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Untangling the role of emotion regulation in gambling and video gaming cravings: A replication and extension study

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ABSTRACT

Background: Existing evidence suggests that urgency—the tendency to act rashly under intense positive or negative affect—reflects dysregulated incidental emotion regulation (ER). Urgency has been reported to predict the intensity and frequency of video gaming and gambling craving, but not the translation of craving onto severity of problem symptoms. However, the role of intentional ER strategies, such as cognitive reappraisal and expressive suppression, in craving control remains underexplored.

Method: 303 regular gamblers and 355 regular video gamers were assessed on urgency traits, ER strategies, self-reported craving, and gaming/gambling-related severity of problem symptoms. Using structural equation modeling (SEM), we tested hypotheses regarding: (1) the mediating role of craving in the relationship between positive/negative urgency and severity, and (2) the moderating role of ER strategies in the link between craving and severity.

Results: Results revealed that, in both activities, positive urgency—but not negative urgency—significantly predicted craving, replicating a positive urgency→craving→severity pathway. However, urgencies did not moderate the craving-severity relationship. Regarding intentional ER strategies, in the gaming sample, suppression moderated the association between craving and severity: cravings were more strongly associated with severity of problem symptoms in individuals more prone to use suppression. In the gambling sample, reappraisal moderated the impact of craving on severity: craving was less strongly associated with severity in individuals using reappraisal more often.

Discussion: These findings suggest that positive urgency operates similarly in gaming and gambling cravings, highlighting appetitive mechanisms in craving emergence. Intentional ER seems to influence severity in interaction with craving, with craving exerting a stronger impact on severity in individuals using less adaptive strategies.

1. Background

The World Health Organization (WHO, 2019) formally included gaming disorder in the 11th edition of the International Classification of Diseases (ICD-11) as a diagnosable condition, placing it alongside gambling disorder under the category of disorders due to addictive behaviors. The American Psychiatric Association (APA), on the contrary, rejected the explicit inclusion of gaming disorder in the DSM-5 (and its revised edition, the DSM-5-TR [APA, 2022]), and relegated it to its section of conditions requiring further research, so that gambling disorder remains to this date the only condition in the behavioral addictions category. Although both of these decisions were controversial,

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there is some agreement that both video gaming and gambling (not necessarily to the same degree or with similar probabilities) can spiral out of control for some individuals (Delfabbro et al., 2021).

Impaired control is thus a central feature of both conditions, and craving (i.e., an intense urge or desire to perform the potentially problematic behavior; Skinner & Aubin, 2010) has been singled out as one of the driving mechanisms accounting for such a loss of control (Brand et al., 2019; Mallorquí-Bagué et al., 2023). In spite of that, neither the DSM-5-TR nor the ICD-11 explicitly includes craving among their diagnostic criteria for any behavioral addiction.

Furthermore, the mechanisms underlying craving remain a subject of ongoing debate. Some theories propose that craving mainly consists of negatively valenced feelings and sensations, such as frustration, tension, or restlessness, which resemble withdrawal symptoms and drive addictive behavior through negative reinforcement—seeking to avoid or alleviate these unpleasant states (Baker et al., 2004; Hogarth, 2020)—. However, unlike withdrawal symptoms, craving can endure beyond the acute withdrawal phase immediately following deprivation, and may be reactivated much later by factors such as stress, physiological symptoms, or environmental cues (Koob & Volkow, 2010; Vafaie & Kober, 2022).

Alternative models conceptualize craving as an appetitive, reward-related state. For instance, the incentive-sensitization theory (Robinson & Berridge, 2001) proposes that repeated exposure to cues predicting the availability of an addictive agent sensitizes the brain's reward pathways. This process heightens the motivational value of these cues, transforming them into 'motivational magnets' capable of eliciting craving states characterized by reward anticipation, approach tendencies, and attentional hijacking. Such states compel behavior toward reward consumption. Similarly, the elaborated intrusion theory of desire (Kavanagh et al., 2005) suggests that craving involves intrusive thoughts and vivid mental imagery of reward gratification. These intrusive experiences, which individuals often struggle to control, amplify craving and perpetuate the addictive cycle.

These two different conceptualizations are, however, not mutually exclusive. Recent research suggests that the predominant features of craving may be context and activity-dependent. In the case of intensive video game players, craving appears to be associated with gratification and reward expectancy rather than the relief of distress (López-Guerrero et al., 2023; Rivero et al., 2023). In patients with gambling disorder, some studies identify craving as predominantly aversive (Mallorquí-Bagué et al., 2023), while others suggest that the content of craving—whether appetitive or aversive—may depend on the preferred gambling modality or the condition's severity (Muela et al., 2023b). The balance between these affective components could even vary within the same individual over time or across different behavior domains (Sayette, 2016; Wilson, 2022).

In previous research, it has been found that craving for gambling and video gaming is indeed associated with both positive and negative emotion-related constructs (Rivero et al., 2023; Muela et al., 2023b). In the present study, we aim to replicate these findings, extend them to more explicit measures of emotion regulation (ER), and clarify the role these constructs play in the emergence of craving and its impact on the loss of behavioral control.

1.1. Craving control as emotion regulation

Regardless of the perspective one adopts, recognizing craving as an affect-laden state ties its control closely to ER (Giuliani & Berkman, 2015). Heightened sensitivity to emotional states, or difficulty in managing them, can intensify cravings, compromise the ability to resist potentially problematic behaviors, and increase the likelihood of maladaptive responses.

Recent models distinguish between two primary forms of ER: intentional (or explicit) and incidental (or implicit; Etkin et al., 2015). On the one hand, intentional ER involves a deliberate, conscious effort to manage emotions, requiring active monitoring and engagement. For instance, according to the model behind the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), explicit ER can be carried out through cognitive reappraisal, which involves reinterpreting a potentially emotional situation to alter its emotional impact, or through emotional suppression, a strategy focused on actively limiting the outward expression of emotional responses. Suppression appears to be less adaptive than cognitive reappraisal, and evidence suggests that individuals with gambling disorder tend to rely more heavily on emotional suppression than on cognitive reappraisal strategies (Navas et al., 2016, 2017b; Williams et al., 2012). Comparable findings have been reported in studies on clinical or subclinical gaming-related problems (Yen et al., 2018). Evidence highlights cognitive reappraisal strategies as protective factors against the negative impacts of both gambling and gaming (Kökönyei et al., 2019; Williams et al., 2012). However, in the case of gambling-related problems, reappraisal can work as a double-edged sword, as some studies have found that cognitive reappraisal strategies are used by some individuals to rationalize continued gambling despite its negative consequences (Jara-Rizzo et al., 2019; Navas et al., 2016; Ruiz de Lara et al., 2019).

On the other hand, incidental ER occurs automatically through associative processes, likely before full awareness of the emotional experience. For instance, context-dependent inhibitory associations have been proposed to underpin the extinction of emotional responses, and thus to prevent their propagation to situations where those emotions would be dysfunctional or inappropriate (see summary chart in Braunstein et al., 2017, p. 1547; and Quintero et al., 2020, for a related discussion).

Incidental ER has been conceptualized as largely inaccessible to introspection and, consequently, to self-report. However, emerging evidence indicates that dysfunction in this form of regulation often manifests as excessive behavioral reactivity to emotionally charged situations—a phenomenon referred to as emotional impulsivity or urgency— (for a review of this evidence, see Fisher-Fox et al., 2024; see also Muela et al., 2023b; Perales et al., 2020; Quintero et al., 2020). The UPPS-P (Urgency, Premeditation, Perseveration, Sensation Seeking – Positive, referring to the four original dimensions in the model plus the later inclusion of Positive Urgency), a widely recognized dimensional model and tool for assessing impulsivity, includes measures of both positive and negative urgency—henceforth PU and NU, reflecting the tendency to engage in rash actions under intense positive and negative emotional states, respectively—along with sensation seeking and dimensions of cognitive impulsivity (lack of premeditation and lack of perseverance; Cyders & Smith, 2008). If the hypothesis that incidental ER dysfunction leads to emotional impulsivity holds true, the urgency subscales of the UPPS-P could serve as proxies for studying the mechanisms underlying incidental ER.

