study. All subjects were informed about the study and all provided informed consent.

3. Results

3.1. Characteristics of the sample

The first block of Table 1 contains the descriptive for the complete sample. Most participants were male (90.0%), achieved primary (48.0%) or secondary education levels (41.1%), were single (49.2%) or married (41.1%), were employed (63.2%) and pertained to social indexes mean-low to low (79.1%). The mean age was 40.0 years ($SD = 13.8$), the average age of onset of gambling problems was 28.8 years ($SD = 12.1$) and the average duration of the gambling problems was 5.6 years ($SD = 5.8$).

The second block of Table 1 contains the comparison for the variables based on the gambling preference (non-strategic versus strategic). Non-strategic gambling was associated with female gender, lower education levels, higher likelihood of being single, higher probability of being unemployed, and lower education levels. Non-strategic gambling was also characterized by older age, later onset of the gambling problems, and longer duration of the gambling problems. No differences between the groups were obtained for the GD severity (number of DSM-5 criteria and SOGS total).

3.2. Association between gambling preferences and ER and impulsive tendencies/traits

Table 2 contains the results of the ANCOVA (adjusted by age, gender, and social position), comparing the DERS and the UPPS-P scores between the groups defined by the gambling preference. Non-strategic gambling was associated with higher impairments in ER in all the domains assessed using the DERS (except in the difficulties in engaging in goal-directed behavior/goals subscale), as well as higher levels in the impulsivity domains positive urgency, negative urgency, and total.

Fig. 1 contains the radar chart displaying the standardized z-scores in the DERS and the UPPS-P registered in each group. Fig. 2 contains the graph-lines with the prevalence of participants within the clinical range for each gambling preference (Table S1, supplementary material). It includes the statistical comparison for the proportions of the graphs.

3.3. Correlations between ER, impulsive tendencies/traits and GD severity

Table 3 displays the matrix with the partial correlations (adjusted by age, gender, and social position) between the DERS scores, the UPPS-P scores, the number of DSM-5 criteria for GD and the SOGS total score. The results of this table have been obtained separately for the non-strategic preference group (correlation coefficients displayed in the upper-diagonal part) and the strategic preference group (correlations in the lower-diagonal part). As a whole, high correlations were obtained for the variables contained in each questionnaire, with the following exceptions: a) DERS-awareness did not achieve correlation with other measures of ER; b) the UPPS-P sensation seeking did not correlate with the UPPS-P lack of premeditation and lack of perseverance (within non-strategic group, the positive and negative urgency subscales did not converge with lack of premeditation and sensation seeking).

For patients with a non-strategic gambling preference, the following associations were observed: a) high correlations between the DERS subscales *lack of emotional awareness* and *lack of emotional clarity* with

Table 1
Descriptive for the sample.

Sociodemographics	Total n = 321		Non-strategic n = 221		Strategic n = 100		p	h
	n	%	n	%	n	%		
Gender Female	32	10.0%	31	14.0%	1	1.0%	0.001*	0.57†
Male	289	90.0%	190	86.0%	99	99.0%		
Education Primary	154	48.0%	120	54.3%	34	34.0%	0.001*	0.41
Secondary	132	41.1%	85	38.5%	47	47.0%		0.17
University	35	10.9%	16	7.2%	19	19.0%		0.36
Civil status Single	158	49.2%	98	44.3%	60	60.0%	0.010*	0.31
Married	132	41.1%	96	43.4%	36	36.0%		0.15
Divorced	31	9.7%	27	12.2%	4	4.0%		0.31
Employment Unemployed	118	36.8%	91	41.2%	27	27.0%	0.015*	0.30
Employed	203	63.2%	130	58.8%	73	73.0%		
SocialMean/high - high	30	9.3%	15	6.8%	15	15.0%	0.002*	0.27
Mean	37	11.5%	25	11.3%	12	12.0%		0.02
Mean-low	124	38.6%	77	34.8%	47	47.0%		0.25
Low	130	40.5%	104	47.1%	26	26.0%		0.44
Age, onset, duration	Mean	SD	Mean	SD	Mean	SD	p	d
Age (yrs-old)	40.04	13.79	44.20	13.58	30.84	8.95	0.001*	1.16†
Onset of GD (yrs-old)	28.83	12.10	30.56	13.33	24.99	7.52	0.001*	0.51†
Duration of GD (yrs)	5.61	5.79	6.55	6.34	3.55	3.59	0.001*	0.58†
GD severity	Mean	SD	Mean	SD	Mean	SD	p	d
DSM-5 criteria	7.10	1.83	7.10	1.95	7.09	1.56	0.996	0.12
SOGS total score	10.93	3.21	10.77	3.11	11.28	3.42	0.192	0.29

