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Age and gender adjusted Brazilian normative reference data for the 16-item version of Difficulties in Emotion Regulation Scale (DERS-16)

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ABSTRACT. La *Difficulties in Emotion Regulation Scale (DERS)* è un questionario self-report che misura le difficoltà nella regolazione delle emozioni con dimostrata validità, affidabilità e rilevanza clinica in diversi contesti e culture. La versione breve condivide proprietà psicometriche simili, tuttavia è assente un riferimento normativo in letteratura. Partendo da un ampio campione brasiliano, composto da 12838 adulti, questo studio ha potuto ottenere i punteggi normativi aggiustati per età e genere per la popolazione brasiliana e che possono essere utilizzati come parametri affidabili nell'interpretazione dei punteggi del DERS a 16 item.

SUMMARY. The Difficulties in Emotion Regulation Scale (DERS) is a self-report tool that measures difficulties in regulating emotions that have demonstrated its reliable psychometric properties and clinical relevance in different contexts and cultures. The shorter, 16-item version of DERS has shown similarly sound psychometric properties and validity in measuring emotion dysregulation. However, no study has yet provided normative reference for interpretation of its scores. Accordingly, this study aimed to reproduce Giromini et al.'s (2017) procedures for developing age- and gender-adjusted normative reference data, using a large Brazilian sample. Data from N = 12838 adults from all regions of Brazil were used in the study, with two-thirds of the sample (n = 8531) comprising the development sample, from which we derived the parameters of age- and gender-adjusted t-scores, and the other third of the data (n = 4307) comprising a cross-validation sample. Development of adjusted normative scores that control age and gender effects are provided to be used as parameter for interpreting data from adult assessment, along with its application in an independent nonclinical sample. Normative data are useful in psychological assessment for reliable interpretation of test scores. The present study provides reliable normative parameters for interpretation of scores of emotion dysregulation across Brazilian samples. Future studies should replicate and test whether this approach might be useful in other countries and clinical samples.

Keywords: *Emotion regulation, Test norms, Psychological assessment*

INTRODUCTION

The ability to regulate emotions is a core feature of the adaptation in the society. It is defined by the capacity to modify emotional experience and consequent behavior to better adjust to a situation. How one reacts to intense life events and is capable of find strategies to confront challenging events is an important skill to preserve mental health. In fact, difficulties in emotion regulation (ER) are related to various mental health issues in the literature, such as mood disorders, anxiety, personality disorders, autism spectrum disorder, and substance abuse. Other health conditions like cardiovascular disease and obesity have also been associated to problems with regulating emotions (Gross, 2014; Jentsch & Wolf, 2020; Segura-Serralta et al., 2019).

For its clinical relevance, this field of study has rapidly grown in the last decades, giving rise to different approaches toward ER and how it works. ER is a complex construct involving physiological, emotional, cognitive and behavioral processes (Etkin, Büchel & Gross, 2016; Gross, 1998). Theories on ER usually focus on specific parts of the process, such as changing the situation that generates emotions, controlling the body's intense physiological responses, and modifying cognitions related to the situation or control behavioral response to adapt (John & Eng, 2014).

In that sense, Gratz and Roemer (2004) presented a multidimensional perspective on ER based on empirical work in which they propose six components, or dimensions of ER: a) acceptance of emotional states; b) engagement on goal-directed behaviors, even when experiencing a negative emotion; c) controlling impulsive behavior in the face of negative emotions; d) awareness of emotional states; e) access to strategies do regulate emotions; f) having clarity of emotional experience.

Proposing a more comprehensive approach to understand ER, these authors introduced the *Difficulties in Emotion Regulation Scale* (*DERS*) (Gratz & Roemer, 2004), as a measure of problems in regulating emotions, to address these six dimensions previously proposed. This instrument is a 36-item self-report questionnaire assessing the forementioned dimensions of difficulties of ER.

