



# The Relationship Between Temperament Characteristics and Emotion Regulation Abilities in Institutionalized and Noninstitutionalized Children

Mariana Sousa<sup>1</sup> · Maria Manuela Peixoto<sup>2</sup> ·  
Orlanda Cruz<sup>2</sup> · Sara Cruz<sup>1,3</sup>

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**Abstract** This study examined the role of institutionalization and temperament dimensions on emotion regulation and negative lability in school-aged (6–10 years) children. Participants were 46 institutionalized (22 boys; 24 girls) and 48 noninstitutionalized children (23 boys; 25 girls), matched in age and sex. Emotion regulation and negative lability were assessed with the Emotion Regulation Checklist (ERC). The School-Age Temperament Inventory (SATI) was used to measure temperament dimensions. No significant between-group differences emerged in temperament dimensions, emotion regulation and negative lability. After controlling for institutionalization status, results indicated that (a) approach/withdrawal (sociability) and persistence positively predicted emotion regulation, (b) negative reactivity positively predicted negative lability, and (c) persistence negatively predicted negative lability. Institutionalization did not predict emotion regulation or negative lability. The protective role that specific temperament characteristics, such as persistence and approach/withdrawal (sociability), may have for at risk populations (e.g., institutionalized) and typically developing (e.g., noninstitutionalized) children is highlighted.

**Keywords** Temperament · Emotion regulation · Negative lability · Institutionalized children

## Introduction

Residential care is a support and protection measure for children and youth at risk, under the current legislation in Portugal. According to the CASA report (Departamento de Desenvolvimento Social / Unidade de Infância e Juventude do Instituto da Segurança Social, 2021), in 2020, of the 9065 children and youth monitored, 3471 were in situations of danger (40% due to lack of family supervision and monitoring, 17% to deviant behaviors, and 7% to exposure to domestic violence). Of these, 2022 started institutional foster care, whereas 14% of the entries were influenced by the COVID-19 pandemic. Currently, there are a total of 6706 institutionalized children and youth, which supports the relevance of studying in-care children adjustment outcomes.

Children living in institutions are often exposed to repeated disruptions that impair their positive organization of diverse developmental systems (Cicchetti & Lynch, 1993). At one level, family adverse experiences increase the probability of children's maladaptation and psychopathology, due to the negative transactions with the environment (Cicchetti & Handley, 2019). Then, institutionalization can also be considered an adverse experience, as it is associated with developmental delays and socioemotional problems (Baptista et al., 2018; Landgren et al., 2010).

The study of emotion regulation abilities is one of the main foci of research on children living in residential care (Kim-Spoon et al., 2013; Lavi et al., 2019; Maughan & Cicchetti, 2002; Milojevich et al., 2019; Romens & Pollak, 2012; Shields & Cicchetti, 1998). However, further studies

✉ Mariana Sousa  
marianasousa@por.ulusiada.pt

<sup>1</sup> The Psychology for Positive Development Research Center, Lusíada University - Porto, Porto, Portugal

<sup>2</sup> Center for Psychology at University of Porto, Faculty of Psychology and Sciences of Education of the University of Porto, Porto, Portugal

<sup>3</sup> Department of Psychology, School of Philosophy, Psychology & Language Sciences, University of Edinburgh, Edinburgh, UK

are needed to understand the factors underlying this process, in this population.

Emotion regulation can be defined as the ability to control emotional states in support of goal-directed behavior (Thompson & Meyer, 2007), allowing for a proper response to social demands (Kim-Spoon et al., 2013; Rothbart et al., 2006). One important aspect associated with emotion regulation is temperament. It can be understood as an individual difference regarding children's experience, expression, and regulation of emotions, modulating their reactivity to the environment (MacNeill & Pérez-Edgar, 2020). As the association between temperament and emotion regulation abilities remains poorly explored in institutionalized children, this study aims to examine this relationship and to investigate the influence of institutionalization in emotion regulation abilities.

Considering the close association between emotion regulation and socioemotional adjustment, there is still a research gap concerning the identification of potential risk factors that make in-care children more vulnerable to maladjustment. Importantly, numerous studies have suggested difficulties in emotion regulation as a possible transdiagnostic factor underlying the emergence of psychopathology in children with early adverse experiences, such as internalizing and/or externalizing problems (Aldao et al., 2016; Cludius et al., 2020; Weissman et al., 2019). Further exploring the difficulties these children experience in regulating their emotions and the factors associated with these difficulties may contribute to the understanding the emergence of psychopathology in these atypical developmental pathways. Furthermore, the analysis of these risk factors may have important implications not only for clinical practice, but also to inform social and political policies, as it may offer additional reflections on institutional practices to make residential care a truly protective experience for children.

