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Research paper

Emotion dysregulation and neuroticism as moderators of group Unified Protocol effectiveness outcomes for treating emotional disorders

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ABSTRACT

Background: The personality dimension neuroticism and difficulties in emotional regulation (ER) are two variables closely related to the onset, course, and maintenance of emotional disorders (EDs). The Unified Protocol for the Transdiagnostic Treatment of Emotional Disorders (UP) is a treatment specifically designed to address neuroticism by training in adaptive ER skills and has been shown to be effective in reducing difficulties in ER. However, the specific impact of these variables on treatment outcomes is not entirely clear. The aim of the present study was to explore the moderating role of neuroticism and difficulties in ER regarding the evolution of depressive and anxiety symptoms and quality of life.
Methods: This secondary study included 140 participants diagnosed with EDs, who received the UP in group format as part of an RCT being conducted in different Spanish Public Mental Health Units.
Results: The results of this study found that high scores in neuroticism and difficulties in ER were associated with greater severity of depression and anxiety symptomatology, and with poorer quality of life. In addition, difficulties in ER moderated the efficacy of UP regarding anxiety symptoms, and quality of life. No moderating effects were found for depression ($p > 0.5$).
Limitations: We only evaluated two moderators that may influence UP effectivenes; other key moderators should be analyzed in future.
Conclusions: The identification of specific moderators affecting transdiagnostic interventions outcomes will allow the development of personalized interventions and provide useful information to improve the psychopathology and well-being of people with EDs.

Emotional disorders (EDs; anxiety, depressive and related disorders; Bullis et al., 2019) are the most prevalent group of psychological disorders worldwide (World Health Organization, 2017). These disorders are characterized by high levels of anxiety, depression, fear, and physical symptoms (Goldberg et al., 2009) and are commonly related to functional impairment and high socio-economic costs (World Health Organization, 2017).

Overlapping symptoms of the EDs (e.g., difficulty concentrating in depression, generalized anxiety disorder or posttraumatic stress disorder; presence of panic attacks in any EDs) and high rates of comorbidity between them have suggested the presence of shared mechanisms that may contribute to the development and maintenance of these disorders (Brown et al., 2001; Wilamowska et al., 2010). Specifically, psychopathology research suggests the existence of genetically based, personality dimensions that can account for the etiology, course, and maintenance of the full range of EDs. This would be the case for neuroticism (Brown and Barlow, 2009). Neuroticism would be defined as a relatively stable tendency to experience negative emotions with great frequency and high intensity in response to different sources of stress and those emotional responses would include anxiety, irritability, anger, sadness, and worry, among others (Brown and Barlow, 2009). It is a dimension highly related to a multitude of mental health disorders (e.g., emotional disorders, schizophrenia or substance use disorder), as well as physical problems (e.g., cardiovascular problems, immune system alterations or irritable bowel syndrome) (Lahey, 2009).

In addition, different research studies have found that difficulties in

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emotion regulation (ER), which is defined as "those processes by which people influence what emotions we have, when we have them, and how we experience and express them" (Gross, 1999), have been also observed in various types of psychological disorders such as depression, anxiety and eating disoders (e.g., Aldao and Nolen-Hoeksema, 2012; Fairholme et al., 2013; Gruber et al., 2008; Vine and Aldao, 2014). Although neuroticism and emotion regulation have been usually studied as separated phenomena (Stanton et al., 2016), they show similarities and an undoubted relation. Of the major dimensions of personality (i.e., neuroticism, extraversion, agreeableness, openness, and conscientiousness), neuroticism is one the most consistently linked to functional outcomes and corresponds to variation in the capacity to regulate emotional reactions (Ozer and Benet-Martínez, 2006). Furthermore, it has also been defined as a trait characterized by emotional lability and a propensity to experience high levels of negative affect (Watson and Naragon-Gainey, 2014). It is therefore not surprising that people with EDs show high rates of neuroticism as well as emotion dysregulation. Accordingly, this personality dimension (i.e., neuroticism) as well as emotion dysregulation has been considered in the research literature as a possible transdiagnostic factor associated with EDs since they show difficulties, inabilities and maladaptive strategies when pursuing to manage emotional experiences (Aldao et al., 2010; Cludius et al., 2020). In this line, a recent study conducted by Abdi and Pak (2019), found that there is a direct and significant relationship between pathological personality dimensions (e.g., neuroticism) and EDs (anxiety and depression). Furthermore, the results also showed that ER difficulties mediated the relationship between pathological personality and EDs (anxiety, depression, and stress). These findings suggest that intervention on ER difficulties can be beneficial for the prevention and intervention of EDs (Abdi and Pak, 2019). A more recent study, with a large sample of 1138 participants, found statistically significant relationships between ER and the psychopathology of EDs. However, these authors found that these relationships could be explained by the influence of neuroticism, suggesting the need to include neuroticism as a covariate in future studies when analyzing the relationship between ER and the severity of EDs symptoms (Anderson et al., 2021).

There are several transdiagnostic interventions that have been shown good outcomes to reduce neuroticism and difficulties in ER. The Unified Protocol for transdiagnostic treatment of EDs (UP; Barlow et al., 2011) is one example of a transdiagnostic intervention that focuses on addressing core emotion dysregulation and personality dimensions across EDs psychopathology (Sauer-Zavala et al., 2017). According to the Gratz and Roemer's (2004) multidimensional model, the UP also teaches competencies of adaptive ER strategies, including an awareness and acceptance of emotional experiences, the ability to flexibly modulate the intensity and duration of emotional experiences, and a willingness to experience emotions within everyday life. Therefore, UP aims to reduce psychopathological responses, by changing patterns in key ER based skills.