Importantly, heightened positive and negative urgency has been observed in individuals experiencing gambling and video gaming-related problems, meeting or not the criteria for a gambling or gaming disorder diagnosis (López-Guerrero et al., 2023). Nevertheless, the extent to which negative and positive urgency contribute as predictors of severity in these addictive behaviors remains ambiguous within the existing body of evidence. Some studies have reported that negative urgency serves as a stronger predictor of severity than positive urgency (Jara-Rizzo et al., 2019; Savvidou et al., 2017; Torrado et al., 2020), whereas others have found the opposite pattern (Rivero et al., 2023; Velotti & Rogier, 2021). Raybould et al. (2022) examined the relationship between urgency dimensions and gaming-related issues, identifying both types of urgency as linked to an increased number of symptoms and potentially playing a role in the progression from recreational gaming to gaming disorder.

1.2. The present study

As noted earlier, the present research aims to replicate and extend previous findings on the role of ER in craving (Rivero et al., 2023; Muela

et al., 2023b) and, eventually, in the occurrence of problems linked to these activities. Throughout this manuscript gaming- and gambling-related problems will be those included in customary diagnostic symptom checklists for gaming and gambling disorder (see measures), and the number of these the individual presents will be interpreted as an ordinal or quasi-quantitative measure of severity of problem symptoms, regardless of whether this number is sufficient or not for a positive screening.

In these previous studies it was reported that, in similar samples of individuals regularly participating in video gaming and gambling activities, but mostly below the diagnostic threshold, positive and negative urgency are differently associated with severity of gambling- and video gaming-related problem symptoms. On the one hand, negative urgency appeared as a direct predictor of severity. On the other, people with higher positive urgency scores reported to experience stronger cravings, which, in turn, were associated with more severe problems. In other words, whereas positive urgency was linked to severity of problem symptoms via craving, craving did not seem to mediate the link between negative urgency and severity. As discussed elsewhere (López-Guerrero et al., 2023), these findings support the presence of appetitive components in craving for these activities (at least in the severity range under study).

Additionally, Rivero et al. (2023) discovered that, among video gamers, neither positive nor negative urgency interacted with craving in predicting severity of problem symptoms. Instead, positive urgency showed a mediational effect, while negative urgency exhibited a direct effect on severity, with neither showing moderation effects. This evidence shows that people with higher positive urgency scores tend to experience stronger cravings, but urgency does not further facilitate the expression of craving in the form of gambling/gaming problems. In processual terms, this evidence was tentatively interpreted as supporting the previously presented idea that positive urgency is a proxy to *incidental* regulation of positive affect, namely, that it exerts its effect before the individual is fully aware of their craving state, and contributes to the subjective intensity of craving. The direct link of negative urgency with severity, not mediated by craving, has been proposed to reflect the contribution to severity of behavioral problems that are known to be exacerbated by this trait, such as conduct problems, externalizing symptoms or aggression, that frequently co-occur with addictive behaviors in a mostly craving-independent manner (Settles et al., 2012).

Our first set of hypotheses thus involve replicating this pattern of relationships: (a) The mediational role of craving in the relationship between positive urgency and severity of problem symptoms, for both gambling and gaming-related problems, in two groups of people regularly participating in these activities, mostly at subclinical levels; (b) the direct link between negative urgency and severity of problem symptoms, not mediated by craving; and (c) the lack of urgencies × craving interactions, suggesting that, once the individual is aware of a craving state, urgencies would no longer participate in its translation into problems. See the left panel in Fig. 1 for a graphical depiction of the model resulting from these hypotheses.

The present study also aims to extend previous research to exploring the role of intentional ER in craving regulation. Intentional ER as measured by the ERQ—reappraisal and expressive suppression—has been proposed to require that the individual becomes aware of the emotion to be regulated, followed by the intentional use of some mental mechanism to alter its course or expression (Etkin et al., 2015). For instance, people making a timely use of reappraisal could be able to manage their cravings (once they have emerged), which would reduce their contribution to loss of control and its ensuing problems (Mestre-Bach et al., 2020; Velotti et al., 2021). People more frequently resorting to suppression are, however, expected to fail to effectively regulate their cravings and are thus hypothesized to experience more severe problems in the presence of craving.

Our second set of hypotheses, as modelled in the right panel of Fig. 1, thus involves extending previous results in the following ways: (d) reappraisal is hypothesized to interact with craving in such a way that, in people with more frequent use of reappraisal, craving intensity will be more weakly related to severity of problem symptoms than in people with less frequent use (negative reappraisal × craving interaction on severity); and (e) suppression is expected to interact with craving in such a way that, in people with more propensity to use suppression, craving intensity will be more strongly associated with severity of problem symptoms than in people with less frequent use (positive suppression × craving interaction on severity). The interpretation of any direct effects of ERQ dimensions is subordinated to the existence of these interaction effects. However, a strong interpretation of these last two hypotheses implies that some level of perceived craving is necessary for intentional ER to have any room to exert its effects. That means that (f) the effect of these ER strategies among individuals with low craving levels will be

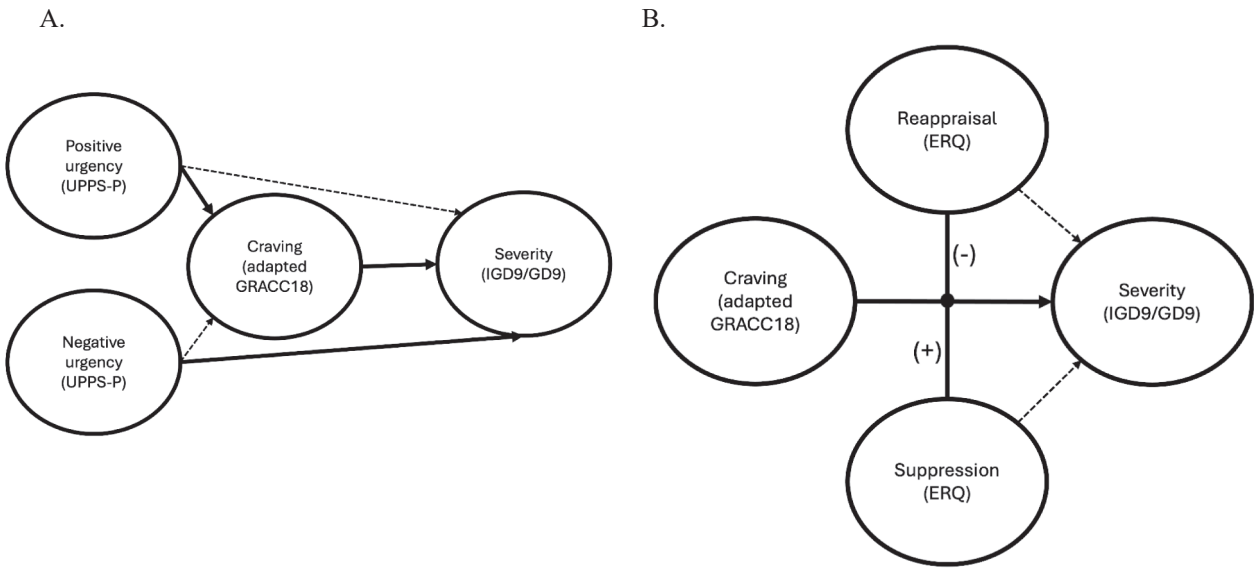

Fig. 1. Proposed hypothetical models of the relationships between the constructs of interest. Solid lines represent hypothesized relationships between constructs, while dashed lines indicate those effects are hypothesized not to exist (A), or to be theoretically irrelevant (B). Severity stands for Severity of Problem Symptoms, as measured by standardized checklist self-reports. See text for details.

very small or nonexistent.

Predictions regarding differences between the two groups, that is, between people primarily participating in either gambling or gaming activities, remain mostly open. In previous works, we have hypothesized that gambling craving would be more strongly associated with severity of problem symptoms than gaming craving, and that aversive states are more strongly involved in gambling than in gaming craving, so that negative urgency was expected to be more directly associated with gambling than with gaming craving. However, recent research has not corroborated any of these hypotheses (López-Guerrero et al., 2023). Consequently, in the present study, all analyses will be conducted separately for the two groups, but the analyses of the differences between them will remain exploratory.