### **Emotion Regulation and Negative Liability in Institutionalized Children**

Emotion regulation refers to the ability of attempting to influence one's emotions, depending on their valence (positive or negative) and the situations and time when they are expressed (see McRae & Gross, 2020). It is closely related to negative liability, which concerns intense shifts in emotional states, lack of flexibility, mood lability, as well as dysregulated negative affect, which is commonly recognized as manifested difficulties in emotion regulation (Leaberry et al., 2017; Shields & Cicchetti, 1997). Emotion regulation abilities (for example cognitive reappraisal, i.e., reinterpreting or reevaluating an emotional situation; see Gross, 2015) have been linked to adjusted adaptive outcomes, such as better long-term mental and physical health (Gross & John, 2003).

In-care children's altered emotion regulation processes are extensively described in the literature (Ellis et al., 2014; Hébert et al., 2018; Kim et al., 2009; Kim-Spoon et al., 2013; Lavi et al., 2019; Maughan & Cicchetti, 2002; Milojevich et al., 2019; Romens & Pollak, 2012), with evidence showing that adverse experiences lead to negative changes in emotion processing and regulation, across the developmental pathway (Camras et al., 1983; Chinn et al., 2021; Cicchetti & Toth, 2015; Jedd et al., 2015). Children with a history of abuse often exhibit more negative affect dysregulation and lower adaptive regulation than non-abused children (Kim-Spoon et al., 2013), and express difficulties dealing with frustration, higher anger, and lower positive affect intensity (Robinson et al., 2009). Similarly, these children frequently use noneffective and maladaptive strategies (e.g., disengagement, expressive suppression, and rumination) to manage their emotions (Boyes et al., 2016; Epstein-Ngo et al., 2013; Maughan & Cicchetti, 2002; Milojevich et al., 2019).

Difficulties in emotion regulation have long-term consequences for social functioning, academic achievement, and mental health (Cole et al., 2004; Eisenberg et al., 2010; Graziano et al., 2007; Zeman et al., 2006), which is related to the emergence of psychopathology (Alink et al., 2009; Egeland et al., 2002; Kim & Cicchetti, 2009; Kim-Spoon et al., 2013; Milojevich et al., 2019). Hence, due to the detrimental impact of adverse experiences on emotion regulation, and the salience of emotional dysregulation as a predictor of long-term socioemotional adjustment, the study of the factors underlying these difficulties in in-care children may be particularly relevant.

### **The Temperament Construct and its Association with the Exposure to Early Adversity**

There are multiple definitions and conceptualizations of temperament, concerning its structure, dimensions, and assessment (Lima et al., 2010; Rettew & McKee, 2005). Despite the theoretical differences, temperament refers to constitutionally determined individual differences in reactivity, responsiveness (i.e., physiological excitability and responsiveness to internal and external stimuli) and self-regulation (i.e., modulation of reactivity) (Rothbart, 2011; Rothbart & Bates, 1998). Temperament is a multidimensional construct, which represents the biological basis that underlies individuals' behavior (Buss & Plomin, 1984; Cloninger et al., 2019; Thomas & Chess, 1977) that tend to be moderately stable across a variety of settings and environments, though it becomes more visible in new or distressing situations (Lima et al., 2010; McClowry, 1995; Rettew & McKee, 2005). Although the strong emphasis on the study of its biological basis, temperament has been increasingly considered to be a result of both internal and external factors (Rothbart et al., 2006, 2015).

While there is an agreement that temperament includes multiple dimensions, different definitions of these dimensions have been proposed. In this study, the dimensions of temperament identified by McClowry (1995) will be considered: *task persistence*, *negative reactivity* (also defined as emotionality), *approach/withdrawal* (also defined as sociability), and *activity*. *Task persistence* refers to children's degree of self-direction when performing tasks and dealing with responsibilities. *Negative reactivity* concerns the intensity and frequency of children's negative affective expression, reflecting a predisposition to become upset easily. *Approach/withdrawal* describes children's initial response to new people and situations, reflecting a tendency to prefer being in the presence of others, rather than being alone, and looking for engaging in social interactions (Hong et al., 2017). *Activity* is related to the amount of motor agitation of children (McClowry et al., 2003).

