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ORIGINAL PAPER

Careworkers' Affect Regulation in Youth Residential Care: A Study on the Psychometric Properties of the Affect Regulation Checklist

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Abstract

The ability of formal caregivers who work in residential care to regulate their emotions plays an important role in determining the quality of their care. However, there are few instruments to assess affect regulation in this context. This study addresses this gap by providing a preliminary analysis of the psychometric properties of the Affect Regulation Checklist (ARC) in a sample of Portuguese child careworkers in residential care settings. The ARC was administered to 212 careworkers working in 21 residential care institutions in the district of Porto/Portugal (M age = 40.99 years, SD = 11.05). Confirmatory factor analysis (CFA) and item response theory (IRT) analysis were used to examine the psychometric properties of ARC. CFA confirmed the three-factor solution proposed by the original authors (suppression; dysregulation; adaptive reflection) and provided evidence of the construct validity of the ARC. IRT analyses showed that all items were moderately to highly discriminant and that some items were more difficult than others. Support was found for the internal consistency and test-retest reliability of the ARC. Overall, the ARC is a psychometrically sound approach for assessing careworkers' affect regulation strategies in the residential care context.

Keywords Affect regulation · Careworkers · Item response theory · Psychometric analysis · Residential care

Highlights

- Staff emotion regulation directly affects the quality of their care and should be prioritized in agency evaluations.
- For professionals working in residential care contexts, suppression can be a healthy strategy for emotional regulation.
- Item Response Theory showed that some ARC items are more suitable for distressed populations.

The ability to regulate emotions is critical for meeting the challenges of daily life and subjective well-being (Cole et al., 1994; Gross, 2014). According to Gross (2015), emotion regulation involves the ability of individuals to understand their emotions, modulate their experiences, and express emotions constructively. However, different contexts call for the use of different strategies in emotion regulation and emotion expression (Gross, 2013). The ability to be flexible and to adapt affect regulation strategies to different contexts ensures synchronization between affect regulation strategies and contextual demands and is positively associated with adjustment across situations (Aldao et al., 2015).

Several empirical studies evidenced that certain affect regulation strategies may be more adaptive than others (e.g., Aldao et al., 2014; Dryman & Heimberg, 2018). Gross & John (2003) identified cognitive reappraisal and expressive suppression as two critical skills that are essential to regulating emotions. Cognitive reappraisal, which has been classified as an "adaptive" strategy (Gross, 2014), is a form of cognitive change about potentially emotion-eliciting events. Expressive suppression, which is generally viewed as a "maladaptive" regulatory strategy, is a form of response modulation that focuses on inhibiting emotionally expressive behavior (Gross, 2014). The literature has consistently

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shown that expressive suppression is associated with increased depression, anxiety, and stress symptoms, while cognitive reappraisal is associated with better interpersonal functioning, well-being (Gross & John, 2003; Moore et al., 2008), better social adjustment, and better decision making (Heilman et al., 2010; Magar et al., 2008).

In the context of residential care (RC), child careworkers affect regulation is particularly important as it is likely to influence the quality of care, yet it has been given little attention by the scientific community (Moretti et al., 2020; Steinkopf et al., 2020). These professionals provide support for young people in their transition to care outside the home and during their residence (Mota et al., 2016). Thus, the ability of these careworkers to regulate difficult emotions in this challenging context is key to their impact on the health and well-being of vulnerable youth (Benzi et al., 2023; Vernon & Moretti, 2024). As professionals, caregivers are called on to co-regulate with and scaffold the ability of young people to manage overwhelming emotions (Bath & Seita, 2018; Steinkopf et al., 2020). The development of emotion regulation skills among vulnerable youth is strongly associated with stable, contingent, and sensitive care (Sousa et al., 2021).

Challenging child behaviour and loss of control in residential settings is frequent and intense (Mota et al., 2021; Savicki, 2002), and can trigger intense and difficult emotions in careworkers and undermine the quality of care they provide to young people. Providing stable, safe, and quality care requires a significant personal investment from careworkers and is also essential to the health and wellbeing of these professionals as well (Horwitz et al., 2010; Mota & Matos, 2016). Investigations regarding the mental health of formal caregivers' point to the high levels of burnout and depression among these professionals (Decker et al., 2002), and to their high emotional involvement in the experiences of adolescents they work with (Hamre & Pianta, 2004). In a study by Proeschold-Bell and colleagues (2019) examining how successful formal caregivers of vulnerable children in diverse countries sustained their positive mental health, results showed that emotion regulation is, in itself, a strategy to maintain positive mental health. The ability of careworkers to reflect on their emotional experiences may increase their tolerance to challenging demands in their relationships with young people (e.g., hostility, aggression) (Moretti & Obsuth, 2009; Proeschold-Bell et al., 2019).

The literature has also pointed to gender as an important factor to consider when discussing emotion regulation (Chaplin & Aldao, 2013). Previous research regarding the general population has shown that men tend to present more externalizing emotions, like anger, and women tend to present more internalizing emotions, such as sadness and anxiety (Bastiaanssen et al., 2014; Chaplin & Aldao, 2013). These differences can be based on biological and social differences but are also context-related (Goubet & Chrysikou, 2019). The literature on sex differences in the use of emotional regulation strategies points out that women use cognitive reappraisal more frequently than men do, whereas men employ suppression more regularly than women (Gross & John, 2003; Spaapen et al., 2014). However, the use of suppression as a strategy of emotional regulation seems to increase with age, only in women (Nolen-Hoeksema & Aldao, 2011). Recent studies highlight that among professionals working in social services, women report higher levels of empathy and compassion fatigue than men (Bridger et al., 2020; Hiles Howard et al., 2015). Women in healthcare professions may develop stronger bonds with the people in their care, which can heighten the distress when they witness or experience more intense situations (Jang et al., 2021). This appears to be a more female-dominated job not just in Portugal but also in other countries, and interventions in line with that finding would be beneficial (Benveniste et al., 2024).

