

# Analysis of the Effectiveness of Cognitive Remediation and Emotional Skills Training in a Group format. Preliminary results in patients with eating disorders

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## Abstract

Eating disorders (ED) are associated with cognitive and emotional impairments. Cognitive and Emotional Remediation Skill Training (CREST) was developed as an intervention program targeting patients' thinking styles and their skills in recognizing and managing emotions.

**AIM:** to analyze the effects of the CREST intervention in a group format in females with ED. **METHOD:** eight females underwent a CREST program (eight 90-minute sessions) targeting cognitive (central coherence, set shifting, problem solving) and emotional (recognizing emotions, managing emotions) difficulties. It was assessed cognitive flexibility (Wisconsin Card Sorting Test), decision-making (Iowa Gambling Task), central coherence (Group embedded Figures Test), alexithymia (Toronto Alexithymia Scale), affect (Positive and Negative Affect Schedule), ED symptomatology (Eating Attitudes Test). **RESULTS:** Results showed improvements in cognitive flexibility, decision-making, and central coherence, a decrease in depression, anxiety, negative affect, and alexithymia, and an improvement in quality of life. **CONCLUSION:** The results of this study on patients with ED suggest that the CREST can reduce ED symptomatology and could increase adherence to psychological treatments.

## Introduction

Eating disorders (ED) are characterized by an altered eating pattern (restricting eating, having an irresistible urge to eat, etc.), along with a series of practices aimed to compensate for the effects of eating (vomiting, taking laxatives, excessive exercise, etc) [1]. Anorexia Nervosa (AN) and Bulimia Nervosa (BN), along with the eating disorder not otherwise specified or the DSM-5 classification of other specified feeding or eating disorder (EDNOS/OSFED), are the most frequent eating disorders [2]. AN is related to intake restrictions and weight significantly below what would be expected for that age, whereas BN is related to recurrent binge episodes followed by compensatory behaviors [1]. Despite these differences in symptomatology, eating disorders (ED) share the characteristic of presenting impairments in several cognitive domains. For example, impairments in decision-making [3,4] central coherence [5-9] and cognitive flexibility [10] have been reported in both AN and BN. These impairments, however, vary depending on the specific diagnosis. Whereas individuals with AN have a tendency to focus on details [11] and have impairments in simple alternation and perceptual change [11], individuals with BN are more likely to have impairments in inhibition [12] and cognitive flexibility [10]. In addition to these cognitive impairments, ED are associated with emotional impairments expressed as difficulties in identifying and distinguishing emotions [13,14], expressing and managing emotions [13,15], and regulating negative emotions [16].

To address these cognitive and emotional difficulties present in ED, the CREST was designed based on Cognitive Remediation Therapy [17], the interpersonal cognitive model, and quantitative and qualitative research on interventions for ED and general psychology (positive psychology, emotional intelligence, social communication, and social anhedonia) [18]. The CREST was developed initially as a treatment for inpatients with AN, and it was considered a complimentary treatment offered on admission as a way to "think about emotional processing". It has been reported that this type of intervention, based on psychoeducation and developed in a ludic environment unrelated to food, may help patients to process their emotions, develop an adequate rapport with the therapist, and get ready for other psychological interventions [18,19]. It is a standardized individual intervention program structured around 6 topics (cognitive and emotional) that are developed throughout 10 sessions lasting 30-45 minutes each. The main aims are to identify the patients' thinking

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styles and skills in recognizing and managing emotions, and train them in cognitive and emotional abilities to be used in their daily lives. These goals are attained through psychoeducation about thinking and emotions, exercises performed during the sessions, and homework done between sessions to facilitate learning and generalization to other untrained situations. The CREST has been applied successfully in patients with AN in both individual and group formats [18,20] and it was recently applied in a group format to people with obesity [21]. The aims of the present study were to analyze the effects of the CREST in a group format in a sample of females with AN and BN. To our knowledge, the CREST has never been applied in a group format to Spanish samples of females with eating disorders that include AN and BN. For this reason, we believe that this study could provide important data for both research and clinical purposes.

## Materials and Methods

### Participants

This study reports on data from females with ED from the Hospital Universitario de la Ribera (Alzira, España). Inclusion criteria were being female, age between 16-60 years, and meeting the criteria for AN, BN or other specified ED according to the DSM-5 [1]. Participants were all psychology and/or psychiatry outpatients. Exclusion criteria were having sensoriperceptual impairments that affected reading or comprehension and having severe physical or mental diseases (e.g., psychosis).