Note. SD: standard deviation. *Bold: significant comparison. †Bold: effect size within the ranges moderate to large.

Table 2
Comparison between the groups: analysis of covariance (adjusted by age, sex and social position).

	Non-strategic n = 221		Strategic n = 100		p	d
	Mean	SD	Mean	SD		
<i>Emotional (dys) regulation (DERS scales)</i>						
Non-acceptance of emotional responses	16.84	6.92	14.17	6.42	0.004*	0.40
Difficulties engaging goal directed behaviors	14.05	4.86	13.37	4.82	0.294	0.14
Impulse control difficulties	14.34	6.04	11.40	4.69	0.001*	0.55†
Lack of emotional awareness	17.43	5.29	15.88	3.87	0.022*	0.33
Limited access to emotion regulation	19.60	7.84	17.01	6.60	0.010*	0.36
Lack of emotional clarity	12.55	4.56	10.71	4.16	0.002*	0.42
Total score	94.81	25.95	82.54	22.95	0.001*	0.50†
<i>Impulsivity (UPPS-P scales)</i>						
Lack of premeditation	25.01	6.28	25.05	5.49	0.967	0.01
Lack of perseverance	22.53	5.79	21.49	5.41	0.179	0.19
Sensation seeking	27.32	8.50	27.12	7.52	0.848	0.03
Positive urgency	33.12	10.32	28.26	8.72	0.001*	0.51†
Negative urgency	33.57	7.44	30.69	6.90	0.004*	0.40
Total score	141.56	24.51	132.60	23.94	0.006*	0.37

Note. SD: standard deviation. *Bold: significant comparison. †Bold: effect size within the ranges moderate to large.

the UPPS-P subscale *lack of premeditation*; b) high correlations between the DERS scores with the trait impulsivity domains included in the UPPS-P *lack of perseverance subscale* (except for the DERS scales *non-acceptance of emotional responses* and *lack of emotional awareness*); c) high correlations between all the ER subscales with the impulsivity levels registered in *positive urgency*, *negative urgency* and *total scale* (with the exception of the DERS subscale *lack of emotional awareness*); d) high correlations between all the DERS subscales with the GD severity measures; and e) high correlations between the impulsivity subscales *positive urgency*, *negative urgency* and *total scale* with the GD severity measures.

Within the strategic group, the next associations were also found: a) the UPPS-P *positive urgency* and *negative urgency* subscales correlated with all the DERS subscales, except with the *lack of emotional awareness*; b) the UPPS-P *sensation seeking* only correlated with the DERS *limited access to emotion regulation*; c) the UPPS-P *lack of premeditation* correlated with the DERS *difficulties engaging goal-directed behaviors*, the *impulse control difficulties*, the *lack of emotional clarity* and the *total score*; and d) the UPPS-P *lack of perseverance* was related to the DERS *difficulties engaging goal-directed behaviors*, the *limited access to emotion regulation*, the *lack of emotional clarity* and the *total score*.

Table S2 (estimate-methods material) displays the correlation matrix within the total sample (partial correlations adjusted by age, gender and social position).

