



The portuguese version of the Emotion Regulation of Others and Self (EROS) in a clinical sample: psychometric properties and measurement invariance across sex

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Abstract

The Emotion Regulation of Others and Self Scale (EROS) is commonly used to measure individual differences in the use of strategies to regulate one's own and other people's emotions. This study aimed to examine its psychometric properties and measurement invariance across sex in a Portuguese clinical sample. For this purpose, we tested the factorial structure of the EROS in a sample of 390 adults (259 women; Mage = 34.33; SD = 9.99) undergoing active psychotherapy in a private clinic. The confirmatory factor analysis showed that the four-factor solution proposed by the original authors (intrinsic affect-improving, intrinsic affect-worsening, extrinsic affect-improving and extrinsic affect-worsening) fitted well to our data. Invariance across sex was determined by using multi-group analyses. Additionally, reliability analysis indicated good coefficients for all the dimensions. The pattern of associations of the EROS subscales with dispositional mindfulness, ruminative thinking, psychological inflexibility, emotional intelligence, and psychopathological symptoms were examined. As expected, small to moderate correlations were found evidencing the convergent construct validity of the EROS. Findings suggest that the EROS is a psychometrically sound approach for assessing individual differences in emotion regulation in clinical samples.

Keywords Emotion regulation · Affect regulation · EROS · Psychometric properties · Scale validation · Clinical sample

It is now widely recognized that the way individuals regulate their emotions has important implications for psychological well-being (Marroquín et al., 2017; Williams et al., 2018). Emotion regulation (ER), which refers to “the processes by which individuals influence which emotions they have, when they have them and how they experience and

express them” (Gross, 1998, p. 275) became an important issue in psychotherapy since studies have shown that difficulties in ER are associated with psychopathological symptoms/disorders (e.g., depression, anxiety, eating disorders) (Bydlowski et al., 2005; Kassel et al., 2007).

Several different models with distinct definitions and conceptualizations of ER and its key components have been proposed with consequences in terms of measurement (Brandão et al., 2016). According to Niven et al. (2011) available measures do not assess different types of affect regulation simultaneously or entirely. Indeed, the authors pointed as important limitations in ER measurement the fact that most of the available measures assess intrinsic ER (i.e., when the target of regulation is one's own affect, also called intrapersonal emotion regulation) leaving unexplored extrinsic ER (i.e., when the target of regulation is others' affect, also called interpersonal emotion regulation) (Gross & Thompson, 2007). Additionally, measures have focused on assessing individuals' efforts to improve their emotions leaving understudied the strategies aiming at worsening

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affect. Finally, most available measures only target a specific set of ER strategies (Niven et al., 2011).

For all these reasons, Niven et al. (2011) developed the Emotion Regulation of Others and self (EROS) scale using community samples in the United Kingdom. The authors followed two models that focused on two different characteristics of affect regulation, one related to the target of the regulation (how individuals regulate their own emotions or the emotions of others) (Gross & Thompson, 2007) and another one related to the regulatory motive (i.e., what individuals want to do: to improve or to worsen affect) (Parrott, 1993). Thus, the EROS assesses four types of emotion regulation: *intrinsic affect-improving* (i.e., strategies that aim to improve one's own feelings; e.g., thought about something nice), *intrinsic-affect worsening* (i.e., strategies that aim to worsen one's own feelings; e.g., thought about negative experiences), *extrinsic affect-improving* (i.e., strategies that aim to improve others' feelings; e.g., give someone advice to try to improve how they felt), and *extrinsic affect-worsening* (i.e., strategies that aim to worsen others' feelings; e.g., act annoyed towards someone). While most of the research on ER has focused on affect improving strategies, recent literature on ER goals has shown that sometimes individuals have contra-hedonic motives to regulate their emotions (i.e., they desire to increase or maintain negative emotions, and decrease positive emotions), especially when negative affect can be useful or positive affect can be disadvantageous (e.g., Riediger, 2015). For example, individuals may want to feel anger to claim their interests when engaging in a confrontation with other people or individuals may want to express guilt or shame to be better understood or liked by others (Riediger, 2015).