The UP, both in individual and group formats, currently has empirical support across a wide range of EDs, including depression, anxiety and related disorders (Carlucci et al., 2021; Cassiello-Robbins et al., 2020). In addition to its effectiveness in psychopathology, the UP leads to improvements in overall functioning and quality of life (Ellard et al., 2010; Gallagher et al., 2013). Moreover, UP has also demonstrated its efficacy in improving other variables such as personality dimensions, as shown by the results of the study by Carl et al. (2014), where reductions in neuroticism were found during treatment (with small effect sizes compared to the waiting list group). These improvements in personality dimensions were associated with improvements in EDs symptomatology and quality of life. Similar results were found more recently in the study carried out by Sauer-Zavala et al. (2021), where they found significantly greater reductions in neuroticism in participants who received the UP, compared to those who received traditional cognitive behavioral therapy and waitlist condition. Regarding the moderating role of neuroticism in the response to a psychological treatment, Osma et al. (2021) found reductions in neuroticism and negative affect after the application of UP in group format, with greatest changes occurred in those patients with EDs who presented medium-high scores in these two variables (i.e., neuroticism and negative affect). The literature has found contradictory evidence on how the initial personality profiles of patients may affect the evolution of emotional symptomatology. For example, Brown (2007) found that those patients with higher scores in neuroticism were less responsive to treatment, in particular to treatments for anxiety. While other studies such as Eskildsen et al. (2020) were unable to find robust moderators affecting the treatment of depression or anxiety.

In addition, UP has also been shown to be effective in improving ER, specifically, Sakiris and Berle (2019) published a systematic review and meta-analysis (15 studies; n = 1244), where moderate effect sizes were found indicating greater use of adaptive and less use of maladaptive ER strategies. These findings highligh that UP can be an effective treatment to increase ER. Furthermore, ER has also been identified as an important moderator of EDs. One example is the study conducted by Hosogoshi et al. (2020), who found that patients with high initial scores on emotional suppression (which is a dimension of emotional dysregulation), were those with the least improvement in anxious symptomatology at post-treatment. These results are consistent with the findings obtained by Ellard et al. (2017), who found that, in patients with comorbidity of bipolar disorder and an anxiety disorder, participants with high neuroticism and high ER difficulties responded worse to treatment. These results highlight the importance of studing moderators of treatment in order to personalize treatments, thus maximizing the efficiency of current interventions for EDs.

As we have seen, UP has achieved good outcomes to improve depression and anxiety symptoms as well as transdiagnostic mechanisms such as neuroticism and ER related variables. However, to our knowledge, there are no published studies that have evaluated difficulties on ER and neuroticism as moderators of UP treatment outcomes in patients with EDs treated in a public health system and in a group format. Therefore, the main goal of this study was to explore the moderating effect of emotion dysregulation (i.e., difficulties in ER) and personality dimensions (i.e., neuroticism) in different treatment effectiveness outcomes (depression and anxiety symptoms and quality of life) for people with EDs after receiving a UP intervention in a group format in Spanish public mental health units, and at 6-month follow-up. We hypothesized that participants with higher difficulties in ER and higher neuroticism scores at baseline would show higher levels of depression and anxiety after receiving UP in group and at follow-ups, and participants would present a different evolution depending on their difficulties in ER and neuroticism, specifically that these variables would moderate the response to treatment overtime in depression and anxiety symptoms. Secondly, we expected that those participants with higher difficulties in ER and higher neuroticism would display lower levels of quality of life after the treatment and at follow-ups, and both difficulties in ER and neuroticism would moderate treatment response.

1. Method

1.1. Participants

The sample of this study consisted of 140 participants selected from a main study and who were part of an RCT (Osma et al., 2018). Of these, 77.1 % were female (n = 108), with a mean age of 42.16 [SD = 12.16, range 18–66]. All participants were patients with a principal diagnosis of EDs and who had received the UP in group format in specialized mental health units within the Spanish public health system.

1.2. Instruments

The semi-structured Anxiety Disorders Interview Schedule (ADIS-IV, Di Nardo et al., 1994) was used for the clinical diagnosis. This interview is based on the DSM-IV diagnostic criteria (American Psychiatric

Association, 1994), and allows, among others, the diagnosis of anxiety disorders and depressive disorders.

As primary measures, depressive and anxious symptomatology were assessed using the Beck Depression Inventory (BDI-II, Beck et al., 1996; Sanz et al., 2003) and the Beck Anxiety Inventory (BAI, Beck and Steer, 1993; Sanz et al., 2012). The response format used was Likert-type ranging from 0 "No presence of symptomatology" to 3 "Severe symptomatology". Both instruments consisted of 21 items and presented an adequate internal consistency in the present study with a Cronbach's Alpha of 0.91, and 0.92, respectively.

Quality of life was also assessed through the 10 items of the Quality of Life Index (QLI, Mezzich et al., 2000). This instrument, with a 10-point Likert-type response format (0 "Poor" to 10 "Excellent"), evaluates physical and psychological well-being, self-care, occupational and interpersonal functioning, social and community support, personal and spiritual fulfillment, and finally, global perception of quality of life. In the present study, an adequate internal consistency was obtained with a Cronbach's Alpha value of 0.82.

Finally, neuroticism and emotional regulation were assessed as moderating variables. Specifically, the 12 items of the neuroticism dimension of the NEO Five-Factor Inventory (NEO-FFI, Costa and McCrae, 1999) were used, with a 5-point Likert-type response scale ranging from 0 "strongly disagree" to 4 "strongly agree". A Cronbach's alpha of 0.72 was obtained. Regarding emotional dysregulation, the 28 items of the Difficulties in Emotional Regulation Questionnaire (DERS, Gratz and Roemer, 2004; Hervás and Jódar, 2008) were used, which employs a 5-point Likert-type response scale ranging from 1 "Almost never" to 5 "Almost always". For this study we used the total score of the questionnaire. An internal consistency of Cronbach's alpha 0.86 was obtained.