3.4. Regression models between ER, impulsive tendencies/traits and GD severity

Table S3 (supplementary material) displays the results of the multiple regressions assessing the specific contribution of the ER and the impulsivity dimensions on the GD severity (ENTER method). Within the non-strategic preference subsample, the number of DSM-5 criteria was significantly related to the higher scores in the DERS *difficulties engaging goal-directed behaviors*, the DERS *lack of emotional awareness* and the UPPS-P *negative urgency*, while the SOGS total score was significantly related to the DERS *lack of emotional awareness* and the UPPS-P *negative urgency*. Within the strategic preference subsample, the number of DSM-5 criteria was significantly associated with the UPPS-P *positive urgency* and *negative urgency*, while no significant contributors were observed for the SOGS-total score.

Table 4 contains the results of the regressions obtained with the stepwise method, which automatically selected the variables with significant contribution to GD severity. The same predictors were retained in the final model obtained within the non-strategic group for the criterion number of DSM-5 criteria for GD (DERS *difficulties engaging goal-directed behaviors*, the DERS *lack of emotional awareness* and the UPPS-P *negative urgency*). For the criterion SOGS-total score, the DERS *impulse control difficulties* was selected also with the DERS *lack of emotional awareness* and the UPPS-P *negative urgency*. Within the strategic preference subsample, the following significant contributors were selected: a) for the criterion number of DSM-5 criteria for GD, the contributors were the UPPS-P *positive urgency* and *negative urgency*, as well as the DERS non-

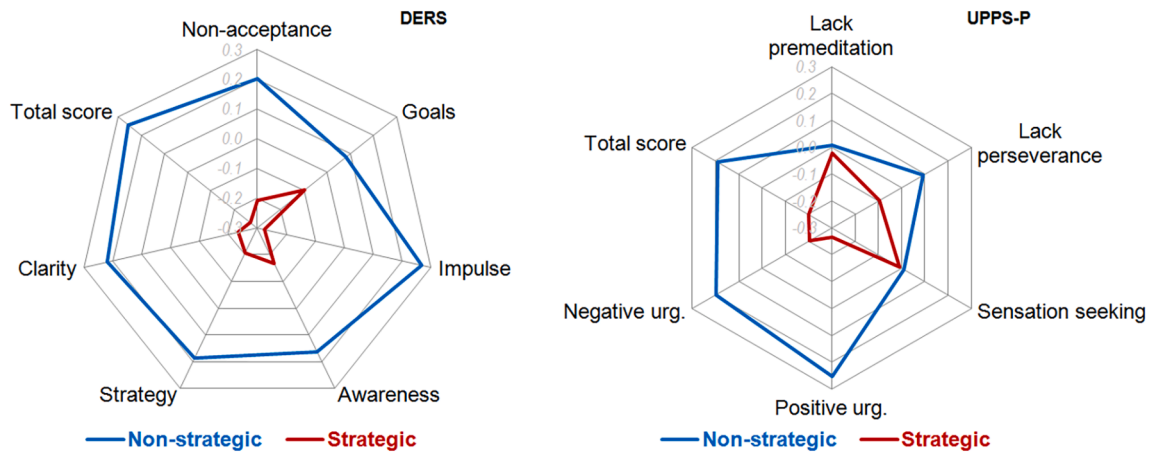


Fig. 1. Radar charts.

