

The Journal of Genetic Psychology

Research and Theory on Human Development

ISSN: 0022-1325 (Print) 1940-0896 (Online) Journal homepage: <http://www.tandfonline.com/loi/vgnt20>

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To cite this article: María Laura Andrés, María Cristina Richaud de Minzi, Claudia Castañeiras, Lorena Canet-Juric & Raquel Rodríguez-Carvajal (2016) Neuroticism and Depression in Children: The Role of Cognitive Emotion Regulation Strategies, *The Journal of Genetic Psychology*, 177:2, 55-71, DOI: [10.1080/00221325.2016.1148659](https://doi.org/10.1080/00221325.2016.1148659)

To link to this article: <http://dx.doi.org/10.1080/00221325.2016.1148659>



Published online: 24 Mar 2016.



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Neuroticism and Depression in Children: The Role of Cognitive Emotion Regulation Strategies

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ABSTRACT

This study's general objective was to analyze whether different types of cognitive emotion regulation strategies (CERS), namely adaptive strategies—specifically positive refocusing and positive reappraisal—and maladaptive strategies—self-blame, catastrophizing, and rumination—mediated the neuroticism-depression relationship in children 9–12 years old, and whether gender and school transition moderated the relationships proposed. A self-reporting measure was administered to 315 children to evaluate said variables. The resulting data were analyzed using structural equations. The study verified that maladaptive CERS partially mediated neuroticism's relationship with depression, while adaptive CERS, though negatively associated with depression, did not show a mediating effect on this relationship. The results provide evidence of the mediating function of maladaptive CERS on the neuroticism-depression relationship. Gender and school transition did not moderate the relationships proposed. Because, by their very nature, these strategies are modifiable, these results constitute an important finding that can be transferred to the design and content of child mental health prevention and promotion programs.

ARTICLE HISTORY

Received 11 March 2015
Accepted 27 January 2016

KEYWORDS

Children; cognitive emotion regulation strategies; depression; neuroticism

A risk factor for developing depression is neuroticism. But what are the processes involved in this association? Emotion regulation could constitute an explanatory mediator mechanism for the relationship between neuroticism and depression. The general objective of this study was to examine if neuroticism is related to specific vulnerability markers, namely cognitive emotion regulation strategies (CERS), which in turn contribute to high levels of depression in children. Structured equation models were used to analyze the mediating role of the CERS on the neuroticism-depression relationship. Additionally, could these relations vary between boys and girls and between school children transitioning from primary school to secondary? It was analyzed whether gender and school transition moderate the relationships proposed. The moderator effects of gender and school transition were examined through multigroup analysis. The results will contribute to better understand the processes involved in youth depression, which might contribute to promote child mental health.

Depression is an emotional problem among children (Fleming & Offord, 1990) frequently associated with problems in interpersonal relationships and school performance, as well as delays in social, emotional, and cognitive development (Rao & Chen, 2009). From a developmental psychopathology perspective, Hankin (2015) emphasized that risk factors for depression are across multiple systems and

levels of analysis, including genetics, stress contexts and processes, biological stress mechanisms, temperament, emotion, reward, cognitive processes, and interpersonal influences. The most notable risk factor is cognitive processes (e.g., cognitive emotion regulation strategies) that predict an increase in depressive symptoms in youth. This process often occurs through vulnerability-stress interactions in which cognitively vulnerable children are more likely to become depressed (Hankin, 2015).

Factors involved in developing depression

Neuroticism

Neuroticism is a stable personality trait that is characterized by a tendency to experience negative emotions. It manifests itself through feelings of anxiety, nervousness, sadness and tension, and through responses to stressors that are disproportionate to the circumstances and frequently have negative effects (John, Naumann, & Soto, 2008). Other components of neuroticism proposed have been the inability to control urges, inefficient coping with stress, a preference for preemptive threat management strategies, a disposition to complain or the tendency to have unrealistic ideas, appraise situations as stressful, and experience aversive emotional states (Ormel et al., 2013).

An extensively regarded risk factor for developing depression is neuroticism (Lahey, 2009). The relationship between neuroticism and depression has been amply established in children as well as in adults (e.g., Agh-Yousefi & Maleki, 2011; del Barrio, Moreno, López, & Olmedo, 1997; Ehrlér, Evans, & McGhee, 1999; Muris, Meesters, & Diederén, 2005; Kotov, Gamez, Schmidt, & Watson, 2010; Malouff, Thorsteinsson, & Schutte, 2005); however, the processes involved in this association are relatively unknown (Shea & Yen, 2005). Namely, although neuroticism seems to be a potent vulnerability factor for depression (e.g., Ormel et al., 2013), it is still relatively unknown through what specific mechanisms the person's vulnerability is increased by neuroticism (Broeren, Muris, Bouwmeester, van der Heijden, & Abee, 2011; Kuyken, Watkins, Holden, & Cook, 2006; Ormel, Rosmalen, & Farmer, 2004). Researchers have begun to examine whether vulnerability for emotional problems can be better understood in terms of a model in which a general vulnerability factor, namely neuroticism, is related with specific vulnerability markers, which in turn determine the specific categories of psychopathology (Broeren et al., 2011; Norton & Mehta, 2007). Sexton, Norton, Walker, and Norton (2003) identified two specific vulnerability markers: anxiety sensitivity and intolerance of uncertainty. Broeren et al. (2011) identified worry and rumination as specific vulnerability markers in children. They found support for a model in which worry and rumination acted as partial mediators in the relation between neuroticism and symptoms of anxiety and depression. Other studies have demonstrated that emotion regulation could be identified as specific vulnerability markers and mediate the neuroticism-depression relationship (e.g., Lahey, 2009; Yoon, Maltby, & Joormann, 2013).

Emotion regulation

Kring and Sloan (2010) pointed that another essential factor in developing depression is how individuals regulate their negative emotions. Indeed, Lahey (2009) states that the way individuals regulate their emotions could constitute an explanatory mechanism for the relationship between neuroticism and depression. Emotion regulation can be defined as, "the extrinsic and intrinsic processes responsible for monitoring, evaluating and modifying emotional reactions, especially their intensity and duration, to accomplish one's goal" (Thompson, 1994, p. 27). CERS are among a number of emotion regulation strategies; CERS refer to cognitive modes of modify the magnitude and/or type of emotional experience (Aldao & Nolen-Hoeksema, 2010; Ochsner & Gross, 2005). These strategies have gained prominence because they are associated to several different disorders (e.g., Aldao & Nolen-Hoeksema, 2010).

