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Psychological Assessment

Emotional Dysregulation Scale – Adults (EDEA): Validity evidence

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Abstract

Emotional self-regulation is necessary at various times in life; however, studies have indicated differences in the way men and women tend to express, contain, or change their emotions. These events are essential to be investigated in psychological instruments, since, when assessing this construct, an item could be endorsed by either sex, resulting in a biased conclusion. With this in mind, this study aimed to analyze the differential item functioning (DIF) of the Emotional Self-Regulation Scale – Adult (EARE-AD) for sadness, concerning the gender variable and the instrument's distribution's response categories. Due to the existence of DIF, neutralized items were prioritized, thus favoring less biased results. Based on this, in a second study, a reduced version of the scale (Emotional Dysregulation Scale – Adults – EDEA) with 15 items was proposed. We searched for validity evidence based on the internal structure for this new version.

Keywords: emotions; validity studies; emotional regulation; psychological tests; sadness.

ESCALA DE DESREGULAÇÃO EMOCIONAL – ADULTOS (EDEA): EVIDÊNCIAS DE VALIDADE

Resumo

A autorregulação emocional é necessária em diversas ocasiões da vida, porém estudos têm indicado diferenças na forma como homens e mulheres tendem a expressar, conter ou mudar suas emoções. É importante investigar essas considerações em instrumentos psicológicos, uma vez que, quando se avalia esse construto, sobretudo no caso de um item ter maior probabilidade de endosso por um ou outro sexo, os resultados podem ser enviesados. Com base nisso, o objetivo deste estudo foi analisar o funcionamento diferencial do item (DIF) da Escala de Autorregulação Emocional – Adulto (EARE-AD) para tristeza, em relação à variável sexo. Além disso, analisaram-se as distribuições das categorias de respostas do instrumento. Mediante a existência de DIF, itens neutralizados foram priorizados, favorecendo assim resultados menos tendenciosos. A partir disso, em um segundo estudo, foi proposta uma versão reduzida da escala (Escala de Desregulação Emocional – Adultos – EDEA) com 15 itens, com vistas a buscar evidências de validade baseadas na estrutura interna para essa nova versão.

Palavras-chave: emoções; estudos de validade; regulação emocional; testes psicológicos; tristeza.

ESCALA DE DESREGULACIÓN EMOCIONAL – ADULTOS (EDEA): EVIDENCIAS DE VALIDEZ

Resumen

La autorregulación emocional es necesaria en varios momentos de la vida, sin embargo, los estudios han indicado diferencias en la forma en que hombres y mujeres tienden a expresar, contener o cambiar sus emociones. Estas informaciones son importantes para ser investigadas en los instrumentos psicológicos, pues al evaluar estos aspectos, cuando es más probable que un ítem sea respaldado en ambos sexos, los resultados pueden estar sesgados. Así, el objetivo de este estudio fue analizar el funcionamiento diferencial del ítem (DIF) de la Escala de Autorregulación Emocional – Adulto (EARE-AD) para la tristeza, en relación con la variable de sexo, además de la distribución de las categorías de respuesta del instrumento. Debido a la existencia de DIF, se priorizaron los ítems neutralizados, lo que favoreció resultados menos sesgados. En base a esto, en un segundo estudio, se propuso una versión reducida de la escala (Escala de Desregulación Emocional – Adultos – EDEA) con 15 ítems, en que se buscó por la evidencia de validez basada en la estructura interna de esta nueva versión.

Palabras clave: emociones; estudios de validez; regulación emocional; pruebas psicológicas; tristeza.

1. Introduction

Regulating emotions is an essential aspect of human development. It is a process in which people use different strategies to inhibit, control, or express their emotions, in order to match the needs of the environment and/or personal goals and objectives. This process can occur automatically (when it does not require efforts or anticipated thoughts) or intentionally, involving decision making and choices about which expression is more appropriate or desired (Barros, Goes, & Pereira, 2015).

Considering the relevance of emotional self-regulation, it is necessary to have instruments that measure the construct correctly, which can be specific to contexts and samples. This occurs because different situations and stages of life sometimes require different types of self-regulatory strategies (Kring & Sloan, 2010). Given this need, Noronha and Baptista (2016) developed the Emotional Self-Regulation Scale – Adults (Escala de Autorregulação Emocional – Adultos – EARE-AD) directed toward situations of sadness, for the Brazilian context. The authors relied on Gratz and Roemer's (2004) concepts regarding the expressive

control of negative emotions and the reduction of emotional arousal for the elaboration of the items. Therefore, several aspects and processes of regulation were contemplated: the expression and manifestation of positive or negative emotions when faced with sad situations; positive reassessment of attention; rumination; impulsive reaction; non-acceptance of emotional responses; and difficulty in performing actions aimed at achieving the objectives, among others (Noronha, Baptista, & Batista, 2019).