2. Method

2.1. Participants

Participants were recruited from a Spanish online panel that adheres to UNE ISO 20252 and ESOMAR standards, and were invited to participate in an online survey. The main inclusion criterion for each of them was self-categorizing as being a regular gambler or a regular video gamer. Prior to participation, confidentiality statements were presented. Participants were informed that the study was anonymous, and were provided details on the studýs duration and the remuneration process. The panel provider uses a financial compensation system based on points that can be redeemed through different online payment partners or be paid directly into panelists' bank accounts.

Recruitment continued until reaching a minimum of 300 fully valid and complete surveys in both subsamples, which finally yielded 303 participants in the gambling sample and 355 in the gaming sample. Among those, three participants from the gambling and one participant from the video gaming sample reported their gender as not being either male nor female. Given that we planned to add gender as covariate in our analysis, those four participants were discarded. See Tables 1 and 2 for a description of each sample. Notably, the average number of gambling and gaming disorder symptoms in the respective samples was relatively high (3.07 and 2.20, respectively). This suggests that both groups not only engaged in gambling and gaming activities regularly, but also, on average, participated in them with considerable intensity.

Table 1
Sociodemographic data by group.

Variables	Gambling group (n = 300)	Video gaming group (n = 354)
Gender		
Male	128 (42.7 %)	206 (58.2 %)
Female	172 (57.3 %)	148 (41.8 %)
Education		
No Education	4 (1.3 %)	5 (1.4 %)
Incomplete Mandatory Education	7 (2.3 %)	6 (1.7 %)
Completed Mandatory Education	26 (8.7 %)	32 (9.0 %)
Incomplete High School/Technical Studies	57 (19.0 %)	62 (17.5 %)
Completed High School/Technical Studies	83 (27.7 %)	93 (26.3 %)
Incomplete University Studies	25 (8.3 %)	31 (8.8 %)
Completed University Studies	98 (32.7 %)	125 (35.3 %)
Monthly family income		
Less than €600	10 (3.3 %)	7 (2.0 %)
€600 to €1000	16 (5.3 %)	32 (9.0 %)
€1001 to €1500	56 (18.7 %)	49 (13.8 %)
€1501 to €2000	58 (19.3 %)	81 (22.9 %)
€2001 to €2500	73 (24.3 %)	64 (18.1 %)
More than €2500	87 (29.0 %)	121 (34.2 %)

2.2. Procedure

Upon providing explicit informed consent, participants completed a protocol that belonged to a broader research project aimed at comparing the psychological processes associated with gambling and video game use (see Ethics statement). The assessment protocol started with an *ad hoc* questionnaire designed to collect sociodemographic information and data on participants' preferred modalities of video gaming or gambling, followed by the questionnaires mentioned in the *Measures* section, as well as the following instruments (not relevant for the current study): Quality of Life (Lozano-Rojas et al., 2007), Positive and Negative Affect Schedule (Sandín et al., 1999), Brief Gambling Motives Inventory (Barrada et al., 2019), and Video Gaming Motives Questionnaire (López-Fernández et al., 2020). Some of these measures will be reported in a study aiming to independently validate and show the structural invariance across domains of a short version of the Granada Assessment for Cross-domain Compulsivity (GRACC) scale (for the original one, see Muela et al., 2023a).

A final *ad hoc* survey examined participantś engagement in specific gambling and video gaming modalities, capturing data on frequency, financial expenditure for gamblers, and time investment for gamers. To ensure data integrity, consistency checks and control items were implemented. Individuals who did not meet these quality criteria did not count to reach the established sample size, and were not considered for any analyses.

2.3. Measures

2.3.1. Severity of gambling-related problems

The Spanish version of the Diagnostic Questionnaire for Gambling Disorder (GD-9; Jiménez-Murcia et al., 2019) was adapted from a previous version for DSM-IV-TR criteria (Jiménez-Murcia et al., 2009) to evaluate the nine DSM-5 diagnostic criteria for gambling disorder. The measure comprises 17 questions (e.g., "Have you frequently thought about ways of getting money with which to gamble?"), each with a response option of yes or no. For criteria assessed with two items, a criterion was coded as positive if the participant responded affirmatively to at least one of the two items evaluating that criterion. The diagnostic threshold for gambling disorder is defined as meeting four or more criteria. Reliability was $\rho = 0.93$. All reported reliabilities correspond to those found in the current samples. As noted earlier, the number of symptoms the individual endorses will be interpreted as a measure of severity of problem symptoms, regardless of whether this number is sufficient or not for a positive screening.

2.3.2. Severity of video games-related problems

A specifically adapted version of the Spanish validation of the Internet Gaming Disorder Scale (IGD-9; Beranuy et al., 2020) was utilized to ensure the highest possible degree of comparability with the GD9 measure without compromising reliability. In contrast to the original version, which employs a Likert-type scale, this scale consists of nine yes-or-no questions (e.g., "Do you feel preoccupied with your gaming behavior?"), each corresponding to one of the specific criteria for Internet Gaming Disorder as proposed in Section III of the DSM-5-TR (APA, 2022). The diagnostic threshold for internet gaming disorder is established at the presence of five or more criteria. Reliability was $\rho = 0.87$. As noted earlier, the number of symptoms the individual endorses will be interpreted as a measure of severity of problem symptoms, regardless of whether this number is sufficient or not for a positive screening.

2.3.3. Craving

A questionnaire consisting of the craving items from the brief version of the GRACC scale (GRACC-18; Muela et al., 2023a) were used in this study. The GRACC-18 items selected to assess craving in the present study (translated from Spanish) were the following: (1) "I feel an

Table 2
Descriptive statistics by group.

	Observed Scores		Latent Correlations							
	Gambling	Video gaming								
	M (*SD*)	*M* (*SD*)	1	2	3	4	5	6	7	8
1. Severity – DSM-Criteria	3.07 (3.19)	2.20 (2.53)		**0.84**	**0.46**	**0.47**	**0.16**	**0.46**	**−0.16**	0.04
2. Craving – GRACC5	2.29 (1.19)	2.26 (1.16)	**0.79**		**0.45**	**0.53**	**0.18**	**0.45**	**−0.22**	−0.01
3. Negative Urgency – UPPS-P	9.57 (2.80)	9.40 (2.87)	**0.47**	**0.43**		**0.85**	0.10	**0.31**	**−0.19**	0.05
4. Positive Urgency – UPPS-P	9.81 (2.54)	9.79 (2.41)	**0.53**	**0.49**	**0.81**		0.08	**0.30**	**−0.25**	0.06
5. Cognitive Reappraisal – ERQ	29.31 (6.74)	29.56 (6.42)	0.03	0.12	0.11	0.08		**0.45**	−0.10	0.05
6. Emotional Suppression – ERQ	17.21 (5.20)	16.95 (5.47)	**0.40**	**0.46**	**0.47**	**0.40**	**0.41**		**−0.15**	**−0.15**
7. Age	36.27 (11.76)	40.00 (11.05)	**−0.31**	**−0.16**	**−0.19**	**−0.27**	**0.05**	**−0.04**		**−0.10**
8. Gender (*male* = 0; *female* = 1)	0.57 (0.50)	0.42 (0.49)	−0.07	−0.10	0.12	0.01	0.05	−0.09	−0.04	

Note: Severity: Severity of problem symptoms. Below the diagonal, latent correlations for the gambling sample. Above the diagonal, latent correlations for the video gaming sample. Bold values correspond to statistically significant, $p < 0.05$, correlations.

uncontrollable desire to play even right after I'm done"; (2) "Sometimes, the desire to play dominates me"; (3) "I often play because I feel an irrepressible desire to play when a surge of strong emotions takes over me"; (4) "Often, playing is something that I want to do so badly that I feel my heart beating faster"; and (5) "I can't get rid of the desire to play when I'm overpowered by certain bodily or internal sensations". Items are rated on a five-point scale ranging from 1 = *totally disagree* to 5 = *totally agree*. Participants were instructed to answer with their predominant activity in mind (gaming in the case of video gamers and gambling in the case of gamblers), so that scores reflect the degree to which they experienced activity-specific cravings. Reliabilities for the gambling/video gaming groups were ρ = 0.93/.94.