The main objective of this study was to examine the psychometric properties of the EROS in a clinical sample of Portuguese adults (outpatients). Specifically, we examined the factor structure of EROS to examine if the data from a clinical sample would fit to the four-factor structure proposed by Niven et al. (2011) that derived from community and occupational samples. No further validation studies have been found. Lane et al. (2011) have examined the factor structure of the EROS with 700 runners but they used only 12 items and no details were provided on items' choice. Previous studies, however, have found that the four-factor structure of the EROS presents good internal consistency in their samples (e.g., Barnett et al., 2021; Dingle et al., 2017).

Additionally, we aimed to examine the EROS reliability, and obtain evidence regarding convergent construct validity. Difficulties in ER, namely in the terms of number and type of strategies used, emotion awareness and understanding, and acceptance of negative emotions have been linked to higher psychological inflexibility and less emotional intelligence (e.g., Cobos-Sánchez et al., 2020), more rumination

(e.g., Miranda et al., 2013; Vine et al., 2014), less mindfulness (e.g., Hill & Updegraff, 2012; Prakash et al., 2017), and more psychopathological symptoms (e.g., Bydlowski et al., 2005; Kassel et al., 2007). Thus, we examined whether the four subscales correlated with mindfulness, ruminative thinking, psychological inflexibility, emotional intelligence, and psychopathological symptoms, using Pearson's correlations. Mainly, and based on these previous studies about ER, it was expected that intrinsic and extrinsic affect worsening, contrary to intrinsic and extrinsic affect improving, would be associated with: (H1) less mindfulness since individuals with this trait have more monitoring and acceptance skills which contribute to reduce affective and physiological reactivity and enhance positive affectivity (Lindsay & Creswell, 2019); (H2) more rumination since it usually prolongs and exacerbates negative affect (e.g., Moberly & Watkins, 2008); (H3) less psychological inflexibility since individuals with more psychological inflexibility have more difficulty in accepting unpleasant feelings, thoughts, and emotions and in regulating emotions in an adaptive way (Cobos-Sánchez et al., 2020); (H4) less emotional intelligence since individuals higher in emotional intelligence are more likely to drop down negative mood states and experience more positive emotions (e.g., Limonero et al., 2015); (H5) psychopathological symptoms since those with some types of psychopathologies are more likely to pursue ER goals that increase or maintain negative emotions, something that is typically maladaptive for their well-being (e.g., Millgram et al., 2015).

Finally, while there are studies showing that men and women differ in some emotion regulation dimensions (e.g., rumination, acceptance, emotional competence; Cobos-Sánchez et al., 2020), we examined EROS' measurement invariance across sex to ensure that EROS has the same meanings for both men and women.

Method

Participants

All participants attending the clinic that give their consent to participate were included in the study. Participants were 390 adults from a clinical sample who were receiving counseling/psychiatric services at a private clinic (outpatients), 259 women (66.4%) and 131 men (33.6%), with a mean age of 34.33 (SD=9.99). Most of the participants were single (n=191; 49%) or married or lived together with a partner (n=175; 44.9%), 23 were divorced (5.9%) and one was widowed (0.3%). As regards education level, most held a university degree (230; 59%), 121 (31%) had 12 years of education, and 39 (10%) had less than 9 years of education.

Most participants were having both psychiatric and psychological support ($n=244$; 62.6%), 105 (26.9%) were having only psychological support, and 41 (10.5%) were having only psychiatric support. On average, they have participated in 13.77 sessions ($SD=15.32$). The most common reasons for seeking support were related to depressive and anxiety symptoms. For this reason, none of the participants were excluded.

Measures

The Emotion Regulation of Others and Self (Niven et al., 2011)

This self-report scale is composed of 19 items and assesses four types of affect regulation: extrinsic affect improving (item example “*I listened to someone’s problems*”), extrinsic affect worsening (item example “*I acted annoyed towards someone*”), intrinsic affect improving (item example “*I did something I enjoy*”), and intrinsic affect worsening (item example “*I thought about my shortcomings*”). Items are rated on a Likert-type scale ranging from 1 (*not at all*) to 5 (*a great deal*). In this study, Cronbach’s α coefficients were 0.88 for extrinsic affect improving, 0.80 for extrinsic affect worsening, 0.83 for intrinsic affect improving, and 0.85 for intrinsic affect worsening.