The first psychometric properties of the EARE-AD were investigated in the study by Noronha et al. (2019). Participants were 802 subjects aged between 18 and 79 years (M = 27.62; SD = 12.19), with 66.2% of the sample consisting of women. An exploratory factor analysis was conducted, testing models of one to five factors for the instrument. The four-factor solution presented the best fit of the data (CFI = 0.994; RMSEA = 0.03 and χ^2 = 618.64; df = 431; RMSR = 0.04). Also, reliability indexes were found to be suitable for all factors, with values of 0.98, 0.69, 0.88, and 0.92, respectively, for factors 1 (adequate coping strategies), 2 (aggressiveness externalization), 3 (pessimism), and 4 (paralyzation).

Seeking to obtain new evidence of validity and reliability for the EARE-AD, another study tested the instrument through confirmatory factor analysis (CFA) and the assumptions of the item response theory (IRT). Three models were tested (multidimensional, second order, and two-factor). A total of 660 people, aged between 18 and 71, participated (M = 22.83; SD = 7.21), 68.9% of whom were male. The best fit indexes were found in the multi-dimensional model (χ^2 = 1938; df = 521; CFI = 0.95; RMSEA = 0.06; TLI = 0.95; WRMR = 1.622), with a reliability of 0.94, according to the alpha and 0.96 considering omega. Two items presented infit and outfit rates outside of those expected, which could be excluded in later studies (Bonfá-Araujo, Pallini, Baptista, & Noronha, manuscript submitted for publication).

Although the scale has already been tested for adequate psychometric properties, as indicated in the reported studies, it is important to highlight the possibility of differences in the regulation of emotions considering the sex of the respondent. The review by Nolen-Hoeksema (2012) showed that women make greater use of emotional regulation strategies. However, because they are more prone to rumination, women present more depression and anxiety symptoms than men. Also, the author emphasized that few studies have sought to investigate which strategies of emotional self-regulation are most used by men.

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Possible differences in self-regulation strategies concerning sex, using magnetic resonance imaging, were considered by McRae, Ochsner, Mauss, Gabrieli, and Gross (2008). The authors found that women put more effort than men into using the strategies, suggesting that the differences could be explained by the fact that men generally make greater use of the automatic regulation of emotions. Furthermore, even with more considerable effort, women would use positive emotions to a greater extent in the reevaluation of negative emotions.

Accordingly, for the present research, two studies were performed. The first study aimed to test the differential item functioning (DIF) considering the gender variable and the response categories for the EARE-AD. Subsequently, in a second study, an improvement of the measure was proposed, derived from the EARE-AD, renamed the Emotional Dysregulation Scale – Adults (Escala de Desregulação Emocional – Adultos – EDEA), which considered only items that were not affected by the DIF, in order to seek validity evidence based on in the internal structure.

2. Method

2.1 Participants

The sample of this study was composed of 1372 subjects (M = 23.3; SD = 7.67), 49.6% female and 50.4% male. The majority reported being single (87.6%) and in higher education (75.0%). This sample was derived from a combination of databases, in which the EARE-AD was used.

2.2 Instruments

The EARE-AD was used (Noronha & Baptista, 2016). This instrument was constructed to measure the emotional self-regulation of sadness through self-reported items. The final version consists of 34 items on a Likert-type scale (0 = never/none to 4 = always). The EARE-AD consists of four dimensions, namely: adequate coping strategies (α = 0.98, in the original study), aggressiveness externalization (α = 0.69), pessimism (α = 0.88), and paralysis (α = 0.92).

2.3 Procedures

This research was approved by the Research Ethics Committee before the data collection (CAAE: 80594117.1.0000.5514). All participants agreed to participate and signed the consent form. The ethical aspects requested by resolution 510/2016 (National Health Council, 2016) were followed. The collection took place online through the Google Forms platform, with an estimated duration of ten minutes.