Furthermore, the literature has shown that affect regulation learning occurs throughout life, particularly in the course of emotionally secure experiences with attachment figures (Mikulincer & Shaver, 2007). Attachment styles are associated with individual differences in the capacity to regulate emotions, cope with stress, and effectively seek and use social support (Bowlby, 1969; Mikulincer & Shaver, 2007). Attachment can be characterized as secure or insecure (Bowlby, 1969; Hazan & Shaver, 1990). Insecure attachment orientations are organized around two fundamental dimensions: anxiety and avoidance (Mikulincer & Shaver, 2007). Cassidy & Shaver (2008) argue that adult caregivers with insecure attachment exhibit increased negative affect compared to individuals with secure attachment styles. In addition, attachment insecurity has been associated with burnout in some professions, especially those that involve work in social contexts (Kokkonen et al., 2014; Pines, 2004). There is also evidence that high levels of attachment anxiety or avoidance are associated with difficulties in identifying and describing emotions (e.g., Gilbert et al., 2014). In contrast, secure attachment is associated with good emotion regulation skills and the capacity to prevent oneself from becoming overwhelmed by distress when faced with other people's suffering (Mikulincer & Shaver, 2007). Adult caregivers with secure attachment are more confident in their ability to deal with challenges and tend to use more constructive and effective emotion regulation strategies (e.g., problem-solving, seeking support) (Mikulincer & Shaver, 2019). This ability seems to be especially important in the context of residential care, given the unpredictable and challenging nature of providing care to youth who have lacked stable and emotionally secure relationships (Costa et al., 2022; Haffejee

et al., 2024). Given the importance of affect regulation for providing high-quality care in the RC context, we believe that it is important to have valid and reliable measures to assess child careworkers' affect regulation strategies so challenges can be identified and support provided when needed.

The Affect Regulation Checklist (ARC; Moretti, 2003) is a 12-item measure scale that emerged from a critical review of previously published scales, including the Emotional Regulation Questionnaire (Gross & John, 2003) and the Emotional Regulation Checklist (Shields & Cicchetti, 1997). Moretti (2003) developed the ARC to assess emotion regulation strategies independent of specific emotions; thus, items do not refer to specific emotions to avoid confounding regulatory processes with emotional states. According to Moretti (2003), the ARC taps three dimensions of emotion regulation, including two maladaptive factors (dysregulation and suppression of affect) and one adaptive factor (adaptive reflection). Each dimension consists of 4 items that measure how individuals regulate emotions in general. Besides being a self-report measure for adolescents, this scale can also be answered by parents/alternative caregivers regarding their own affect regulation, their child's affect regulation, and affect regulation associated with the caregiver-child relationship. The ARC has been used in studies examining adolescent aggressive behavior (e.g., Moretti & Craig, 2013; Penney & Moretti, 2010), but also in studies with parents or alternative caregivers of at-risk adolescents (Moretti & Obsuth, 2009; Hernandez, 2015). Research has also shown that attachment-based parenting interventions improve parental and youth affect regulation (Moretti et al., 2015; Moretti et al., 2017). This research has shown that ARC is a useful measure in assessing the regulation of affect of both adolescents and adults. In addition, to the best of our knowledge, there are no affect regulation measures adapted for use with child and youth careworkers performing functions in residential care settings. Finally, only one recent study has tested the ARC psychometric properties across clinical and community samples in Canada (Goulter et al., 2021), and no ARC validation studies were found using samples from other countries.

Considering the critical role of affect regulation in residential care and the scarcity of measures to evaluate this domain, the current study aimed to assess the affect regulation dimensions of child careworkers working in residential care institutions and contribute to a preliminary analysis of a new application of ARC. Through exploration of the psychometric properties of this measure and its relationship with key constructs such as attachment and burnout, this research seeks to provide a deeper understanding of affect regulation in this context and offer insights for future assessments.

Method

Participants

The sample included careworkers working in 21 youth residential care institutions in the district of Porto/Portugal. It comprised 212 careworkers, women ($n = 165$; 77.8%) and men ($n = 47$; 22.2%), aged 19–66 years old (M age = 40.99 years, $SD = 11.05$). As in previous studies using different samples, there is an overrepresentation of women working in RC settings in Portugal (Costa et al., 2020; Mota & Matos, 2016; Rodrigues, 2019). Most participants integrated the educational team (e.g., educators who help with the daily tasks of adolescents; $n = 140$; 66%) followed by elements from the technical team (e.g., social workers, psychologists; $n = 72$; 34%). Regarding education level, 3 (1.4%) caregivers had the 4th grade, 30 (14.1%) between 6th and 9th grade, 64 (30.2%) between 11th and 12th grade and 114 (53.8%), caregivers had academic degrees (Bachelor Degree; Master Degree). The average length that caregivers worked in RC ranged from 1 month to approximately 46 years (M working time = approx. 11 years, SD = approx. 10 years).

The sample used for retesting ARC, included 157 careworkers, women ($n = 126$; 80.3%) and men ($n = 31$; 19.7%), aged 19–66 years old (M age = 41.06 years, $SD = 10.21$).