Self-blame describes the tendency to blame oneself for the events and situations one experiences. Catastrophizing refers to thoughts that magnify the gravity of an experience. And rumination refers to thoughts that focus individual attention on the negative mood, its causes and consequences, and on self-evaluations based on the negative mood. Positive refocusing is the focusing of attention on more positive thoughts with the goal of shifting attention from negative situations and events. Positive reappraisal

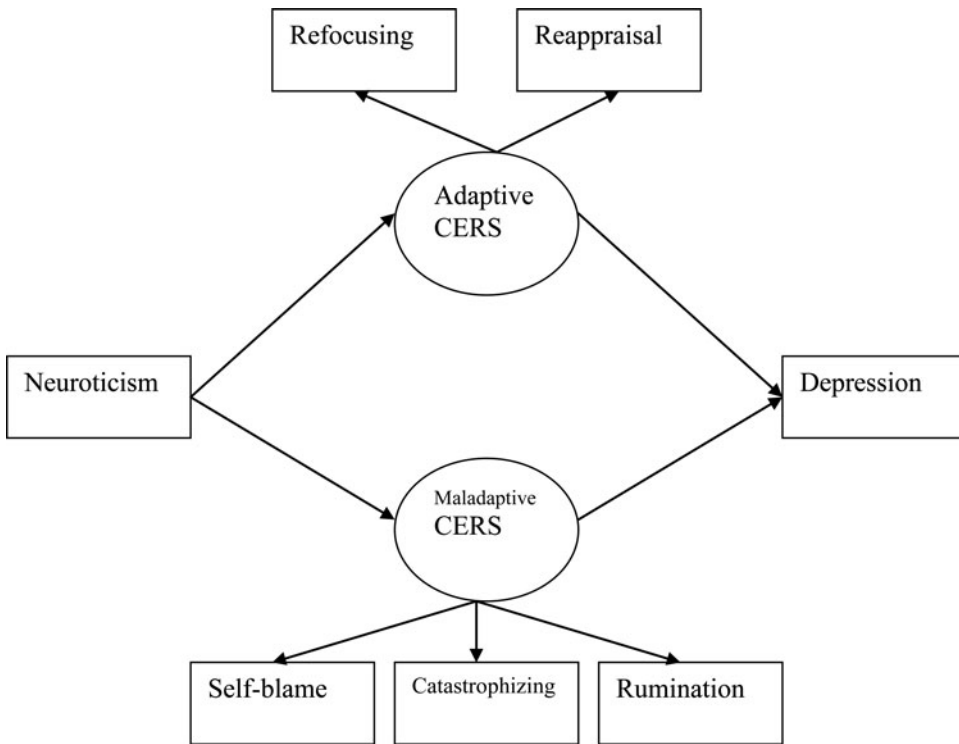


Figure 1. The hypothesized model. CERS = cognitive emotion regulation strategies.

is assigning a positive interpretation and meaning to a situation (Garnefski et al., 2007). Self-blame, catastrophizing, and rumination have been called maladaptive, nonfunctional, and negative CERS, while positive reappraisal and positive refocusing are considered adaptive, functional, and positive CERS (Garnefski, Kraaij, & Spinhoven, 2001). As Garnefski, van den Kommer, et al. (2002) posited the use of certain cognitive strategies, such as maladaptive CERS, increases a person's vulnerability to developing a psychopathology, while the use of other cognitive strategies, such as adaptive CERS, can help one more easily tolerate or better manage the emotions associated with a negative experience. We propose a model, in which CERS follow the general vulnerability factor of neuroticism, which in turn increments vulnerability to develop high levels of depression (see Figure 1).

Relationships among neuroticism, emotion regulation, and depression

Previous research analyzing the mediating effect that cognitive emotion regulation has on the neuroticism-depression relationship has found that rumination is a mediating process in adults (e.g., Muris, Roelofs, Rassin, Franken, & Mayer, 2005; Roelofs, Huibers, Peeters, & Arntz, 2008; Roelofs, Huibers, Peeters, Arntz, & van Os, 2008), adolescents (Kuyken et al., 2006; Muris, Fokke, & Kwik, 2009; Verstraeten Vasey, Raes, & Bijttebier, 2008), and children (Broeren et al., 2011).

It is important, therefore, to analyze the role of other CERS that have shown consistent associations with depression. In a recent study Yoon et al. (2013) emphasized the value of introducing adaptive as well as maladaptive strategies in the same model. In doing so, it is possible to analyze whether these strategies possess a differential role when introduced simultaneously in the neuroticism-depression relationship. These authors found evidence of a mediating effect for rumination, thought suppression and expressive suppression in the neuroticism-depression relationship among an adult population. Although cognitive reappraisal was associated with neuroticism and depression, it did not have a mediating effect when introduced in the model. This shows a differential role in the above-mentioned strategy when being analyzed simultaneously with maladaptive strategies.

Additionally, to determine the specific explanatory capacity of the CERS, it would be appropriate to analyze adaptive and maladaptive strategies that are exclusively cognitive by nature (Balzarotti, Biassoni, Villani, Prunas, & Velotti, 2014). The general objective of this study, therefore, is to analyze whether the neuroticism–depression relationship is mediated by the adaptive (positive reappraisal and refocusing) and maladaptive (self-blame, catastrophizing, and rumination) CERS in a sample of children 9–12 years old.

An important point to mention before continuing is that the concepts of neuroticism, maladaptive CERS, and depression seem to overlap considerably; however, various studies have shown that these concepts are related although they are statistically distinguishable. For example, a meta-analytic review by Rood, Roelofs, Bögel, Nolen-Hoeksema, and Schouten (2009) assessed the cross-sectional and longitudinal relations between rumination and depressive symptoms, rumination was associated with concurrent and future levels of depression in children and adolescents. Muris et al. (2009) examined the unique contribution of rumination to symptoms of depression. They found that the link between rumination and depressive symptoms remained significant, even after controlling neuroticism and concurrent anxiety symptoms. Uliaszek et al. (2009) demonstrated that the content overlap does not largely account for the association between neuroticism and specific disorders like depression. In children from 8 to 13 years old, Noël, Francis, Williams-Outerbridge, and Fung (2012) demonstrated that a unique relationship exists between catastrophizing and depressive symptoms, after controlling anxiety. Other studies have shown modest correlations between these variables, which indicate that there is moderate overlap between the constructs (e.g., Broeren et al., 2011; Garnefski et al., 2001; Garnefski et al., 2007).