The Philadelphia Mindfulness Scale (PHLMS) (Cardaciotto et al., 2008; portuguese version: Teixeira et al., 2017)

This self-report scale is composed of 20 items and measures two subscales, namely *acceptance* (i.e., “attitude of openness and receptivity to whatever happens to occur in the field of awareness”) and *present moment awareness* (i.e., “the self-regulation of attention so that it is maintained on immediate experience, thereby allowing for increased recognition of mental events in the present moment”) (Bishop et al., 2004, p. 232). Each subscale is composed of 10 items that are rated on a Likert-type scale ranging from 1 (*never*) to 5 (*very often*). In this study, Cronbach’s α coefficients were 0.78 for awareness and 0.81 for acceptance.

The Perseverative Thinking Questionnaire (PTQ) (Ehring et al., 2011; portuguese version: Chaves et al., 2013)

This self-report scale is composed of 15 items that evaluate repetitive negative thinking. It includes three dimensions, namely the core characteristics of repetitive negative thinking (i.e., repetitiveness, intrusiveness, and difficulty of disengagement, each one with 3 items), the perceived unproductiveness of the negative repetitive thinking (3 items), and the repetitive negative thinking capturing mental

resources (3 items). Items are rated on a Likert-type scale ranging from 0 (*never*) to 4 (*almost always*). In this study, Cronbach’s α coefficient was 0.95 for the total score.

The Wong and Law Emotional Intelligence Scale (WLEIS) (Wong & Law, 2002; portuguese version: Rodrigues et al., 2011)

This self-report scale is composed of 16 items and measures emotional intelligence. It has 4 dimensions: *self-emotion appraisal*, *others’ emotion appraisal*, *use of emotion* and *regulation of emotion*. Items are rated on a Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). In this study, Cronbach’s α coefficients were 0.79 for self-emotion appraisal, 0.81 for others’ emotion appraisal, 0.84 for use of emotion, and 0.89 for regulation of emotion.

The Acceptance and Action Questionnaire (AAQ) (Bond et al., 2011; Pinto-Gouveia et al., 2012)

This self-report scale is composed of 7 items and measures experiential avoidance and psychological inflexibility. It is a unidimensional scale. Items are rated on a Likert-type scale ranging from 1 (*never true*) to 7 (*always true*). In this study, Cronbach’s α coefficient was 0.88.

The Brief Symptom Inventory (BSI) (Derogatis & Fitzpatrick, 2004; Canavaro, 2007)

This self-report scale is composed of 53 items and assesses individuals’ psychopathological and psychological symptoms. It covers 9 dimensions: *somatization*, *obsessive-compulsive*, *interpersonal sensitivity*, *depression*, *anxiety*, *hostility*, *phobic anxiety*, *paranoid ideation*, and *psychoticism*. Items are rated on a Likert-type scale ranging from 0 (*not at all*) to 4 (*extremely*). In this study, Cronbach’s α coefficients ranged from 0.73 (psychoticism) to 0.89 (depression).

Procedure

This study was part of a larger project about emotion regulation processes in patients undergoing active psychotherapy and was approved by the Ethical Committee of the Clinic. Participants were followed in a private clinic in the north of Portugal. They were approached by their psychologist/psychiatrist to participate in the study by filling out a set of self-report measures. They were informed about the main objectives of the study and an informed consent was obtained. Confidentiality and anonymity were guaranteed. Participants were for compensated by their participation.