The decision to use this selection of items to assess craving in the present study obeyed strictly methodological reasons. First, there exist no multi-item craving questionnaires validated for both the gambling and the video gaming domains, whereas the GRACC-18 scale was explicitly developed to be transferable across behavioral domains and has been validated in both. Second, given the general analysis approach adopted here (structural equation modelling—henceforth SEM—of relationships between latent factors), multi-item questionnaires are clearly advantageous over single-item ones (e.g., visual-analogue scales). Third, all the craving items in the GRACC-18 scales were originally adapted or extracted from previous validated scales and translated in Spanish taking strict measures to retain content validity (see Muela et al., 2023a). And fourth, the selection of only craving items from the GRACC-18 ensures no item overlapping occurs between craving and severity measures in the present study.

2.3.4. Positive and negative urgency

We assessed negative urgency (NU; e.g., "When I am upset, I often act without thinking") and positive urgency (PU; e.g., "When I am in a great mood, I tend to get into situations that could cause me problems") with the respective subscales (of four items each) from the Impulsive Behavior Scale (brief UPPS-P; Spanish version; Cándido et al., 2012). Items are rated on a 4-point scale ranging from 1 = *strongly agree* to 4 = *strongly disagree*. Higher scores on positive and negative urgency indicate a greater level of impulsivity. Reliabilities for the gambling/video gaming groups were ρ = 0.79/.79 for negative urgency and ρ = 0.72/.69 for positive urgency.

2.3.5. Emotion regulation strategies

We assessed cognitive reappraisal (six items; e.g., "When I want to feel more positive emotion, I change what I'm thinking about") and expressive suppression (four items; e.g., "When I am feeling negative emotions, I make sure not to express them") with the ER Questionnaire (ERQ; Spanish version; Cabello et al., 2013). Items are rated on a 7-point scale ranging from 1 = *totally disagree* to 7 = *totally agree*. Reliabilities for the gambling/video gaming groups were ρ = 0.82/.82 for reappraisal and ρ = 0.75/.79 for suppression.

2.4. Analysis plan

Initially, descriptive statistics were calculated for sociodemographic data and questionnaires, separately for each group. Reliabilities were computed with the nonlinear SEM reliability coefficient (ρ; Green & Yang, 2009), which is appropriate for ordinal indicators. We also computed latent correlations among all constructs, including age and gender.

Then, the different models were tested within the SEM framework. This approach was preferred as relying on latent variables rather than observed ones reduces the risk of results being affected by measurement error and, thus, increases effect size estimation precision and statistical power (Cole & Preacher, 2014). First, we computed two models (one per sample) in which we computed the latent correlations among all the involved constructs.

Subsequently, different moderation models were tested. In all of them, symptom severities were the output variables. In the first set of models, urgencies and craving with their interactions were the predictors; in the second set, the predictors were reappraisal and suppression, craving, and their interactions. To define each interaction factor, a product-indicator approach was implemented with all-pairs configuration (Foldnes & Hagtvet, 2014). By doing so, we avoided the arbitrariness of other approaches that only use a limited subset of all possible combinations. The resulting product indicators were orthogonalized using a double-mean-centering strategy (Lin et al., 2010). Model fit for these models, following Schoemann and Jorgensen's (2021) recommendations, was initially assessed without including the latent interaction factors. This step ensured the model fit was not artificially inflated by an excess number of degrees of freedom. This implies that model fit for mediation and moderation models was the same. Simple slopes for statistically significant latent interactions were plotted to aid interpretation, using three levels of the involved variables: low (−1 SD), medium (mean = 0), and high (+1 SD).

In case the interaction effects were not statistically significant, we proceeded with mediation models. In these models, craving was the mediator variable and severity of problem symptoms was the output variable. In a first set of models, negative and positive urgencies were the input variables; in a second set, input variables were reappraisal and suppression. To test the statistical significance of the indirect effects, we requested bias corrected bootstrap confidence intervals with 5,000 replications.

To check the robustness of our results, we recalculated the moderation models with residual centering (Little et al., 2006) for the product variables and we tested all the moderation and mediation models adding age and gender as covariates.

According to conventional cut-offs (Hu & Bentler, 1999), values greater than 0.95 for the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) and values smaller than 0.06 for the Root Mean Square Error of Approximation (RMSEA) and smaller than 0.08 for Standardized Root

Mean Square Residual (SMSR) are indicative of adequate model fit. The Weighted Least Squares Mean and Variance corrected (WLSMV) estimator were employed, given its appropriateness for ordinal data (Finney & DiStefano, 2013). Item scores were treated as ordinal. For all models, we interpreted the standardized solution (STDYX solution in *Mplus*). For moderation models we computed the appropriate standardized solution for the interaction terms (Wen et al., 2010).

The analyses were conducted with M*plus* 8.4 and R 4.4.3. We used the packages *lavaan* version 0.6–19 (Rosseel, 2012), *psych* version 2.4.12 (Revelle, 2024), *MplusAutomation* version 1.1.1 (Hallquist & Wiley, 2018), and *semTools* version 0.5–6 (Jorgensen et al., 2022). No missing data were present in our database (beyond those scales not administered to each sample). The database and code files for these analyses are available at the Open Science Framework (OSF): https://osf.io/6gz5d/?view_only=674a8418e30a4d1692f1362e01a257e5.

3. Results

3.1. Descriptives

Table 2 provides descriptive statistics for psychological variables in both groups. Importantly, the percentage of participants meeting the diagnostic criteria for gambling disorder was 42.00 % (at least four out of nine criteria), while for internet gaming disorder it was 21.19 % (at least five out of nine criteria).

Table 3 shows the goodness of fit indices across the different latent models. All models provide overall adequate fit indices ($min_{CFI} = 0.962$, $min_{TLI} = 0.957$, $max_{RMSEA} = 0.062$, $max_{SRMR} = 0.067$). All fit indices were below/above their corresponding cut-off values, except for a single RMSEA = 0.062. Hence, estimated parameters will be reported and interpreted.

Latent correlations provide relevant insights into the associations among the variables of interest. The pattern for the gambling and video gaming samples was very similar. severity showed strong associations with craving ($r_{gambling} = 0.79$, $r_{videogaming} = 0.84$), while being also positively correlated with negative urgency ($r_{gambling} = 0.47$, $r_{videogaming} = 0.46$), positive urgency ($r_{gambling} = 0.53$, $r_{videogaming} = 0.47$), and expressive suppression ($r_{gambling} = 0.40$, $r_{videogaming} = 0.46$). Cognitive reappraisal was positively associated with severity of problem symptoms in the video gaming sample ($r = 0.16$) but not in the gambling sample ($r = 0.03$, $p = 0.638$). Craving presented similar patterns, with strong correlations with both positive urgency ($r_{gambling} = 0.49$, $r_{videogaming} = 0.53$) and negative urgency ($r_{gambling} = 0.43$, $r_{videogaming} = 0.45$). Urgency dimensions were highly correlated between them ($r_{gambling} = 0.81$, $r_{videogaming} = 0.85$). Furthermore, craving was positively associated with expressive suppression ($r_{gambling} = 0.46$, $r_{videogaming} = 0.45$). Craving and cognitive reappraisal were associated in the video gaming sample ($r = 0.18$), but not in the gambling sample ($r = 0.12$, $p = 0.064$). Cognitive reappraisal and emotional suppression showed a moderate positive relationship ($r_{gambling} = 0.41$, $r_{videogaming} = 0.45$).

3.2. Urgency (UPPS-P), craving, and severity of problem symptoms

For all mediation and moderation models, differences between models without and with covariates were negligible, so we only report here the results for models without age and gender. For the sake of transparency and completeness, figures display results both with and without covariates. As for moderation models, no relevant differences were found depending on how product terms were centered, we only report results for double-mean centering.

In the gambling sample, neither the NU × craving ($\beta = 0.13$, $p = 0.114$) nor the PU × craving ($\beta = -0.15$, $p = 0.118$) interaction terms were statistically significant. The same holds for the video gaming sample: NU × craving, $\beta = 0.11$, $p = 0.348$; PU × craving, $\beta = -0.09$, $p = 0.418$.