1.3. Procedure

This secondary study is part of a main RCT (Osma et al., 2018), in which the efficacy of the UP applied in group format in the public health system compared to treatment as usual (TAU) in individual format is being tested (Osma et al., 2018). The study participants were patients over 18 years of age, who attended their primary health center of reference. In Spain, family doctors working in primary care health settings are the first professionals who evaluates people with psychological issues. They refer to specialized care health settings those cases who needs a psychological assessment, diagnoses, and intervention. Those cases with EDs diagnosis were informed of the possibility of participating in the project, signed the informed consent form and were randomized to the UP condition in group format or TAU (for more information, see study protocol in Osma et al., 2018). For the present study, participants who received the UP condition in a group format and completed the evaluation protocol, including the Difficulties in Emotional Regulation Questionnaire (DERS; Gratz and Roemer, 2004) in at least one evaluation time, were selected. The treatment consisted of 12 group sessions, of 2 h duration and weekly frequency. Throughout these sessions, the 8 treatment modules of the UP were applied, following the therapist's manual as a guide (Barlow et al., 2011) and were carried out by a therapist and co-therapist previously trained in the UP treatment (they received between 10 and 20 h of training by an expert supervisor; for more information, see Osma et al., 2018). Assessments were carried out at baseline (Time 0), post-treatment (T1), 3-month follow-up (T2) and 6-month follow-up (T3).

1.4. Data analysis

The data were analyzed with linear mixed effects models using the lm4 package (version lme4_1.1–13; Bates et al., 2015) for R statistical software (version 4.1.0; R Core Team, 2021). Three different models were fitted for each dependant measure: depression (BDI), anxiety (BAI), and quality of life (QLI). For each model, Time (T0 vs. T1 vs. T2 vs. T3), Neuroticism (NEO-FFI), and ER difficulties (DERS) were entered as fixed effects. Time was dummy coded, being Time 0 the baseline, T1 post-treatment, T2 3-month follow-up, and T3 6-month follow-up. Random intercepts for center and participants were included in the random part of the nested models [i.e., Dependent measure ~ Time × Neuroticism × DERS + (1|Center/Participant)]. In order to facilitate the interpretation of the b coefficients, the numerical variables from scales entered as fixed effects in the models (Neuroticism and DERS) were standardized before the analyses. In addition, R^2 was calculated as a measure of the effect size with the r2glmm package (version 0.1.2.; Jaeger, 2017; Jaeger et al., 2017) for R statistical software when a statistically significant main and interaction effect was found in the models. The figures to visually display the effects of the models were built using the ggplot2 (version 3.4.1; Wickham, 2016) and sjPlot (version 2.8.12; Lüdecke, 2022) packages for R statistical software. These figures represent the three dependent variables (BDI, BAI, QLI) over the different Time measurements (T0 vs. T1 vs. T2 vs. T3), taking into account the potential moderator role of neuroticism and emotional regulation difficulties on each model estimates. Tables for random effects and estimates of fixed effects for the three models are presented below.

2. Results

2.1. Sociodemographic and descriptive results

The sociodemographic data can be seen in Table 1, and descriptive statistics for the three dependent measures and the two independent measures at T0, T1, T2, and T3 are provided in Table 2.

2.2. Depression

As can be seen in Table 3 and Fig. 1, the model showed a significant main effect of neuroticism, b = 4.73, 95%CI [2.85–6.61], t = 4.95, R^2 = 0.07, and also a main effect of ER difficulties, b = 4.94, 95%CI [2.99–6.88], t = 4.98, R^2 = 0.07, which points to lower levels of depression when neuroticism and ER difficulties also show lower levels, in the four periods of time. Complementarily to the statistically significant effects found, the values of R^2 showed also medium effect sizes for

Table 1
Socio-demographic characteristics of the participants in the baseline (N = 140).

		n	(%)
Educational level	< 12 years	67	(47.9)
	> 12 years	73	(52.1)
Marital status	Married/partner	77	(55.0)
	No partner (Single, Divorced, Widowed)	63	(45.0)
Employment status	Working	60	(42.9)
	Not working (Unemployed, Sick leave, Homemaker, Student, Retired)	80	(57.1)
Principal diagnosis	Adjustment disorder	47	(33.6)
	Major depressive disorder	34	(24.3)
	Generalized anxiety disorder	15	(10.7)
	Non-specific anxiety disorder	10	(7.1)
	Dysthymia	9	(6.4)
	Obsessive-compulsive disorder	6	(4.3)
	Unspecified mood disorder	6	(4.3)
	Others (Agoraphobia, Panic disorder, among others)	13	(9.3)
Secondary diagnosis	Generalized anxiety disorder	9	(6.4)
	Adjustment disorder	8	(5.7)
	Major depressive disorder	8	(5.7)
	Non-specific anxiety disorder	7	(5.0)
	Agoraphobia	5	(3.6)
	Others (Obsessive-compulsive disorder Agoraphobia, Panic disorder, among others)	7	(5.0)
Taking medication	Yes	110	(78.6)
	No	30	(21.4)

Table 2
Means and standar deviations for the three dependent measures and the two independent measures as a function of Time.

	T0	T1	T2	T3
Measure	M (SD)	M (SD)	M (SD)	M (SD)
BDI	30.84 (11.24)	21.57 (15.07)	20.45 (13.84)	19.56 (15.56)
BAI	27.57 (11.83)	23.78 (14.80)	21.07 (14.37)	19.83 (14.56)
QLI	4.32 (1.79)	5.20 (2.05)	5.19 (2.12)	5.51 (2.39)
N	34.85 (6.16)	30.65 (7.62)	29.12 (8.70)	27.96 (9.80)
DERS	91.63 (17.08)	75.20 (23.40)	71.32 (21.91)	72.57 (24.86)

Note: T0 = Baseline; T1 = Post-treatment; T2 = 3-month follow-up; T3 = 6-month follow-up; BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, QLI = Quality of Life Index, N = Neuroticism (NEO-FFI), DERS = Emotional Regulation Difficulties Questionnaire.