2.4 Analysis of the data from study 1

After combining the databases, descriptive statistics were used to categorize the participants according to gender, marital status, and level of education. Then, DIF was tested according to sex. Subsequently, the data were analyzed to interpret the response categories for the factors of the EARE-AD, according to the assumptions of the item response theory (IRT). The criterion used to establish the presence of DIF was that of Draba (1977), in which items with t-scores equal to or greater than 2.40 present differential functioning. Afterward, the response categories were analyzed and presented in graphs in which the x-axis indicates the theta (level of the subjects in the latent trait), and the y-axis indicates the probability of the subjects' response at different levels of theta, with the mean-centered on zero. When two categories of endorsement present an intersection, this can be considered as the threshold value of change between the categories. The Winsteps (Linacre, 2010) software was used for the analyses. The items that showed differential functioning for gender were then excluded.

2.5 Analysis of the data from study 2

After study 1, two CFA were performed. The first contained the instrument without the items that presented DIF from the previous study to understand the structure of the instrument without items influenced by differential functioning. The second contained those items with the highest factor loadings, theoretical relevance, and semantic comprehension extracted from the first-factor analysis, which were selected to compose a version of the EDEA balanced according to the number of items, with CFA performed for this. For the CFA, the Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimator was used, considering the Root Mean Square Error of Approximation (RMSEA ≤ 0.08), the Comparative Fit Index (CFI ≥ 0.95) and the Tucker Lewis Index (≥ 0.95) fit indexes. For internal

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consistency, Cronbach's alpha and McDonald's omega were calculated, in addition to the correlation between the dimensions of the final instrument. All analyses were performed using the MPlus 7 software (Muthén & Muthén, 2011).

3. Results

3.1 Study 1: DIF in the sex and variable and response category for the EARE-AD

First, we sought to analyze the DIF for the items of the Emotional Self-Regulation Scale (EARE-AD). These results are presented in Table 3.1.1.

Table 3.1.1. Differential item Functioning for the EARE-AD dimensions.

Factor	Item	Gender	DIF	DIF SE	Gender	DIF	DIF SE	Contrast	*t*
	EARE1	Fem	0.58	0.04	Male	0.58	0.04	0.00	0.00
	EARE3	Fem	0.06	0.04	Male	−0.01	0.04	0.07	1.14
	EARE8	Fem	−0.35	0.05	Male	−0.38	0.05	0.02	0.32
	EARE9	Fem	0.04	0.04	Male	−0.07	0.04	0.11	1.82
	EARE10	Fem	−0.13	0.04	Male	−0.07	0.04	−0.07	−1.10
	EARE11	Fem	0.05	0.04	Male	0.05	0.04	0.00	0.00
	EARE12	Fem	−0.37	0.05	Male	−0.26	0.05	−0.12	−1.76
1	EARE13	Fem	−0.03	0.04	Male	−0.07	0.04	0.04	0.67
	EARE14	Fem	−0.02	0.04	Male	0.04	0.04	−0.06	−0.96
	EARE18	**Fem**	**0.31**	**0.04**	**Male**	**0.47**	**0.04**	**−0.16**	**−2.68**
	EARE25	Fem	−0.23	0.05	Male	−0.13	0.05	−0.10	−1.58
	EARE26	Fem	−0.29	0.05	Male	−0.22	0.05	−0.07	−1.06
	EARE27	Fem	0.07	0.04	Male	−0.04	0.04	0.11	1.74
	EARE28	Fem	0.25	0.04	Male	0.11	0.04	0.14	2.28
	EARE34	Fem	0.05	0.04	Male	0.05	0.04	0.00	0.00
	EARE7	**Fem**	**0.20**	**0.05**	**Male**	**−0.07**	**0.05**	**0.27**	**3.49**
	EARE15	**Fem**	**−0.88**	**0.04**	**Male**	**−0.70**	**0.05**	**−0.17**	**−2.74**
	EARE29	Fem	0.06	0.05	Male	0.21	0.06	−0.15	−1.95
2	EARE30	Fem	−0.16	0.05	Male	−0.07	0.05	−0.09	−1.21
	EARE31	Fem	0.32	0.06	Male	0.32	0.06	0.00	0.00
	EARE32	Fem	−0.14	0.05	Male	−0.22	0.05	0.08	1.15
	EARE33	**Fem**	**0.67**	**0.07**	**Male**	**0.44**	**0.07**	**0.22**	**2.44**
	EARE19	Fem	0.22	0.06	Male	0.22	0.06	0.00	0.00
	EARE20	Fem	0.14	0.06	Male	0.14	0.06	0.00	0.00
3	EARE21	Fem	0.13	0.06	Male	0.23	0.06	−0.09	−1.14
	EARE22	Fem	−0.09	0.06	Male	−0.20	0.06	0.11	1.40
	EARE23	Fem	−0.12	0.06	Male	−0.12	0.06	0.00	0.00
	EARE24	Fem	−0.29	0.06	Male	−0.25	0.05	−0.04	−0.56
	EARE2	Fem	−0.16	0.05	Male	−0.16	0.05	0.00	0.00
	EARE4	Fem	0.12	0.05	Male	0.06	0.05	0.05	0.79
4	**EARE5**	**Fem**	**0.76**	**0.05**	**Male**	**0.50**	**0.05**	**0.27**	**3.75**
	EARE6	Fem	−0.30	0.05	Male	−0.42	0.04	0.12	1.91
	EARE16	Fem	−0.20	0.05	Male	−0.09	0.05	−0.11	−1.63
	EARE17	**Fem**	**−0.21**	**0.05**	**Male**	**0.11**	**0.05**	**−0.33**	**−4.92**