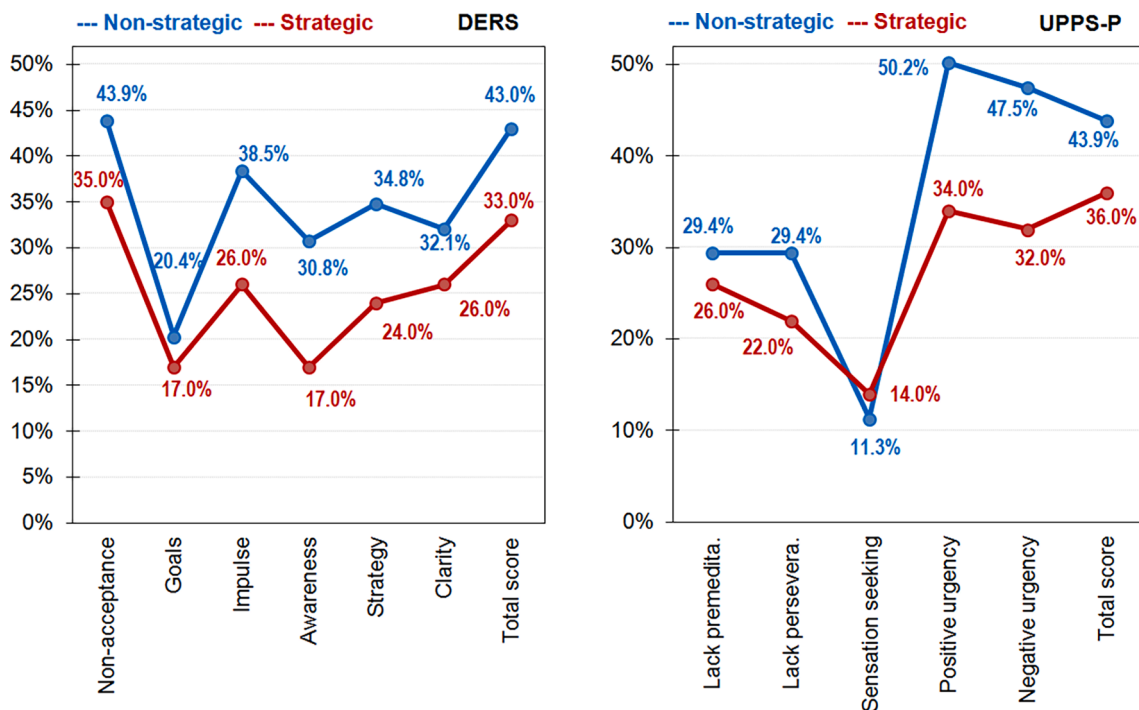


Fig. 2. Prevalence of participants within the clinical range.

acceptance of emotional responses; and b) for the criterion SOGS total, the selected contributors were the UPPS-P positive urgency and the DERS non-acceptance of emotional responses.

4. Discussion

The present study aimed to compare ER and impulsive tendencies/traits between strategic and non-strategic gambling patients. It also pretended to analyze the relationship between these two variables.

Sociodemographic data indicated a higher education level as well as a greater rate of employment and social status in strategic gamblers compared to non-strategic ones. Furthermore, in the present study, strategic gamblers were the youngest group, which also explains the higher number of singles and lower frequency of married and divorced compared to non-strategic gamblers. These findings are consistent with earlier studies describing the profile of the strategic gambler as young and with a high level of education (Jiménez-Murcia, Granero, Fernández-Aranda, & Menchón, 2020; Moragas et al., 2015; Stevens & Young,

2010). Regarding GD severity, as in previous studies (Odlaug et al., 2011), we did not find significant differences between strategic and non-strategic groups.

Non-strategic gambling was more prevalent in women and, contrary to our hypotheses, it was associated with higher impairments in ER, as well as with higher levels of positive and negative urgency. This finding supports the proposal to distinguish between so-called action-seekers and so-called over-stimulated gamblers (Blaszczynski & Nower, 2002). In this case, our results would support the latter group, formed by individuals with a greater emotional vulnerability. This vulnerability may make them experience dysphoric emotional states more frequently, which they may try to reduce or avoid by using the gambling behavior (Blaszczynski & Nower, 2002). This is also in line with the results of the present study stating that negative urgency contributes to the severity of GD in non-strategic gamblers. In fact, other authors have highlighted the relationship between negative urgency and GD severity (Michalczuk et al., 2011; Rogier et al., 2020), and in samples composed of non-strategic gamblers only as well (Haw, 2017). Furthermore, the greater