Fifty-five careworkers were lost due to attrition (25.94%) between T0 and T1, namely due to the challenges posed by the pandemic period and caregiver turnover. We conducted a series of logistic regressions to determine the extent to which the absence of data at the second wave was predicted by any demographic variable. The results indicated careworkers' education level ($b = 0.26$, $p = 0.003$, $OR = 1.30$) as a predictor of attrition at the second wave.

Measures

Affect Regulation Checklist (ARC; Moretti, 2003) is a self-report questionnaire that assesses the regulation of affects through 12 items distributed over three dimensions: suppression, dysregulation, and adaptive reflection. Each dimension consists of four items scored on a 5-point Likert scale ranging from *Not like me* to *A lot like me*. In the present study, careworkers responded to the ARC version for parents asking them about their own affect regulation. Example questions include "I try hard not to think about my feelings" (suppression); "My feelings just take over me and I can't do anything about it" (dysregulation); and "Thinking about why I have different feelings helps me to learn about myself" (adaptive reflection). Results from confirmatory factor analyses (CFA) with the original version supported a three-factor solution for the ARC, CFI = 0.96, RMSEA =

0.06 (Goulter et al., 2021; Moretti, 2003). Internal consistencies of the dimensions have been reported: Cronbach's alpha = 0.81, 0.65, and 0.80 for the dysregulation, suppression, and adaptive reflection, respectively (Penney & Moretti, 2010).

Experiences in Close Relationships – Relationship Structures Questionnaire (ECR-RS; Fraley et al., 2011; Portuguese version from Moreira et al., 2016) is a self-report questionnaire designed to assess attachment dimensions in multiple contexts. This scale assesses attachment-related anxiety and avoidance in four kinds of relationships: relationships with mother, father, romantic partners, and friends. In this study, we used the version for romantic partners. The questionnaire consists of 9 items distributed in two dimensions: anxiety (3 items) and avoidance (6 items). Each item was scored on a 7-point Likert scale ranging from *strongly disagree* to *strongly agree*. The ECR-RS has been validated for a sample of Portuguese community individuals with a Cronbach's alpha of 0.91 for anxiety and 0.72 for avoidance in relation to a romantic partner and supporting a two-factor structure. In the present study, Cronbach's alpha was 0.81 for anxiety and 0.78 for avoidance. Results from a CFA supported a two-factor solution for the ECR-RS, CFI = 0.96, RMSEA = 0.07.

Oldenburg Burnout Inventory (OLBI; Demerouti, 1999; Portuguese version from Sinval et al., 2019) is a self-report questionnaire that assesses two core dimensions of burnout: exhaustion and disengagement (from work). In the present study, we used the dimension of exhaustion (8 items), defined as a consequence of intense physical, affective, and cognitive strain (that results in a consequence of prolonged exposure to certain job demands) (Bakker et al., 2004; Demerouti et al., 2003). Each item was scored on a 6-point Likert scale ranging from *strongly disagree* to *strongly agree*. The OLBI has been validated for a sample of Portuguese and Brazilian workers with a Cronbach's alpha of 0.87 for exhaustion. In the present study, Cronbach's alpha was 0.82 for this dimension. Results from a CFA indicated that the model fits the data well: CFI = 0.92, RMSEA = 0.07.

Sociodemographic information (e.g., age, sex), education information (e.g., school grade) and information about the time that careworkers worked in the RC context was collected.

Procedure

This study is part of a larger project - CareME - that aims to develop, implement, and assess an attachment-based intervention for careworkers in the context of residential care and their effects on the young people who live in this context.

The translation and adaptation to the Portuguese language followed the guidelines of the American Educational Research Association (2014). Items' translation was conducted independently by two post-graduate Psychology students. ARC was backtranslated to English by two senior researcher experts in emotion regulation and attachment theory. The two back translations did not show substantial differences from the original version of the ARC, so we concluded that the translation adequately reflects the conceptual meaning of the original version. All the professionals with responsibilities for technical decisions in the RC facilities, namely the technical directors (TD), were invited to an open session, where the objectives of the project were presented, and questions were responded to. After this presentation session, 21 residential care institutions agreed to participate in the project, and the careworkers gave their informed consent for data collection. Data were collected on two different waves with a five-month interval. In the first wave, careworkers completed the questionnaire in paper format. In the second wave, given the contingencies associated with the pandemic COVID-19, participants completed the questionnaire in an online format. Anonymous association codes were created for linking responses from the 1st and 2nd waves. An investigator was always available during both questionnaire administrations (paper and online) to answer questions and ensure confidentiality.

The project received previous ethical approval from the authors' institutional Ethics Committee (reference: 2019/09-5).

Data Analysis

Using *IBM SPSS* Statistics 26.0 (IBM Corp., 2019) descriptive analysis, attrition analysis (T0–T1), pearson correlations, and test-retest of ARC were performed. We also examined the internal consistency, through Cronbach's alpha and coefficient Omega (ω). Compared to Cronbach's alpha, coefficient Omega does not rely on tau equivalence (each item on a scale contributes equally to the total scale score) and does not assume that items are continuous with normal distributions, that errors are uncorrelated, and that the measure is unidimensional (Dunn et al., 2014; McNeish, 2018). Additionally, we calculated the mean inter-item correlation for each dimension of the ARC. Inter-item correlation is another way of analyzing internal consistency, examining the extent to which scores on one item are related to scores on all other items in a scale (Streiner & Norman, 2008).