Note: Factor 1 = adequate coping strategies; factor 2 = aggressiveness externalization; factor 3 = pessimism; factor 4 = paralyzation; DIF = differential item functioning; SE = standard error.

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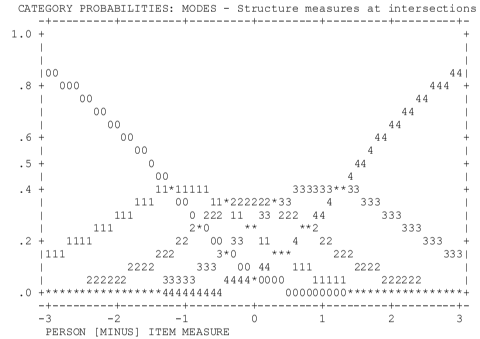
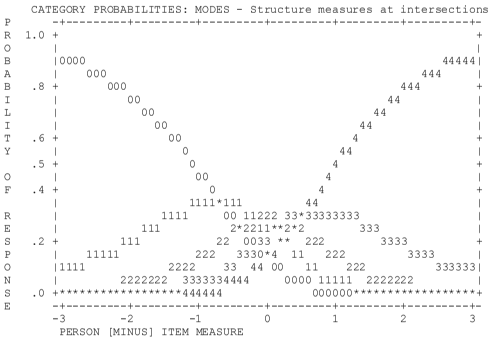
According to the pre-established criteria, items 5, 7, 15, 17, 18, and 33 presented DIF, with the t-values ranging from 2.44 to -4.92. The female respondents endorsed items 5, 7, and 33 more. These are EARE5 – "I think that nothing that can be done will do any good," EARE7 – "I want to hit other people," and EARE33 – "I punch things/break things." In turn, the male respondents endorsed items 15, 17, 18 in higher proportion, these being EARE18 – "I think what I feel is important for my growth," EARE15 – "I fight with others," and EARE17 – "I get lost."

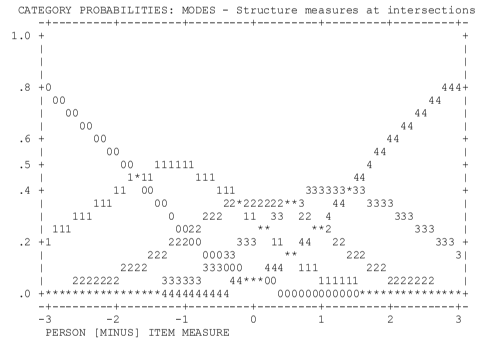
Next, the response category graph was produced. Figure 3.1.1 presents the categories according to the dimensions. The results of the endorsement distributions in the categories indicate that the subjects, in general, used all the possibilities of response. However, from the visual inspection, it is relevant to highlight that, despite the evident progression of theta levels for the Likert-type scale, category 2 presented little endorsement in all factors, especially concerning factors 1, 2, and 3 (appropriate coping strategies, aggressiveness externalization, and pessimism, respectively). Regarding the percentage of use of these categories, considering all factors, 33.85% of the participants indicated answer key zero, 20.40% indicated key one, 16.04% indicated key two, 14.15% indicated key three, and 13.87% indicated answer key four. However, it must be taken into account that the contents of these keys (0 = never/none; 1 = a little; 2 = somewhat; 3 = a lot; and 4 = always) are different. Therefore, alternative two is unable to discriminate the construct.