Although the first validation study focused on a student sample comprised of white women (Gratz & Roemer, 2004), several studies that followed this original publication were able to demonstrate the validity and reliability of DERS scores in a multitude of cultural contexts and samples (Giromini, Velotti, De Campora, Bonalume & Zavattini, 2012; Muñoz-Martínez, Vargas & Hoyos-González, 2016; Shahabi, Hasani & Bjureberg, 2020; Westerlund & Santtila, 2018; Wolz et al., 2015). Studies contributing to support the usefulness and validity of the DERS include samples of patients with anxiety, depressive and trauma-related disorders (Hallion, Steinman, Tolin & Diefenbach, 2018), borderline personality disorder (Salsman & Linehan, 2012), eating disorders and obesity (Gianini, White & Masheb, 2013; Harrison, Sullivan, Tchanturia & Treasure, 2010), alcohol use (Dvorak et al., 2014), gambling disorders (Williams, Grisham, Erskine & Cassedy, 2012), patients with chronic pain (Kökönyei, Urbán, Reinhardt, Józan & Demetrovics, 2014), and adolescents (Charak et al., 2019; Hansson, Daukantaité & Johnsson, 2017).

Because of its comprehensive approach and applicability among different contexts, DERS is currently one of the most used measures for assessing ER in clinical and research settings (Xu et al., 2021). For instance, a quick research on Scopus performed at September, 2021, revealed that the original publication of Gratz and Roemer (2004) had more than 3553 citations. Many developments of the original scale were later proposed in order to expand its applicability and usefulness, such as the work of Bjureberg et al. (2015), that proposed a reduced version using 16 items of the original scale, after investigating its factor structure, and provided a short and reliable version of the measure, that has been adapted to different contexts. The short version, such as the original one, have shown consistently adequate psychometric properties across a variety of countries and contexts (Cho & Hong, 2013; Mitsopoulou, Kafetsios, Karademas, Papastefanakis & Simos, 2013; Victor & Klonsky, 2016; Westerlund & Santtila, 2018; Yiğit & Guzey Yiğit, 2019), which reinforces its clinical and research utility as a valid tool for assessing ER.

Recent studies tried to investigate whether age and/or gender would impact the scores of various ER measures. For instance, evidence from neurobiological and developmental studies support the idea that ER is highly influenced by age, showing that younger individuals usually display more difficulties in regulating emotion then older individuals, as a result of maturation of cognitive processes and learning experiences (Ahmed, Bittencourt-Hewitt & Sebastian, 2015; Livingstone & Isaacowitz, 2021; Messina, Grecucci & Viviani, 2021; Schweizer, 2020). Similarly, recent studies provide evidence that women tend to have higher scores on ER measures, and that gender moderates the association

of emotion dysregulation to several attachment-related constructs (Malesza, 2021; Velotti et al., 2016).

Consistent with these considerations, in a recent publication, Giromini, Ales, de Campora, Zennaro and Pignolo (2017) developed age- and gender-adjusted normative scores for DERS-36 in order to provide a benchmark regarding expected scores on the scale, thereby providing standardized cut-off scores to help interpret results on the assessment of emotional dysregulation with DERS, across research and clinical settings. However, these procedures were solely applied to DERS-36, but have not been tested on DERS-16, so there are no normative reference data available to interpretation of DERS-16 scores. Additionally, age and gender effects on scores of the short version of DERS are not yet described in the literature.

Therefore, we aim to fill this gap by testing the effect of age and gender on DERS-16 scores. Furthermore, we intend to replicate the procedures from Giromini et al.'s (2017) study to produce a normative gender and age-adjusted scores to DERS-16, using a large Brazilian sample, thus providing parameters of interpretation of DERS-16 scores.

METHOD

Participants

The total sample used in this study was comprised of 12838 participants derived from all regions and states of Brazil. Slightly more than half were women (59.6%); ages ranged from 18 to 69 (M = 28.05; SD = 9.42). The majority (63.7%) had 11 or more years of study, i.e., were enrolled or completed graduation courses, 33.5% had between 9 and 11 years of education (high school) and only 2.8% had less than eight years of education.

In order to develop a set of normative reference values adjusted by age and gender for the DERS-16, we split the initial sample into two parts: the first was comprised by two thirds of the sample (n = 8531), randomly selected using the SPSS random sample function, that were used to develop our age- and gender-adjusted scores (developmental sample), and the other third (n = 4307) was used for validation purposes (validation sample). As shown in Table 1, the developmental and validation samples did not differ from each other on age or gender.