In order to provide the construct validity of the ARC, a CFA was performed to test the scale's factor structure, using the lavaan package for Structural Equation Modeling in R software (Kabacoff, 2015). To further provide evidence of the convergent validity of the ARC, we subsequently tested the associations between ARC dimensions and two external measures, the ECR-RS and OLBI, using

structural equation modeling. Given that attachment and burnout have conceptual links to affect regulation, moderate correlations with ARC dimensions were expected, supporting the scale's convergent validity (American Educational Research Association, 2014). The estimator ML (maximum likelihood) was used in the CFA model. This method estimates parameters that maximize the probability of the observed data and has been considered the most efficient estimator, given the normality assumptions. In our specific sample, the variables present a multivariate normal distribution, leading to the choice of this estimator. It provides a consistent but flexible approach which makes it suitable for a wide variety of applications, including cases where assumptions of other models are violated (Kline, 2005). The CFA was tested using several fit indices, namely the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA). The CFI and TLI values greater than 0.95 are representative of an acceptable model (Bentler, 1990; Kline, 2011), the SRMR and RMSEA values lower than 0.08 and 0.05, respectively, correspond to an acceptable fit (Hu & Bentler, 1999). The proportion χ^2/df is considered adequate when values range from one to five (Hu & Bentler, 1999; Kline, 2015). In addition, modification indices (MIs) were also examined as they provide more specific information about model misfit than the standard measure of the overall goodness of fit (Brown, 2006). Post-hoc power analysis was also conducted for the CFA model. We estimated power analysis to detect model misspecification throught the approach by MacCallum et al. (1996), that uses the RMSEA. For a CFA model with $df = 63$ ($\alpha = 0.05$), Null RMSEA = 0.05, Alternative RMSEA = 0.08, and a sample size of $N = 212$, we estimated a power analysis of 0.87. This means that it is possible to detect a model misspecification that actually exists when the RMSEA is equal to or greater than 0.08.

In order to support the ARC factorial structure for our sample, a refined analysis was carried out, item by item, based on IRT. We tested a multidimensional IRT (MIRT) approach since we confirmed through CFA that ARC is a multidimensional scale (Desjardins & Bulut, 2018; Mair, 2018). We used the R package *mirt* (Chalmers, 2012) to fit a Graded Response Model (GRM), the recommended model for ordered polytomous response data, using a full-information maximum likelihood fitting function. Additionally, we assessed model fit using an index, M2, which is specifically designed to assess the fit of item response models for ordinal data (Desjardins & Bulut, 2018; Mair, 2018). An item fit analysis was tested using the $\chi 2$ test (Desjardins & Bulut, 2018; Orlando & Thissen, 2000) to evaluate ARC scale items' performance. We also calculated three fundamental parameters: local independence (LI), item discrimination parameters (a_i), and threshold parameters (b_i). The LI is an IRT assumption that presupposes that the participants' responses to one item are not statistically related to the responses to other items, even after the latent variable is kept statistically constant. The analysis of the LI values was based on standardized LI χ^2 statistics for each item pair (<5). The a_i corresponds to the strength of each item's relationship with the latent variable. This parameter was examined according to the following guidelines: 0.01–0.34 = very low discrimination; 0.35–0.64 = low discrimination; 0.65–1.34 = moderate discrimination; 1.35–1.69 = high discrimination; and more than 1.70 = very high discrimination (Baker & Kim, 2017). The b_i (difficulty parameter) was examined according to the guidelines by Toland (2014), in which the ideal threshold should range between −3 and 3. These thresholds reflect the point at which an individual with a given latent trait has an equal probability of 50% of responding to an item. Finally, plots of the item characteristic curves (ICC), including the different response categories, were provided to get a visual impression of the differences in difficulty and response behavior. We also provide a scale information function, which is a summary of how well items, overall, provide statistical information about the latent trait (Desjardins & Bulut, 2018; Mair, 2018).

Missing data were inspected. There was no missing data in the ARC responses on times 1 and 2. The percentage of missing data in the ECR-RS responses was 0.9% and ranged from 0–0.5% for the OLBI responses. Results from Little's MCAR tests (Little, 1988) failed to reject the null hypothesis that the observed pattern of missing data was consistent with the assumption of Missing Completely at Random (MCAR), $\chi 2(11) = 6{,}72$, $p = 0.821$.

Results

Preliminary Analyses

In order to verify if the assumptions of normality of the data were assumed, the values of skewness and kurtosis were calculated. Severe violation of normality was not found for the affect regulation checklist (Kline, 2015; skewness (<3); kurtosis (<8–10)). The mean and standard deviation for each ARC item were also calculated (Table 1). Pearson correlations were performed between the ARC dimensions, ECR-RS, and OLBI to verify the degree of correlation between them. These correlations and the mean and standard deviation for each ARC factor are shown in Table 2 as supplemental material. By observing the mean values obtained in each of the ARC dimensions, we found that these are consistent with the mean values obtained in previous studies (Hernandez, 2015).

Table 1 Descriptive data of the ARC items ($N = 212$)

Scale	Nr	Item	Mean	SD	Min	Max	Skew	Kur
Dys.	1	I have a hard time controlling my feelings.	2.27	0.973	1	5	0.685	0.145
Dys.	4	It's very hard for me to calm down when I get upset.	2.13	0.958	1	5	0.755	0.152
Dys.	7	My feelings just take over me and I can't do anything about it.	1.75	0.821	1	5	1.229	1.899
Dys.	10	When I get upset, it takes a long time for me to get over it.	2.08	0.878	1	5	0.981	1.315
Supp.	3	I try hard not to think about my feelings.	2.11	1.033	1	5	0.656	−0.382
Supp.	6	It's best to keep feelings in control and not to think about them.	2.34	1.074	1	5	0.492	−0.425
Supp.	9	I keep my feelings to myself.	2.68	1.062	1	5	0.312	−0.445
Supp.	12	I try to do other things to keep my mind off how I feel.	2.64	1.174	1	5	0.339	−0.664
Refl.	2	Thinking about why I have different feelings helps me to learn about myself.	3.68	0.929	1	5	−0.427	−0.314
Refl.	5	Thinking about why I act in certain ways helps me to understand myself.	3.75	0.952	1	5	−0.855	0.773
Refl.	8	The time I spend thinking about what's happened to me in my life helps me to understand myself.	3.82	0.973	1	5	−0.620	−0.008
Refl.	11(R)	If I think about my feelings, it just makes everything worse.	4.18	0.902	1	5	−1.231	1.509