*Participant 1 (P1)* was 18 years old, with a weight of 47.8 Kg and a Body Mass Index (BMI) of 17.88. P1 was diagnosed with AN-restricting type. At the time of inclusion in the study, P1 lived with her parents and a sibling. She was a nursing student at the university. At age 13, P1 initiated a restricting diet to lose weight after being obese during childhood. She was seen for the first time by an ED specialist at age 15 after losing 17 Kg, at that time with a BMI=16.2. P1 has been an outpatient for 3 years and is still receiving psychological and psychiatric interventions.

*Participant 2 (P2)* had a diagnosis of atypical AN. She was 43 and weighed 50.60 Kg, with an BMI=18.88. At the time of inclusion, she was living with her mother. The onset of the eating disorder was at age 14, with restricting and purging behaviors. At that time, she met criteria for the AN-purging subtype. P2 has been in psychological and psychiatrist treatment since the onset of the ED, with fluctuations in her symptomatology. At the time of her participation in the study, she met the criteria for the other specified eating disorder restricting type.

*Participant 3 (P3)* had a diagnosis of AN-restricting type. She was 21 and weighed 44.1 KG, with a BMI=17.22. P3 was a college student and lived with other students. During her childhood, P3 was overweight, reaching 82 Kg at age 19. After she was advised to lose weight to find a job, she started restricting food intake behaviors associated with compensatory behaviors such as vomiting and excessive exercising. At the time of her participation in the study, P3 had stopped the purging behaviors, although she still had an intense fear of putting on weight, obsessive thoughts related to food, food dysregulation, and behaviors such as checking and avoiding. P3 met criteria for the other specified eating disorder bingeing type.

*Participant 4 (P4)* was diagnosed with the AN-restricting type. She was 17 and weighed 45.60 Kg, with a BMI=16.4. Her ED started at age 14 with behaviors related to restriction of the frequency and amount of food intake. At the time of participation, P4 lived with her parents

and an older sister, had restricting behaviors and hyperactivation, and referred to feelings of anxiety and sadness.

*Participant 5 (P5)* was diagnosed with the AN-purging subtype. She was 18 years old and weighed 40.20 KG (BMI=16.73). She was in high school and lived with her parents and an older sister. The ED began about 1.5 years earlier, when she started to perform restricting and vomiting behaviors. At the time of participation, she still had an intense fear of gaining weight and high body image dissatisfaction.

*Participant 6 (P6)* was diagnosed with the AN-restricting type. She was 17 years old and lived with her father and two siblings. She weighed 40.80 Kg and had a BMI of 15.36. The ED began at age 12 with body dissatisfaction after food restriction following salmonellosis. Her lowest BMI reached 13.7. At the time of participation, she had gained some weight and still met criteria for the AN-restricting type.

*Participant 7 (P7)* was diagnosed with the AN-purging subtype. She was 40 years old, weighed 53.1 Kg (BMI=18.37), and lived with her husband and 9 year-old daughter. Her ED began at age 13, after suffering from bullying at school because of her overweight problems. She first presented restricting behaviors that later changed into binge/purging behaviors such as vomiting and laxative abuse. At the time of participation, she still met criteria for the AN-purging-type.

*Participant 8 (P8)* was diagnosed with BN. She was 19, weighed 97.10 kg (BMI=36.1), and lived with her mother and two sisters, one older and one younger. The ED had begun three years earlier, after a conflictive relationship, and it worsened after her father's sudden death. Early in the beginning of the ED, she presented purging and vomiting behaviors, along with food intake restriction and excessive physical exercise. At the time of participation, P8 still met criteria for BN.

### CREST procedure

The CREST adaptation to a group format was structured in 4 modules across eight weekly 90-minute sessions. Each module was focused on different cognitive abilities: module 1 focused on executive functioning skills, such as central coherence, set-shifting, and problem solving; module 2 focused on the relation between thinking and emotions, and how each affects the other reciprocally; module 3 focused on recognizing emotions in oneself and in others; module 4 focused on managing emotions with regard to others. The first session focused on explaining the objectives of the CREST, whereas the remaining sessions worked on different cognitive abilities through exercises and homework. Each session, except for session 1, began with homework from the previous session and developed new exercises and homework. Exercises in the CREST are based on psychoeducation, and, thus, the therapeutic style is collaborative, fostering collaboration and reward. All the sessions were carried out by an experienced therapist trained in CREST.