Table 1 Descriptive and Item Analyses of the EROS Subscales (N = 390)

Subscales	M/SD	Median	IQR	Range Min/Max	Absolute skewness	Absolute Kurtosis
extrinsic affect improving	3.53/0.89	3.67	1.17	1/5	-0.443	-0.069
extrinsic affect worsening	1.54/0.81	1	1	1/5	1.941	3.738
intrinsic affect improving	3.04/0.83	3	1.17	1/5	0.095	-0.525
intrinsic affect worsening	1.77/0.91	1.50	1	1/5	1.330	1.20

Note. M = mean; SD = standard deviation; IQR = interquartile range

Data analysis

Descriptive analyses (means, standard deviations, medians, interquartile ranges, skewness, and kurtosis) were performed in SPSS software (version 26, IBM SPSS, Inc. in Chicago, IL). Skewness absolute value of 3 and kurtosis absolute value of 7 were used as cut-off criteria to determine whether data was normally distributed (Kline, 2011).

The factorial structure of the EROS was examined using confirmatory factor analysis (CFA). The CFA was performed using maximum likelihood estimation in Analysis of Moment Structures software – AMOS (version 26.0, IBM SPSS, Inc. in Chicago, IL). The assessment of the model fit was done by examining the respective thresholds of commonly applied goodness-of-fit indices, namely: the comparative fit index (CFI; ≥ 0.95 for good, ≥ 0.90 for acceptable), the Tucker–Lewis index (TLI; ≥ 0.95 for good, ≥ 0.90 for acceptable), and the root mean square error of approximation (RMSEA; ≤ 0.06 for good, ≤ 0.08 for acceptable) with its 90% confidence interval (CI) (Hooper, Coughlan, & Mullen, 2008).

The reliability of the EROS was assessed with the Cronbach's alpha and using the commonly reported cutoff value of 0.70 (Nunnally, 1978).

The convergent validity of EROS was assessed by conducting Pearson's correlations with various relevant constructs namely dispositional mindfulness (PHLMS), psychological inflexibility (AAQ), emotional intelligence (WLEIS), ruminative thoughts (PTQ) and psychopathology (BSI). Correlations between 0.10 and 0.30 were considered small, 0.30 and 0.50 were considered moderate, and above 0.50 were considered large (Cohen, 1988).

Measurement invariance between men ($n = 131$) and women ($n = 259$) was examined using multi-group invariance analysis also in AMOS. Configural (i.e., a model in which loadings and intercepts were freely estimated), metric (i.e., a model in which loadings were constrained to be equal across sex and the intercepts were freely estimated), and scalar (i.e., a model in which loadings and intercepts were constrained to be equal across sex) invariances were examined. We ran a model without cross-group constraints and a model with the cross-group constraints. Then we compared the fit of both models in terms of the chi-square difference

test value and the CFI difference value. Invariance was determined by non-significant $\Delta\chi^2$ tests between the two models (Bollen, 1989) and Δ CFI and Δ RMSEA smaller than 0.01 (Chen, 2007).

Results

Descriptive statistics

Descriptive statistics are presented in Table 1. EROS subscales did not exceed skewness absolute value of 3 (max 2.15) neither kurtosis absolute value of 7 (max 4.28) (Kline, 2011) indicating no departure from normality.

Confirmatory factor analysis

The CFA is presented in Fig. 1. The model provided a good overall fit to the data for the four-factor structure proposed by the original authors: $\chi^2(146) = 430.35$; $p = .146$; $\chi^2/df = 2.95$; CFI = 0.92; GFI = 0.89; TLI = 0.90; SRMR = 0.06; RMSEA = 0.07 (90% CI [0.06, 0.08]). All items presented loadings above 0.40 (except item 7 that presented a factor loading of 0.38). Factors were significantly associated except extrinsic affect improving and intrinsic and extrinsic affect worsening.

Table 2 reports the fit indices for invariance tests. The change in the CFI and RMSEA was smaller than 0.01, suggesting that factor structure, factor loadings and intercepts are similar across men and women.

Reliability

The internal consistency coefficients for all the dimensions were found to be good: 0.88 for extrinsic affect improving, 0.80 for extrinsic affect worsening, 0.83 for intrinsic affect improving, and 0.85 for intrinsic affect worsening.