Table 3
Mixed-effects model estimates for depression.

Random effects		
Group	Variance	SD
Participant:Center	55.73	7.47
Center	0.83	0.91

Fixed effects			
	b	95 % CI	*t*
Intercept	**26.02**	**[24.17–27.87]**	**27.53**
T1	**−4.18**	**[−6.47 to −1.90]**	**−3.58**
T2	**−2.84**	**[−5.23 to −0.44]**	**−2.32**
T3	**−4.02**	**[−6.73 to −1.32]**	**−2.92**
N	**4.73**	**[2.85–6.61]**	**4.95**
DERS	**4.94**	**[2.99–6.88]**	**4.98**
T1*N	−1.73	[−4.59–1.13]	−1.19
T2*N	−1.21	[−3.95–1.52]	−0.87
T3*N	−1.60	[−4.49–1.30]	−1.08
T1*DERS	2.28	[−0.42–4.98]	1.66
T2*DERS	2.10	[−0.54–4.74]	1.56
T3*DERS	2.57	[−0.52–5.67]	1.63
N*DERS	−0.23	[−1.88–1.42]	−0.28
T1* N*DERS	1.46	[−0.79–3.71]	1.27
T2* N*DERS	0.75	[−1.42–2.92]	0.68
T3* N*DERS	0.78	[−1.34–2.90]	0.72

Note: T1 = Post-treatment; T2 = 3-month follow-up; T3 = 6-month follow-up, N = Neuroticism (NEO-FFI), DERS = Emotional Regulation Difficulties Questionnaire. In bold: statistically significant effects based on confidence intervals.

both main effects. In addition, the model for depression did not show significant interactions between time (T1, T2, T3) and neuroticism, and neither between time (T1, T2, T3) and ER difficulties. Additionaly, Fig. 1 points to further improvements in depression when participants start the treatment at lower levels of neuroticism and ER difficulties.

2.3. Anxiety

As can be appreciated on Table 4 and Fig. 2, the model for anxiety showed a significant main effect of neuroticism, b = 3.08, 95%CI [0.94–5.22], t = 2.82, $R^2 = 0.02$, and also a main effect of ER difficulties, b = 3.33, 95%CI [1.12–5.54], t = 2.95, $R^2 = 0.03$, which points to lower levels of anxiety when neuroticism and ER difficulties are also low, in the four periods of time. In addition, the model showed a statistically significant interaction between time (T1) and ER difficulties, b = 3.76, 95%CI [0.73–6.79], t = 2.43, $R^2 = 0.01$, which points to higher levels of anxiety on T1 when the ER difficulties values are also high. This interaction effect is showing a moderating role of the ER difficulties on the relationship between time and anxiety, pointing to a greater decrease on anxiety values when the treatment also succeeded in decreasing the ER difficulties values on the post-treatment measure (T1). Complementarily to the statistically significant effects found, the values of R^2 showed also low effect sizes for both main effects and also for the interaction effect. The model did not show significant interactions between time (T1, T2, T3) and neuroticism. Additionaly, Fig. 2 points to further improvements in anxiety when participants start the treatment at lower levels of neuroticism and ER difficulties.

2.4. Quality of life

Regarding Table 5 and Fig. 3, the quality of life model showed a significant main effect of neuroticism, b = −0.60, 95%CI [−0.91 to −0.28], t = −3.71, $R^2 = 0.04$, and also a main effect of ER difficulties, b = −0.36, 95%CI [−0.68 to −0.04], t = −2.19, $R^2 = 0.01$, which points to higher levels of of quality of life when neuroticism and ER difficulties are low, in the four periods of time. In addition, this model also showed statistically significant interactions between time (T1 & T3) and ER difficulties, b = −0.55, 95%CI [−1.00 to −0.09], t = −2.37, $R^2 = 0.01$ and b = −0.68, 95%CI [−1.20 to −0.16], t = −2.55, $R^2 = 0.01$ respectively, which points to higher levels of quality of life on T1 and T3 when the ER difficulties values are low. Similar to the previous model, this interaction effect is showing a moderating role of the ER difficulties on the relationship between time and quality of life, pointing to a greater improvement on quality of life when the treatment succeeded in decreasing the ER difficulties on both post treatment measures (T1 & T3). Complementarily to the statistically significant effects found, the values of R^2 showed also a low effect size for both interaction effects and for the main effect of ER difficulties, and also a medium effect size for neuroticism. The model did not show significant interactions between time (T1, T2, T3) and neuroticism. Additionaly, Fig. 3 points to further improvements in quality of life when participants start the treatment at lower levels of neuroticism and ER difficulties.

3. Discussion

The general aim of this study was to analyze the moderating effect of difficulties in ER and neuroticism in anxiety, depression and quality of life outcomes in people with EDs attending the Spanish health system after receiving a UP program in a group format and at 3-and 6-month follow-ups.

The first study hypothesis was that participants with higher difficulties in ER and higher neuroticism scores at baseline would show higher levels of depression and anxiety after receiving UP in group and at follow-ups, and a moderating effect would be found between ER and neuroticism on depressive and anxious symptomatology. First of all, and as we expected, the results showed that patients with higher levels of neuroticism and difficulties in ER presented higher levels of depression and anxiety in the four periods of time (i.e., at baseline, post-treatment, and at 3- and 6-month follow-ups) with low-to-medium effect sizes. This finding corresponds with past evidence showing that people with EDs have higher levels of neuroticism (Brown and Barlow, 2009), experience negative emotions more intensely and frequently (Campbell-Sills et al., 2006; Mennin et al., 2005), try to avoid or repress that emotional experience (Weiss et al., 2012), and are more likely to use maladaptive ER strategies (Brown and Barlow, 2009). The existence of some biological (i.e., neuroticism) and psychological vulnerabilities, and maladaptive ER strategies shared by different EDs has been argued to explain the high comorbidity rates in this population (Aldao et al., 2010; Barlow et al., 2004; Brown and Barlow, 2009). In that sense, personality traits (e.g., neuroticism) and clinical traits (e.g., trait ER) show similarities and an undoubted relationship.

