

# Emotion regulation as a transdiagnostic factor in eating disorders and gambling disorder: Treatment outcome implications

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## BRIEF REPORT



## ABSTRACT

**Background:** A first approach addressed to ascertain whether emotion regulation (ER) could be a transdiagnostic construct between eating disorders (EDs) and gambling disorder (GD) (through a joint clinical clustering analysis of both disorders) was performed by Munguía et al. (2021). Both conditions were represented by a *severe, moderate, and low ER profile* subgroups, according to the degree of ER difficulties. Results showed a linear relationship between the severity of ER difficulties and the severity of the disorder and the psychopathological state. **Aims:** Based on the aforementioned cross-sectional study, the objective of this longitudinal research was to explore the treatment response of the different ER subgroups. **Methods:** 459 adult patients ( $n = 277$  ED;  $n = 182$  GD) were included. Several clinical variables, as well as outcome indicators (after completing 16 weeks of cognitive-behavioral therapy), were evaluated. **Results:** The three subgroups found in the previous cross-sectional study were taken for the performance of the present research. ED and GD distribution in each subgroup replicates the one exposed by Munguía et al. (2021), as well as their characterization, considering psychopathology, disorder severity and personality traits. The *low ER* subgroup reported a better response to treatment, whereas the *severe* group had the highest rates of non-remission and dropouts. **Conclusions:** Our results suggest that greater difficulties in ER lead to poorer treatment outcomes. Therefore, tailored treatments for patients with poor ER abilities would be recommended to improve adherence and treatment outcomes.

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## KEYWORDS

gambling disorder, eating disorder, emotion regulation, transdiagnostic, treatment outcome, longitudinal

## INTRODUCTION

Emotion regulation (ER) is the ability to identify, modulate and use specific strategies for an adequate emotional experience and expression (Gross, 2015). Difficulties in ER have been

related to the etiology and maintenance of several psychological disorders, including eating disorders (EDs) and gambling disorder (GD). Even though there is no high prevalence of the co-occurrence of both disorders (Potenza et al., 2019), several commonalities in risk and maintaining factors have been emphasized (Lemón, Fernández-Aranda, Jiménez-Murcia, & Håkansson, 2021). Behaviors such as binge eating, restrictive eating, and betting have been postulated as coping strategies to deal with negative emotional states (Aldao, Nolen-hoeksema, & Schweizer, 2010; Velotti, Rogier, Beomonte Zobel, & Billieux, 2021). In this sense, ER difficulties have been suggested as an underlying transdiagnostic factor (Sloan et al., 2017).

Munguía et al. (2021) explored ER as a transdiagnostic construct between EDs and GD through a joint clinical clustering analysis. The ER severity profile followed a linear relationship with the general psychopathology and severity of the disorder: subgroup-1 (Sg1) corresponds to the “*severe profile*”, subgroup-2 (Sg2) to the “*moderate profile*”, and subgroup-3 (Sg3) to the “*low profile*”. In addition, more functional personality traits (high reward dependence, persistence, self-directedness, and cooperativeness) were found in Sg3, while more impaired ones, as high harm avoidance, were found in Sg1 (Munguía et al., 2021). However, the relationship between ER and treatment outcome was not explored in this previous study.

ER also plays an important role in the response to treatment in ED (MacDonald, Trottier, & Olmsted, 2017) and GD (Sancho et al., 2018). Improvements in ER during cognitive-behavioral therapy (CBT) led to a better response to treatment in ED populations (MacDonald et al., 2017). Treating emotion dysregulation has been highlighted in GD to maintain abstinence (Daughters et al., 2005). However, no previous research has demonstrated if the transdiagnostic role of ER could also have an impact on treatment outcome or, specifically, if treatment response would follow the severity of the ER profile found in the cross-sectional transdiagnostic approach (Munguía et al., 2021).

## Aims

The present longitudinal study aims to explore the treatment outcomes of the different ER subgroups reported by Munguía et al. (2021). We hypothesize that the *low profile* subgroup will present lower rates of dropouts and higher remission rates than the *moderate* and, especially, the *severe profile* subgroups.