Temperament characteristics influence children's subsequent social interactions and social functioning (Xing et al., 2018). Particularly, children's negative reactivity and self-regulation significantly predicted specific dimensions of parenting behavior (Bates et al., 2014). Indeed, children's temperament is part of a dynamic interaction between children and their caregivers, as it reflects the influence of parenting styles, and this interaction may predict children's subsequent development (Bates et al., 2012, 2014). Thus, according to the Differential Susceptibility Model (Belsky, 2013), highly reactive children are particularly susceptible to adverse family experiences (e.g., maltreatment) and may exhibit more negative developmental outcomes than less reactive children. Similarly, children who are more reactive to environmental risk (e.g., exposure to domestic violence or to parents' psychopathology) are also more susceptible to a high quality environment (e.g., supportive and responsive parenting) (Belsky & Pluess, 2009). In line with this, temperament dimensions, such as negative reactivity, social withdrawal, and excessive activity, are common in children living in residential care, who were exposed to early adversity and often exhibit socio-emotional adjustment problems (Bolger & Patterson, 2001; Clayton et al., 2018; Gracia & Musitu, 2003; Lavi et al., 2019; Wade et al., 2018; Weissman et al., 2019).

### Temperament, Emotion Regulation, and Negative Lability

Due to their close and dynamic association, temperament, emotion regulation, and negative lability (i.e., emotional dysregulation) are frequently difficult to distinguish, and often conceptualized as being part of the same construct (Rothbart & Sheese, 2007). Although temperamental characteristics may impact the development of emotion regulation

abilities, emotion regulation strategies transcend temperament (Rothbart et al., 2007).

Emotion regulation abilities result from the interaction between temperamental predisposition and social interactions, allowing for a proper response to environmental demands (Yap et al., 2007; Zalewski et al., 2011). Individual differences in temperament play a central role in the development of children's emotion regulation skills, as they contribute to children's ability to modulate their emotions and make mutual and reciprocal social interactions possible (Kim-Spoon et al., 2013).

In particular, evidence shows that task persistence is positively associated with children's effective emotion regulation strategies and adjustment, as it requires controlling impulses to engage in sustaining behaviors (Kochanska & Knaack, 2003; Lunkenheimer et al., 2020). This temperament dimension is also dependent on children's self-regulation skills, as it involves the ability to sustain effort towards a task-oriented goal, over time (Rothbart & Bates, 2006). Children exhibiting higher levels of negative reactivity are more likely to react with intense negative affect and maladaptive behaviors in social interactions, as children with lower levels of negative reactivity tend to use more effective strategies to manage their emotions (Zalewski et al., 2011).

Approach/withdrawal (sociability) dimension is also a core organizational process of emotional behaviors (Sullivan, 2014), particularly for emotion regulation (Zhu et al., 2021). Children who display higher approach tendencies, which are closely linked to sociability, and develop effective emotion regulation strategies tend to conquer an increased social acceptance and competence (Dollar & Stifter, 2012). In addition, approach tendencies, such as emotional approach, are associated with adaptive behavior and negatively related to maladaptive behavior (Sullivan 2011). Conversely, socially avoidant children tend to respond to stressful social situations with more negative lability (i.e., greater reactivity and emotional volatility) (Kagan et al., 1987). Also, greater difficulties in emotion regulation and increased levels of negative lability may reinforce maladaptive social skills among socially avoidant children, leading to peer rejection and social exclusion (Rubin et al., 1995, 2009). Children who exhibit higher levels of behavioral inhibition, along with greater fear and sadness, when exposed to negative events, tend to show poorer emotion regulation strategies, which often leads to behavioral problems (Buss et al., 2004; Eggum-Wilkens et al., 2014; Fox & Calkins, 1993; Gullone et al., 2006; Kochanska, 1998; Penela et al., 2015).

Studies on the association between temperament dimension activity and emotion regulation are scarce. However, evidence supports that appropriate motor activity is associated with effective emotion regulation strategies, which positively contributes to children's mental and physical health

(Cavadini et al., 2021; Mancini et al., 2016). Conversely, children with higher ratings of motor activity tend to show more difficulties in managing negative emotions, by delaying gratification and dealing with frustration (Duckworth et al., 2013).

### Residential Care and its Protective Effects

Despite the negative effects of residential care on children's development, which are extensively described (Baptista et al., 2018; Cicchetti & Lynch, 1993; Landgren et al., 2010), some studies pinpoint the 'positive/neutral' effects of residential settings, especially for children who were previously exposed to severe adverse contexts before institutionalization (Knorth et al., 2008; Little et al., 2005; Perry et al., 2019; Solerdelcoll et al., 2022; Wendt et al., 2019). For example, Wendt et al. (2019) showed that institutionalized children and adolescents reported higher life satisfaction regarding friendship and non-violence compared to when they lived with their biological families. It is possible that under specific circumstances residential care may act as a protective factor for developing socioemotional adjustment problems (Perry et al., 2019). In accordance, Lino et al. (2016) observed that institutionalized boys with greater cognitive dysregulation (e.g., difficulties understanding negative affection) benefited from a longer length period of residential care, as they developed greater communication skills, and increased trust and perception of attachment to peers. Although institutions do not always provide specific programs to promote specific skills, in care, children learn social behaviors due to the modelling effect associated with the observation of their peers' behaviors and interactions. Indeed, in the context of collective care, interactions between children play a crucial role, as they help them to develop empathy and social perspective taking, as well as to be responsive to the others' (both children and adults) needs, thus enhancing their physical, cognitive, social and emotional development (Moura et al., 2020).