However, contrary to our hypothesis, no moderating effects between neuroticism nor difficulties on ER and depression were found at any Time (i.e., T1, T2, T3). These results are related with the contradictory findings reported in the literature about the relationship between personality dimensions (i.e., neuroticism) and depression, with some studies showing that levels of personality dimensions (e.g., neuroticism

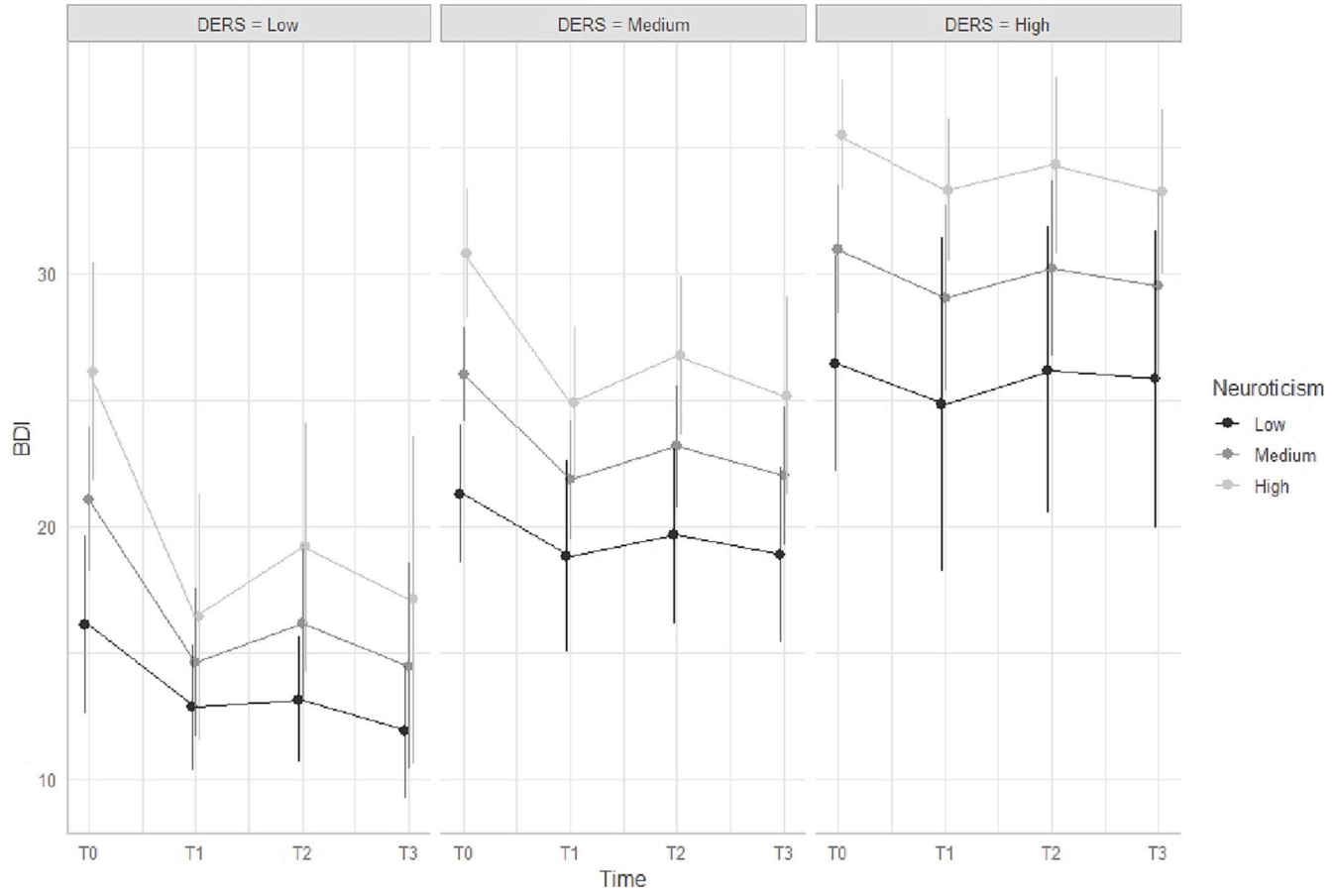

Fig. 1. Model Estimates for depression as a function of Time (T0 vs. T1 vs. T2 vs. T3), neuroticism and emotional regulation difficulties
Note: Error bars represent 95 % CIs. Neuroticism and emotional regulation difficulties are grouped by low, medium, and high values from the standardized version of the variables. T0 = Baseline; T1 = Post-treatment; T2 = 3-month follow-up; T3 = 6-month follow-up. The figure represents the evolution of BDI across Time, showing the potential moderator role of neuroticism and emotional regulation difficulties on the model estimates.

Table 4
Mixed-effects model estimates for anxiety.

Random effects		
Group	Variance	SD
Participant:Center	76.23	8.73
Center	12.12	3.48

Fixed effects			
	b	95 % CI	*t*
Intercept	**26.46**	**[23.46–29.46]**	**17.30**
T1	−1.39	[−3.96–1.17]	−1.07
T2	−2.45	[−5.14–0.23]	−1.79
T3	−2.81	[−5.82–0.21]	−1.82
N	**3.08**	**[0.94–5.22]**	**2.82**
DERS	**3.33**	**[1.12–5.54]**	**2.95**
T1*N	−2.20	[−5.41–1.01]	−1.34
T2*N	0.68	[−2.40–3.75]	0.43
T3*N	−1.20	[−4.44–2.03]	−0.73
T1*DERS	**3.76**	**[0.73–6.79]**	**2.43**
T2*DERS	2.77	[−0.19–5.73]	1.83
T3*DERS	3.14	[−0.32–6.59]	1.78
N*DERS	0.28	[−1.60–2.17]	0.29
T1* N*DERS	−0.45	[−2.97–2.06]	−0.35
T2* N*DERS	0.67	[−1.76–3.11]	0.54
T3* N*DERS	−0.93	[−3.31–1.45]	−0.76