Importance of its study in children

Although it is known that psychopathological problems in children and adolescents do not always lead to difficulties in adulthood, sometimes these problems aggravate with time. It has been documented that problems in adults almost always have their roots in an earlier stage of life (Garnefski, Legerstee, Kraaij, Van den Kommer, & Teerds, 2002). Children from 9 to 12 years old may experience and identify emotions in complex social contexts (Schultz, Izard, & Bear, 2004). They have the ability to consider multiple sources of information, to understand a wide range of emotions (Berk, 1994) and to attribute causal relationships to their experience similar to adults (Denham 1998).

During school years, children respond to emotional events in a flexible manner due to a greater cognitive maturity, emotion recognition, ability to introspection, and to reflection (Stegge & Meerum Terwogt, 2007). In children from 8 to 9 years old, changes involved in reflection, monitoring, conceptualization and verbalization of ideas about internal states occur due to the maturity of cognitive skills (e.g., executive functions, inhibitory control, working memory; Thompson & Goodman, 2010; Zelazo & Cunningham, 2007). These skills allow greater ability to regulate emotion through the emergence of CERS (Dennis, O'Toole, & DeCicco, 2013). Moreover, children have learned to regulate their own emotions by cognitions or thoughts about themselves, their feelings or others (Meerum, Terwogt, & Stegge, 1995) For example, when enduring a negative event, some children may reappraise the situation in a more positive way (positive reappraisal), or just think about more pleasant issues instead of the actual events (positive refocusing) (Garnefski et al., 2007). Skinner and Zimmer-Gembeck (2007) reviewed 44 studies reporting age differences or changes in coping from infancy through adolescence. They found that the use of cognitive strategies is achieved during middle childhood. For example, older children always used positive refocusing and positive reappraisal regardless of the range evaluated (6–9 years old, 5–12 years old, 8–14 or 10–13 years old).

Although improvements in metacognitive skills and emotion recognition facilitate the use of cognitive strategies to regulate complex emotions, reviewers also indicate developmental increases in vulnerabilities (Skinner & Zimmer-Gembeck, 2007). For example, a greater capacity to think and focus on future events can cause a rise in anxiety and rumination. Older children and adolescents reported more worry and rumination about negative feelings and events (Eisenberg, Fabes, & Guthrie, 1997). Children may also blame themselves (self-blame), focus on their sadness (rumination), or emphasize the terror of the situation (catastrophizing) (Garnefski et al., 2007).

More specifically, numerous studies have found that the CERS known as self-blame, catastrophizing, rumination and positive reappraisal (in its negative sense) are associated in a consistent manner with symptoms of depression in children and adolescents (e.g., Garnefski & Kraaij, 2006; Garnefski, Legerstee, et al., 2002; Garnefski, Teerds, Kraaij, Legerstee, & van den Kommer, 2004; Martin & Danlem, 2005; Schoroevers, Kraaij, & Garnefski, 2007). Additionally, there is evidence that positive refocusing prevents the emergence of symptoms of depression in children and adolescents (e.g., Garnefski et al., 2001; Garnefski et al., 2007).

Effects of gender and school transition

Moreover, it can be suggested that gender and school transition moderate the association among neuroticism, CERS and depression. Previous research showed that girls score higher in neuroticism (e.g., McCrae et al., 2002), are more prone to ruminate and to develop a depressive disorder than boys (e.g., Craske 2003; Kercher, Rapee, & Schniering, 2009; Lewinsohn, Clarke, Seeley, & Rohde, 1994). Do these differences affect the relationships between neuroticism, CERS, and depression on children? Kuyken et al. (2006) analyzed the mediation effect of rumination in neuroticism and depression relationship in adolescents and the moderator effect of gender on this model. They found that the mediational model applied equally for boys and girls, suggesting that while girls may ruminate more than boys, the relationships between neuroticism, rumination and depressive symptoms were the same for boys and girls. It is important to analyze whether there are differences between boys and girls in CERS and whether gender moderates the relationships proposed in the model.

According to Argentina's education system, children 9–11 years old are attending primary school, while 12-year-old children have started their secondary school. This transition to secondary school coincides with an increase in cognitive ability (Anderson, Jacobs, Schramm, & Splittgerber, 2000) and causes children to experience affective, social, and academic changes (McGee, Ward, Gibbon, & Harlow, 2004). These changes could demand a differential implementation of emotion regulation resources in older children. Muris, de Jong, and Engelen (2004) explored the link between rumination and depressive symptoms in two groups: 12–15 years old and 16–18 years old. The idea that rumination plays a more important role in older adolescents was supported. With reference to the differences in age and the associated changes in cognitive, emotional, social, and academic domains, it is important to analyze whether the proposed relationships in the model vary in 9–11-year-old children from primary school regarding secondary school 12-year-old children.

We expect a deeper comprehension of the mechanisms involved in youth depression that might contribute to a better understanding of its etiology and therefore to the development of more optimal psychological interventions to promote child mental health.

Methodology

Participants

There were evaluated 321 schoolchildren from 9 to 12 years old. Due to the elimination of six atypical cases (scores three standard deviations above the mean in some variables), the final sample was composed of 315 children with a mean age of 11 years and 1 month ($SD = 1$ year and 4 months). Of this total, 150 children were boys (47.62%) and 165 were girls (52.38%), 220 children were in the primary school, 83 were in the Grade 4 ($M = 9$ years and 5 months, $SD = 1$ year and 1 month), 75 were in the Grade 5 ($M = 10$ years and 7 months, $SD = 4$ months), 62 were in the Grade 5 ($M = 11$ years and 5 months, $SD = 3$ months), and 95 were in the first year of secondary school ($M = 12$ years and 6 months, $SD = 4$ months). The socioeconomic status (SES) of the children's families was estimated using the Hollingshead (2011) index of social status. For this purpose the educational levels of each parent was defined according to the scale devised by Pascual, Galperín, and Bornstein (1993), which is based on the Argentine education system, and the occupational level of both parents was defined according to Sautú's (1989)

Table 1. Means, standard deviations, and Cronbach's alpha values for subscales.