Specific care programs or provisional services in institutions may also contribute to positive developmental outcomes in children (Cameron & Das, 2019; Cox et al., 2018; Green et al., 2017; Grey et al., 2018; Liddle et al., 2018; Marvin et al., 2017; Sinclair et al., 2016). Introducing training and structural changes in care environment leads to more positive outcomes in children's emotional, social, and cognitive development (Chernego et al., 2018; Hermenau et al., 2017), as well as to improved levels of self-reported well-being (Orúzar et al., 2019).

Thus, although most studies show that in-care children are at a disadvantage on several developmental dimensions compared to noninstitutionalized children, research also highlights the relevance of attending to the quality of

institutional practices and its impact on children's development, adjustment, and well-being (Porter et al., 2020).

### The current study

It is widely accepted that individual differences in temperament influence emotion regulation abilities (Rothbart & Sheese, 2007; Séguin & MacDonald, 2018; Zalewski et al., 2011). However, additional research on the relationship between temperament characteristics and emotional regulation abilities in institutionalized children is needed. This study aims at examining the role of institutionalization and temperament dimensions on emotion regulation and negative lability. Specifically, it explores differences concerning these dimensions, comparing school-age children in residential care and children who live with their biological families. In addition, it analyses the potential predictive effect of temperament dimensions on emotion regulation and negative lability. It is expected that: (1) in-care children exhibit lower levels of task persistence and higher levels of negative reactivity, approach/withdrawal and activity, along with more difficulties in emotion regulation and more negative lability, when compared to their noninstitutionalized peers; (2) institutionalization negatively predicts emotion regulation and positively predicts negative lability, (3) task persistence and approach/withdrawal (sociability) positively predict emotion regulation and negatively predict negative lability, and (4) negative reactivity and activity negatively predict emotion regulation and positively predict negative lability.

## Method

### Participants

Ninety-four children participated in this study, of which 46 were institutionalized (22 boys; 47.83%) and 48 were non-institutionalized children (23 boys; 47.92%).

The institutionalized children were selected based on a Ministry of Social Affairs list of Portuguese residential care institutions. They were referred to the Child Protective Services, removed from their biological families and placed in institutions, due to a Court order. Twenty-two children (48%) experienced neglect, and 17 (37%) physical and/or emotional/psychological maltreatment and neglect (no information on reasons for being placed in residential care for 7 children). Twenty-five children (54%) were institutionalized for more than 1 year, and 18 (39%) for less than 1 year (no information available for 3 children). The noninstitutionalized children lived with their birth families, had no history of abuse and/or neglect, and attended public schools in northern Portugal, in the metropolitan area of Porto. Children

from both groups were matched in age and sex, and are described in a previous article (cf. Author et al., 2021).

## Measures

### Socio-Demographic Information

Information regarding the process of institutionalization, contacts with the biological family, social support network, and clinical history of the institutionalized children was collected with the support of the institutions' caregivers. Regarding noninstitutionalized children, information on the family risk factors (i.e., items concerning drug and alcohol abuse, parents' or substitutes' psychopathology, and an item of overt response, defined as 'others'), parents' education, and medical history was gathered with the help of the elementary school teachers. Information on the family risk factors helped us to exclude from the sample all the children whose teachers reported the existence of risk factors associated to their families.

Of note, the selection of different informants to fill in the questionnaires was due to the difficulty in contacting some of the institutionalized children's families. Likewise, contact with the teachers of these children depended on the mediation of the institutions' caregivers, which was not always feasible. Thus, the caregivers answered the questionnaires for the institutionalized children. In an attempt to homogenize the informants of both groups, the teachers of the noninstitutionalized children were asked to fill out the questionnaires for this group.

### Emotion Regulation and Negative Lability

Children's emotion regulation abilities and negative lability were assessed with the Portuguese version of the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997), a questionnaire assessing children's ability to modulate emotions. ERC includes 24 items measured on a 4-point Likert scale (1 = *never* to 4 = *almost always*) and is organized in two subscales—Emotion Regulation (8 items) and Emotion Lability/Negativity (16 items). The Emotion Regulation subscale focuses on regulation strategies that allow children to appropriately respond to social interactions, such as empathy, equanimity, emotional self-awareness, and the ability to understand emotional states (e.g., 'is easily frustrated' or 'can modulate excitement in emotionally arousing situations'). The Emotion Lability/Negativity subscale considers the amplitude in emotional expression, which is associated with arousal, reactivity, flexibility, intense emotional states, expression of negative emotions, and mood swings (e.g., 'child's emotional state is difficult to anticipate because s/he moves quickly from positive to negative moods').