Table 1 – Demographic composition of the sample

	Developmental (n = 8531)	**Validation (n = 4307)**	**Total (n = 12838)**
Age, $t_{(12836)} = -.51$, $p = .61$			
M	28.02	28.11	28.05
SD	9.41	9.42	9.42
Gender (ø = .01; $p = .40$)			
Females	5108	2546	7654
Males	3423	1761	5184

Procedure

All data collection was conducted online, following all required ethical procedures and guidelines for online and computerized assessment as proposed by the International Testing Commission (2017), with approval of Ethical Committee of State University of Londrina. All instruments were adapted to online format and uploaded to a domain-specific to this research. Invitations to participate in research were made using social networks. Those who decided to volunteer clicked on a link and were taken to the research entry page, where the informed consent was displayed, informing the goals of the studies. If the participant agreed to participate, they created an account with a username and password. Then (and only then) they had access to the psychological measures.

Measures

– *Difficulties in Emotion Regulation Scale (DERS-16)* (Miguel, Giromini, Colombarolli, Zuanazzi & Zennaro, 2017). The Brazilian version of the DERS-16 is comprised of 16 items assessing five dimensions of emotional dysregulation: non-acceptance of emotional responses, difficulties in engaging in goal-oriented behaviors, difficulties in control impulses, restrict access to emotional regulation strategies, and lack of emotional clarity. Respondents have to classify the frequency with which each item applies to themselves on a Likert scale varying from 1 (almost never, 0-10%) to 5 (almost always, 91-100%). The scores provide an estimate of how difficult it is for the respondent to deal with emotional-charged situations. This scale has been largely used and applied to many contexts and has been adapted for various countries. In the previous Brazilian adaptation study, the DERS-16 showed excellent psychometric properties, with Cronbach's alphas ranging from .80 to .87 for the scales and .93 for the total scale. In the present study, Cronbach's alpha ranged from .71 to .89, with an index of .91 for the whole scale, revealing adequate reliability.

Data analysis

The procedures herein applied to obtain normative age- and gender-adjusted scores for DERS-16 closely reproduce those described by Giromini et al. (2017) in the original normative study with DERS-36. First, we quantified the average contribution of two the key demographic variables under investigation, i.e., age and gender, in the determination of any given DERS-16 scores. Then, we removed the effects of these two demographic variables from each DERS-16 score to develop a set of age- and gender-adjusted DERS-16 reference data. Lastly, we tested these newly developed reference data's applicability by inspecting an independent, cross-validation sample. Consistent with Giromini et al. (2017), two-thirds of the data in our initial sample were used to generate our estimated age- and gender-adjusted scores, and the other third was used for validation purposes.

RESULTS

Development of age and gender adjusted DERS scores

As noted above, to develop age- and gender-adjusted DERS scores, we first focused on the developmental sample. Specifically, a series of multiple regressions models were tested to obtain the raw *b* weight values of age and gender (transformed into dummy variables, M = 0 and F = 1) as predictors of the DERS total and subscales scores. The values obtained from the regression models are shown in Table 2.

All regression models tested were statistically significant, $F_{(2,\ 8528)} \geq 75.619$, $p<.001$, explaining 2% to 5% of the variance on DERS scores. For all scores, both age and gender produced statistically significant beta weights ($p<.001$) in the expected directions, with increasing age negatively affecting DERS scores, and female gender reporting more emotional dysregulation.

The parameters obtained from these regression models were then used to develop our age- and gender-adjusted scores. More specifically, using the *b* weights of age and gender, we predicted, for that sample, what a DERS score of a specific participant would be considering his or her age and gender. To construct these equations, we used following calculation, exemplified by the Nonacceptance score on DERS:

$$\textit{Predicted score} = \textit{Constant} + (\text{Age} \times \textit{raw b age}) + (\text{Gender} \times \textit{raw b gender})$$

therefore,

Table 2 – Multiple regression models for developing age and gender adjusted scores (n = 8531)