Table 3
Partial correlation matrix (adjusted by age, sex and social position).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. DERS Non-accept.	—	0.594 [†]	0.601 [†]	-0.223	0.745 [†]	0.474 [†]	0.783 [†]	0.004	0.221	0.023	0.384 [†]	0.397 [†]	0.353 [†]	0.338 [†]	0.195
2. DERS Goals	0.683 [†]	—	0.704 [†]	-0.106	0.775 [†]	0.573 [†]	0.823 [†]	0.133	0.424 [†]	0.058	0.367 [†]	0.439 [†]	0.454 [†]	0.417 [†]	0.271 [†]
3. DERS Impulse	0.581 [†]	0.597 [†]	—	-0.073	0.789 [†]	0.564 [†]	0.847 [†]	0.101	0.358 [†]	0.156	0.464 [†]	0.503 [†]	0.524 [†]	0.296 [†]	0.289 [†]
4. DERS Awareness	-0.064	-0.098	0.019	—	-0.153	0.321 [†]	0.122	0.354 [†]	0.227	0.041	0.081	0.090	0.224	0.147	0.141
5. DERS Strategy	0.807 [†]	0.768 [†]	0.616 [†]	-0.107	—	0.611 [†]	0.906 [†]	0.097	0.361 [†]	0.005	0.422 [†]	0.459 [†]	0.441 [†]	0.384 [†]	0.276 [†]
6. DERS Clarity	0.493 [†]	0.590 [†]	0.482 [†]	0.328 [†]	0.498 [†]	—	0.794 [†]	0.247 [†]	0.373 [†]	0.129	0.419 [†]	0.392 [†]	0.503 [†]	0.277 [†]	0.188
7. DERS Total score	0.861 [†]	0.842 [†]	0.769 [†]	0.166	0.880 [†]	0.746 [†]	—	0.195	0.444 [†]	0.086	0.497 [†]	0.532 [†]	0.569 [†]	0.433 [†]	0.316 [†]
8. UPPS-P Premedit.	0.170	0.307 [†]	0.293 [†]	0.214	0.205	0.379 [†]	0.339 [†]	—	0.582 [†]	-0.043	0.154	0.146	0.500 [†]	0.046	0.027
9. UPPS-P Persevera.	0.181	0.416 [†]	0.192	0.157	0.264 [†]	0.531 [†]	0.378 [†]	0.496 [†]	—	-0.124	0.246 [†]	0.340 [†]	0.567 [†]	0.227	0.189
10. UPPS-P Sensation	0.169	0.200	0.223	-0.045	0.266 [†]	0.158	0.234	-0.010	-0.070	—	0.234	0.092	0.423 [†]	-0.012	0.008
11. UPPS-P Positive	0.463 [†]	0.432 [†]	0.533 [†]	0.043	0.468 [†]	0.501 [†]	0.567 [†]	0.332 [†]	0.356 [†]	0.439 [†]	—	0.665 [†]	0.820 [†]	0.349 [†]	0.267 [†]
12. UPPS-P Negative	0.397 [†]	0.455 [†]	0.479 [†]	0.035	0.427 [†]	0.516 [†]	0.531 [†]	0.433 [†]	0.488 [†]	0.266 [†]	0.729 [†]	—	0.752 [†]	0.416 [†]	0.431 [†]
13. UPPS-P Total score	0.418 [†]	0.518 [†]	0.515 [†]	0.097	0.485 [†]	0.590 [†]	0.599 [†]	0.587 [†]	0.592 [†]	0.529 [†]	0.872 [†]	0.851 [†]	—	0.344 [†]	0.306 [†]
14. DSM-5 total criteria	0.488 [†]	0.385 [†]	0.359 [†]	0.017	0.480 [†]	0.384 [†]	0.505 [†]	0.155	0.266 [†]	0.316 [†]	0.657 [†]	0.652 [†]	0.625 [†]	—	0.611 [†]
15. SOGS total score	0.375 [†]	0.354 [†]	0.283 [†]	0.112	0.340 [†]	0.318 [†]	0.415 [†]	0.180	0.282 [†]	0.214	0.464 [†]	0.461 [†]	0.476 [†]	0.600 [†]	—

Note. †Bold: effect size within the ranges moderate to large.

Upper diagonal-part: results obtained within the non-strategic subsample (n = 221).