The total subscales' scores were computed by summing its items. Higher scores in the Emotion Regulation subscale reflect children's increased ability to effectively modulate their emotional expression. Higher scores in the Lability/Negativity subscale indicate greater rapid and intense emotional reactions, as well as mood lability. Both construct validity and discriminant validity were supported for the ERC (Shields & Cicchetti, 1997). In this study, Cronbach's alpha yielded acceptable consistency results for Emotion Regulation subscale ( $\alpha=0.71$ ), and good consistency results for Emotion Lability/Negativity subscale ( $\alpha=0.88$ ).

### Temperament

The Portuguese version of School-Age Temperament Inventory (SATI; Lima et al., 2010; McClowry, 1995) was used to assess children's temperament. This inventory measures temperament dimensions in children aged between 8 and 11 years. It includes 38 items, assessed on a 5-point Likert scale (1 = *never* to 5 = *always*) and organized in four subscales: negative reactivity, task persistence, approach/withdrawal and activity. Negative reactivity refers to the frequency and intensity of the child's negative affective expression. Task persistence concerns the child's engagement and self-direction while performing a task or other responsibility. Approach/withdrawal relates to the child's initial response, when confronted with new social contexts and interactions, and is closely related to sociability. Activity reflects the child's level of motor movement. The total score is calculated by summing the scores of each item and dividing the result of this sum by the total number of items in each subscale. Cronbach's alpha yielded high consistency results for all subscales (negative reactivity  $\alpha=0.96$ ; task persistence  $\alpha=0.97$ ; approach/withdrawal  $\alpha=0.88$ , and activity  $\alpha=0.88$ ).

### Procedure

This study was reviewed and approved by the Ethics Committee of the institution where it was conducted.

The directors of the institutions and the schools were contacted by phone to present the study goals and required procedures. More detailed information on the study were sent by email to those who show interest to be enrolled. Children's parents or substitutes were asked to sign the informed consent in accordance with the Declaration of Helsinki. The institutions main caregivers and the teachers, respectively, for institutionalized and noninstitutionalized children, completed the questionnaires after having the permission of the children's parents or substitutes.

In the institutionalized group, the main caregivers were selected as informants, as they were the figures with whom children have a closer relationship. In addition, in most

cases, the families were unavailable or do not have contact with the children. Furthermore, due to legal constraints, the contact with the children's teachers was difficult, as it depended on the mediation of the institution caregiver. In the non-institutionalized group, teachers filled out the questionnaires. As asking institutionalized children's parents to fill out the questionnaires was not feasible, we tried to homogenize the informants, considering that teachers, like the institutional caregivers also have a bond with the children.

Questionnaires were presented in a paper-and-pencil version. The questionnaires' completion lasted around 20 min. All the procedures in data collection were in line with the General Data Protection Regulation (GDPR) guidelines.

### Statistical Plan

A priori power analysis was performed using the G\*Power software (version 3.1.9.6) to determine the minimum sample capable of detecting a medium-size effect ( $f^2 = 0.25$ ) with a statistical power of 95% ( $p$ -value  $< 0.05$ ) when performing a hierarchical regression analysis with five predictors. The G\*Power software results indicate that a minimum sample size of 85 participants for a hierarchical regression analysis with five predictors is sufficient to detect a medium-size effect ( $f^2 = 0.25$ ) with a statistical power of 95% ( $p$ -value  $< 0.05$ ).

For the statistical procedures and analysis, the software IBM SPSS version 26.0 was used. Descriptive statistics were conducted with calculation of mean, standard-deviations, ranges, and frequencies, for sample characterization. Independent sample  $t$ -tests were performed to investigate differences between institutionalized and noninstitutionalized children regarding the temperament dimensions, emotion regulation and negative lability. Hierarchical regression analyses were performed to examine predictors of emotion regulation and negative lability, with step 1 including the institutionalization variable (institutionalized vs. not institutionalized), and step 2 including the temperament

dimensions (negative reactivity, task persistence, approach/withdrawal (sociability), and activity).

### Data Availability

The data that support the findings of this study is available upon request to the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## Results

### Emotion Regulation, Negative Lability, and Temperament Dimensions

Table 1 presents the mean, standard-deviations, and range of the responses of emotion regulation, negative lability, and temperament dimensions (negative reactivity, task persistence, approach/withdrawal, and activity). Independent sample  $t$ -tests revealed no statistically significant differences between institutionalized and noninstitutionalized children for emotion regulation ( $p = 0.799$ ), negative lability ( $p = 0.115$ ), negative reactivity ( $p = 0.098$ ), task persistence ( $p = 0.526$ ), approach/withdrawal (sociability) ( $p = 0.938$ ), and activity ( $p = 0.092$ ).