| | Total sample (<i>N</i> = 315) | | Boys (<i>n</i> = 150) | | Girls (<i>n</i> = 165) | | Primary school (9–11 years old) (<i>n</i> = 220) | | Secondary school (12 years old) (<i>n</i> = 95) | | Cronbach's α |
|-------------------------|-----------------------------------|-----------|------------------------|-----------|-------------------------|-----------|--|-----------|---|-----------|---------------------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | |
| 1. Neuroticism | 2.17 | 0.37 | 2.12 | 0.38 | 2.22 | .35 | 2.19 | .35 | 2.14 | 0.42 | .75 |
| 2. Positive refocusing | 15.64 | 3.41 | 15.50 | 3.35 | 15.77 | 3.47 | 16.17 | 3.26 | 14.42 | 3.44 | .74 |
| 3. Positive reappraisal | 14.74 | 3.17 | 14.86 | 3.18 | 14.62 | 3.17 | 14.69 | 3.20 | 14.86 | 3.13 | .57 |
| 4. Self-blame | 10.61 | 3.51 | 11.13 | 3.51 | 10.13 | 3.46 | 10.59 | 3.49 | 10.65 | 3.59 | .69 |
| 5. Catastrophizing | 11.60 | 3.46 | 12.29 | 3.38 | 10.98 | 3.43 | 11.78 | 3.46 | 11.19 | 3.45 | .63 |
| 6. Rumination | 13.83 | 3.39 | 13.88 | 3.43 | 13.79 | 3.37 | 13.94 | 3.38 | 13.57 | 3.44 | .66 |
| 7. Depression | 14.55 | 3.24 | 14.72 | 3.06 | 14.39 | 3.38 | 14.45 | 3.14 | 14.78 | 3.45 | .64 |

EGO 70 occupational prestige scale for Argentina. Both scales have a correlation of 0.94 with the Hollingshead index (Pascual et al., 1993). The majority of the families had a mid to mid-high SES (77.68%). Most of the others had a mid to mid-low SES (21.12%), with only a small minority having a high SES (1.2%).

Measures

Neuroticism

We used the neuroticism subscale of Lemos's (2006) 46-item Argentine Child Personality Questionnaire (CAPI), which operationalizes the Big Five model and was built to measure personality traits in children. The subscale consists of 14 items and a 3-point Likert-type response scale ranging from 1 (*Yes*) to 3 (*No*). Example items are, "I feel bad when I'm told I was wrong about something" and "I become overly nervous if the teacher calls me to the front of the class." The factor analysis conducted by the instrument's author indicates a penta-factorial structure comprised by the big five factors, which account for 55% of the variance. The basic psychometric results for its items and dimensions were satisfactory (Lemos, 2001, 2006). Relationships between traits evaluated by the questionnaire and other theoretically related variables in children (e.g., dimensions of flow: cognitive and affective experiences and achievement and ability perception, Mesurado & Richaud de Minzi, 2012) have been observed. The reliability indicators of this subscale and the remaining are listed in Table 1.

CERS

We used the self-blame, catastrophizing, rumination, positive reappraisal, and positive refocusing subscales of Garnefski et al.'s (2007) 36-item child version of the Cognitive Emotion Regulation Questionnaire (CERQ-k). The CERQ-k was constructed for children and measures CERS. Each scale consists of four items and a 5-point Likert-type response scale ranging from 1 (*Never*) to 5 (*Always*). Example items: "I think of nicer things" (positive refocusing); "I think that there are good sides to it as well" (positive reappraisal); "I think that it's my own fault" (self-blame); "Again and again, I think about how terrible it all is" (catastrophizing); and "All the time, I think that I want to understand why I feel that way" (rumination). The instrument's authors reported a nine-factor structure that accounts for 57.6% of the variance. A regression analysis undertaken to examine validity showed the expected relationships with depression, worry, and fear in children of 9, 10, and 11 years of age (Garnefski et al., 2007). Before it was used with this study's final sample, the questionnaire was translated, adapted and tested in a sample of Argentinean children with the author's authorization (N. Garnefski, personal communication, May 9, 2009). This translated and adapted version has shown consistent relationships with theoretically related variables in 10-year-old children (e.g., anxiety, depression, happiness; Andrés, Castañeiras, & Richaud de Minzi, 2014).

Depression

We administered the self-reporting Dimensions of Depression Profile for Children and Adolescents (DDPCA; Harter & Nowakowski, 1987), validated and adapted for the Argentine population by Richaud

de Minzi, Sacchi, and Moreno (2001). The DDPCA adapted for the Argentine population consists of 12 items that explore mood (e.g., “Some children are sad most of the time”), general self-worth (e.g., “Some children would like to be different than they are”), energy level (e.g., “Some children lack the energy to do their homework”), and a tendency for self-blame (e.g., “Some children blame themselves for their problems”). It has a 3-point Likert-type response scale ranging from 1 (*Not me*) to (*Yes, that is me*). An exploratory factor analysis of the adaptation to the Argentine context (Richaud de Minzi et al., 2001) made it possible to observe the dimensions proposed by Harter and Nowakowski (1987). It has shown associations with theoretically related variables, for example, negative associations with secure attachment style in children 8–12 years old (Richaud de Minzi, 2010). It has also shown negative associations with child perceived parental styles of acceptance and moderate control and positive associations with pathological control and extreme autonomy in children 8–12 years old (Richaud de Minzi, 2006). The general index of depression used in our study does not include the self-blame dimension because it is itself considered a cognitive emotion regulation strategy.

Education level and occupation type

We administered a semistructured questionnaire to the parents in order to gather information on their education level and occupation type.

Data collection procedures and ethical considerations

The authorities at the educational institutions were informed about the objectives of the study and once they approved it, informed consent was sought in writing from the children’s parents. The children were then informed about the study and those who provided assent to participate were evaluated. Participants were interviewed during school hours in small groups of up to five children in a classroom of the educational institution that was designated for that purpose. The instruments were administered in a session that lasted approximately 45 min. The instruments administered to children were neuroticism, self-blame, catastrophizing, rumination, positive reappraisal, positive refocusing, and depression scales. Simultaneously, the semistructured questionnaire about education level and occupation type was sent to parents in their children’s notebooks.