Lower diagonal-part: results obtained within the strategic subsample (n = 100).

presence of women in this group is consistent with previous studies, which observed that women have a greater tendency to use gambling as a maladaptive coping strategy to deal with anxiety, boredom, or feelings of loneliness and social isolation, primarily (Holdsworth, Hing, & Breen, 2012; McCormack, Shorter, & Griffiths, 2014; Toneatto & Wang, 2009). When analyzing gambling modalities according to gender, previous studies had already observed a greater preference of women for non-strategic games (chance-based games such as lotteries, electronic gambling machines, or bingo), compared to men, who would prefer skill-based games (Castrén et al., 2013; Svensson & Romild, 2014). Finally, the fact that urgency dimensions are specifically those that stand out in the non-strategic group with greater ER impairments may confirm the emotional component of both dimensions of impulsivity, as suggested by other authors (Whiteside et al., 2005) and hypothesized in this study. It should be noted, however, that Barrault et al. (2019) observed that strategic gamblers showed higher use of suppression, a non-adaptive regulatory strategy, in comparison to mixed gamblers. These differences between studies may be due to the fact that different instruments have been used to measure ER difficulties in each of the researches. Whereas Barrault et al. (2019) just evaluated suppression and reappraisal strategies, we used the DERS scores which are not focused on specific strategies but on several ER deficits.

Our data also indicated that between one third and one half of the patients evaluated are within the clinical range regarding emotional dysregulation. This finding dovetails with several studies that demonstrate an impaired ER in patients with GD (Elmas et al., 2017; Navas et al., 2017; Rogier et al., 2020; Toneatto, Lecce, & Bagby, 2009; Wood & Griffiths, 2007). Besides, high correlations between almost all the DERS subscales and GD severity were found in both strategic and non-strategic groups, highlighting the relation between ER impairments and GD severity, also observed in previous studies (Mestre-Bach et al., 2019).

Finally, significant correlations between GD severity and positive and negative urgency were observed. On the one hand, in the case of negative urgency, this study was partially in line with previous findings. For example, Quintero, Navas, and Perales (2020) observed that negative urgency predicted higher craving scores which, in turn, were predictive of greater severity of GD symptomatology. These authors concluded, as previously stated by Navas, Billieux, Verdejo-García, and Perales (2019), that negative urgency, although it does not seem to play an essential role in the etiology of GD, complicates the symptomatology of the disorder since it enhances its externalizing component. In this line, other authors have suggested that negative urgency is essential especially in escape-oriented gambling modalities, such as electronic gambling machines (Lutri et al., 2018). On the other hand, the present study observed that positive urgency contributes to greater severity of the disorder in the group of strategic gamblers. Previous literature had already reported the association between positive urgency and severity of the disorder (Kim, Poole, Hodgins, McGrath, & Dobson, 2019; Savvidou et al., 2017). Furthermore, an association between positive urgency and one of the essential components of GD, gambling-related cognitions, has been identified in previous studies (Ruiz de Lara, Navas, Perales, & Rodda, 2019). This link, however, was not evident in the case of negative urgency. Consequently, the authors suggested that although both positive and negative urgency contribute significantly to the symptomatology of GD and, therefore, to the severity of the disorder, both dimensions of impulsivity are theoretically different and would influence different gambling pathways.

4.1. Clinical implications

The results obtained in the present study confirm the need to jointly assess ER difficulties and impulsivity levels in clinical contexts. Knowing the presence or absence of these factors in each patient, as well as the specific interaction between them, would allow us to understand in greater depth and address these possible factors that maintain gambling

Table 4

Regression models assessing the specific contribution of the emotion dysregulation (DERS) and the impulsivity (UPPS-P) on the GD severity (adjusted by age, sex and social position).