Given that—in line with our expectations—moderation effects were not supported, we continued with the mediation models. Their graphical depiction is shown in Fig. 2. Overall, the strongest effects were the ones of craving on severity (gambling: $\beta = 0.69$, $p < 0.001$; video gaming: $\beta = 0.82$, $p < 0.001$). For the two urgencies in both samples, direct effects on severity were not statistically significant (gambling, $\beta_{NU} = 0.07$, $p_{NU} = 0.540$, $\beta_{PU} = 0.13$, $p_{PU} = 0.293$; video gaming, $\beta_{NU} = 0.21$, $p_{NU} = 0.252$, $\beta_{PU} = -0.15$, $p_{PU} = 0.455$). While indirect effects for NU were not statistically significant (gambling: effect = 0.05, 95 % CI [-0.19, 0.28]; video gaming: effect = 0.01, 95 % CI [-0.38, 0.29]), such indirect effects were significant for PU (gaming: effect = 0.30, 95 % CI [.08, 0.56]; video gaming: effect = 0.43, 95 % CI [.13, 0.84]).

3.3. Emotion regulation strategies (ERQ), craving, and severity of problem symptoms

For both the gambling and video gaming samples, statistically significant interactions between ER strategies and craving were found (see Fig. 3 for their graphics depiction). In both samples, the main effect of craving on severity was strong and statistically significant (gambling: $\beta = 0.75$, $p < 0.001$; video gaming: $\beta = 0.78$, $p < 0.001$). While in the gambling sample the main effect of reappraisal was significant and the main effect of suppression was not ($\beta_{REAP} = -0.21$, $p_{REAP} = 0.009$; $\beta_{SUP} = 0.20$, $p_{SUP} = 0.060$), the opposite pattern was found in the video gaming sample ($\beta_{REAP} = -0.09$, $p_{REAP} = 0.245$; $\beta_{SUP} = 0.18$, $p_{SUP} = 0.009$).

Most importantly, the significance of interaction terms also diverged across activity domains. While in the gambling sample higher levels of cognitive reappraisal significantly reduced the slope of the association between craving and severity, that was not the case for the video gaming sample (gambling: $\beta_{REAP\times Craving} = -0.10$, $p_{REAP\times Craving} = 0.003$; video gaming: $\beta_{REAP\times Craving} = -0.05$, $p_{REAP\times Craving} = 0.134$). The suppression × craving term was statistically significant only in the video gaming sample (gaming: $\beta_{SUP\times Craving} = 0.08$, $p_{SUP\times Craving} = 0.143$; video gaming: $\beta_{SUP\times Craving} = 0.07$, $p_{SUP\times Craving} = 0.003$), indicating that higher suppression levels increase the slope of the association between craving with severity. Despite these differences in significance, please note that β parameters for these interactions were slightly larger for the gambling than for the gaming samples.

To facilitate the interpretation of these results, simple slopes for these models are plotted in Fig. 4. In the gambling sample, reappraisal partially prevented severity from being impacted by craving. For the video gaming sample, the deleterious effect of craving on severity was amplified by suppression.

4. Discussion

4.1. Replication hypotheses: associations between urgency, craving for gambling and video games, and severity of problem symptoms

The existing literature highlights the relationships between emotional impulsivity (positive and negative urgency), cravings for gambling and video gaming, and the severity of the problems experienced by some individuals intensively engaging in these activities. Primarily, craving has consistently been identified as a key force behind the persistence of addiction and the risk of relapse (Dong et al., 2017; Mallorquí-Bagué et al., 2023). Consistent with these findings, the present study observed the strongest associations between craving and severity of problem symptoms in both gambling and video gaming domains. It is worth emphasizing that we employed a craving measure (adapted from the GRACC-18 questionnaire) specifically designed to avoid item overlapping with the severity measurement tool. This methodological choice ensures that the observed associations cannot be attributed to scales sharing similar items between them.

As previously mentioned, urgency has also been theoretically linked to craving, with distinct associations between urgency dimensions and

Table 3
Goodness of fit indices across the different latent models.

Model	Variables	Sample	Covariates	χ^2	*df*	*p*	CFI	TLI	RMSEA	SRMR
M1	All	Gambling	–	852.4	501	< 0.001	0.969	0.965	0.048	0.061
M2	All	Video Gaming	–	954.9	501	< 0.001	0.962	0.957	0.051	0.064
M3	UPPS-P	Gambling	No	330.6	203	< 0.001	0.988	0.986	0.046	0.049
M4	UPPS-P	Gambling	Yes	370.5	239	< 0.001	0.988	0.986	0.043	0.048
M5	UPPS-P	Video Gaming	No	263.0	203	0.003	0.994	0.993	0.029	0.049
M6	UPPS-P	Video Gaming	Yes	301.1	239	0.004	0.994	0.993	0.027	0.048
M7	ERQ	Gambling	No	438.7	246	< 0.001	0.982	0.979	0.051	0.057
M8	ERQ	Gambling	Yes	486.0	286	< 0.001	0.981	0.979	0.048	0.056
M9	ERQ	Video Gaming	No	581.2	246	< 0.001	0.970	0.966	0.062	0.067
M10	ERQ	Video Gaming	Yes	632.7	286	< 0.001	0.970	0.966	0.059	0.065

Note: Variables = those included beyond severity of problem symptoms and craving; Covariates = gender and age included (or not) as covariates; *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; UPPS-P = negative and positive urgency included; ERQ = reappraisal and suppression variables included.

craving anticipated based on the affective nature of craving. If craving is a predominantly aversive state, individuals with high negative urgency—who struggle to regulate negative emotions—would likely experience more intense craving states. Conversely, if craving is primarily viewed as an appetitive or reward-related state, individuals with high positive urgency—who have difficulty controlling positive emotions—would be expected to exhibit heightened levels of craving.

A recent systematic review (López-Guerrero et al., 2023) identified studies where either positive or negative urgency predicted self-reported craving. However, among studies involving samples with similar severity levels and gaming or gambling preferences to those in the present study, the association between positive urgency and craving was reported to be stronger and more consistent than that involving negative urgency. These findings informed our first hypothesis, i.e., that craving would mediate the relationship between positive urgency and severity of problem symptoms in both gaming and gambling contexts (see left panel in Fig. 1). This hypothesis has been fully supported by our results.

Our second hypothesis—a direct association between negative urgency and severity of problem symptoms, independent of craving—was grounded in prior findings (see López-Guerrero et al., 2023, for a systematic review), and a well-established theoretical framework that conceptualizes negative urgency as an ER-related transdiagnostic factor that contributes, not only to addiction vulnerability, but also to other externalizing behaviors that contribute to total severity of problem symptoms (Johnson et al., 2013). Earlier theoretical work also suggests that negative urgency is a key vulnerability factor for specific pathways to gambling-related problems, particularly among gamblers classified as 'impulsivist-antisocial' in seminal models (Blaszczynski & Nower, 2002; Navas et al., 2019). Similar pathways have also been proposed for video games-related problems (Marchica et al., 2022). Aligned with this perspective, we hypothesized that negative urgency acts as a broad risk factor for behavioral addiction severity, exerting effects beyond its potential link to craving. However, the findings of the present study did not support this prediction.[1]

Our third hypothesis, predicting the absence of urgency × craving interactions, was based on the premise that urgency reflects a dispositional dysfunction in incidental regulation mechanisms that operate prior to the full conscious experience of emotion. Consequently, urgency would contribute to intensified emotion perception (i.e., emotional flooding) rather than to moderating the effects of emotion on behavior. This prediction was corroborated, as neither the PU × craving interaction nor the NU × craving interaction reached significance in either of the two groups. These findings allowed us to dismiss moderation models in favor of mediation models for the triadic urgency-craving-severity association. This absence of significant urgency × craving interactions has been reported previously in studies with video gamers (Rivero et al., 2023). The present findings thus replicate this result in a similar but larger sample and extend it to a group of individuals involved in gambling activities. Moreover, SEM is more robust and less sensitive to measurement error than the analytical approaches used in previous works (and is particularly advantageous when measures present borderline reliability indices).

Previous theoretical work has conceptualized urgency to have two major components (Billieux et al., 2010). A reactive component would be responsible for a higher sensitivity to emotion-triggering cues, i.e., high urgency individuals would be more prone to emotional flooding in the presence of emotional triggers. A proactive component would be responsible for top-down inhibition of the preponderant emotional response, with this component assumed to be impaired in individuals with high urgency. While our findings do not entirely rule out the existence of this proactive component, they suggest that its influence would precede the full manifestation of craving, and it would operate at an earlier stage in the process of emotional appraisal.