### Materials

Anthropometric measures of weight and height were registered for each participant to calculate the BMI. Weights reported in the Participants section are the ones registered at the beginning of their participation in the pre-test assessment prior to entering the CREST.

**The Iowa gambling task (IGT):** This test is used to measure decision-making. The examinee is told to gain as much money as possible by selecting cards from 4 decks. Two decks are advantageous, and two are disadvantageous. The total score is obtained by subtracting the disadvantageous decks from the advantageous decks after 100 choices, so that positive scores indicate better decision-making [22].

**Wisconsin Card Sorting test (WCST):** This test assesses the ability to adapt one's cognitive strategies in response to environmental changes. Examinees are asked to classify 128 cards in one of four stimulus decks according to a criterion that is unknown to the subject and modified after a number of correct responses. In this study, the computerized version was used, and the variables total number of complete categories, number of perseverative errors, and total number of errors were analyzed. Lower scores suggest cognitive deficiencies [23].

**Group Embedded Figures Test (GEFT):** This test is used to assess the tendency to focus on details from visually presented information. The examinee is asked to identify a simple figure embedded in a complex figure. The outcome is the total number of figures correctly identified in two sections with 9 figures each, in 5 minutes per section. Higher scores indicate a greater number of correctly identified figures [24].

**Toronto Alexithymia Scale (TAS) [25] (Spanish version by Páez, et al. [26]):** The TAS is a self-report questionnaire assessing difficulties in dealing with emotions. The TAS includes three scales: difficulties identifying emotions and differentiating body sensations and emotional activation; difficulties describing emotions in others; and a thinking style oriented towards external cues. Each scale contains 20 Likert-type items with scores ranging from 1 (completely disagree) to 5 (completely agree), with higher values indicating higher levels of alexithymia.

**Positive and Negative Affect Schedule (PANAS) [27], Spanish version by Sandín, et al. [28]).** The PANAS is a 20-item self-questionnaire assessing positive (PANAS+) and negative (PANAS-) affect. The PANAS+ (range 1-50) assesses the ability to get involved in pleasant activities, whereas the PANAS- (range 1-50) assesses the presence of self-perceived distress. Each item is rated on a 5-point Likert type scale ranging from 1 (nothing) to 5 (very much), with higher values indicating more positive or negative affect.

**Eating Attitudes Test (EAT-26) [29]:** The EAT is a self-report questionnaire assessing attitudes and behaviors related to eating habits. The 26-item version provides three factors: DIET or food restriction, BULIMIA and worry about food, and ORAL control. The Spanish version by Castro, Toro, Salamero and Guimerá [30] was used in this study. Each item is rated on a 6-point Likert type scale. Responses can be rated as 0 (never, rarely, sometimes), 1 (often), 2 (almost always), or 3 (always), with higher values suggesting distorted eating attitudes and eating concerns. Only item 25 is inverted.

**Quality of Life Index [31]:** The Spanish version of the Quality of Life Index (QLI-Sp) was used to measure aspects of physical and psychological well-being, self-care and independent functioning, occupational and inter-personal functioning, socio-emotional and community support, and personal and spiritual fulfillment. Each item is rated on a 10-point Likert-type scale, with higher values indicating better quality of life.

**Satisfaction with the CREST.** We used a self-report questionnaire adapted from Borkovec and Nau [31] to assess satisfaction with the CREST. This questionnaire included six Likert-type items ranging from 0 (nothing) to 10 (very much) to assess to what degree the CREST was logical, useful for each participant, and useful for other psychological problems, to what degree they would recommend the CREST, to what degree they found the CREST aversive, and to what degree they are satisfied with the CREST.

Neuropsychological, emotional, and quality of life tests and questionnaires were administered both before and after the CREST.

This project was carried out according to the Helsinki declaration, and it was approved by the Ethical Committee at the University of Valencia and at each participating site. Participants signed the informed consent before the first assessment.

## Results

After receiving the CREST, the majority of the participants showed an improvement on the neuropsychological measures compared to their pre-training scores. As Table 1 shows, in most cases the IGT improved from negative to positive scores, which suggests that participants used a strategy based on long-term reinforcement after the CREST. On the WCST, participants remained stable or increased the number of categories completed. Regarding the WCST errors, in most cases patients had a lower number of total errors (except P2) and perseverative errors (except P2, P4 and P5). Participants also showed a higher number of embedded figures, which indicates an increased tendency to focus on details after the CREST.