## METHODS

### Sample

The participants of this study ( $n = 459$ ; *GD-age*:  $M = 39.68$ ,  $SD = 13.08$ ; *ED-age*:  $M = 28.77$ ,  $SD = 10.32$ ) constitute a subsample of the previous cross-sectional study conducted by Munguía et al. (2021), recruited between January-2017 and July-2019. Patients who underwent group treatment and whose response to treatment was available were included.

They were  $n = 277$  ED patients ( $n = 68$  anorexia nervosa [AN],  $n = 96$  bulimia nervosa [BN],  $n = 41$  binge eating disorder [BED], and  $n = 72$  other specified feeding or eating disorders [OSFED]) and  $n = 182$  GD patients ( $n = 95$  non-strategic gamblers,  $n = 48$  strategic gamblers, and  $n = 39$  mixed gamblers). The upper part of Table S1 (supplementary material) includes the subgroup distribution of the different categories in this study.

### Instruments

The Spanish adaptations of the Difficulties in Emotion Regulation Scale (DERS), Symptom Checklist-Revised (SCL-90-R) and Temperament and Character Inventory-Revised (TCI-R) questionnaires were used. A detailed description of them can be found in the previous study (Munguía et al., 2021).

### Treatment

**Eating disorders.** Patients received CBT treatment carried out by experienced psychologists at Bellvitge University Hospital (HUB). The treatment for BN, BED and OSFED patients was 16 weekly outpatient group sessions of 90 min each. Patients with AN completed a day hospital treatment program with two daily group CBT sessions during 3 months. A detailed explanation could be found in Mallorquí-Bagué et al. (2018).

Not attending three consecutive sessions of CBT was considered a dropout. Patients who completed treatment were categorized as follows: full remission (total absence of ED symptoms for a sustained period of time), partial-remission (substantial symptomatic improvement but with residual symptoms) and non-remission (still meeting full criteria for an ED) (American Psychiatric Association, 2013). Prior published studies have also used these categories (Mallorquí-Bagué et al., 2018).

**Gambling disorder.** Participants with GD received 16 weekly outpatient CBT sessions of 90 min each at HUB, with the main objective of achieving full abstinence.

Despite that to date no consensus about how to define treatment outcomes based on relapses exists (Ledgerwood & Petry, 2006), the following criteria have been established. They were based on the consensus judgment of senior clinical psychologists who considered all aspects of the patient’s relapses, such as the number of them and gambling activity. Following the same classification categories of EDs treatment outcome (American Psychiatric Association, 2013), patients with GD were labeled as dropouts if they missed 3 consecutive sessions. It was considered full remission if there was one or no relapse during the treatment; partial remission implied two or more relapses of their problem gambling activity during the treatment, and finally, non-remission implied active gambling behavior at the end of the treatment.

### Procedure

Exclusion criteria for the study were being under 18 years old, the presence of a severe mental disorder or intellectual



disability, and having received individual treatment. All patients were screened via a structured interview by experienced clinical psychologists.

**Statistical analysis.** Statistical analysis was carried out with Stata17 for Windows (Stata-Corp, 2021). First, the descriptive indexes for the sample were obtained. Next, analysis of variance (ANOVA), for comparing quantitative measures and chi-square test ( $\chi^2$ ) for categorical variables compared the groups defined by the subgroups and the diagnostic subtype. The effect size was estimated with Cohen's *d* for the mean differences and Cohen's *h* for the proportion differences (null effect size was considered for estimates  $< 0.20$ , low-poor for estimates  $> 0.20$ , moderate-medium for estimates  $> 0.50$  and large-high for estimates  $> 0.80$ ) (Cohen, 1988). Finner-procedure was also used for controlling the increase in Type-I error due to the use of multiple statistical significance tests (Finner & Roters, 2001).

**Ethics.** The present study was carried out in accordance with the latest version of the Declaration of Helsinki. The University Hospital Clinical Research Ethics Committee approved the study, and signed informed consent was obtained from all participants.

## RESULTS

### Description of the sample

Compared to GD, the ED subsample included a higher proportion of women (91.3% versus 9.3%,  $P < 0.001$ ), younger age patients ( $M = 28.8$  versus  $M = 39.7$  yrs,  $P < 0.001$ ), earlier onset of the disorder ( $M = 19.6$  versus  $M = 24.4$  yrs,  $P < 0.001$ ) and shorter duration of it ( $M = 9.2$  versus  $M = 15.3$  yrs,  $P < 0.001$ ).