Note: T1 = Post-treatment; T2 = 3-month follow-up; T3 = 6-month follow-up, N = Neuroticism (NEO-FFI), DERS = Emotional Regulation Difficulties Questionnaire. In bold: statistically significant effects based on confidence intervals.

and extraversion) predict poorer treatment outcomes (Kasch et al., 2002), and other studies reporting no such effects (Brown, 2007; Clark et al., 2003). In this regard, related to depression, future studies should try to examine the moderating role of neuroticism and ER in clinical outcomes, especially for this high-risk group (i.e., individuals with depressive disorders). The results of this study seem to indicate that although high levels of neuroticism and difficulties in ER are present in people with greater depressive symptomatology, it seems that when there is an improvement in depressive symptomatology, these changes cannot be explained exclusively by an improvement in these mechanisms. Therefore, it is possible that other mechanisms not considered in this study, such as behavioral activation or extraversion, may be influencing changes in depressive symptomatology, as was found in Brown's study (2007). Consequently, future studies should include these type of variables with the aim of identifying robust predictors of treatment response in patients with predominantly depressive symptomatology.

However, in contrast to depression, moderating effects have been found regarding anxiety. Results of our study revealed statistically significant interaction between difficulties on ER and anxiety symtpoms at post-treatment with low effect sizes. This interaction effect suggests that emotion dysregulation has a moderating role on the relationship between anxiety and time (i.e., post-treatment), pointing out that the effectiveness of UP on reducing anxiety at post-treatment was moderated by the lower levels of difficulties in ER at that time. That is, participants who had greater improvements in their difficulties in ER scores were those who had greater reductions in anxious symptomatology. These results were not found for the interaction between neuroticism and anxiety at post-treatment or follow-ups. This finding is consistent

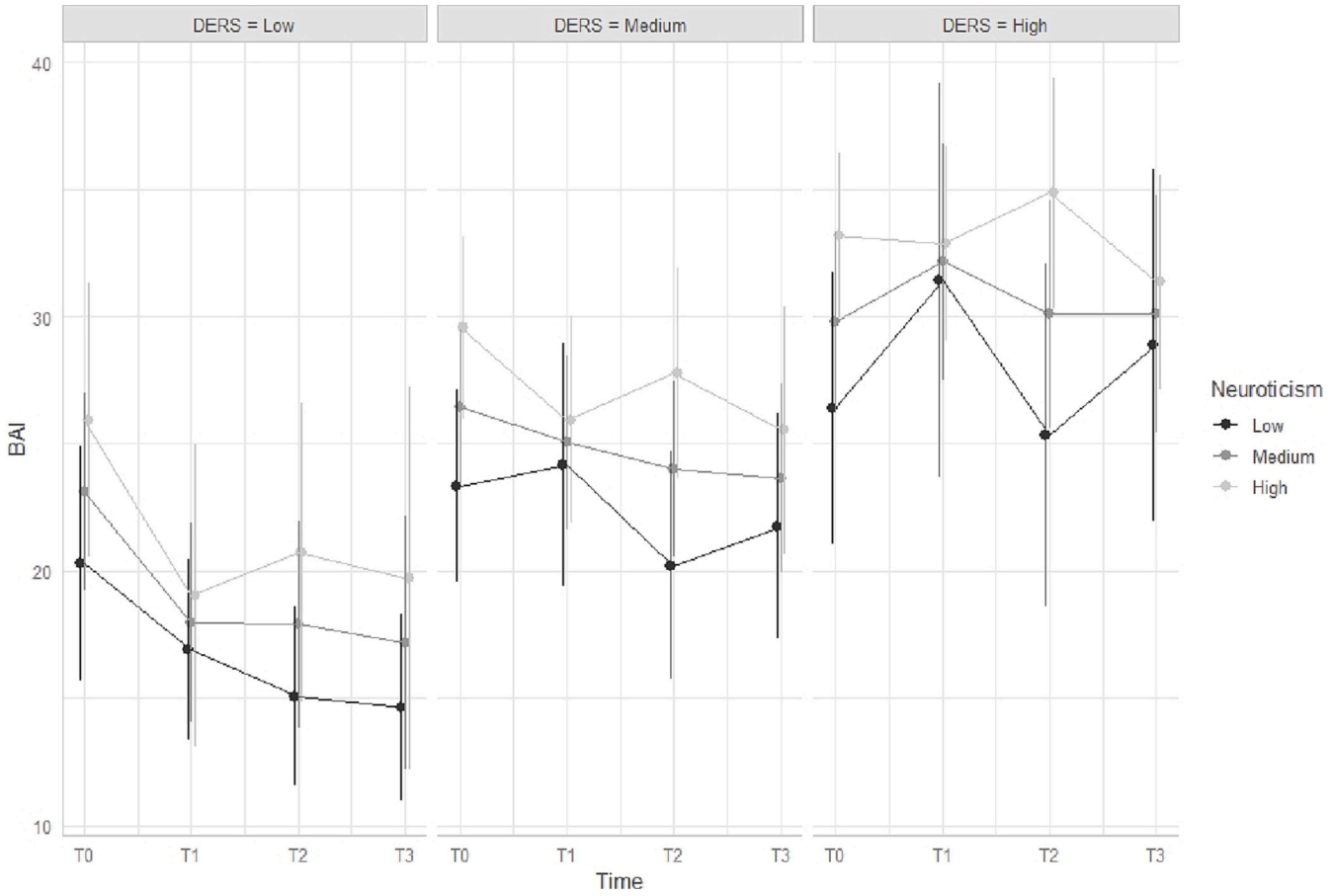

Fig. 2. Model Estimates for anxiety as a function of Time (T0 vs. T1 vs. T2 vs. T3), neuroticism and emotional regulation difficulties
Note: Error bars represent 95 % CIs. Neuroticism and emotional regulation difficulties are grouped by low, medium, and high values from the standardized version of the variables. T0 = Baseline; T1 = Post-treatment; T2 = 3-month follow-up; T3 = 6-month follow-up. The figure represents the evolution of BAI across Time, showing the potential moderator role of neuroticism and emotional regulation difficulties on the model estimates.