	$F_{(2, 8528)}$	*p*	R^2	Adj. R^2	Raw b	Standardized ß	*p*
Nonacceptance	75.619	<.001	.13	.02			
(Constant)					9.490		<.001
Age					−.049	−.123	<.001
Gender					.476	.062	<.001
Goals	113.120	<.001	.16	.03			
(Constant)					10.892		<.001
Age					−.058	−.152	<.001
Gender					.506	.069	<.001
Impulse	119.015	<.001	.16	.03			
(Constant)					7.548		<.001
Age					−.022	−.065	<.001
Gender					1.002	.158	<.001
Strategies	159.017	<.001	.19	.04			
(Constant)					16.286		<.001
Age					−.097	−.163	<.001
Gender					1.311	.114	<.001
Clarity	224.739	<.001	.22	.05			
(Constant)					6.895		<.001
Age					−.058	−.215	<.001
Gender					.438	.085	<.001
Total	197.192	<.001	.21	.04			
(Constant)					951.110		<.001
Age					−.284	−.182	<.001
Gender					3.734	.124	<.001

Nonacceptance Predicted score = 9.490 + (Age × −.049) + (Gender × .476)

where age is measured in years and gender is transformed in dummy variable with M = 0 e F = 1. After obtaining all predicted scores, residuals between estimates and raw scores (presented in Table 3) were added to the equation to produce the scores adjusted for age and gender, as follows:

Adjusted score = (*Raw value* – *Predicted score*) + *Mean score* (*Sample*)

e.g., for Nonacceptance,

Age & *Gender Adj. Nonacceptance score* = (*Raw value* – (9.490 + (Age × −.049) + (Gender × .476)) + 8.40

where raw values refer to the individual's original raw score on that scale, and the mean score is the one obtained for the scale on the developmental sample. These formulas inform what DERS scores a respondent would have if his/her gender and age were the same as the average values found for these two demographic variables in our developmental sample. For instance, if the gender of a person was female and her age was lower than the average age of our developmental sample, then her adjusted DERS score would be smaller compared to her un-adjusted score.

These age- and gender-adjusted scores were then transformed into standardized *t*-scores (M = 50, SD = 10), to make it possible to obtain normative parameters for interpretation. More specifically, the following formula was used to that goal:

Adj t-score =[(Adj. score - Mean score (Sample))/Std Deviation (Sample)] 10 + 50

All equations to calculate adjusted t-scores derived from our normative sample may be obtained by contacting the first author. With these valuables, derived from a representative developmental sample, the reader could obtain adjusted standardized scores to other samples of adults (in the Brazilian context) and, therefore, interpret the level of emotional dysregulation reported by participants regardless of age gender.

Representativeness of DERS age and gender adjusted t-scores

After calculating the adjusted t-scores in the developmental sample, we inspected the validation sample to verify if the resulting scores would be representative of an independent nonclinical community-derived sample. The main goal was to test if the average age- and gender-adjusted *t*-scores derived from our developmental sample would show a mean value close to t = 50 also with this independent, cross-

Table 3 – Raw age and gender adjusted DERS scores: developmental sample (n = 8531)

	M	SD
Nonacceptance	8.40	3.75
Goals	9.57	3.54
Impulse	7.53	3.07
Strategies	14.35	5.53
Clarity	5.54	2.46
Total	45.39	14.38

validation sample. Because these analyses essentially aimed to test the null hypothesis, i.e., they aimed to demonstrate that the one-sample *t*-tests comparing our scores against 50 would not demonstrate any statistically significant differences, we implemented Bayesian statistics. More in detail, consistent with Giromini et al. (2017), we calculated the JZS Bayes Factor values based on Rouder, Speckman, Sun, Morey and Iverson's (2009) Equation 1, and interpreted them based on Jeffreys' (1961) criteria. The results of these analyses, reported in Table 4, demonstrate that our validation sample did produce DERS scores virtually identical to 50, as expected.

Additionally, point biserial correlations were calculated between the adjusted *t*-scores of DERS with age and gender on the validation sample, in order to test if those are being affected by the age and gender of participants in this sample. Results are reported in Table 5, and demonstrate that, as opposed to initial raw scores, all highly correlated with age and gender, adjusted *t*-scores did not suffer major influence of age and none of them appears to be related to gender. Although a few significant correlations were still found for age, specifically on Impulse ($r = .06$, $p<.01$), Strategies ($r = .03$, $p<.05$) and Total DERS score ($r = .04$, $p<.01$), all correlations can be considered very small in a way that they reflect effect sizes that can be considered of a minimal practical significance (Rouder & Morey, 2011).