In summary, the replication aspect of this study successfully confirmed the mediational role of craving in the relationship between positive urgency and severity of problem symptoms across gambling and video gaming. Furthermore, as hypothesized, no significant urgency × craving interactions were identified in predicting severity. However, the study did not find evidence to support a direct association between negative urgency and severity of problem symptoms independently of craving. With due caution, this pattern of results reinforces the emotional basis of craving and supports the interpretation of urgency (or, at least, positive urgency) as a proxy for incidental ER processes. Urgency does not appear to moderate the impact of craving on gambling or gaming-related problems once craving is subjectively perceived and reportable.

Although not predicted, the absence of a direct link between negative urgency and severity of problem symptoms is not entirely surprising either, as that link has not been established in every previous study assessing it. The discrepancies between the present findings and some previous studies reporting that link may be attributed to differences in sample composition, such as variations in activity preferences or severity.

In any case, the present results underscore some similarities underlying the emergence of gambling and gaming craving. While some studies have reported significant differences in the trajectory and content of craving across these domains (King et al., 2016; Evans et al., 2018), the comparable role of urgency in driving craving for both activities supports a framework of mechanistic convergence rather than divergence. In earlier work, we hypothesized that craving would exhibit

[1] At this point, a digression is needed regarding the meaning of failing to corroborate an effect. In our (frequentist) analysis approach, failing to reject the null hypothesis can be interpreted as absence of evidence for that effect, but should not be interpreted as evidence of absence (Altman & Bland, 1995), a caution that must be applied to other non-significant differences, including the ones regarding negative predictions (i.e., hypotheses predicting the non-significance of certain links), in the present work.

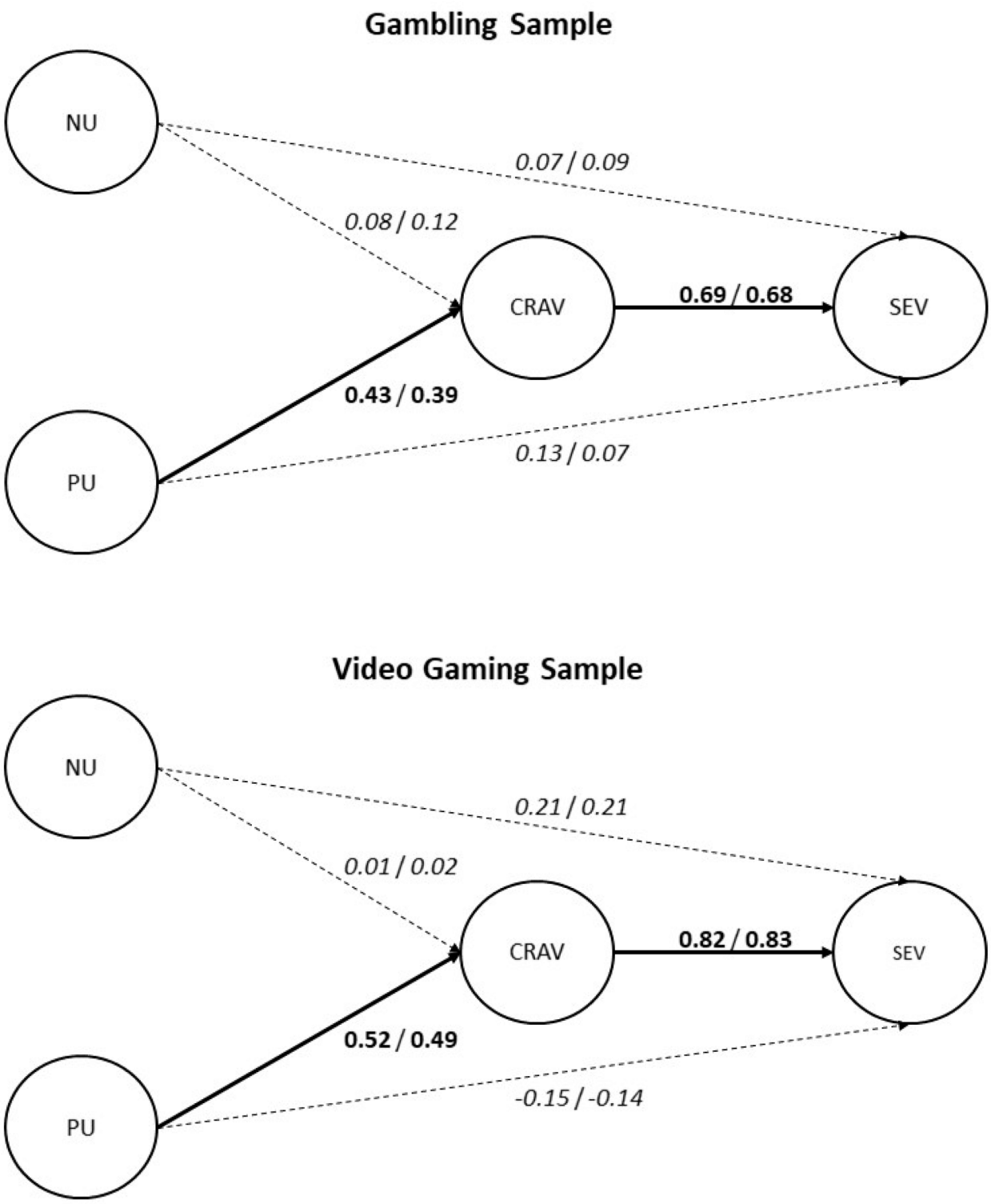

Fig. 2. *Mediation models for negative and positive urgency.* Note. Coefficients in bold correspond to significant effects. Nonsignificant coefficients are represented with dashed lines. Standardized coefficients are presented for the models without covariates/with covariates. NU: Negative Urgency, PU: Positive Urgency, CRAV: Craving, SEV: Severity of Problem Symptoms. For clarity, indicators, intercepts, covariances, thresholds, unique variances, and paths for age and gender are omitted from the plot.

a stronger association with gambling problems than with gaming problems, and that aversive states would play a more substantial role in gambling-related craving than in gaming-related craving, thereby linking negative urgency more directly to gambling than to gaming craving. However, both hypotheses were disconfirmed in two prior studies (Rivero et al., 2023; Muela et al., 2023b), leading us to refrain from explicitly advancing them in the present study.

4.2. Extension hypotheses: associations between ERQ dimensions, craving, and severity of problem symptoms

In contrast with urgency, ERQ dimensions measure the dispositional

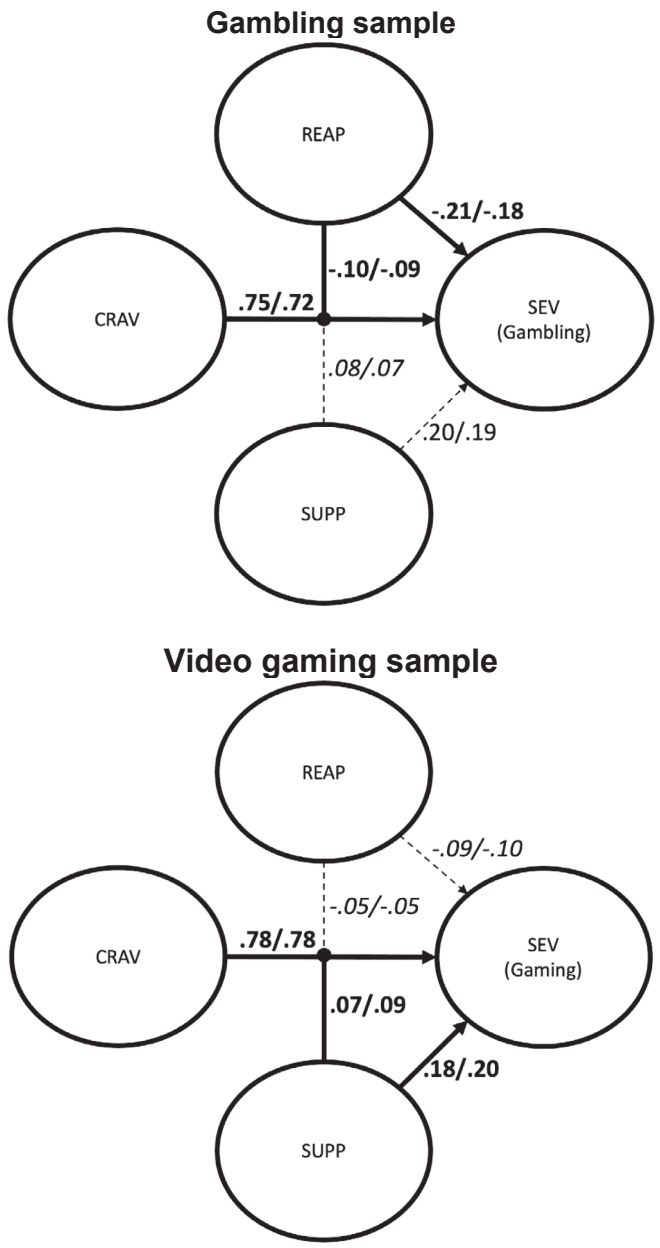

Fig. 3. *Moderation models for emotional regulation*. Note. Coefficients in bold correspond to significant effects. Nonsignificant coefficients are represented with dashed lines. Standardized coefficients are presented for the models without covariates/with covariates. REAP: Reappraisal, SUPP: Suppression, CRAV: Craving, SEV: Severity of Problem Symptoms. For clarity, indicators, intercepts, covariances, thresholds, unique variances, and paths for age and gender are omitted from the plot.