Nr: item number in the original ARC

Dys dysregulation, *Supp* suppression, *Refl* adaptive reflection

R, reversed scoring (item 11)

Confirmatory Factor Analysis

A CFA was performed, testing the structure of three factors suggested by Moretti (2003): dysregulation, suppression, and adaptive reflection. The items from the ECR-RS and OLBI were incorporated to provide evidence of the convergent validity of the ARC. We found significant but relatively low to moderate correlations between all ARC dimensions and the ECR-RS. We also found that the exhaustion dimension of the OLBI correlates significantly with the dysregulation dimension of the ARC and with the anxiety dimension of the ECR-RS, also presenting themselves as low-intensity correlations. The associations observed support the ARC's convergent validity since attachment is theoretically related with affect regulation, and burnout may be a consequence of difficulties in regulating affect in work (American Educational Research Association, 2014). Except for the positive correlation between anxiety and suppression, all the observed correlations are in the expected direction.

We observed that the factorial loading of item 11 of the ARC on the adaptive reflection factor was very low (0.27). There was a refinement of the original model using the modification indices. The analysis of modifications indices suggests that the model presented better adjustment indices if item 11 ("*If I think about my feelings, it just makes everything worse*") incorporates the dysregulation (78.1) and the dimension suppression (68.8). However, the CFA model improves significantly if item 11 is disregarded. So, we decided to remove item 11 from the CFA model. Additionally, and through the analysis of the modification indices, we made correlations between the errors of items 1 and 3 and of items 4 and 6 to improve the model.

Thus, the model obtained for the present sample of portuguese careworkers consists of 11 items distributed for three dimensions: dysregulation (4 items); suppression (4 items); and adaptive reflection (3 items). Figure 1 shows the results of the CFA. Results indicated that the model fits the data satisfactorily: $\chi^2/df = 1.38$; CFI = 0.97, TLI = 0.95, SRMR = 0.05, RMSEA = 0.04, 90% CI [0.02, 0.06].

IRT Analysis

A multidimensional IRT approach was performed to test the ARC at the item level. The GRM was estimated using the three-factorial structure of the ARC. Model fit of the GRM was evaluated using the M2 index (Desjardins & Bulut, 2018). Although the CFA supported the removal of item 11, we evaluated the GRM model fit after including item 11 in the adaptive reflection dimension. The following fit measures were obtained: RMSEA = 0.12, 95% CI [0.09, 0.13], SRMR = 0.14, CFI = 0.87. These results indicate that the inclusion of item 11 worsened the model's fit measures. Appropriate model-data fit was ensured when testing the fit of the GRM without item 11: RMSEA = 0.08, 95% CI [0.06, 0.09], SRMR = 0.07, CFI = 0.95. Although RMSEA cutoff values were above the recommended (RMSEA < = 0.05), the other adjustment measures presented acceptable values (SRMR < = 0.08; CFI = > 0.95), thus ensuring model-data fit of the GRM without item 11. Considering these criteria, only the RMSEA did not support the model-data fit, which may be related to the sample size of our study and the correlations between the factors (Jiang et al.,