The upper part of Table S1 displays the distribution of the clinical diagnoses between the subgroups. Statistical differences appeared within the total sample ( $P < 0.001$ ): most patients within Sg1 (77.0%) were diagnosed with ED, while Sg2 included 57.4% of ED patients and Sg3 44.1% of ED patients. Among the GD subsample ( $n = 182$ ), no statistical difference was found for the distribution of the gambling preference into subgroups ( $P = 0.872$ ). Within the ED subsample ( $n = 277$ ), statistical differences appeared ( $P < 0.001$ ): Sg1 was characterized by the presence of BN (37.9%) and OSFED (31.5%), Sg2 by BN (37.6%), and Sg3 by AN (46.7%); the lowest proportion of BED was registered for Sg3.

### Description of the subgroups at baseline

Table 1 includes the distribution of the clinical measures at baseline and the comparison between subgroups. The best functional profile was observed for Sg3 whereas Sg1 reported the worst functional profile.

### Comparison of CBT outcomes between subgroups

The upper part in Fig. 1 includes the first 100% stacked bar charts with the distribution of the CBT outcomes among the

total sample, with the comparison between the subgroups and between the diagnostic subtypes (see also Table S1, appendix). Sg3 was associated with the best treatment effectiveness, followed by Sg2 and Sg1. The highest risk of bad treatment outcome (dropout or non-remission) was associated with Sg1 (55.2%). Post-hoc comparison between the subgroups showed differences between Sg1 versus Sg3 ( $P = 0.018$ ), while no differences were obtained comparing Sg2 to Sg3 ( $P = 0.183$ ). Compared with GD, ED patients also increased the likelihood of a bad treatment outcome ( $P < 0.001$ ). The lower part in Fig. 1 includes the 100% stacked bar charts with the comparison of the CBT outcomes between the subgroups within each diagnostic subtype (GD and ED). No statistical differences were obtained in the stratified analyses.

## DISCUSSION

The goal of the present study was to explore the treatment outcome of individuals with GD or ED diagnosis based on the ER profiles defined in the study by Munguía et al. (2021).

Women showed higher difficulties in regulating their affective states, while most of the men belonged to the *low profile* (Sg3). Previous findings have shown greater ER impairments in females with EDs (Agüera et al., 2019), while a recent study revealed that men with GD presented more ER difficulties compared to women (Sancho et al., 2019). Our findings also showed that patients included in the *severe profile* (Sg1) were younger and presented an earlier onset of the disorder. While in the general population ER skills are usually related to older age (Aldao, Gee, De Los Reyes, & Seager, 2016). Sancho et al. (2019) observed that older patients with GD presented more difficulties in regulating affect. Regarding ED population, younger age was associated with a higher risk of dropout in men (Agüera et al., 2017). Nevertheless, the age of onset of the disorder does not appear to be determinant for treatment outcome (Jiménez-Murcia et al., 2010; Vall & Wade, 2015), whereas other characteristics, such as ER skills (MacDonald et al., 2017), do play a key role in determining the rate of remission, number of dropouts and relapses.

The dropout and remission rates in the present work are similar to those described in previous studies (Agüera et al., 2019; Toneatto & Ladouceur, 2003). As hypothesized, the *severe profile* was characterized by a higher number of dropouts compared to the rest of the subgroups, which agrees with previous research stating that greater psychopathology predicts a worsened treatment response (Accurso et al., 2016; Jiménez-Murcia et al., 2007). Regarding personality, *severe profile* presented the highest score in harm avoidance (related to a more anxious, pessimistic, and insecure profile), whereas elevated scores in reward dependence, persistence, self-directedness, and cooperativeness characterized the *low profile*, meaning they are more friendly, more empathic and with a tendency to set and achieve goals. These findings are in agreement with previous studies reporting altered personality traits affecting