tendency to use cognitive reappraisal and expressive suppression to reinterpret the causes of an emotion once it is subjectively perceived, or to avoid its open expression as a last resort, respectively. According to the (previously mentioned) original and reformulated versions of Gross and cols.' ER model, these two strategies are instrumental, yet covert, behaviors that require becoming aware of the emotion to be regulated and then forming the goal of reducing it or at least preventing its expression, so they can affect the emotion's later course. Reappraisal and suppression were thus hypothesized to moderate the translation of craving into gambling and gaming-related problems.

On the one hand, gamers and gamblers experiencing cravings could try to reappraise craving in a more functional way, thus precluding the impact of craving on behavior. Following this idea, reappraisal training is a customary ingredient of cognitive therapy for addictive disorders, mostly intended to equip patients with the necessary skills to prevent relapse. On the other hand, people for whom reappraisal is not available (e.g. due to time pressure, cognitive load, or lack of skill; see Navas et al., 2017b) could try to suppress the expression of the emotion in order to prevent the problems this would cause. Resorting to the exertion of raw willpower is known to be ineffective in the long run, so it ends up causing more harm than good and aggravating the problems caused by dysfunctional emotions, including addictive behaviors fueled by craving states.

These hypotheses were partly corroborated: two of the four possible ERQ dimensions × craving interactions were significant. In gamblers using reappraisal more frequently, the relationship between craving and self-reported gambling-related severity of problem symptoms was weaker than in individuals less prone to use that strategy. In turn, in video gamers using suppression more frequently, there was a stronger relationship between craving and gaming-related symptoms.

In other words, ERQ interaction with craving appeared in the predicted direction, but was significant only in the video gaming domain, in the case of suppression, and only in the gambling domain, in the case of reappraisal. However, as non-significant interactions are similar in size to significant ones, and go in the same direction, it is difficult to establish whether these differences in significance are meaningful or merely attributable to low test sensitivity (please note that, for the gaming sample, the 0.08 craving × reappraisal beta coefficient was declared non-significant, whereas, in the gambling sample, a 0.07 coefficient for the same interaction was significant).

In any case, where ERQ × craving interactions were significant, the shape of these interactions closely matched our predictions, not only because reappraisal seemed to be beneficial and suppression detrimental to manage craving, but also because the effects of these ERQ dimensions were substantially smaller in low craving levels (i.e., −1SD, see Fig. 4).

Concerning the role of reappraisal in the observed interaction, an important caution must be noted. While reappraisal is typically considered a functional ER strategy, it has been suggested that some gamblers may use it to mentally conceal the emotional impact of their behavior or to rationalize gambling urges (Navas et al., 2019; Ruiz de Lara et al., 2019). In such cases, individuals who frequently rely on reappraisal might underestimate the severity of their gambling-related issues. This reduction in reported severity may not reflect genuinely lesser problems but rather the influence of an ego-protective mechanism on their self-perception. These two interpretations would produce similar self-report outcomes, making them indistinguishable within the scope of the current study design. As there is evidence of both the functional and dysfunctional use of reappraisal in the relevant literature, the current design does not allow to conclude with certainty whether the craving × reappraisal interaction is unveiling one mechanism or the other.

The possible role of suppression also deserves further consideration. Although Gross and cols.' ER models locate it at the end of the emotional cascade, as a last-resort gating mechanism to prevent the immediate negative consequences of inappropriate emotion expression, some findings suggest that people use it in situations in which high cognitive load impedes the use of reappraisal. For instance, in accordance with Navas et al. (2017b), high-negative urgency individuals are prone to feel overwhelmed by negative emotions, which precludes them from using reappraisal, and leaves them only with suppression to (ineffectively) deal with such emotions (Williams et al., 2012; Chester et al., 2016). Accordingly, this association between suppression and urgency has been observed to be strong in the present study.

It is noteworthy that suppression and reappraisal—typically regarded as dysfunctional and functional strategies, respectively—were moderately yet positively correlated between them in our sample. Tentatively, individuals who frequently rely on one strategy are also

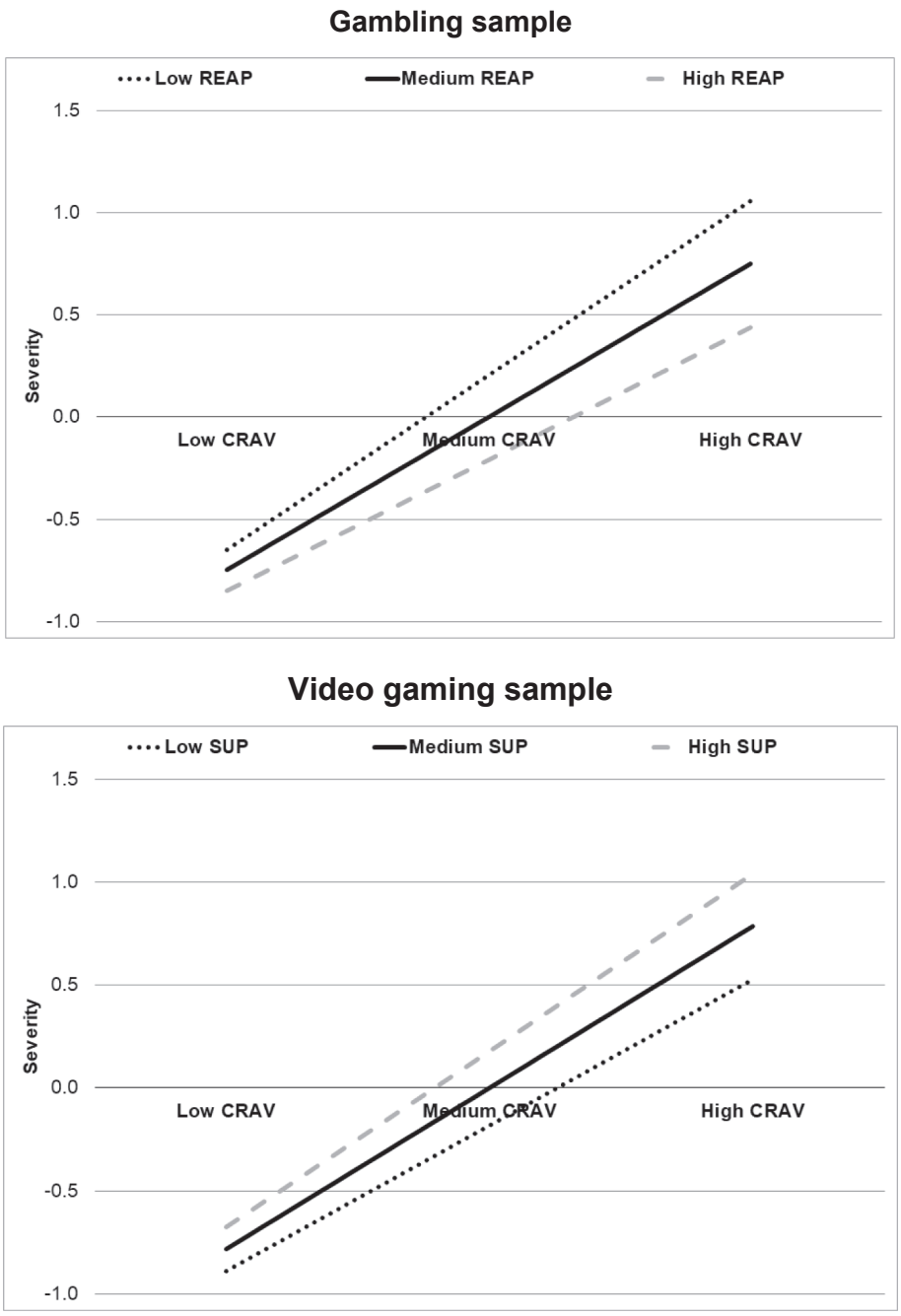

Fig. 4. Slope of the craving- severity of problem symptoms effect as function of use of emotion regulation strategies in the gambling and the video gaming sample (only significant interactions in the moderation models are shown). Note. Severity: Severity of Problem Symptoms, REAP: Reappraisal, SUP: Suppression, CRAV: Craving. Low (−1 SD), Medium (mean = 0), and high (+1 SD).