Data analysis

Structured equation models were used to analyze the mediating role of the CERS on the neuroticism-depression relationship. AMOS 19 (Arbuckle & Wothke, 1999) software was used to test models with raw data imported from SPSS (Version 19). First, data preparation was conducted. For this purpose, collinearity, missing data and the presence of atypical uni- and multivariate cases, and uni- and multivariate normality was analyzed. Second, preliminary analysis of means, standard deviations, and mean comparisons between gender groups and school transition groups for each variable were analyzed. Third, the structural model’s latent variables were analyzed to determine its validity as a measurement model (Anderson & Gerbing, 1998). Fourth, a total mediation model of depression was estimated and alternative models that could fit the data equally well were tested (partial mediation model, nonmediation model, and nonhierarchical model) according to Kline’s (2005) recommendations. The models consist of two observational variables (neuroticism and depression) and two latent variables. The adaptive CERS latent variable has two indicators: the positive refocusing and the positive reappraisal subscales. The maladaptive CERS latent variable has three indicators: the self-blame, catastrophizing, and rumination subscales. Finally, moderator effects of gender and school transition on the relationships proposed in the structural model were examined through multigroup analysis. With regards to the goodness-of-fit diagnostic, the most commonly used indicators and criteria (Hu & Bentler, 1995) were applied: the chi-square statistic and other fit indicators: chi-square divided by degrees of freedom (χ^2/df), the comparative fit index (CFI), the goodness-of-fit index (GFI), standardized root mean square residual (SRMR) and root mean square error of approximation (RMSEA). CFI and GFI values $\geq .90$ are considered adequate and $\geq .95$ are considered optimal (Byrne, 2001; Hu & Bentler, 1995); RMSEA values $\leq .06$ and RMR

values near 0 are considered adequate (Byrne, 2001; Hu & Bentler, 1995). To evaluate the significance of indirect effects, the *RMediation* software package was used due to the estimation of confidence intervals (CIs) using the method based on the distribution of the product. This method has a good statistical performance for building CIs for the mediation effect (MacKinnon, Fritz, Williams, & Lockwood, 2007). Mediation effects are considered significant if the intervals do not contain 0 (zero; MacKinnon et al., 2007).

Results

Data preparation

The presence of collinearity was not a threat because not a single case showed either a value of $R^2 > .90$ between each variable and the others or a tolerance level of $> .10$. Nor were variance inflation factor values of > 10.0 documented. Missing data were less than 5% (Tabachnick & Fidell, 2001). In order to verify that the missing data were completely at random (MCAR) the Little's (1988) MCAR test was applied. The Little MCAR test is a common test to verify whether the missing data is completely at random (MCAR). If the p value for the Little MCAR test is not significant, the data can be assumed to be completely at random and missing values are assumed not to affect the analysis. The test supported this assumption, $\chi^2(72, N = 315) = 70.19, p = .53$, and to handle missing data, Expectation-Maximization method was applied. Then, in order to identify univariate and multivariate atypical cases, the standard z score for each variable (z scores > 3.29 were considered atypical, Tabachnick & Fidell, 2001) and the squared Mahalanobis distance ($p < .001$, Byrne, 2001) were respectively calculated. The presence of 6 atypical univariate cases were detected in one or more of the variables evaluated, two of which were also atypical multivariate cases. Six cases had scores in neuroticism three standard deviations above the mean (z scores > 3.29). Two of these cases also had scores in depression three standard deviations above the mean. It is possible that these few members of the sample were not representative of the target population (not clinical children) and belonged to a different population (e.g., clinical population). According to Osborne and Overbay (2004) if outliers were from sampling errors they should be removed, as they do not reflect the target population. By removing outliers, researchers have shown empirical benefits, such as reducing errors of inference and enhancing accuracy of estimates (Osborne & Overbay, 2004). Based on this approach it was preferred to eliminate the outliers. Univariate normality was examined through skewness and kurtosis. Across variables, the values for asymmetry and kurtosis were appropriate ($-.64$ to $.61$ and $-.37$ to $.12$) within 1 and -1 (George & Mallery, 2011). Multivariate normality was examined through the critical ratio (C.R.) of Mardia's multivariate kurtosis coefficient. The C.R. value was 2.92, which indicates that the distribution is close to normal (Bentler, 2005; Byrne, 2000; Mardia, 1970).

Preliminary analysis

Table 1 shows the means and standard deviations for each subscale for the sample, separated by gender and age. Mean comparisons revealed significant differences between boys and girls for neuroticism, $t(313) = -2.30, p < .01$; self-blame, $t(313) = 2.53, p < .05$; and catastrophizing, $t(313) = 3.41, p < .01$. Significant differences between children transitioning from primary school to secondary school children were also found to reveal positive refocusing, $t(313) = 4.29, p < .001$. All subscales showed relatively low yet acceptable internal consistency levels (Cronbach's alpha) and variables were correlated among themselves (see Table 2).

Measurement model

A confirmatory factor analysis with the structural model's latent variables was undertaken to determine its validity as a measurement model. The measurement model consists of two latent variables. The adaptive CERS latent variable has two indicators: the positive refocusing and the positive reappraisal subscales. The maladaptive CERS latent variable has three indicators: the self-blame, catastrophizing, and

Table 2. Correlations between subscales ($n = 315$).

| | 2. | 3. | 4 | 5. | 6. | 7. |
|-------------------------|-----|-------|-------|-------|-------|--------|
| 1. Neuroticism | .02 | -.06 | .28** | .36** | .31** | .34** |
| 2. Positive refocusing | – | .40** | -.05 | .00 | .10 | -.27** |
| 3. Positive reappraisal | | – | .00 | -.02 | .12** | -.16** |
| 4. Self-blame | | | – | .41** | .35** | .29** |
| 5. Catastrophizing | | | | – | .55** | .32** |
| 6. Rumination | | | | | – | .15** |
| 7. Depression | | | | | | – |

* $p < .05$. ** $p < .01$. *** $p < .001$.

rumination subscales. The fit indices for the initial measurement model in which none of the measurement errors were correlated with each other were acceptable, $\chi^2(4, N = 315) = 8.22, p = .08, \chi^2/df = 2.05, GFI = .99, CFI = .98, SRMR = .03, RMSEA = .05$ (90% CI [.00, .11]). However, some absolute correlation residuals were above .10 and 2 in absolute terms in the standardized residual covariance matrix. Therefore, we respecified the model so that the residuals for reappraisal and rumination were allowed to covary. The residuals of these variables could be reflecting the common variance associated with the cognitive processes shared by these strategies, such as the capacity to inhibit negative emotional content, working memory, and attentional switching (e.g., Cohen, Daches, Mor, & Henik, 2014; Whitmer & Gotlib, 2013). The new model provided a good fit to the data $\chi^2(3, N = 315) = 6.24, p = .10, \chi^2/df = 2.08, GFI = .99, CFI = .98, SRMR = .03, RMSEA = .05$ (90% CI [.00, .12]) and the residual covariance matrix analysis revealed the predominance of values $< .10$ in absolute terms and a totality of values < 2 in absolute terms in the standardized residual covariance matrix.