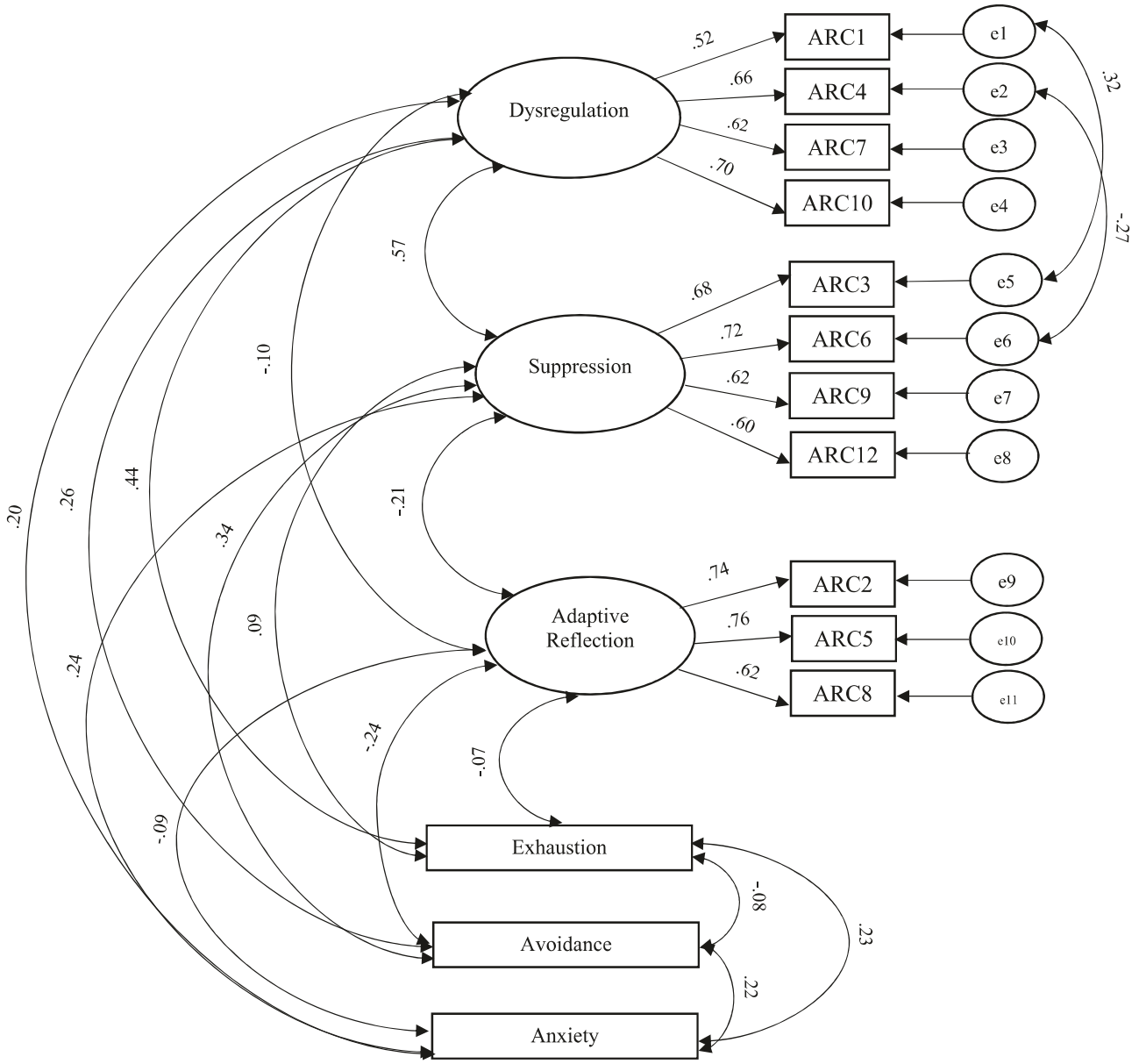


Fig. 1 Confirmatory factor analysis of the Portuguese version of the Affect Regulation Checklist (ARC)

2016). This must be considered since all other fit indicators were acceptable, namely the CFI. These results should point once again to the removal of item 11 from the ARC. However, our IRT analysis continued with the inclusion of item 11. The reason for maintaining item 11 in the GRM was so that we can obtain a more accurate analysis of how the scale works as a whole, covering all the items, and ensuring that we are not removing informative items.

After determining the overall fit of the model, the GRM with item 11 included was also evaluated at the item level using the $\chi 2$ test (Desjardins & Bulut, 2018; Orlando & Thissen, 2000). This analysis is a type of item fit evaluation that uses significance tests to assess the quality and suitability of the items when measuring the underlying trait (Desjardins & Bulut, 2018). Table 3 (see supplemental material) presents the results of the item fit test. The columns S_X2, df.S_X2, and p.S_X2 indicate the S - $\chi 2$ statistic, the degrees of freedom for the S - $\chi 2$ statistic, and the p-value for the S - $\chi 2$ statistic, with p-values below 0.05 for a given item suggesting that the item does not fit to the data. As can be seen from the table, only item 11 presented significant values ($p < 0.001$), underpinning CFA's results.

Finally, three fundamental parameters were estimated: local independence (LI); item discrimination parameters (ai); and threshold parameters (bi). First, we found evidence of local independence for all the items of the Portuguese version of the ARC (dysregulation: LI $\chi 2$ statistics ranging

Table 2 Item parameters estimates and threshold estimates (Portuguese Version of ARC)

	a_i	b_{i1}	b_{i2}	b_{i3}	b_{i4}
Dysregulation					
Item 1	1.33	−1.31	0.70	1.97	3.42
Item 4	1.77	−0.84	0.82	1.81	3.24
Item 7	1.73	−0.21	1.55	2.58	3.53
Item 10	1.93	−0.94	0.97	2.02	2.94
Supression					
Item 3	2.36	−0.50	0.65	1.51	2.73
Item 6	1.96	−0.87	0.37	1.46	2.49
Item 9	1.45	−1.75	−0.07	1.24	2.48
Item 12	1.52	−1.35	−0.05	1.16	2.17
Adaptive Reflection					
Item 2	2.50	−2.86	−1.46	−0.43	1.09
Item 5	2.84	−2.14	−1.54	−0.62	0.97
Item 8	1.71	−3.02	−1.89	−0.67	0.84
Item 11	0.78	−0.42	2.30	3.77	5.73

a_i discrimination parameter, $b_{i1,2,3,4}$ threshold parameter (difficulty parameter)

from 0–0.1; suppression: LI $\chi 2$ statistics range from 0–0.4; adaptive reflection: LI $\chi 2$ statistics ranging from 0.2–0.3). This indicates that even after maintaining the latent variable's statistical constant, the participants' answers to one item were not statistically dependent on their responses to other items. Regarding the item discrimination parameter (ai), we found evidence that all items presented moderate to very high discrimination levels in the three dimensions of the ARC (dysregulation: ai values ranging from 1.33–1.93; suppression: ai values ranging from 1.45–2.36; adaptive reflection: ai values ranging from 0.78–2.84). Threshold parameters for the items of the ARC ranged between −3.02 (item 8) and 5.73 (item 11). Items 1, 4, and 7 revealed threshold values slightly above 3 (Table 2). Despite presenting moderate discrimination levels, item 11 had the lowest levels of discrimination values (ai = 0.78) among the items of the ARC, and it presents threshold values well above the expected range (bi4 = 5.73), which again supports the results obtained by the CFA. The plots of the item characteristic curves (ICC) for all items of the ARC and the plots of the scale information and conditional standard errors were obtained and are represented, respectively, by Figures 2 and 3 (see supplemental material).