On the emotional variables (TAS and PANAS), a significant reduction was found in the total alexithymia scores and on each of the scales. All but one participant improved on identifying emotions and externally orienting thinking, whereas all but two participants improved on describing emotions. Regarding affect, we found a slight increase in positive affect and a slight decrease in negative affect, although the variability in the scores increased after the CREST. In the case of the PANAS scores, only P5 and P8 improved positive affect, whereas the remaining participants remained stable or reported slightly lower positive affect. Conversely, the majority of the participants reported decreased negative affect.

As can be observed, on the variables related to general psychopathology (DASS), all but one participant (P3) reported a significant decrease in scores related to depression, anxiety, and distress. The eating symptoms, measured by the EAT, showed a significant decrease for all participants in every factor. All the patients except one (P2) showed lower total scores and lower ORAL control scores, and all but two participants showed lower BULIMIA scores (P1 and P2), whereas every participant showed lower DIET scores. As Figure 1 reveals, on quality of life, all the participants showed an increase in the score on the QLI-Sp, from an average score of 4.12 before the treatment to an average score of 5.87 after the CREST.

Finally, when participants were asked to rate their satisfaction with the CREST, most of them reported that it was logical ( $M=7.71$ ) and useful ( $M=7.15$ ), that they were satisfied with the program ( $M=7.71$ ),

## Quality of life scores

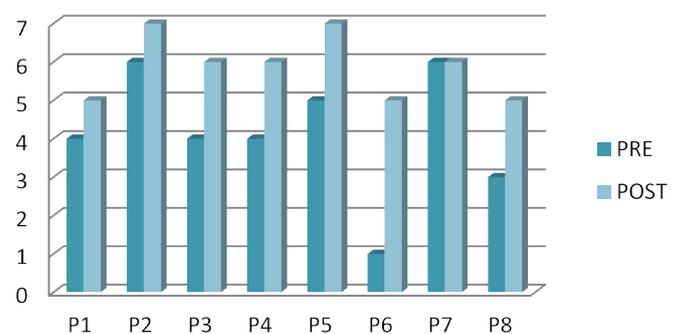


Figure 1. Perceived quality of life before and after the CREST intervention

**Table 1.** Pre- and post-intervention measures for each patient

	P1		P2		P3		P4		P5		P6		P7		P8		Mean (SD)	Mean (SD)
	Pre	Post	Pre	Post														
IGT	4	-8	-2	2	-20	22	0	2	-8	0	-16	-8	-16	-2	4	4	-6.75 (9.62)	1.50 (9.43)
WCST Cat.	6	6	6	6	6	6	6	6	6	6	1	6	6	6	4	6	5.13 (1.81)	6 (0)
WCST Total errors	24	13	13	15	9	7	13	10	13	12	61	8	35	17	58	19	28.25 (21.01)	12.63 (4.24)
WCST Pers errors	9	6	5	7	4	4	5	4	7	9	31	4	16	8	25	10	12.63 (10.38)	6.63 (2.26)
GEFT	8	11	4	4	10	16	14	12	3	11	15	18	10	6	10	9	9.25 (4.23)	10.88 (4.67)
TAS F1	16	7	15	12	22	14	14	8	27	21	35	22	16	16	31	12	22 (8.11)	14 (5.48)
TAS F2	14	7	14	12	13	12	12	13	22	19	24	13	20	12	6	13	15.63 (5.95)	12.63 (3.25)
TAS F3	25	20	29	29	18	17	26	19	25	27	30	18	28	20	22	20	25.38 (3.93)	21.25 (4.33)
TAS Total	53	34	58	53	53	43	52	40	74	67	89	53	64	48	59	45	62.75 (12.87)	47.88 (10.03)
PANAS+	21	37	22	23	28	24	33	21	26	30	27	24	23	19	41	50	27.63 (6.63)	28.50 (10.38)
PANAS-	17	11	30	30	21	25	27	40	31	24	33	49	25	24	33	11	27.13 (5.82)	26.75 (13.07)
DASS D	6	0	8	6	8	9	11	8	15	6	21	3	11	5	13	0	11.63 (4.78)	4.63 (3.38)
DASS A	2	1	5	5	8	7	8	7	13	6	17	1	6	3	10	0	8.63 (4.72)	3.75 (2.87)
DASS S	3	0	13	7	11	11	16	13	12	10	16	4	17	1	15	0	12.88 (4.52)	5.75 (5.23)
EAT Diet	15	14	9	8	29	20	34	0	24	12	18	17	24	21	20	18	21.63 (7.91)	13.75 (7.03)
EAT Bulimia	1	2	2	2	15	9	19	0	15	2	9	8	15	11	7	0	10.38 (6.65)	4.25 (4.37)
EAT Control	10	7	1	4	14	13	15	2	18	0	14	3	18	16	12	4	12.75 (5.47)	6.13 (5.59)
EAT Total	26	23	12	14	58	42	68	2	57	14	41	28	57	48	39	22	44.75 (18.85)	24.13 (15.14)