Structural model of depression

To examine whether the adaptive and maladaptive CERS mediated the neuroticism–depression relationship, a total mediation model was estimated and the structural model's fit was analyzed. Based on the results of the confirmatory factor analysis measurement model, it was retained the parameter free to covary between the measurement errors of reappraisal and rumination (path *a* in Figure 2). It was observed that the total mediation model had a good fit to the data, $\chi^2(11, N = 315) = 20.49, p = .039, \chi^2/df = 1.86, GFI = .98, CFI = .97, SRMR = .03, RMSEA = .05$ (90% CI [.01, .08]). The direct effects of neuroticism on the maladaptive CERS were significant, as were the direct effects of the maladaptive and adaptive CERS on depression. On the other hand, the direct effect of neuroticism on the adaptive CERS was not statistically significant. With respect to indirect effects, neuroticism was significantly associated with depression via the maladaptive CERS ($\beta = .24; 95\% \text{ CI } [.16, .32]$), and the adaptive CERS did not have a significant mediating effect on this relationship ($\beta = .01; \text{ CI } [-.04, .07]$).

Alternative models that could fit the data equally well or better should be tested (Kline, 2005; Tomarken & Waller, 2005). Consequently, this total mediation model was compared with a hierarchical partial mediation model where a direct effect from neuroticism to depression was estimated (Figure 2). This path turned out to be statistically significant. The general fit of this partial mediation model was better, $\chi^2(10, N = 315) = 11.85, p = .295, \chi^2/df = 1.18, GFI = .99, CFI = .99, SRMR = .02, RMSEA = .02$ (90% CI [.00, .06]) and the difference of the chi-square values of the models was significant, $\Delta\chi^2(1, N = 315) = 8.64, p < .003$; therefore, it was decided to keep this partial mediation model (Figure 2) instead of the total mediation model. Table 3 contains all the fit indices and the comparative fit indices between the models. Additionally, the residual covariance matrix analysis revealed the predominance of values $< .10$ in absolute terms and a totality of values < 2 in absolute terms in the standardized residual covariance matrix. Said model indicated that neuroticism was associated in a statistically significant way with depression via the maladaptive CERS ($\beta = .16; 95\% \text{ CI } [.08, .02]$) and the adaptive CERS did not show a significant mediating effect on this relationship ($\beta = 0; \text{ CI } [-.05, .05]$). This model also demonstrated a direct effect of neuroticism on depression—beyond its indirect effect—via the CERS. This indicates that children with higher neuroticism scores reported a

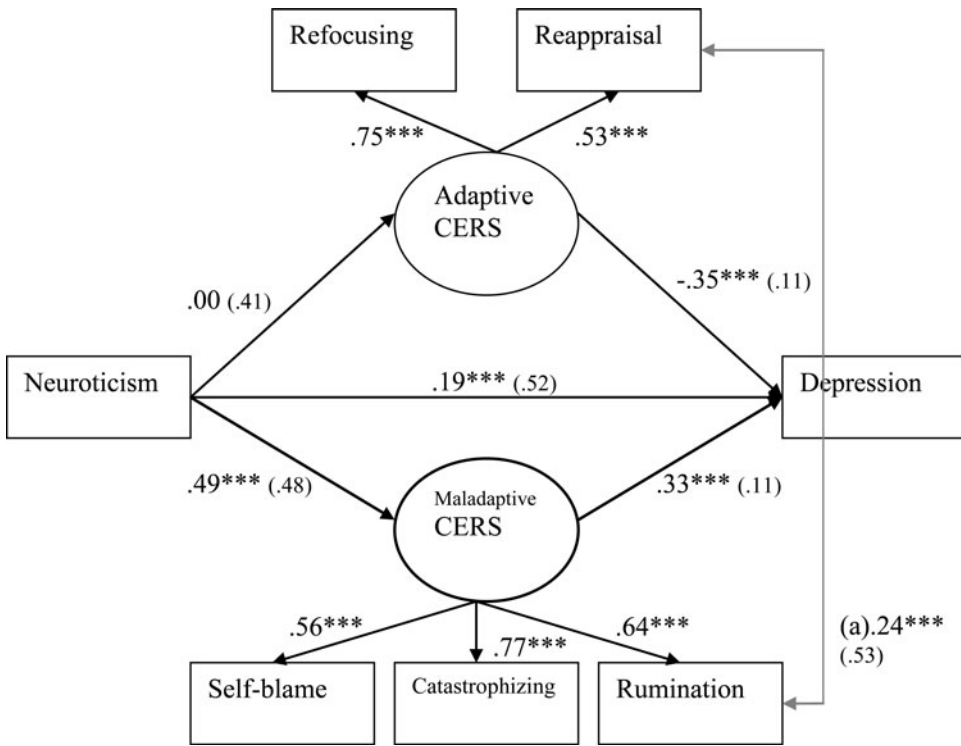


Figure 2. Mediating effects of cognitive emotion regulation strategies (CERS) on the relation between neuroticism and depression. Values on paths are standardized regression coefficients. Standard errors are presented in parenthesis. Maladaptive CERS were a significant mediator. *** $p < .001$.

greater number of depression symptoms, and this association can be partially explained by the more frequent use of maladaptive CERS. In summary, we decided to keep this partial mediation model that showed that the maladaptive CERS possess a partial mediating effect on the neuroticism-depression relationship.