Subsample	Criterion		<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>p</i>	<i>95%CI (B)</i>	
Non-strategic (<i>n</i> = 221)	# DSM-5 crit.	DERS Goal directed behavior	0.127	0.027	0.316	<0.001	0.074	0.179
		UPPS-P Negative urgency	0.067	0.017	0.255	<0.001	0.032	0.101
		DERS Emotional awareness	0.059	0.022	0.162	0.007	0.016	0.103
Non-strategic (<i>n</i> = 221)	SOGS total	UPPS-P Negative urgency	0.134	0.029	0.320	<0.001	0.076	0.192
		DERS Impulse control diff.	0.101	0.036	0.197	0.006	0.030	0.173
		DERS Emotional awareness	0.074	0.035	0.127	0.037	0.004	0.144
Strategic (<i>n</i> = 100)	# DSM-5 crit.	UPPS-P Positive urgency	0.059	0.019	0.332	0.002	0.022	0.097
		UPPS-P Negative urgency	0.070	0.023	0.310	0.003	0.025	0.115
		DERS Non acceptance	0.056	0.019	0.231	0.005	0.018	0.094
Strategic (<i>n</i> = 100)	SOGS total	UPPS-P Positive urgency	0.140	0.039	0.357	0.001	0.062	0.218
		DERS Non acceptance	0.114	0.053	0.214	0.034	0.009	0.220

Note. *B*: un-standardized coefficient. *SE*: standard error. *Beta*: standardized coefficient.

behavior, as well as to design personalized and effective treatment plans.

It has been observed that both factors (impulsivity and ER) may be considered as transdiagnostic treatment targets and have an essential role in the treatment of multiple pathologies, including GD. In the specific case of ER, Sloan et al. (2017) highlighted that psychological interventions seem to produce changes in the ER process, independently of the treatment protocol or the disorder addressed. Modifications in ER are associated with an improvement in clinical symptomatology, and therefore the ER approach would contribute to the reduction of psychopathology, as proposed by the authors. Moreover, impulsivity could be considered as a key predictor of treatment outcomes, especially in the case of addictions (Loree, Lundahl, & Ledgerwood, 2015). For those individuals with high levels of impulsivity, a promising effect of contingency management has been observed (Tomko, Bountress, & Gray, 2016). However, more studies on both ER and impulsivity are needed to solidly determine their specific role in the development and maintenance of GD, as well as their impact on the treatment of this disorder.

4.2. Limitations

Certain limitations of the present study should be considered. First, due to the cross-sectional nature of the study at hand, we could not draw conclusions regarding causality or the direction of the effects analyzed. Longitudinal studies are needed to provide important data about the interactions between gambling modalities and ER and impulsive tendencies/traits and also to examine whether these variables may improve after treatment or could be predictors of low rates of remission, dropout, or relapses. Second, ER and impulsive tendencies/traits were assessed using self-report measures that can hardly fully capture the complexity of both variables. In addition, only trait impulsivity was analyzed, but it should be noted that impulsivity is a multifactorial construct. Third, no data on pharmacotherapy were recorded, although different drugs may alter particularly the levels of impulsivity and emotional states. Similarly, comorbidity with other disorders that may also have an impact on impulsivity and emotional dysregulation levels (such as anxiety or depression, among others) has not been taken into account in the present study. Finally, our sample was mostly composed of male patients with GD. Thus, the generalizability of the present findings to other populations should be avoided.

5. Conclusions

This study provides a greater understanding of the specific role of ER and trait impulsivity in GD, as well as their interaction. Our findings suggest that non-strategic gambling is associated with higher impairments in ER, as well as with higher levels of positive and negative urgency. Therefore, gamblers with GD who prefer the non-strategic modality could be using gambling as a maladaptive coping strategy in the face of intense emotions and, therefore, would present a more altered clinical profile than strategic gamblers. The role of both ER and

impulsivity is essential in GD and both variables, although independent, could be highly interrelated.

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7. Author agreement

All the authors declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We understand that the Corresponding Author is the sole contact for the Editorial process. She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

CRediT authorship contribution statement

Cristina Vintró-Alcaraz: Conceptualization, Writing – original draft. **Gemma Mestre-Bach:** Conceptualization, Writing – original draft. **Roser Granero:** Formal analysis, Methodology. **Mónica Gómez-Peña:** Investigation. **Laura Moragas:** Investigation. **Fernando Fernández-Aranda:** Writing – review & editing, Funding acquisition. **Susana Jiménez-Murcia:** Writing – review & editing, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. FFA received consultancy honoraria from Novo Nordisk and editorial honoraria as EIC from Wiley. The rest of the authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of

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Appendix A. Supplementary data

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