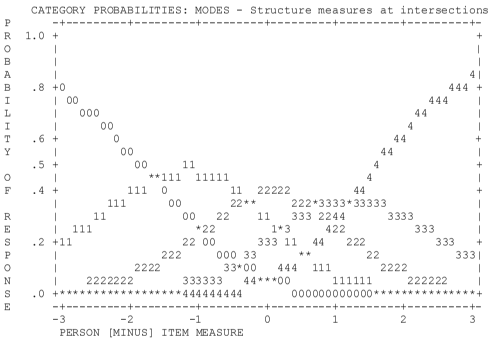
Factor 1 - Appropriate Coping Strategies



Factor 2 - Aggressiveness Externalization



Factor 3 - Pessimism



Factor 4 - Paralyzation

Figura 3.1.1. Answer categories for the EARE-AD dimensions.

3.2. Study 2: Evidence of validity based on the internal structure of the EDEA.

Initially, the CFA for the EDEA was performed, considering only the items that did not show differential functioning (DIF). As previously mentioned, this test was performed after excluding the items that showed differential functioning for gender. Table 4.1 presents the results of the factor analysis.

Table 3.2.1. Factor loadings of the EARE-AD items extracted to compose EDEA.

Items	Factor 1	Factor 2	Factor 3	Factor 4
EARE1	0.41			
EARE3	0.59			
EARE8	0.72			
EARE9	0.69			
EARE10	**0.82**			
EARE11	0.72			
EARE12	0.77			
EARE13	**0.83**			
EARE14	0.77			
EARE25	0.72			
EARE26	**0.80**			
EARE27	**0.78**			
EARE28	0.77			
EARE34	0.64			
EARE29		**0.80**		
EARE30		**0.71**		
EARE31		0.75		
EARE32		**0.76**		
EARE19			0.83	
EARE20			**0.87**	
EARE21			**0.93**	
EARE22			**0.93**	
EARE23			**0.90**	
EARE24			0.82	
EARE2				**0.71**
EARE4				**0.61**
EARE6				**0.69**
EARE16				**0.79**

Note: Factor 1 = adequate coping strategies; factor 2 = aggressiveness externalization; factor 3 = pessimism; factor 4 = paralyzation.

For this first model, the fit indexes obtained were RMSEA = 0.07, CFI = 0.95, and TLI = 0.95, with these fits indicating a satisfactory model. However, a second analysis was carried out to improve some topics, namely, unbalanced quantities of items for the dimensions and low factor loadings for some items. A second CFA model was proposed, tested with four items for three dimensions and three items for the aggressiveness externalization dimension. One of the items (EARE31) was considered by the authors to be semantically difficult to understand and, therefore, we chose to exclude it from the final instrument. The items used are in bold in Table 3.2.1, chosen due to their high factor loadings, theoretical relevance, and semantic clarity. Table 3.2.2 presents the new factor analysis test, internal consistency for each factor, and the correlation between the dimensions.

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Table 3.2.2. Factor loadings and EDEA correlation.

Items	Factor 1	Factor 2	Factor 3	Factor 4	*h2*
"I try to think about good things"	0.84				0.70
"I try to cheer myself up"	0.81				0.66
"I think that it will pass"	0.70				0.49
"I try to relax"	0.75				0.55
"I mistreat other people"		0.82			0.68
"I scream/shout"		0.72			0.51
"I blame others for things that are not their fault"		0.80			0.63
"I think I'm a bad person"			0.90		0.81
"I think I have no value"			0.93		0.86
"I think I am worse than the others"			0.95		0.90
"I think I'm incompetent"			0.91		0.83
"I'm afraid it won't pass"				0.65	0.42
"I can't understand why I'm like this"				0.60	0.36
"I cannot think straight"				0.66	0.43
"I do not know what to do"				0.79	0.62
Alpha	0.72	0.92	0.96	0.68	
Omega	0.82	0.92	0.97	0.70	
Factor 1	1				
Factor 2	-0.17*	1			
Factor 3	-0.40*	0.64*	1		
Factor 4	-0.43*	0.63*	0.78*	1	

Note: Factor 1= adequate coping strategies; factor 2= aggressiveness externalization; factor 3= pessimism; factor 4= paralyzation; h2 = commonality; * p < .001.

This second satisfactory model presented the following fit indexes RMSEA = 0.06, CFI = 0.98, and TLI = 0.98. The factor loadings ranged from 0.60 to 0.95. Concerning internal consistency for the general scale, the results obtained were Cronbach's alpha (α = 0.94) and McDonald's omega (ω = 0.96).