### Temperament Dimensions as Predictors of Emotion Regulation

A hierarchical regression analysis was performed to examine the predictive value of temperament dimensions (negative reactivity, task persistence, approach/withdrawal, and activity), regardless of institutionalization status, on emotion regulation. Thus, the first step in the hierarchical regression included the variable institutionalization status as predictor, and, in the second step, the temperament dimensions—negative reactivity, persistence, approach/withdrawal, and activity—were added as predictors. As shown in Table 2, the institutionalization status was not a significant predictor

**Table 1** Mean, standard-deviations, and range of emotion regulation, negative lability, and temperament dimensions for the total sample ( $N = 92$ ), and for the institutionalized children ( $n = 45$ ) and for the

non-institutionalized children ( $n = 47$ ), separately, and differences between groups

Variables	Total ( $N = 92$ )		Institutionalized ( $n = 45$ )		Non-institutionalized ( $n = 47$ )		T-test	
	$M$ (SD)	Range	$M$ (SD)	Range	$M$ (SD)	Range	$t(90)$	$p$
Emotion regulation	23.19 (3.81)	14.00–31.00	23.29 (3.70)	14.00–31.00	23.09 (3.96)	17.00–31.00	0.26	.799
Negative lability	28.23 (7.30)	14.00–49.00	29.47 (6.75)	14.00–42.00	27.06 (7.68)	15.00–49.00	1.60	.115
Negative reactivity	2.41 (0.72)	1.31–4.46	2.54 (0.74)	1.31–4.15	2.29 (0.69)	1.31–4.46	1.67	.098
Task Persistence	3.55 (0.93)	1.55–5.00	3.48 (0.88)	1.82–4.91	3.61 (0.99)	1.55–5.00	−0.64	.526
Approach/withdrawal	3.40 (0.76)	1.75–4.86	3.40 (0.71)	1.83–4.75	3.39 (0.81)	1.75–4.86	0.08	.938
Activity	2.31 (0.83)	1.00–4.83	2.46 (0.73)	1.00–4.17	2.17 (0.91)	1.00–4.83	1.71	.092

**Table 2** Hierarchical regression for temperament dimensions as predictors of emotion regulation, controlling for institutionalization status ( $N=92$ )

	$\beta$	95% CI	$t$	$R^2$	$\Delta R^2$
Step 1				.001	.001
Institutionalization status	-.03	-1.79–1.38	-0.27		
Step 2				.354	.353***
Negative reactivity	-.04	-1.42–0.99	-0.36		
Persistence	.28**	0.33–1.97	2.79		
Approach/withdrawal	.47***	1.43–3.24	5.13		
Activity	.08	-0.62–1.37	0.75		

Institutionalization status: institutionalized versus non-institutionalized; \*\* $p < .01$ ; \*\*\* $p < .001$

of emotion regulation ( $\beta = -0.03$ ,  $p = 0.799$ ). When temperament dimensions were entered in the regression equation, 31.6% of variance of emotion regulation was explained (*adjusted*  $R^2 = 0.316$ ), with approach/withdrawal ( $\beta = 0.47$ ,  $p < 0.001$ ) and task persistence ( $\beta = 0.41$ ,  $p = 0.006$ ) emerging as significant predictors of emotion regulation abilities, after controlling for the institutionalization status ( $\beta = -0.04$ ,  $p = 0.697$ ).

### Temperament Dimensions as Predictors of Negative Liability

Likewise, a hierarchical regression analysis was performed to examine the predictive value of temperament dimensions—negative reactivity, task persistence, approach/withdrawal, and activity – above and beyond the institutionalization status, on negative liability. Accordingly, the first step in the hierarchical regression included the variable institutionalization status as predictor, and the second step in the hierarchical regression included the temperament dimensions. The institutionalization status was not a significant predictor of negative liability ( $\beta = -0.17$ ,  $p = 0.115$ ), as showed at Table 3. When temperament variables were included in the regression equation, 66.1% of variance of negative liability was explained (*adjusted*  $R^2 = 0.661$ ), with negative reactivity ( $\beta = 0.67$ ,  $p < 0.001$ ), and task persistence ( $\beta = -0.22$ ,  $p = 0.003$ ) emerging as significant predictors of negative liability, after controlling for institutionalization status ( $\beta = -0.03$ ,  $p = 0.693$ ).