DISCUSSION

Our study aimed to reproduce previously published approach to produce age- and gender-adjusted normative reference for DERS, in an adult Brazilian sample. For that, we used a large community sample from all regions of Brazil ($N = 12838$) and divided into two randomly assigned samples, with two thirds for developing parameters of age- and gender-adjusted scores, and the validation sample to test our newly developed *t*-scores as a normative reference for DERS. Our findings present the significant influence of age in the ability to regulate emotions and gender differences on these abilities. Additionally, we demonstrated that the normative parameters could be successfully applied to nonclinical community sample and control the influence of age and gender variables in the interpretation of DERS. Therefore, we provide researchers with a valid, reliable and useful reference for interpretation of DERS scores and offer additional evidence for the relationship between ER and age, and the usefulness and effectiveness of Giromini et al.'s (2017) approach to adjust age and gender influence on DERS scores.

Influence of age and gender of the respondents on self-reported difficulties to regulate emotions is very well documented in the literature. Similar results were presented by other studies, in which older participants reported fewer

Table 4 – Age and gender adjusted DERS t-scores: testing the null hypothesis that t = 50 within the validation sample (n = 4307)

	M	SD	$t_{(4306)}$	p	JZS B
Nonacceptance	50.22	9.96	1.45	.15	20.35
Goals	50.14	10.01	.89	.38	39.17
Impulse	49.78	9.98	−1.48	.14	19.48
Strategies	50.15	9.95	.99	.32	35.65
Clarity	50.09	9.87	.61	.54	48.31
Total	50.12	10.00	.76	.45	43.60

Table 5 – Correlation of raw and adjusted t-scores to age and gender, within the validation sample (n = 4307)

	Raw scores		Adj. t-scores	
	Age	**Gender**	**Age**	**Gender**
Nonacceptance	−.13**	.06**	.02	−.01
Goals	−.16**	.06**	.02	−.01
Impulse	−.10**	.14**	.06**	.01
Strategies	−.18**	.09**	.03*	−.01
Clarity	−.23**	.06**	.03	−.00
Total	−.20**	.10**	.04**	−.00

*p<.05; ** p<.01

difficulties when compared to young adults (Anderson, Reilly, Gorrell, Schaumberg & Anderson, 2016; Carstensen et al., 2011; Kwon, Yoon, Joormann & Kwon, 2013; Rogier, Garofalo & Velotti, 2019). Although older individuals may suffer from impairment of physical and cognitive functions, research shows that they report a decline of emotional distress and well-being, with might be related to expansion and maturation of emotion regulation strategies throughout their lifetime (Blanchard-Fields, Stein & Watson, 2004; Nashiro, Sakaki & Mather, 2012; Suri & Gross, 2012). Though adjusted *t*-scores still correlated significantly with age in our validation sample, the effect of this relation can be considered null in terms of practical implications, as its magnitude is almost zero (Greene, 2000; Rouder & Morey, 2011). In this sense, age-adjusted scores for ER difficulties are important to control for inflation of young individuals' scores and underestimate older individuals' difficulties in interpretation of mean scores.

Gender differences in ER are also commonly found in other studies. Although in Giromini et al.'s (2017) study this was not the case, we believe that our results might be consequence of a larger sample, and its possibility to better demonstrate gender differences when reporting own emotional difficulties. More specifically, it is part of the gender role expectations that women may openly express their emotional states and have more difficulties with ER, as men are usually thought to develop a more rational, controlled approach to ER. This could be a reason why self-report measures of emotional functioning, women tend to have higher scores than men, and is also the case for ER difficulties assessed by DERS. The cultural context and its influence on gender expectations might also be the reason why some samples did not found differences between genders, i.e., it is possible that specific cultural context could be a moderating factor on the openness to self-report emotional difficulties in women and men. However, more research is needed to address this relationship.

Developing normative reference for interpretation of scores is a standard procedure for measurement instruments in psychological and clinical practice. They provide

standardized and secure parameters to interpret individual scores on a measure and, therefore, help the practitioner obtain best information about the patient's functioning and define level of clinical impairment. Normative scores of DERS, thus, are a useful and relevant clinical tool to adequate interpretation of self-report difficulties of ER, as they standardize mean scores of 50 and standard deviation of 10, i.e., *t*-score distribution, giving an easy, accessible parameter to identify how far from normative expectations the individual's score is. Deviations of 1.5 to 2.0 points are usually used as parameters of normative deviation in *z*-distributions, which in *t*-score distribution corresponds to 65 *t* and 70 *t* (i.e., 1.5 to 2 *SD* above the mean of the normative sample). In that sense, clinically relevant differences might be found in individuals that present adjusted *t*-scores of 70 *t* or above, as previous studies with clinical samples reported.