Additionally, we compared this partial mediation model with a hierarchical nonmediation model in which the parameters were set at zero to and from the adaptive and maladaptive CERS, leaving only the neuroticism-depression parameter free. This nonmediation model did not show a good fit, $\chi^2(14, N = 315) = 120.64, p < .001, \chi^2/df = 8.61, GFI = .91, CFI = .70, SRMR = .15, RMSEA = .15$ (90% CI [.00,

Table 3. Fit indices for structural models of depression and the multiple-group analyses.

| | χ^2 | df | CMIN/DF | GFI | CFI | SRMR | RMSEA | 90% CI for RMSEA | AIC | χ^2 difference |
|---|----------|----|---------|-----|-----|------|-------|------------------|--------|---------------------|
| Total mediation model | 20.49* | 11 | 1.86 | .98 | .97 | .03 | .05 | [.01, .08] | 54.49 | |
| Partial mediation model | 11.85 | 10 | 1.18 | .99 | .99 | .02 | .02 | [.00, .06] | 47.85 | 8.64** |
| Nonmediation model | 120.64** | 14 | 8.61 | .91 | .70 | .15 | .15 | [.00, .06] | 148.64 | 108.78** |
| Nonhierarchical model | 58.39** | 12 | 4.86 | .95 | .87 | .08 | .11 | [.08, .14] | 90.39 | |
| <i>Grouping variable: Gender</i> | | | | | | | | | | |
| Unrestricted model | 27.48 | 22 | 1.24 | .97 | .98 | .05 | .02 | [.00, .05] | 95.48 | |
| Restricted model | 29.74 | 29 | 1.02 | .97 | .99 | .05 | .01 | [.00, .04] | 83.74 | .26 |
| <i>Grouping variable: School transition</i> | | | | | | | | | | |
| Unrestricted model | 37.31* | 22 | 1.69 | .96 | .96 | .05 | .04 | [.01, .07] | 105.31 | |
| Restricted model | 47.76* | 29 | 1.64 | .96 | .95 | .05 | .04 | [.02, .06] | 101.76 | 10.45 |

Note: CMIN/DF = ratio of chi-square statistic to degrees of freedom; GFI = goodness-of-fit index; CFI = comparative fit index; SRMR = standardized root-mean-square residual; RMSEA = root mean square error of approximation; AIC = Akaike information criterion; χ^2 difference = difference in χ^2 between each of the alternative models.

* $p < .05$. ** $p < .01$.

.06]), and the difference of the chi-squares indicated that the partial mediation model was better than the nonmediation model, $\Delta\chi^2(4, N = 315) = 108.78, p < .001$.

We then tested another alternative model that analyzed the possibility that neuroticism increases the level of depression, which subsequently influences the CERS. This nonhierarchical new model did not have a good fit, $\chi^2(12, N = 315) = 58.39, p < .001, \chi^2/df = 4.86, GFI = .95, CFI = .87, SRMR = .08, RMSEA = .11$ (90% CI [.08, .14]) and its Akaike information criterion (AIC) value (90.39) was greater than that of the partial mediation model (AIC = 47.85). Therefore, considering that when comparing nonhierarchical models the one with the lower AIC value is preferable (Kline, 2005), it was decided once again to keep the partial mediation model.

Multigroup analysis: Moderator effects of gender and school transition

Last, it was analyzed whether gender and school transition had a moderator effect on the relationships proposed in our structural model. A multigroup analysis of the differentiated covariance matrices for the girls ($n = 165$) and the boys ($n = 150$) was performed. First, it was conducted an analysis comparing the girls and the boys in the same specified model without restricting the parameters through all the groups (unrestricted model). Then, an analysis was conducted comparing genders in the same specified model while restricting the parameters to avoid variation in the groups (restricted model; Kline, 2011). Both models had good fit values: unrestricted model, $\chi^2(22, N = 315) = 27.48, p = .19, \chi^2/df = 1.24, GFI = .97, CFI = .98, SRMR = .05, RMSEA = .02$ (90% CI [.00, .05]); restricted model, $\chi^2(29, N = 315) = 29.74, p = .42, \chi^2/df = 1.02, GFI = .97, CFI = .99, SRMR = .05, RMSEA = .01$ (90% CI [.00, .04]). The difference between them was not significant (Dif. $\chi^2 = .26, df = 7, p = .99$). This result suggests the proposed paths do not vary between boys and girls.

Second, an analysis was conducted comparing the primary school and secondary school groups. The unrestricted and restricted model were applied to both groups (9–11 years old from primary school: $n = 220$; 12 years old from secondary school: $n = 95$) and they had good fit values: unrestricted model, $\chi^2(22, N = 315) = 37.31, p = .02, \chi^2/df = 1.69, GFI = .96, CFI = .96, SRMR = .05, RMSEA = .04$ (90% CI [.01, .07]); restricted model, $\chi^2(29, N = 315) = 47.76, p = .01, \chi^2/df = 1.64, GFI = .96, CFI = .95, SRMR = .05, RMSEA = .04$ (90% CI [.02, .06]). The difference between the models was not significant (Dif. $\chi^2 = 10.45, df = 7, p = .16$), which suggests that school transition does not moderate the associations between the variables.

Discussion

This study's general objective was to analyze the possible mediating effect of the CERS on the neuroticism-depression relationship in children 9–12 years old. The results confirm that the maladaptive CERS partially mediate this relationship.

In effect, this study reveals that neuroticism is related to symptoms of depression in children. These results were also found in other studies on children and adolescents (e.g., Agh-Yousefi & Maleki, 2011; del Barrio et al., 1997; Ehrler et al., 1999; Muris, Meesters et al., 2005). It was also found that this relationship is mediated by dysfunctional CERS. These findings concur with previous studies on children and adolescents that found that the rumination maladaptive strategy has a mediating role in the neuroticism-depression relationship for this population (e.g., Broeren et al., 2011; Kuyken et al., 2006; Muris et al., 2009; Verstraeten Vasey Raes, & Bijttebier, 2008).

It has been shown that neuroticism constitutes a vulnerability factor for repetitive negative thinking (Broeren et al., 2011); specifically, Nolen-Hoeksema (2004) maintained that children and adolescents who are temperamentally predisposed to stress or have greater negative emotionality have a greater tendency to develop a ruminative response style. Some explanatory models indicate that neuroticism constitutes a general vulnerability factor that is associated to more specific vulnerability indicators, which in turn determines certain psychopathologies (e.g., Norton & Mehta, 2007; Sexton et al., 2003). For example, Muris et al. (2005) suggested that repetitive negative thinking is a mechanism associated with neuroticism that result in increased depression levels. Broeren et al. provided evidence for this model by

verifying that rumination and worry act as mediators in the relationship between neuroticism and symptoms of depression. Hervas and Vazquez (2011) stated that the tendency to experience negative emotions with frequency and elevated intensity is associated with increased self-focus (Mor & Winquist, 2002), which explains the association of this trait with rumination and provides evidence of the mediating effect of negative emotional overproduction in relation to neuroticism with rumination in adults.

According to the results, the maladaptive CERS constitute vulnerability mechanisms associated with neuroticism that predispose individuals to develop symptoms of depression; this vulnerability includes strategies such as catastrophizing and self-blame, which, together with rumination, open the way to a greater number of symptoms of depression. Moreover, neuroticism constitutes a vulnerability factor for repetitive negative thinking, and it could be suggested that catastrophizing does as well because it is a strategy by which the recurring inference of serious consequences associated to events is regarded as a risk factor for depression (Noël et al., 2012).