### Discussion

This study aimed at examining the role of institutionalization and temperament dimensions on emotion regulation and negative liability. Particularly, it explored differences concerning these dimensions, comparing children in residential

**Table 3** Hierarchical regression for temperament dimensions as predictors of negative liability, controlling for institutionalization status ( $N=92$ )

	$\beta$	95% CI	$t$	$R^2$	$\Delta R^2$
Step 1				.027	.027
Institutionalization status	-.17	-5.40–0.60	-1.59		
Step 2				.680	.652***
Negative reactivity	.66***	5.01–8.25	8.12		
Task Persistence	-.22**	-2.79–0.58	-3.04		
Approach/withdrawal	.02	-1.01–1.43	0.34		
Activity	.07	-0.74–1.95	0.90		

Institutionalization status: institutionalized vs. non-institutionalized; \*\* $p < .01$ ; \*\*\* $p < .001$

care and children who live with their biological families. It also analysed the potential predictive effect of temperament dimensions on emotion regulation and negative liability.

### Emotion Regulation, Negative Liability, and Temperament Between Groups

No significant between-group differences were observed regarding emotion regulation, negative liability, and temperament dimensions. Although the association between maladaptive outcomes with deficits in emotion regulation (Ellis et al., 2014; Hébert et al., 2018; Kim et al., 2009; Kim-Spoon et al., 2013; Lavi et al., 2019; Maughan & Cicchetti, 2002; Romens & Pollak, 2012) and temperament dimensions are commonly observed in institutionalized children (Gracia & Musitu, 2003; Gresham et al., 2011; Lavi et al., 2019; Shrout & Bolger, 2002; Wade et al., 2018), other evidence shows that residential care may not necessarily be linked to negative development and maladjustment outcomes (Knorth et al., 2008; Little et al., 2005).

Indeed, studies have demonstrated that residential placement may provide abused and neglected children the opportunity to establish secure and stable relationships with peers and adults (Corval et al., 2017; Lino et al., 2016; Wendt et al., 2019), which positively contributes to the development of adaptive emotion regulation strategies, and help them deal with social interactions in a more adaptive way, promoting their socioemotional adjustment (Perry et al., 2019). Programs focused on care or service provision, along with structural changes in care environment, also seem to enhance children's emotional, social, and cognitive development (Chernego et al., 2018; Hermenau et al., 2017). For example, literature shows the greater negative consequences on children's development of foster care institutions with minimal physical and stimulation environments where children are typically raised in large groups in single rooms or

who are often moved to different wards of different peers and caregivers, which limits responsive and meaningful interactions (McCall, 2013). Thus, it is possible that children placed in more secure residential environments (e.g., not moving constantly and/or maintain the same caregivers and peers) benefit from institutionalization, which may positively impact their development. This seems to be further supported by our results indicating that institutionalization did not predict emotion regulation abilities or negative lability. It may be that residential care provides an improvement in children's psychosocial functioning, as recent evidence also suggests (Knorth et al., 2008; Kopetz et al., 2019; Robert et al., 2020). This improvement possibly depends on the positive interventions for children in the institutions, such as the work on family dynamics, and children's behavior-modification, along with specific training to promote cognitive, social, and emotional skills (Boel-Studt et al., 2018; Grietens, 2002; Knorth et al., 2008; Scherrer, 1994; Schurmans et al., 2018).

### The Predictive Value of Temperament in Emotion Regulation Abilities

In what concerns the association between the temperament dimensions and emotion regulation and negative lability, as expected, task persistence, and approach/withdrawal (sociability) positively predicted emotion regulation abilities. In addition, negative reactivity positively predicted negative lability, whereas task persistence negatively predicted negative lability. These findings provide evidence for a potential differential role of specific temperament characteristics on emotion regulation abilities in school-age children.

Particularly, our results support the assumption that task persistence, i.e., the degree of self-direction when performing tasks and/or dealing with responsibilities, positively contributes to children's effective emotion regulation strategies and adjustment. It may be that children who are more self-directed and responsible when engaging in tasks, or present greater sustain effort to accomplish specific goals, are able to better control their impulses, and emotional and attentional states (Kochanska & Knaack, 2003; Lunkenheimer et al., 2020; Rothbart & Bates, 2006).

Similarly, these results are consistent with evidence indicating that higher levels of approach/sociability, associated with the development of effective emotion regulation, lead to positive developmental outcomes (Dollar & Stifter, 2012; Sullivan, 2011). Presumably, children with strong approach tendencies, who prefer engaging in social situations, also tend to improve their emotion regulation abilities that, in turn, allow them to remain in, and benefit from these social interactions (e.g., by learning from social cues). Contrarily, it may be that socially avoidant children, who exhibit higher levels of behavioral inhibition, tend to present more

difficulties in managing their emotions, when confronted with negative or distressing situations (Buss et al., 2004; Eggum-Wilkens et al., 2014; Fox & Calkins, 1993; Gullone et al., 2006; Kochanska, 1998; Penela et al., 2015).