One of the advantages of using age- and gender-adjusted scores is that this procedure allows the professional to appreciate the extent to which a given DERS score would be more likely to be ascribed to the fact that the test-taker has an age range in which emotional dysregulation frequently occurs, or rather to the fact that this person is emotionally dysregulated. For instance, a raw score of 60 could seem a relatively high score, when compared to the average total score of about 45 (with *SD* of about 15) found in our developmental sample. However, when applying age- and gender-adjusted normative parameters, this same raw score value of 60 would be considered to be particularly elevated if the test-taker was a 60 years old woman (adjusted *t*-score = 68, i.e., about 2 *SD*s above the *Mean* of the reference values), but only slightly higher than expected (i.e., within a one standard deviation departure) if the test-taker was an 18 years old boy (adjusted *t*-score = 57). As such, the same raw score would be considered differently troublesome depending on the age and gender of the tested person. Therefore, we can discriminate between high scores that are not clinically relevant (i.e., scores that are consistent with age and gender expectations) from those that are high in comparison with normative reference samples that are more similar to the test-taker in terms of age and gender.

This is especially important to control for the effect of these variables in interpreting scores of emotion dysregulation in samples with clinical symptoms, that are commonly associated in several studies using DERS in clinical samples. For instance, Bjureberg et al. (2015) assessed 96 women with borderline personality disorder and reported significant correlations between DERS scores and anxiety, depression and self-harm symptoms. Vuillier, Robertson & Greville-Harris (2020) assessed eating disorder symptoms and emotion dysregulation in a sample of 192 subjects, and found that higher scores on a measure of orthorexia nervosa symptoms were significantly correlated with DERS-16's scores. Additionally, in a randomized control trial with 182 adults and children with ADHD, Skott et al. (2020) found that treatment with symbiotics (a combination of pre and probiotic bacterias) for ADHD symptoms resulted in a significant reduction of DERS-16 scores in the adult sample. As these evidences suggest clinical relevance of ER across several psychiatric disorders, additional research with clinical samples using our proposed adjusted scores is encouraged to verify clinical significance of this threshold and to improve interpretation of the associations between ER scores and clinical symptoms.

Developing representative normative reference data is important to help clinicians and researchers to have a better interpretation of DERS scores. Our study provides reference values that might be used to identify clinically relevant difficulties in ER and how it manifests to particular individuals, therefore offering an important tool for treatment formulation. Additionally, our research contributes with information important to cross-cultural research on emotional functioning, which are very relevant to comprehend how people from different cultural backgrounds might differ in terms of emotional functioning, thus formulating more straight-forward approaches to emotional problems.

Our study presents a contribution to the literature on ER and additional validity for DERS as research and clinical tool. However, it has important limitations that must be underlined. First, we collect data remotely through online assessment, and did not have extensive information about participants' background such as socioeconomic status and clinical information. A great part of our sample was composed of high-educated individuals with the mean age of 28 years, which is fairly low. We know that Brazil is a vast country with great differences and that the fact that college-educated participants are not representative of the majority of Brazilian general educational status. Also, the fact that one should have internet access to participate in the research is a bias in socioeconomic background, as this is a tool not widely accessible for people with low income, which is the majority of Brazilian population. Besides that,

in research with psychological instruments through online recruiting, it is possible that people with emotional problems or psychiatric issues can over-identify with the research theme and be especially willing to collaborate, which might result in bias of the total scores. One second limitation is that we do not have access to a valid clinical sample to test whether our normative scores would differentiate clinical and nonclinical samples. This is important especially because it could provide a reliable, tested threshold to be used as parameters of emotional dysregulation that can be clinically relevant. Future studies should consider the inclusion of clinical samples to advance in this regard.

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Data availability. The datasets analyzed during the current study are available from the corresponding author on reasonable request.

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