Internal Consistency

Cronbach alphas (α) and omega coefficient (ω) were examined for the three dimensions of the ARC. We found acceptable internal consistencies (above 0.70; Cortina, 1993; Taber, 2018) for all dimensions at the first and second waves, respectively: dysregulation (4 items; α/ω = 0.71/0.71), suppression (4 items; α/ω = 0.75/0.75), and adaptive reflection (3 items; α/ω = 0.75/0.75). At the second wave, we also found acceptable alpha and omega values, namely: α/ω = 0.76/0.76 for dysregulation; α/ω = 0.70/0.71 for supression; and α/ω = 0.81/0.81 for adaptive reflection. The mean inter-item correlation coefficients of the ARC dimensions at first and second waves were, respectively: 0.39/0.45 for dysregulation, 0.43/0.38 for suppression, and 0.49/0.59 for adaptive reflection, indicating an ideal correlation between the items (Streiner & Norman, 2008).

Test-Retest

Correlations between the test and retest scores were estimated using the intraclass correlation coefficient (*ICC*; mix of two factors effect model; absolute agreement definition). The five-month test-retest reliability coefficient for the ARC was 0.70, 95% CI [0.59, 0.78] for dysregulation; 0.78, 95% CI [0.70, 0.84] for suppression; and 0.72, 95% CI [0.62, 0.80] for adaptive reflection, reflecting adequate stability.

Discussion

The purpose of the current study was to investigate the psychometric properties of the ARC with Portuguese careworkers in youth residential care context. In general, our results suggest that the ARC is a reliable measure to assess careworkers' affect regulation processes in the Portuguese population.

The results confirmed the original three-factor structure with minor adjustments in the current sample of child careworkers. CFA indicated that item 11 (*"If I think about my feelings, it just makes everything worse"*) did not fit well in the adaptive reflection dimension. Due to its low contribution to the CFA model and, as the only reversed item, we considered that placing it on another factor may not contribute to that factor as intended. The removal of item 11 also supports research by Goulter et al. (2021), through a recent analysis of the psychometric properties of the ARC in clinical and community samples in Canada. The authors found that item 11 had high cross-loading across both clinical and community parent reports and youth self-reports, thus being removed from the analyses. The analysis of the modification indices suggests a correlation between the errors in items 1 and 3, and in items 4 and 6, which indicates that there is commonality between these items unrelated to the overarching latent variable. This may be because the items use similar terms and occupy a close position in the questionnaire.

While the CFA assesses the scale dimensional structure, IRT provides a more comprehensive examination of the

measure at the item level. Thus, we used IRT to provide evidence regarding the ARC at the item level. As already mentioned, we decided to include item 11 in this analysis to ensure that we weren't removing items uncarefully and to ensure the coherent structure of the scale. Regarding the discrimination parameters, our analyses demonstrated that all items achieved moderate to high discrimination levels. This means that the items composing each dimension of the ARC possessed a strong relationship with the latent trait variable under study. The analyses also demonstrated the existence of local independence in all ARC items, which means that the only influence on the response to an item is the levels of the latent variable being measured, ruling out other influences (e.g., items from other dimensions) and item to item dependencies (Toland, 2014).

Although these indicators reveal that most of the items composing the ARC function well and are able to capture the latent trait under study, the analysis of the threshold parameter revealed that items 1, 4, and 7 presented threshold values slightly above the recommended values. This means that these items are more sensitive (i.e. more likely to receive endorse) when the respondent has high levels of dysregulation than for respondents with low or moderate levels of dysregulation, proving to be more suitable for distressed populations. Additionally, by analyzing the data presented in Figure 3, which provides information about the ARC on each dimension, it is possible to observe that for low levels of dysregulation and suppression, the associated error is high. On the other hand, as the levels of dysregulation and suppression increase, there is a drastic increase in information and a decrease in error. This means that the items composing these dimensions better capture careworkers with high levels of dysregulation and suppression. In turn, the items of the adaptive reflection factor seem to better capture caregivers with low levels of this latent trait, since there is a decrease in information as adaptive reflection increases. In the case of item 11 in particular (whose threshold levels were significantly higher than the suggested level), it is also important to note that this is the only reversed item on the ARC and that its wording may be difficult for respondents to understand, which may explain the results obtained for this item both in terms of fit, threshold and discrimination values. This understanding offered by IRT allowed us to deepen our analysis and gain a greater understanding not only of the items of the ARC, structurally, and internally, but also of the respondent's underlying trait, which was not possible to obtain with the CFA alone.

Furthermore, evidence for convergent validity was gathered by considering two external criteria (ECR-RS and OLBI), supporting the suitability of the ARC in evaluating careworkers. As already mentioned, we found significant but moderate correlations between affect regulation and external measures of attachment and burnout, indicating that the ARC captures aspects of affect regulation that are theoretically related to these constructs. Through this analysis we verified that the ARC dimensions were significantly correlated with scores on measures of attachment. Several studies have demonstrated the relationship between attachment avoidance and suppression (e.g., Brennan et al., 1998; Gross & John, 2003). When avoidant individuals are faced with an emotionally challenging situation, they tend to use suppression to regulate and distance themselves from their feelings. In other words, avoidantly attached individuals tend to adopt strategies to deactivate or diminish attachment concerns, such as denying emotional experiences and suppressing negative emotions (Mikulincer & Shaver, 2016).