inclined to use the other because they encounter troubling emotions more often and thus need to regulate them more frequently. Interestingly, the correlation between reappraisal and severity became negative—revealing its potential protective effect—only after controlling for suppression and craving in the corresponding moderation model.

4.3. Similarities and differences between video gaming and gambling

When comparing results across behavioral domains (gambling vs. gaming), our data generally point to more convergence than divergence. While the recruitment criteria were largely identical, gamblers reported more problem symptoms (3.07) compared to gamers (2.20), and were more likely to meet the criteria for their respective disorders. Although the samples were not designed to be representative, this finding aligns with the view that gambling poses a higher potential for abuse compared to video gaming.

In most other respects, the patterns of association were strikingly similar across the two domains. In both samples, positive urgency showed a stronger relationship with severity of problem symptoms than negative urgency, and this effect was mediated by perceived craving. These findings underscore the significance of craving as a driver of gaming- and gambling-related issues, as well as the central role of appetitive components in the conceptualization of craving—at least in the non-patient samples examined in this study.

Furthermore, while the direct and interactive effects of suppression were significant for gamers but not for gamblers, the effect sizes were

comparable (see Fig. 3). The most notable difference lies in the relatively direct and interactive effects of reappraisal on severity of problem symptoms in the gambling sample as opposed to the gaming sample. Correlations indicate that gamblers are more likely to utilize reappraisal in response to craving, and this strategy appears moderately effective in mitigating the impact of craving on symptoms. Whether this reduction truly reflects effective regulation or merely masks the symptoms warrants further investigation. Nonetheless, these findings reinforce the well-known role of cognitive processes—and potentially motivated reasoning—in gambling behavior.

4.4. Limitations, final remarks, future perspectives, and clinical implications

The present study replicates and extends previous findings on the emotional content of craving in behavioral addictions, as well as on the role of ER in craving and severity of problem symptoms, in two large panel samples of regular video gamers and gamblers, with a broad range of severity scores. Results reinforce the importance of ER processes in craving perception and control in behavioral problems in these two domains. Importantly, differences are reported regarding the relative roles of urgency and intentional ER strategies in the emergence of craving and its translation into severity of problem symptoms. Complementarily, although similarities across the gaming and gambling domains regarding craving emergence processes are evident, potential differences in regulation mechanisms have also been observed. These potential differences open new paths for research that circumvent the customary tendency to fall for confirmatory biases in the behavioral addictions field.

To our knowledge, this is only the second study that directly compares groups of individuals highly involved in these activities with identical or comparable instruments and following parallel procedures, but it is not free of limitations. Among them, it is important to mention that participant recruitment may have compromised representativity. In the current samples, certain gaming/gambling preferences (e.g. for online modalities or skill-based gambling games) are probably overrepresented. In the gambling domain, it has been observed that individuals preferring skill-based games are more sensitive to reinforcement than gamblers with a preference for pure chance games (e.g. Navas et al., 2017a). Sample composition specificities could account for diverging results regarding, for example, the roles of positive and negative urgency in craving and severity of problem symptoms, relative to other studies.

Moreover, the cross-sectional nature of the study precludes strong claims about the causal directionality of the links under scrutiny. Still, the pre-selected models to be tested here stand as the most theoretically viable with the simplest assumptions. First, urgency dimensions are traits and, similarly, ERQ dimensions are general predispositions. Cravings, in turn, are retrospectively reported temporary and acute states, and symptoms represent overt behaviors and their consequences. Traits and predispositions are customarily considered to causally precede acute states, so we have only considered the possibility that urgencies and ERQ dimensions cause or interact with craving, but not that craving states cause urgency or ERQ dimensions. Similarly, we regard urgencies, ERQ dimensions, and cravings as causes of severity of problem symptoms, but not the other way round (i.e., we have not considered the opposite directionality, namely that severity cause craving, urgency, or ERQ dimensions). Still, none of these assumptions is granted.

The only way in which this critique can be overcome is by shifting from cross-sectional designs with retrospective craving self-reports to procedures in which craving is experimentally induced and observed on the spot. Several methods have been developed to actively induce gaming or gambling cravings (see, for instance, Cornil et al., 2017). Actually, research on the factors determining sensitivity to such induction procedures is in its way, but only in its initial stages (López-Guerrero et al., 2024). Preliminary evidence does align with the general models depicted in Fig. 1, and with some of the main empirical findings reported here.

Beyond their theoretical relevance, these findings carry significant practical implications. While positive urgency is traditionally viewed as a risk factor for potentially addictive behaviors, this study highlights its role in intensifying craving states triggered by both environmental and internal stimuli. In other words, practitioners should take into account that individuals with high positive urgency are more vulnerable to relapse in craving-inducing situations, at least within the activities examined here.

Moreover, urgency appears to amplify craving intensity rather than interfere with its later management, suggesting that this effect operates largely on an automatic level and is likely to remain resistant to the top-down restructuring techniques commonly included in cognitive-behavioral therapy packages. In such cases, compulsivity-reduction strategies—such as exposure therapies, nonjudgmental observation, or cognitive distancing—offer more promise of effectiveness (for a review, see López-Guerrero et al., 2025).

Conversely, emotion regulation techniques, particularly training in reappraisal, should be used with caution. Our findings, along with previous research, indicate that its deliberate nature makes it cognitively demanding, increasing the likelihood that individuals may bypass it during episodes of emotional flooding, when cognitive resources are compromised (Navas et al., 2017b), and resource to the much less adaptive suppression strategy. This could hold true even for those who are well-trained in applying reappraisal under less demanding conditions. Additionally, it remains unclear whether reappraisal genuinely mitigates the impact of craving or merely helps individuals mask it, thereby reducing problem awareness without truly addressing the underlying issue.

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Author agreement

We, the authors, confirm that the manuscript titled "Untangling the Role of Emotion Regulation in Gambling and Video Gaming Cravings: A Replication and Extension Study" is our original work and has not been published or submitted for publication elsewhere. All authors have significantly contributed to the manuscript and have reviewed and approved the final version submitted for publication. We declare that any potential conflicts of interest have been fully disclosed and that the research was conducted in accordance with all applicable ethical standards.

Ethics declaration

The procedure of this study complies with the ethical standards of the Helsinki Declaration of 1975, as revised in 2008. The sample was recruited as part of the project Gbrain3, approved by the Human Research Ethics Committee of the University of Granada (reference number 1830/CEIH/2020). All participants were informed about the nature of the study and all provided informed consent.

CRediT authorship contribution statement

Francisco J. Rivero: Writing – original draft, Supervision, Conceptualization. **Juan Ramón Barrada:** Formal analysis. **Ismael Muela:** Writing – review & editing, Data curation. **José C. Perales:** Writing – original draft, Supervision, Funding acquisition, Conceptualization. **Jose López-Guerrero:** Writing – review & editing, Data curation. **Juan F. Navas:** Writing – review & editing, Data curation. **Elena-Aurora García-Gómez:** Writing – review & editing. **Damien Brevers:** Writing – review & editing. **Víctor Ciudad-Fernández:** Formal analysis, Conceptualization.

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.

Data availability

The database and code files for these analyses are available at the Open Science Framework (OSF), as stated in the manuscript.

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