In accordance, our results showed that higher levels of negative reactivity were associated with increase and more intense negative affect. This may contribute to the emergence of maladaptive behaviors in social interactions, as children who lack emotion regulation abilities possibly experience more difficulties in recruiting the necessary regulatory strategies to engage in social contexts, as evidence shows that lower levels of negative reactivity tend to be related to adaptive regulation strategies (Zalewski et al., 2011). Interestingly, increased persistence negatively predicted negative lability. This seems to indicate that children who are more self-directed, goal-oriented, and responsible may present more adjusted emotional regulation abilities (e.g., cognitive reappraisal), as they present lower expression of negative emotions and mood swings, as well as more controlled reactivity to the environment (Gross, 2015; MacNeill & Pérez-Edgar, 2020).

Finally, activity did not predict emotion regulation and negative lability. Evidence on the association between activity and emotion regulation is limited, which possibly shows that the nature, frequency, and intensity of this association requires further exploration. Additionally, this SATI subscale simultaneously includes items concerning adaptive (e.g., *walks quietly in the house*) and maladaptive behaviors (e.g., *bursts loud into the room*), along with hybrid behaviors whose judgment on their adaptive nature depends on the situation or context they occur (e.g., *runs to where he/she wants to go; runs or jumps when going down*). Therefore, these items focus on quite different behavioral markers, which possibly explains the nonlinearity of their association with emotion regulation and negative lability.

Overall, these results evidence the complex and dynamic association of temperament and emotion regulation abilities. They seem to suggest a potential protective role of task persistence and approach/withdrawal (sociability) both for risk (e.g., institutionalized) and non-risk populations, as these temperament dimensions seem to be associated with effective emotion regulation strategies and, consequently, to successful environmental and social adaptation. Considering the bidirectional relationship of temperament and emotion regulation and considering temperament as a product of both biological predisposition and social experiences, interventions to promote emotional and social skills will possibly contribute to improve institutionalized children's functioning. These interventions may help in-care children to modulate their emotional states more effectively, as well as to increase their awareness of their temperamental characteristics, to ensure more appropriate responses in social interactions.

In summary, evidence shows that foster care may mitigate some of the negative effects of previous adverse family experiences and be associated with positive developmental outcomes (Knorth et al., 2008; Perry et al., 2019; Wendt et al., 2019). In this respect, it is important that these children benefit from relational experiences and interventions which improve their self-knowledge and their sense of effectiveness in dealing with their emotions in their life contexts. Specific training of the caregivers to implement practices and specific programs focused on the promotion of these skills may substantially enhance in-care children's development and adjustment. In addition, as the adoption project will not be an option for some of these children, it is also crucial to make the institutionalization experience a period of positive development, helping these children to develop the necessary skills and resources to deal with possible challenges they will be facing along their developmental pathway.

Nevertheless, these results must be interpreted with caution, as: (1) the sample included only children aged between 6 and 10 years old; (2) the children enrolled in this study were living in the institution for less or more than 1 year, and a new context, along with the interaction with a new caregiver, necessarily impact the way the institutions' caregivers perceive their behavior and temperament.

### Limitations and future research

Some limitations of the current study can be identified. The first is related to the reduced number of children in the two groups enrolled in this study. In future studies, the sample size should be increased to corroborate our results and to further analyze in a more detailed approach the effect of specific temperament dimensions on emotion regulation abilities in children living in residential care. Other studies should also explore the potential differential effect of different types of abuse on emotional regulation abilities in this population. In addition, the perception of different informants was considered for each group. Standardize informants and consider multiple-informant perceptions is important in upcoming research. Moreover, this study follows a cross-sectional and correlational design, which highlights the relevance of conducting longitudinal studies to further analyze in-care children's temperament dimensions influence on their emotion regulation strategies. Importantly, future studies should investigate the potential beneficial impact of foster care on children's development by assessing children's socioemotional competencies at the time of admission in institutions and follow them throughout their institutionalization period.

Despite these limitations, this study highlights the potential protective effect of specific temperament dimensions which possibly decrease children's vulnerability and favor their socioemotional adjustment.

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**Data Availability** The data that support the findings of this study is available upon request to the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### Declarations

**Conflict of interest** The authors report no conflict of interest.

**Ethical Approval** This study was approved by the Ethics Committee of the Faculty of Psychology and Sciences of Education of the University of Porto.

**Consent to Participate** In accordance with the Declaration of Helsinki, written informed consent from the caregivers and parents for the children's participation was obtained.

**Consent for Publication** All authors are responsible for the reported research and have participated in the concept and design, analysis and interpretation of data, drafting or revising of the manuscript and have approved it as submitted.

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