Table 1. Comparison between the subgroups at baseline

	Subgroup-1 (n = 161)		Subgroup-2 (n = 162)		Subgroup-3 (n = 136)		Global test P	Subgroup-1 vs Subgroup-2		Subgroup-1 vs Subgroup-3		Subgroup-2 vs Subgroup-3	
	n	%	n	%	n	%		P	h	P	h	P	h
Sex Women	122	75.8%	94	58.0%	54	39.7%	<b>&lt;0.001*</b>	<b>0.001*</b>	0.38	<b>&lt;0.001*</b>	<b>0.75<sup>†</sup></b>	<b>0.002*</b>	0.37
Men	39	24.2%	68	42.0%	82	60.3%							
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>P</i>	<i>P</i>	<i> d </i>	<i>P</i>	<i> d </i>	<i>P</i>	<i> d </i>
Age (yr)	30.66	11.44	34.17	12.78	34.68	13.53	<b>0.010*</b>	<b>0.013*</b>	0.29	<b>0.006*</b>	0.32	0.724	0.04
Onset of dis. (yrs)	19.94	7.84	21.85	9.61	22.94	10.37	<b>0.018*</b>	0.064	0.22	<b>0.006*</b>	0.33	0.316	0.11
Duration dis. (yrs)	10.73	10.23	12.31	10.45	11.75	10.30	0.379	0.169	0.15	0.397	0.10	0.638	0.05
DERS Non-acceptance	23.93	4.65	18.11	5.60	12.08	5.53	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>1.13<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.32<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.08<sup>†</sup></b>
DERS Goals	20.47	2.88	15.72	3.99	11.43	3.64	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>1.36<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.76<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.12<sup>†</sup></b>
DERS Strategies	17.76	4.81	18.56	4.63	16.07	4.80	<b>&lt;0.001*</b>	0.134	0.17	<b>0.002*</b>	0.35	<b>&lt;0.001*</b>	<b>0.53<sup>†</sup></b>
DERS Awareness	30.94	5.00	21.79	4.64	13.94	4.15	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>1.90<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>3.70<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.78<sup>†</sup></b>
DERS Impulse	21.76	4.62	14.19	3.92	10.20	3.04	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>1.77<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.96<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.14<sup>†</sup></b>
DERS Clarity	17.15	4.00	14.09	3.98	9.53	2.92	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>0.77<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.18<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.31<sup>†</sup></b>
Total DERS score	132.0	13.57	102.4	13.04	73.3	13.60	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>2.22<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>4.32<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.18<sup>†</sup></b>
SCL-90R GSI	2.24	0.54	1.37	0.49	0.71	0.49	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>1.69<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.98<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.36<sup>†</sup></b>
SCL-90R PST	73.27	10.58	57.44	16.34	36.61	18.33	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>1.15<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.45<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.20<sup>†</sup></b>
SCL-90R PSDI	2.72	0.45	2.10	0.47	1.60	0.45	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>1.36<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.47<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.07<sup>†</sup></b>
TCI-R Novelty seeking	105.4	17.96	105.1	15.84	104.6	13.59	0.905	0.845	0.02	0.655	0.05	0.795	0.03
TCI-R Harm avoidance	125.8	18.31	110.5	16.41	92.1	14.51	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>0.88<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.04<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.19<sup>†</sup></b>
TCI-R Reward depend.	98.5	16.57	99.0	14.32	103.9	14.04	0.003*	0.764	0.03	<b>0.002*</b>	0.36	<b>0.005*</b>	0.35
TCI-R Persistence	103.6	20.88	105.8	18.43	116.1	17.64	<b>&lt;0.001*</b>	0.300	0.11	<b>&lt;0.001*</b>	<b>0.65<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>0.57<sup>†</sup></b>
TCI-R Self-directedness	105.3	15.77	119.2	14.17	144.8	15.99	<b>&lt;0.001*</b>	<b>&lt;0.001*</b>	<b>0.92<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>2.49<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>1.70<sup>†</sup></b>
TCI-R Cooperativeness	128.3	16.98	130.6	15.14	138.6	14.08	<b>&lt;0.001*</b>	0.165	0.15	<b>&lt;0.001*</b>	<b>0.66<sup>†</sup></b>	<b>&lt;0.001*</b>	<b>0.54<sup>†</sup></b>
TCI-R Self-transcende.	67.1	14.01	62.5	13.40	59.8	13.47	<b>&lt;0.001*</b>	<b>0.003*</b>	0.34	<b>&lt;0.001*</b>	<b>0.53<sup>†</sup></b>	0.086	0.20

Note. SD: standard deviation. \*Bold: significant comparison (0.05).