4. Discussion

Two studies were carried out to achieve the proposed objectives. The first one focused on testing the DIF and the response categories of the EARE-AD, following the assumptions of the item response theory. The second aimed to improve the EARE-AD, intending to search for items that were not affected by the DIF and to propose the EDEA. Since the EARE-AD focuses on maladaptive strategies, it was decided to invert only the first dimension of the instrument. Therefore, the name of the scale was changed from the Emotional Self-Regulation Scale (EARE-AD) to the Emotional Dysregulation Scale – Adults (EDEA).

When analyzed, six items indicated differential functioning for the gender of the respondent. This analysis is important, as it allows the identification of characteristics that can skew the instrument's results, limiting its use (Sisto, 2006). Among these items, the female respondents endorsed some items of the aggressiveness externalization and paralysis dimensions more (items EARE5, EARE7, and EARE33, available in Table 3.1.1). In contrast, the male respondents endorsed other items of the appropriate coping strategies, aggressiveness externalization, and paralysis dimensions (items EARE15, EARE17, and EARE18, available in Table 3.1.1). These data indicate that, when faced with sad events, women tend to be more physically aggressive concerning externalizing aggression – behaviors indicated by the items "I want to hit other people" and "I punch things/break things." Men, however, tend to be more aggressive in an expressive way – as indicated by the item "I fight with other people," both blaming others or ruminating on possible coping strategies. Conversely, men – considering only the item "I think what I feel is important for my growth" – are better able to find suitable tools to confront these situations.

For the answer keys, the response category two ("somewhat") was the least discriminatory when assessing the theta progression of the individuals. Previous studies on the anchoring of responses (e.g., Gehlbach & Artino, 2018; Gehlbach & Barge, 2012) indicate that some answer keys are not very discriminatory, especially those that can confuse the respondent. Therefore, aiming for an instrument that is capable of being applied equally to both sexes and can be discriminative concerning the latent trait, it was decided to remove them from the reduced version. These items presented differential functioning for gender and removed the response key that presented little discrimination when evaluated according to the respondents.

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The statements of Chyung, Roberts, Swanson, and Hankinson (2017) contribute to this decision by warning that midpoints in the answer keys are not always necessary, especially when they do not demonstrate good discrimination or impair the measure by providing little information. Due to the low endorsement of this key and the preference for people to position themselves concerning the frequency of their actions in each item, the removal of this key becomes viable, without causing any impairment to the measure.

After this process, the second study was started, carrying out CFA. In order to maintain the proposal of Noronha and Baptista (2016), four dimensions previously highlighted in the literature were maintained (Gratz & Roemer, 2004). For the CFA, factor loadings ranging from moderate to high were found (see Table 3.2.1). However, maintaining this version, the number of items per dimension would have led to the instrument being unbalanced, ranging from 14 items in one factor to 4 items in another. Since an unbalanced version of the instrument could jeopardize future analyses, a second CFA was performed considering the following criteria: 1. to obtain an improved version of the inventory, which was not very extensive and capable of capturing the construct efficiently (Streiner, 2003); and 2. to maintain items that could represent each of the proposed dimensions, without being redundant.

Accordingly, this new analysis (see Table 3.2.2) showed factor loadings ranging from moderate to high, with satisfactory fit indexes higher than those of the previous version. Four items were maintained for three dimensions and three items for the aggressiveness externalization dimension, resulting in a scale with fifteen items in total. One dimension evaluated adaptive strategies, and three assessed maladaptive strategies when faced with sadness. As expected, the maladaptive dimensions indicated a negative correlation with the factor of adequate strategies, which indicated that it was a protective factor regarding sad events (Weiss, Gratz, & Lavender, 2015).

Since this research aimed to test possible discrepancies concerning gender and response categories, as well as to present an improved version (i.e., the EDEA), future studies should seek to test the proposed scale in other contexts (e.g., evidence of validity based on the relationship with other variables and discriminant validity concerning constructs that may share some proximity in the assessment and regulation of emotions such as self-esteem, for example). The proposal of this reduced scale is based on the justification that reduced instruments can be used for

screening and have great clinical utility, especially when associated with investigations of notoriously related symptoms and disorders, such as depression and anxiety, and demands that have significantly increased in recent years. Besides, these instruments are best used in large-scale applications, as they require less time to complete, ultimately avoiding fatigue effects very common in large data collections (Streiner, 2003). Furthermore, relationships with constructs that are notoriously related in the literature, such as depression and anxiety, should be sought. Since this instrument's focus is maladaptive strategies of emotional self-regulation for sadness, the analysis of the relationships between these and psychopathological personality traits is a proposal for future studies.

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