Convergent validity

Correlations between EROS and other relevant variables are shown in Table 3. Small positive associations between extrinsic affect improving and the present moment awareness (PHLMS), and small and medium positive associations

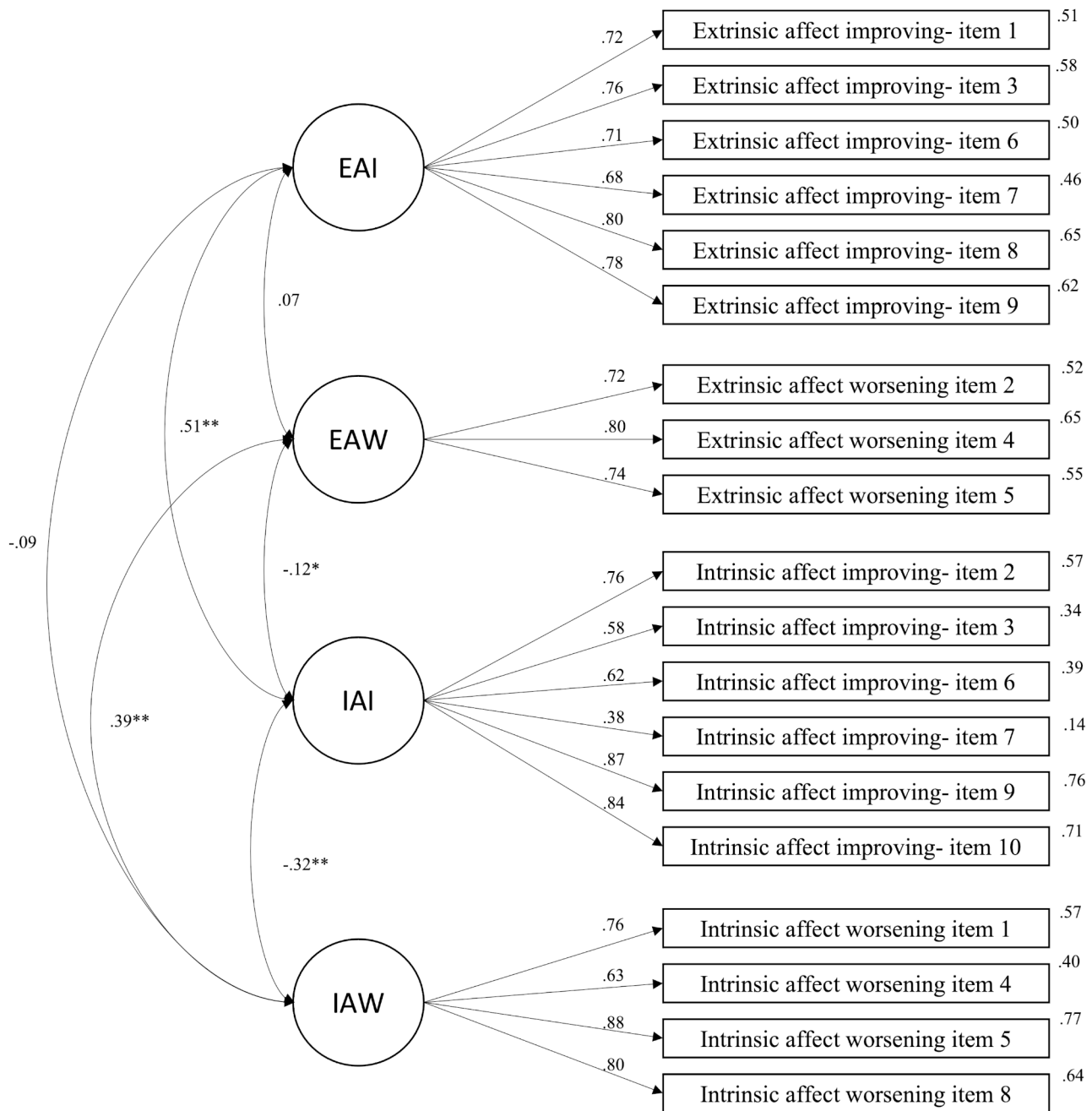


Fig. 1 Confirmatory Factor Analysis

Table 2 Test of EROS Measurement Invariance across Sex

Sex	ΔX^2	ΔDf	CFI	RMSEA	ΔCFI	$\Delta RMSEA$
Configural	16.29	15	0.905	0.053	-	-
Metric	29.60	25	0.904	0.052	.001 ¹	.001 ¹
Scalar	64.75*	44	0.900	0.052	.004 ²	.000 ²