Table 5
Mixed-effects model estimates for quality of life.

Random effects		
Group	Variance	SD
Participant:Center	1.30	1.14
Center	0.32	0.57

Fixed effects			
	b	95 % CI	*t*
Intercept	**4.62**	**[4.16–5.08]**	**19.84**
T1	**0.40**	**[0.01–0.79]**	**2.02**
T2	**0.46**	**[0.05–0.87]**	**2.22**
T3	0.40	[−0.06–0.85]	1.72
N	**−0.60**	**[−0.91 to −0.28]**	**−3.71**
DERS	**−0.36**	**[−0.68 to −0.04]**	**−2.19**
T1*N	0.30	[−0.18–0.78]	1.22
T2*N	−0.28	[−0.75–0.18]	−1.21
T3*N	0.17	[−0.32–0.65]	0.67
T1*DERS	**−0.55**	**[−1.00 to −0.09]**	**−2.37**
T2*DERS	−0.16	[−0.61–0.28]	−0.72
T3*DERS	**−0.68**	**[−1.20 to −0.16]**	**−2.55**
N*DERS	0.06	[−0.22–0.33]	0.41
T1* N*DERS	−0.04	[−0.41–0.34]	−0.19
T2* N*DERS	−0.25	[−0.62–0.11]	−1.38
T3* N*DERS	−0.02	[−0.38–0.33]	−0.13

Note: T1 = Post-treatment; T2 = 3-month follow-up; T3 = 6-month follow-up, N = Neuroticism (NEO-FFI), DERS = Emotional Regulation Difficulties Questionnaire. In bold: statistically significant effects based on confidence intervals.

with the one found in a systematic review of treatment moderators in adults with anxiety disorders, in which neuroticism failed to moderate outcomes (Schneider et al., 2015) and contrary to those obtained by Anderson et al. (2021), since including neuroticism did not explain the results of association between ER and, in this case, anxiety. Our results indicate that changes in neuroticism do not have a direct impact on changes in anxiety, showing that anxiety symptoms can be reduced independently of changes in neuroticism, since there are other mechanisms involved; in this case, improvement in ER difficulties. The goal of the UP is to train in ER skills (e.g., mindfulness, cognitive flexibility, emotional exposures) to produce changes in the mechanisms associated with the etiology and maintenance of EDs, including neuroticism (Barlow et al., 2014).

The second hypotheses of the study concerning quality of life were, firstly, that those participants who presented higher scores in difficulties in ER and neuroticism would be those who would present a worse quality of life and, secondly, that both difficulties in ER and neuroticism would also moderate treatment response of the participants overtime in this measure. In relation to the first assumption, we found a statistically significant relationship (main effect) between higher scores on neuroticism and difficulties in ER and a worse quality of life with low-to-medium effect sizes. This result is in line with the results obtained by Carl et al. (2014), and support the available evidence of the relationship between experiencing negative emotions in an intense and frequent manner (neuroticism) and having difficulties in regulating those emotions, with a poorer quality of life (Gao et al., 2017; Panayiotou et al., 2021). However, and in relation to our second assumption, a moderating effect was found. Findings indicated that only difficulties in ER