Pre: Pre-intervention measure; Post: Post-intervention measure; IGT: Iowa Gambling Task. WCST: Wisconsin Card Sorting Test. WCST Cat. Categories; WCST Pers: perseverative. GEFT: Group Embedded Figures Test. TAS F1: difficulty identifying emotions. TAS F2: difficulty describing emotions; TAS F3: external orientation of thinking. PANAS+: positive affect. PANAS-: negative affect. DASS D.: Depression scale of Depression, Anxiety and Stress Scale; DASS A.: Anxiety scale of DASS; DASS S: Stress scale of DASS; EAT: Eating attitudes test.

and that they would recommend it to a friend with the same problem. Participants did not find the CREST to be aversive ( $M=2.28$ ). On the qualitative report, when patients were asked what they had learned about themselves during this therapy, some patients mentioned that it had helped them to become more aware of the importance of emotions. One of them specifically wrote: “I have learned that I need to stop and look, open my angle of vision, live longer, and enjoy myself instead of having nerves, burdens, and fears”. Regarding the strategy that had been most useful to them, the majority also mentioned strategies related to emotions. Specifically, one patient said that she had found it helpful to “express my feelings, even in writing”. And finally, in terms of aspects to improve, four patients mentioned that they would have liked to participate more, and two of them wished that the treatment had been longer.

## Discussion

The main aim of the present study was to analyze the efficacy of the CREST in a group format in a sample of females with ED. The results of this pilot study with eight females with eating disorders are positive: regarding the neuropsychological variables, we found improvements in cognitive flexibility and improvements on the central coherence task, with participants showing a decreased detail-focused processing style. Thus, we found improvements in emotional processing, mainly in alexithymia, with participants showing fewer difficulties in identifying and describing feelings, along with a reduced thinking style oriented towards external cues. Although pre-intervention scores on general psychopathology and eating attitudes were not very high, scores decreased after the CREST in most of the participants. These results are consistent with previous research reporting improvements in neuropsychological functions [33] and emotional symptoms such as social anhedonia and motivation in patients with AN and obesity [34]. However, as far as we know, this is the first study to include patients with BN and the EDNOS binge type (P8 and P3, respectively). In these patients, the CREST was also effective in improving the neuropsychological measures, affect, and eating symptoms.

Participants rated the CREST highly positively, and they reported that the program was useful for their eating disorder, with training in logical strategies, and quite satisfying. These findings agree with those reported by Tchanturia, *et al.* [18] and Money, *et al.* [35], who reported that participants found the intervention to be useful with regard to the training strategies focused on the functioning, managing, and expression of emotions. In fact, in our study, the management of emotions was the component most appreciated by the patients.

Some limitations must be highlighted: due to the small number of participants, our results are preliminary, and no generalizations can be made. Moreover, our design did not include a group with treatment as usual without CREST, which prevented us from analyzing its differential efficacy. The lack of normative data on neuropsychological and emotional variables in people with eating disorders did not allow us to compare participants’ scores to those of a sample matched on socio-demographic characteristics such as age or level of education.

However, these preliminary results yield hopeful data. Given the difficulties found in treating patients with ED, there is a need to investigate whether this complementary short intervention focused on cognitive and emotional factors increases the effects of the usual psychological treatments (34). As far as we know, this is the first study to apply the CREST in a group format to patients with AN and BN, suggesting significant improvements. The results found here should be replicated in future research with larger samples, especially in patients with BN, for whom this study indicates that the intervention is also effective. As previously pointed out by other authors, the CREST could be delivered early in the course of the eating disorders [35], thus reducing the symptomatology and increasing adherence to psychological treatments delivered in clinical practice [36].

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