<sup>†</sup>Bold: effect size into the ranges mild-moderate to the high-large.



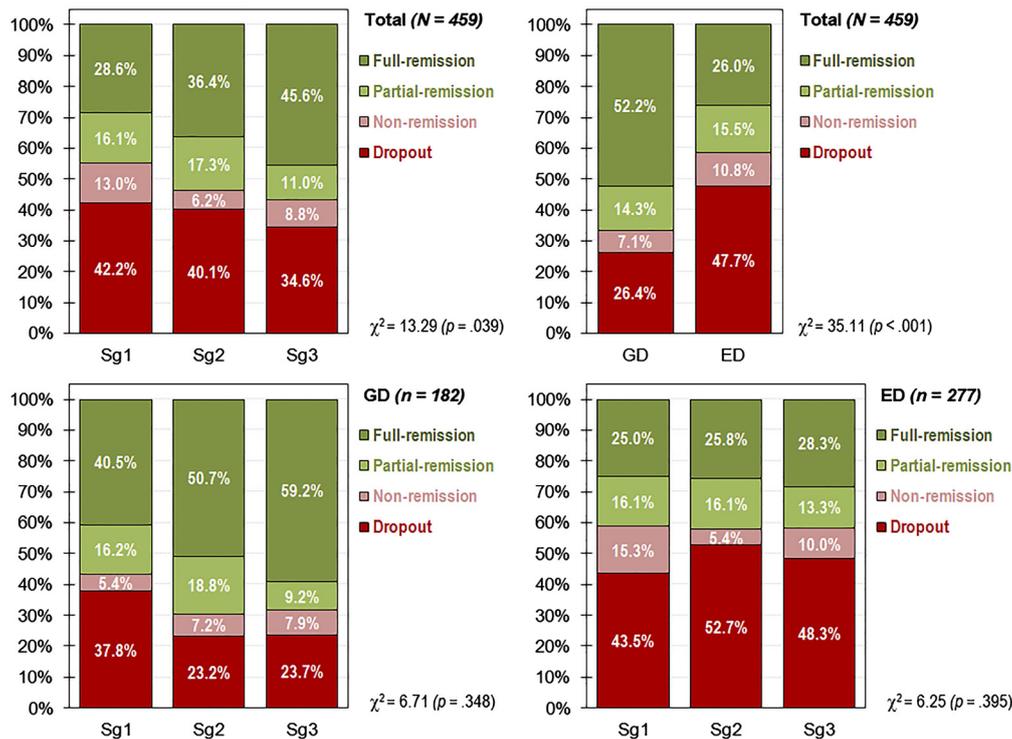


Fig. 1. Distribution of the CBT outcomes within the diagnoses and the subgroups

Note. GD: gambling disorder. ED: eating disorder. Sg1: Subgroup 1. Sg2: Subgroup 2. Sg3: Subgroup 3. Full-rem.: full remission. Partial-rem.: partial remission. Non-rem.: non-remission.

treatment outcomes in individuals with EDs (Agüera et al., 2017) and GD (Ramos-Grille, Gomà-i-Freixanet, Aragay, Valero, & Vallès, 2015).

In conclusion, our hypotheses were confirmed since the *low profile subgroup* presented a higher number of patients with full remission outcomes, while the highest percentage of non-remission corresponded to the *severe profile* as well, and the highest percentage of partial remission was associated with the *moderate profile*. Based on the present findings, we could postulate that higher emotion dysregulation is associated with higher psychological distress and may be related to lower rates of remissions and higher taxes of dropouts. In this regard, deficits in ER have been linked to poorer treatment outcomes in both disorders (Mallorquí-Bagué et al., 2018; Velotti, Rogier, BeomonteZobel, & Billieux, 2021). Thus, interventions aimed at improving emotion dysregulation are necessary to obtain better treatment outcomes. Certain treatments that focus on ER have been applied in both the GD (Sancho et al., 2018) and ED populations (Safer, Telch, & Agras, 2001; Wanden-Berghe, Sanz-Valero, & Wanden-Berghe, 2011) with favorable results.