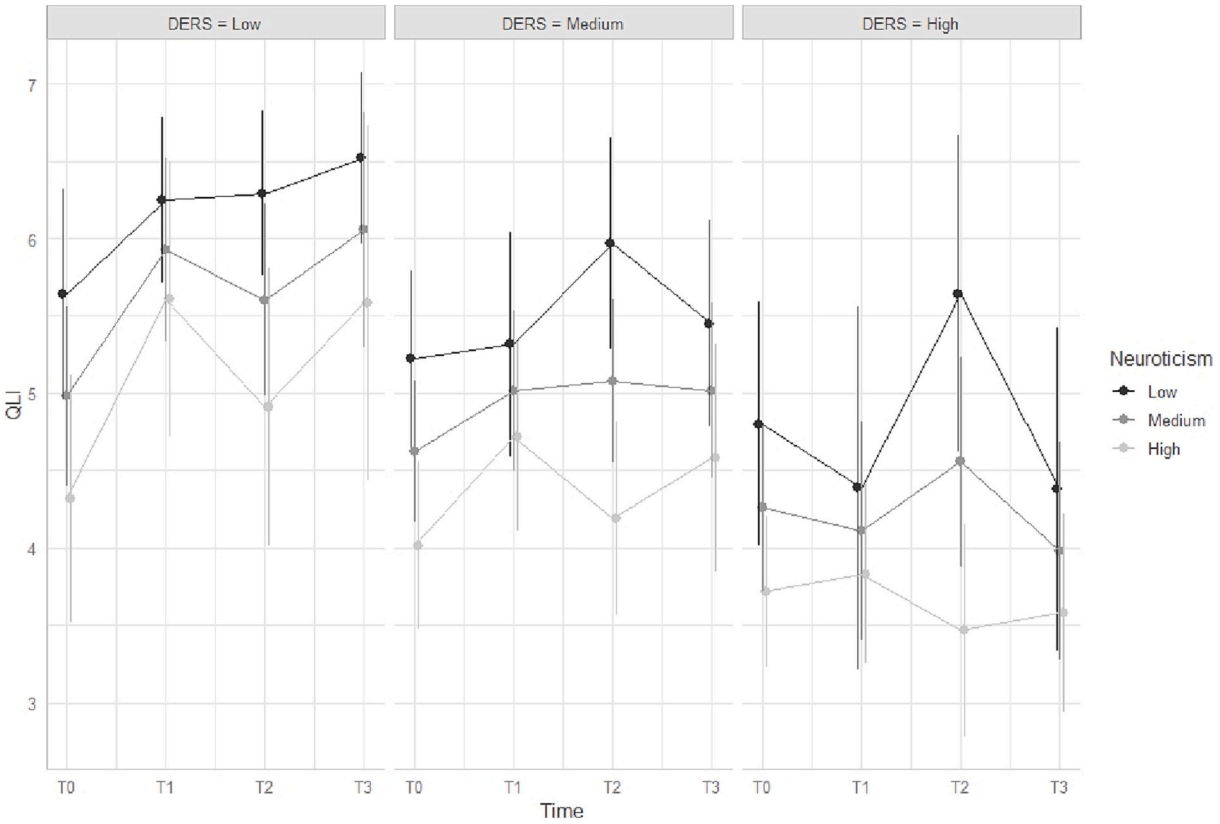

Fig. 3. Model Estimates for quality of life as a function of Time (T0 vs. T1 vs. T2 vs. T3), neuroticism and emotional regulation difficulties
Note: Error bars represent 95 % CIs. Neuroticism and emotional regulation difficulties are grouped by low, medium, and high values from the standardized version of the variables. T0 = Baseline; T1 = Post-treatment; T2 = 3-month follow-up; T3 = 6-month follow-up. The figure represents the evolution of QLI across Time, showing the potential moderator role of neuroticism and emotional regulation difficulties on the model estimates.

moderated the association between time and change in quality of life at post-treatment. That is, participants who most reduced their ER difficulties scores were those who also increased their quality of life most significantly. These results were not found for the interaction between difficulties in neuroticism and quality of life at any assessed period. Previous research had found that UP improves overall functioning and quality of life (Ellard et al., 2010; Gallagher et al., 2013; Osma et al., 2021). Our findings suggest that improving ER, could be one way to improve quality of life. However, future studies should explore what other mechanisms or biological and/or psychosocial factors (e.g., self-esteem) can have an important role and may be influencing quality of life (Gallagher et al., 2013).

A key contribution to this study is the exploration of the moderating role of neuroticism and ER in the response to a group UP intervention. Overall, our findings suggest that neuroticism and ER difficulties are variables that directly affect the severity of anxiety and depressive symptomatology and may be relevant moderators, specifically for the improvement of anxiety symptomatology and quality of life. Therefore, the findings of this study can provide information about how individuals will respond to the UP. This could be important in the field of personalizing interventions by emphasizing or increasing the dosis of the components focused on those variables for individuals that are more vulnerable or have an specific profile. For example, based on the results of our study, for patients with high anxiety symptomatology and high ER difficulties, it may be useful to increase the number of sessions of the different therapeutic components included in the UP with the aim of of decreasing maladaptive emotional strategies and learning and practicing adaptive emotional regulation strategies, which will have an impact on the improvement of anxiety symptoms. Equally with those patients with low self-perceived quality of life, it will be necessary to focus on the reduction of neuroticism as a necessary condition for the improvement of their quality of life, which may require again a greater number of sessions if the patient shows high scores in neuroticism. Other strategies focused on increasing quality of life and well-being independently of learning adaptive emotion regulation strategies through the UP can be also considered (e.g., self-esteem, savoring). As for patients with depressive symptomatology, although the results of this study have not shown moderating effects of neuroticism or difficulties in ER on depression, the results have indicated that UP is effective in reducing depressive symptomatology, perhaps through the improvement of other predictors and moderators not analyzed in this study (i. e. extraversion) and these factors should be explored in future studies.

Strenghs of the study include its large sample size compared to other studies and that the participants included in this study were recruited from a public mental health setting in Spain and, therefore, our findings resulted from a representative sample of our community. Furthermore, this is a longitunidal study, which allows us to explore the evolution of the patiens after the treatment and at follow-ups.

4. Limitations

The present study has some limitations that must be taken into account in order to improve future studies. First, additional unmeasured variables (e.g., extraversion or self-esteem) may also moderate treatment effects. For fututre studies, it should be considered adding other possible moderators. In addition, all the measures used were self-report scales, which can lead to a bias in the responses, affecting the validity and objectivity of the results. Second, the UP is a multicomponent intervention and the extent to which the effects of each specific component were moderated by neuroticism or ER difficulties is unclear; future research studies should explore this question. Third, most of the participants in this study were women (77.1 %), which may affect the

generalizability of the results. In this sense, it is important to highlight that literature has shown that the prevalence of EDs is higher in women (World Health Organization, 2017). A final limitation is that the data shown in this study only include one experimental condition (participants who received the UP group).

5. Conclusions

In conclusion, this study investigates whether and how ER and neuroticism moderate the efficacy of UP for anxiety and depression symptoms and quality of life in patients with EDs. The results of this study found that high scores on neuroticism and ER difficulties were associated with greater severity in depression and anxiety symptomatology, and poorer quality of life. In addition, ER difficulties moderate the efficacy of UP regarding anxiety symptoms and quality of life, in patients with EDs. Specifically, greater reductions in ER difficulties were associated with decreases in anxiety symptoms at post-treatment, and increases in quality of life.

Although there has been growing interest in the identification of treatment moderators, few studies have examined moderators of UP in a group format for adults with EDs from the community. The current interest on transdiagnostic interventions has promoted the study of moderators of change, wich allows to select moderators shared across multiple disorders. Future studies should consider continuing working toward the goal of personalized treatment of EDs through the identification of specific moderators, which can provide useful information to improve EDs psychopathology and well-being.

CRediT authorship contribution statement

All persons who met authorship criteria are listed as authors. All authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. All authors contributed to and approved the final manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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