However, in the present study, we also found significant associations between attachment anxiety and suppression. This relationship was not expected, since anxious individuals tend to pay more attention to stimuli that trigger emotions which exacerbates their emotional states (Mikulincer & Shaver, 2019). This result may be specific to the emotion regulation strategies used by careworkers in the context of RC, as a result of difficult relational situations. These professionals may need to suppress their emotions to meet the obligations of their workplace. Some studies (e.g., Bonanno & Burton, 2013) suggest that flexibility in regulatory strategies is important and that even suppressive strategies can be beneficial in certain circumstances or for certain individuals. Sheppes et al. (2012) showed that in contexts where the intensity of the emotional situation was high, people tended to choose an early disengagement strategy, moving their attention away from the emotional state. Thus, in the context of youth residential care where the unpredictability of events is greater, more anxious careworkers may learn that it is more beneficial for them and for young people to suppress their emotions in situations of greater emotional intensity. For these professionals, this can be a healthy adaptation, which results from the flexible choice of an emotion regulation strategy to adapt to situational demands (Sheppes et al., 2012).

On the other hand, the association between the anxiety dimension and the dysregulation dimension was expected since attachment anxiety has been associated with increased mental rumination, exacerbating suffering (Mikulincer & Shaver, 2019). This can result in higher levels of dysregulation/dyscontrol of negative affects. The negative correlation between avoidance dimension and the adaptive reflection dimension was also expected. Adaptive reflection implies that individuals are able to think about their feelings and how they impact the way they act. As we saw earlier, individuals with an avoidant attachment tend to resort to other types of affective regulation strategies.

Additionally, positive associations were found between anxiety and exhaustion. Some studies have shown that health care workers with anxious attachment styles tend to have a harder time separating their pain from the pain of the others (e.g., West, 2015). These workers may also have more difficulty in "leaving work at work", which can lead to negative responses to stress and higher levels of exhaustion. Finally, it makes sense that dysregulation is positively related to burnout, since the dysregulation of negative affect, lack of emotional flexibility, and nonexpression of emotions can be associated with higher levels of exhaustion.

Post-hoc sensitivity analyses were also performed to identify possible confounding variables in the results obtained. We included age, sex, education and length of working of careworkers in the CFA model, verifying that the general conclusions are maintained.

Regarding internal consistency and the test-retest reliability, we observed that Cronbach's alpha and coefficient omega were higher than 0.70 in all dimensions of the ARC, in the first and second waves, reflecting the coherence of the items that make up the instrument (McCrae et al., 2011). Additionally, a test-retest ICC reliability greater than 0.70 indicates a high degree of stability across a five months' period. This stability suggests that the ARC is capturing a regulatory process that remains relatively consistent across time in careworkers who work in the context of residential care.

In summary, this was the first study to perform a preliminary analysis of the psychometric properties of ARC in youth residential care context and the first to conduct IRT analyses of the ARC items. This analysis is a modern psychometric technique used not only in the development and evaluation of multi-item scales, but also in their improvement (Toland, 2014), where the focus is on the level of each ARC item and not just on the general level of the scale (Baker & Kim, 2017; Toland, 2014). Through this analysis, it was possible to understand that the ARC has some items that are less sensitive for careworkers with lower levels of affect dysregulation. Despite these results, all other analyses provided evidence that ARC can be a useful tool in assessing the regulation of careworkers' affects.

Limitations, Future Research and Implications

A limitation of the present study is related to the fact that the sample consists mainly of women, a characteristic associated with the population under study, which made it impossible to carry out gender invariance analysis. Given this impossibility and previous literature suggesting that men and women may use different emotion regulation strategies (Gross & John, 2003; Spaapen et al., 2014), it is possible that the ARC may not function equivalently across genders. Future studies should, therefore, explore whether the factorial structure found remains valid or invariable between men and women who work in the context of residential care. The attrition between the first and second waves is also considered a limitation of the present study, restricting the performance of the analysis of invariance with both waves (T0 and T1). Another limitation is the small sample size, particularly for use in IRT analyses, which can affect the results' reliability. Despite the promising findings on using the ARC to evaluate careworkers in the context of residential care, results are still preliminary, and further analyses using more extensive and diverse samples should be made. Additionally, future studies focusing on the complete validation of the measure should use other scales (e.g., emotional intelligence; executive functions) to test the construct validity of the ARC. Also, it would be important for future studies to test the predictive validity of the ARC, using different assessments across time and examining whether this measure can predict theoretically relevant constructs in the future. Finally, this study relied only on self-reports, and future research, including observational or interview-based measures, will be important in further validation of the ARC.

Overall, the present study provides a preliminary test of the psychometric properties of the ARC, in a sample of portuguese careworkers in a residential care setting, inviting other researchers to push further with psychometric validation. The greatest strength of this study is that adaptation of the ARC can be very helpful in applied measures. The agencies/institutions might find it useful to monitor staff affect regulation as a way of taking the 'agency temperature' and the need to provide more support or to consider the reasons why staff are struggling. As staff emotion regulation will have direct effects on the quality of their care and youth functioning, it should be prioritized in agency evaluations.

Data availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Author Contributions All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Beatriz Santos, Tiago Ferreira, Mónica Costa and Helena Carvalho. The first draft of the manuscript was written by Beatriz Santos and all authors (but especially Paula Mena Matos, Catarina Pinheiro Mota, Marlene Moretti and Natalie Goulter) commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Compliance with ethical standards

Conflict of Interest The authors declare no competing interests.

Ethics Approval This study considers data privacy and ethical procedures following Helsinki Declaration and the General Data Protection Regulation. The study received previous ethical approval from Ethics Committee of the Faculty of Psychology and Education Sciences, University of Porto (reference: 2019/09-5).

Consent to Participate Informed consent was obtained from all individual participants included in the study.

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