## Limitations

The present study should be evaluated within the context of several limitations. The classification of treatment outcome in GD has been established based on the consensus judgment of the senior clinical psychologist of the unit, not used in earlier studies, which compromises the generalization of the results. What is more, future research should consider

variables that may influence emotion regulation as comorbidity and medication intake. Finally, the transdiagnostic approach only examined two associated disorders; other conditions related to difficulties in ER should be examined.

## Conclusions

This research supports a growing literature highlighting ER impairments as a transdiagnostic feature across psychiatric disorders (Aldao et al., 2010; Sloan et al., 2017). One of the most significant findings of the present study indicated that greater difficulties in regulating emotions may lead to poorer treatment outcomes, suggesting the relevance of considering ER to carry out individualized treatment approaches.

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**Authors' contribution:** CVA, LM, SJM and FFA contributed to the development of the study concept and design. RG performed the statistical analysis. AGP, IS and JSG aided with data collection. CVA and LM wrote the original manuscript. FFA, JM and SJM obtained funding. NSM, FFA, JM and SJM revised the manuscript and provided substantial comments. All authors had full access to all study data.

**Conflict of interest:** None of the authors have any conflicts of interest.

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## APPENDIX

Table S1. Distribution of the diagnostic subtypes within the empirical subgroups and comparison of the CBT outcomes

Sample		Subgroup-1 (n = 161)		Subgroup-2 (n = 162)		Subgroup-3 (n = 136)		Global test P	Subgroup-1 vs Subgroup-2		Subgroup-1 vs Subgroup-3		Subgroup-2 vs Subgroup-3	
		n	%	n	%	n	%		P	h	P	h	P	h
Total (n = 459)	GD	37	23.0%	69	42.6%	76	55.9%	<0.001*	<0.001*	0.42	<0.001*	<b>0.69</b> <sup>†</sup>	<b>0.022</b> *	0.27
	ED	124	77.0%	93	57.4%	60	44.1%			0.42		<b>0.69</b> <sup>†</sup>		0.27
Total (n = 459)	GD	37	23.0%	69	42.6%	76	55.9%	<0.001*	<b>0.001</b> *	0.42	<0.001*	<b>0.69</b> <sup>†</sup>	<b>0.003</b> *	0.27
	AN	19	11.8%	21	13.0%	28	20.6%			0.04		0.24		0.21
	BN	47	29.2%	35	21.6%	14	10.3%			0.17		<b>0.51</b> <sup>†</sup>		0.31
	BED	19	11.8%	17	10.5%	5	3.7%			0.04		0.32		0.27
	OSFED	39	24.2%	20	12.3%	13	9.6%			0.31		0.40		0.09
ED (n = 277)	AN	19	15.3%	21	22.6%	28	46.7%	<0.001*	0.292	0.19	<0.001*	<b>0.70</b> <sup>†</sup>	<b>0.010</b> *	<b>0.51</b> <sup>†</sup>
	BN	47	37.9%	35	37.6%	14	23.3%			0.01		0.32		0.31
	BED	19	15.3%	17	18.3%	5	8.3%			0.08		0.22		0.30
	OSFED	39	31.5%	20	21.5%	13	21.7%			0.23		0.22		0.00
GD (n = 182)	Non-strategic	19	51.4%	37	53.6%	39	51.3%	0.872	0.704	0.05	0.577	0.00	0.928	0.05
	Strategic	8	21.6%	18	26.1%	22	28.9%			0.10		0.17		0.06
	Mixed	10	27.0%	14	20.3%	15	19.7%			0.16		0.17		0.01
Outcomes (n = 459)	Dropout	68	42.2%	65	40.1%	47	34.6%	<b>0.039</b> *	0.130	0.04	<b>0.018</b> *	0.16	0.183	0.12
	Non-remission	21	13.0%	10	6.2%	12	8.8%			0.24		0.14		0.10
	Partial-remission	26	16.1%	28	17.3%	15	11.0%			0.03		0.15		0.18
	Full-remission	46	28.6%	59	36.4%	62	45.6%			0.17		0.35		0.19

Note. GD: gambling disorder. ED: eating disorders. AN: anorexia nervosa. BN: bulimia nervosa. BED: binge eating disorder. OSFED: other specified feeding disorder.

\*Bold: significant comparison (0.05).

<sup>†</sup>Bold: effect size into the ranges mild-moderate to the high-large.

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