Note. *p < .05; ¹ configural vs. metric; ² metric vs. scalar. Δ = change in model fit in relation to the reference model

with all dimensions of WLEIS were found; small negative associations between extrinsic affect improving and

acceptance (PHLMS) and with interpersonal sensitivity and depression (BSI) were found.

Table 3 Correlations between the EROS, the PHLMS, the PTQ, the AAQ, the WLEIS, and the BSI.

	Extrinsic affect improving	Extrinsic affect worsening	Intrinsic affect improving	Intrinsic affect worsening
PHLMS – acceptance	-0.214**	-0.086	-0.331*	0.030
PHLMS – present moment awareness	0.199**	-0.011	0.244**	-0.102*
PTQ – total score	0.015	0.023	-0.175**	0.264**
AAQ – psychological inflexibility	-0.046	0.128*	-0.233**	0.332**
WLEIS – self-emotional appraisal	0.219**	-0.134**	0.291**	-0.212**
WLEIS – others’ emotional appraisal	0.337**	-0.034	0.208**	-0.086
WLEIS – regulation of emotions	0.178**	-0.188**	0.278**	-0.176**
WLEIS – use of emotion	0.257**	-0.127**	0.442**	-0.342
BSI – somatization	-0.009	0.057	-0.089	0.181**
BSI – obsession-compulsion	-0.087	0.106*	-0.172*	0.356**
BSI - interpersonal sensitivity	-0.105*	0.224**	-0.276**	0.478**
BSI - depression	-0.121*	0.173**	-0.311**	0.462**
BSI – anxiety	-0.027	0.071	-0.119*	0.260**
BSI – hostility	-0.083	0.352**	-0.141**	0.393**
BSI – phobic anxiety	-0.046	0.009	-0.052	0.135**
BSI – paranoid ideation	0.014	0.227**	-0.154**	0.314**
BSI – psychoticism	-0.086	0.221**	-0.224**	0.499**

Note. EROS – Emotion Regulation of Others and Self; PHLMS – Philadelphia Mindfulness Scale; PTQ – Perseverative Thinking Questionnaire; AAQ – Acceptance and Action Questionnaire; WLEIS – Wong and Law Emotional Intelligence Scale; BSI – Brief Symptom Inventory; * $p < .01$; ** $p < .001$

Small to medium positive associations were found between extrinsic affect worsening and obsession-compulsion, interpersonal sensitivity, depression, paranoid ideation, and psychoticism (BSI) and small negative associations were found with self-emotion appraisal, regulation of emotions, and use of emotion (WLEIS).

Small positive associations were found between intrinsic improving affect and with present moment awareness (PHLMS), and small and medium associations with all dimensions of WLEIS were found; small and medium associations were found with acceptance (PHLMS), repetitive negative thinking (PTG), psychological inflexibility (AAQ), and all dimensions of BSI (except somatization and phobic anxiety).

Finally, small and medium associations were found between intrinsic affect worsening and repetitive negative thinking (PTG), psychological inflexibility (AAQ), and all dimensions of the BSI; small negative associations were

found with present moment awareness (PHLMS), self-emotion appraisal and regulation of emotions (WLEIS).

Discussion

This study examined the factor structure and sex measurement invariance of the EROS in a clinical sample. Results supported the factor solution proposed by the original authors (Niven et al., 2011) composed of four conceptually distinct dimensions - intrinsic affect-improving, intrinsic affect worsening, extrinsic affect-improving, and extrinsic affect-worsening, as shown by the small to medium associations among them. As found by Niven et al. (2011), extrinsic affect improving was positively associated with intrinsic affect improving, and extrinsic affect worsening was negatively associated with intrinsic affect worsening suggesting that individuals who usually want to improve or worsen their own affect are also more likely to want to improve or worsen others’ affect. However, the lack of associations between the subscales extrinsic affect improving and intrinsic affect worsening and extrinsic affect worsening and intrinsic affect improving seemed to suggest that the target of regulation (self or others) has nothing to do with the motive underlying regulation (improve or worsen affect), reinforcing the need of assessing both types of targets and motives, supporting the four-factor structure of the EROS.