For its part, rumination predisposes individuals to generate more inferences on an event's possible negative consequence (Nolen-Hoeksema, 1998), which activates a rapid escalation of catastrophic thoughts and negative emotions (Aldao & Nolen-Hoeksema, 2010). Children who experienced negative emotions could focus on these symptoms and evaluate the consequences of these negative emotions in a predominantly catastrophic way, which could increase the symptoms of depression (Noël et al., 2012). Neuroticism is also characterized by an elevated frequency of negative emotions that increase the focalization of attention on them and gives way to increased rumination (Hervas & Vazquez, 2011), which hypothetically could produce an increase in self-blame, which also focalizes attention on itself in an excessive and rigid manner (Fejfar & Hoyle, 2000; Schroevers, Kraaij, & Garnefski, 2007).

As Joorman and Quinn (2014) suggested, the focalizing of attention on negative situations and emotions at a time when it is impossible to deactivate those thoughts and feelings (Whitmer & Banich, 2007), prolongs the negative emotional experience. Specifically, Papadakis, Prince, Jones, and Strauman (2006) argued that the attentional focus on oneself and distress itself amplify dysphoric emotions in response to everyday failures and frustrations, increasing the likelihood of a depressive state. In this sense, the maladaptive CERS are associated with depression in a way that is similar to what occurred in other studies (e.g., Garnefski & Kraaij, 2006; Garnefski, Kraaij, & Spinhoven, 2001; Garnefski et al., 2007). In summary, there are reasons to believe that the probable function of maladaptive CERS is as vulnerability mechanisms specifically associated to neuroticism that predispose individuals to increased symptoms of depression.

Another aspect to be considered is that the mediating role of maladaptive CERS is partial. Other studies on children and adolescents also found that cognitive emotion regulation has a partial mediating effect (Broeren et al., 2011; Kuyken et al., 2006), although these studies were concerned only with rumination. While our research was interested in understanding the mediating role of a combined set of strategies that are cognitive in nature on the neuroticism-depression relationship, there exists evidence that a strategy not considered in this study, namely expressive suppression of a behavioral nature (Gross & Levenson, 1993), plays a mediating role in this relationship (e.g., Yoon et al., 2013). Similarly, it is possible that other strategies not considered in this study also have a mediating effect on this relationship.

With respect to the functional CERS, the results show that they are negatively associated with depression in the same manner found by other studies on children and adolescents (e.g., Garnefski & Kraaij, 2006; Garnefski et al., 2001; Garnefski et al., 2007). These findings reinforce the hypothesis that these strategies have a protective function against depression (Garnefski et al., 2007). Although it has been suggested that neuroticism predisposes one to use adaptive CERS less frequently (John & Gross, 2004), there is evidence of this association in adolescents (Gullone & Taffe, 2012). However, our results did not show that neuroticism had a direct effect on these strategies; therefore, we hypothesize that there probably exists in children and adolescents other personality traits with greater predictive ability in this respect, such as, for example, extraversion or conscientiousness, which other studies found associated with cognitive reappraisal (e.g., Gresham & Gullone, 2012; Hasking et al., 2010).

The model simultaneously considered adaptive and maladaptive CERS, finding, as previously mentioned, that only the latter showed a mediating effect on the neuroticism-depression relationship, coinciding with the findings on adults in Yoon et al. (2013). According to Aldao, Nolen-Hoeksema, and

Schweizer (2010), the use of structural models allows for the modeling of relationships between emotion regulation strategies and psychopathologies, and for the incorporation of factors such as personality traits that make it possible to explain differential relationships between the strategies and the psychopathology. The results show that in the predisposition to depression (neuroticism), the more frequent use of maladaptive CERS was more significant than the less frequent use of adaptive CERS. Similarly, Aldao et al. and Aldao and Nolen-Hoeksema (2010) stated that in terms of the relationship with a psychopathology, the presence of maladaptive strategies is more prejudicial than the absence of adaptive strategies. The results contribute to supporting this hypothesis and to expanding it to include populations of children and adolescents.

With respect to the moderator effects of gender and school transition on the proposed model, the results showed that there is no difference in both groups of gender and school transition on the relationships between neuroticism, CERS and depression. Although previous researches have found that girls are more prone to ruminate and to develop depressive symptoms (e.g., Kercher et al., 2009; Kuyken, Watkins, Holden, & Cook, 2006) and that our results showed differences in neuroticism, self-blame, and catastrophizing between girls and boys, the relationships proposed in the model were not affected. These results are similar to the provided by Kuyken et al. Regarding school transition, no differences were found between groups in the model. Other studies have found differences between adolescents groups from 12 to 18 years old (Muris et al., 2004). No differences were found in our research maybe due to the fact that we have evaluated children from 9 to 12 years old. This group constitutes a homogeneous age range. It is possible that age groups with more variability (e.g., 12–18 years old) could lead to corroborate if school transition or even age are moderator factors in these relationships.

In terms of the limitations of this study, its transversal and correlational design does not make causal attributions possible. Therefore, only association, and not causation, can be demonstrated. As such, it is not possible to infer whether neuroticism, mediated via CERS, temporarily precede the onset of symptoms of depression. Future prospective studies need to address this issue. Even so, the model showed the better fit and can be considered valid compared to the alternative models analyzed, even though other relationships than those covered here could exist. The results were derived exclusively from self-reporting measures administered to the children and from one instrument or subscale per construct measured. Future researchers could use more instruments, other methods of evaluation—for example, interviews—and other sources of information—such as parents and teachers. Although we took care to preserve the nature of the data analyzed (e.g., by eliminating from the total depression index the dimension of blame because it presented similarities with the self-blame CERS), the children responded to numerous items that inquired about their negative emotions, which could have produced a strong artificial relationship between some variables. Additionally, the reliability of some scales was relatively low. Lastly, the intentional nature of the sample limits the possibilities for the results to be generalized.

In closing, we maintain, as does Yoon et al. (2013), that personality traits are relatively stable and difficult to change. For this reason, recognizing that their effects on the symptoms of depression are mediated by strategies that can themselves be changed (e.g., Ayduk & Cross, 2010) is especially relevant for the design and content of child mental health prevention and promotion programs (Garnefski et al., 2007).

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