Only intrinsic affect (both improving and worsening) was significantly associated with rumination (partially supporting H2). As expected, intrinsic affect improving was associated with less rumination while intrinsic affect worsening was associated with more rumination, a strategy that usually results in greater negative affect (Segerstrom et al., 2000). Because rumination is essentially an intrapersonal strategy of emotion regulation, no association with extrinsic affect improving or worsening was expected. Overall, this provides some evidence that the intrinsic EROS dimensions are related to other measures of ER abilities and ER strategies that result in greater negative affect, as defended by Niven et al. (2011).

Intrinsic and extrinsic affect worsening were associated with higher psychological inflexibility while intrinsic affect improving was associated with lower psychological inflexibility. As expected (H3), this pattern of association provides evidence that when individuals experience higher psychological inflexibility, they tend to have more difficulties in regulating both their own and others’ emotions (e.g., Cox et al., 2018). The same happened with trait mindfulness. Intrinsic and extrinsic affect improving were associated with trait mindfulness, providing evidence that individuals’ abilities to be aware of one’s and other’s experiences and emotions facilitate ER (e.g., Lineman et al., 2007).

Both intrinsic and extrinsic affect improving were associated with a higher emotional intelligence, while both intrinsic and extrinsic affect worsening were associated with lower emotional intelligence, as expected (H4). These results are consistent with the idea that individuals with higher levels of emotional intelligence tend to be more competent in the way they manage their emotions according to their goals and the context (Peña-Sarrionandia et al., 2019).

As hypothesized (H5), the pattern of associations with psychopathological symptoms seems to suggest that both intrinsic and extrinsic affect improving promotes a healthier psychological functioning while both intrinsic and extrinsic affect worsening lead to more psychopathological symptoms, as expected. Additionally, the association between intrinsic strategies (worsening affect) and psychopathology are more evident than between extrinsic strategies (worsening affect) and psychopathology. This seems to suggest that the intrinsic affect regulation may have more negative self-consequences than extrinsic affect regulation. As proposed by Niven et al. (2012) this may happen due to intrapersonal processes namely due to the individuals' anticipation of others' reactions. However, the same pattern was not found by Niven et al. (2011) in which extrinsic affect regulation was more likely to be associated with negative self-consequences. However, it is important to note that in the present study a clinical sample was used while in the Niven's study an occupational sample from two social work agencies was used in which regulating clients' affect is an essential role in their job.

Finally, the lack of variation in EROS structure across sex adds important evidence for the robustness of this measure. In sum, the EROS can be considered a reliable and valid instrument to measure individual differences in emotion regulation strategies in a clinical Portuguese sample. However, future studies are needed to explore its psychometric properties within other contexts.

Limitations and future research

Some limitations should be noted. Participants were recruited using a convenience sampling method. Additionally, despite this study included a clinical sample data was not analyzed considering participants' diagnostics. Another important issue is related to the fact that we were not able to test discriminant validity of the EROS. Future studies should be conducted including a clinical and a non-clinical sample. Also, reliability in terms of test-retest was not performed so future studies should include this type of analysis to examine the stability of these four strategies of affect regulation over time. It would also be important to examine in future studies the associations between the

EROS and relevant interpersonal outcomes (e.g., relationship functioning/satisfaction).

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Data availability Data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

Declarations

Informed consent statement Informed consent was obtained from all subjects involved in the study.

Conflict of interest The authors declare no conflict of interest.

Methodological disclosure We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study.

Institutional review board statement All subjects gave their informed consent for inclusion before they participated in the study. All data was obtained in an anonymized form and data are not externally accessible. The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Aveiro University Ethics Committee.

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