Developmental origins of regulatory emotional self-efficacy beliefs in preadolescence: A longitudinal investigation from early childhood till adolescence

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ABSTRACT

Regulatory emotional self-efficacy beliefs (RESE) are essential for socio-emotional functioning. While they are shown to emerge in early adolescence, their developmental origins are largely unknown. The current study takes a longitudinal approach to investigate the developmental factors that relate to the emergence of RESE. It covers central factors from early to middle childhood. Specifically, we examined the impact of maternal interaction quality, emotion knowledge, goal maintenance (at 4–5 years), and global self-worth (8 years) on 12-year-olds' ($M_{age} = 12;2$) perceived capability to regulate negative emotions (RESE-NEG) and to express positive emotions (RESE-POS) ($N = 155$, 68 female, mostly White). Maternal non-hostility and child cognitive competencies at 4–5 years predicted adolescents' RESE-NEG (βs $=.26–.33$), demonstrating first evidence how early social experiences contribute to RESE. Global self-worth predicted RESE-POS ($\beta =.27$). The study broadens our knowledge on the psychological mechanisms that support the development of RESE. It highlights adolescents' RESE as outcome of earlier developing social-cognitive competencies and experiences in caregiver-child interactions in early childhood.

1. Developmental origins of regulatory emotional self-efficacy beliefs in preadolescence

Emotion regulation is a key aspect of adequate social functioning (Fischer & Manstead, 2016). Expressing positive emotions in an adequate manner allows for rewarding social experiences and regulating negative emotions allows to not be overwhelmed by feelings such as despondency or anger. It supports people's ability to, for example, respond prosocially even in challenging situations (e.g., Carlo et al., 2012; Song et al., 2018). While key aspects of emotion regulation abilities emerge in early childhood (e.g., Calkins & Hill, 2007; Eisenberg et al., 1998; Kammermeier & Paulus, 2022), adolescence has been highlighted as a central phase for emotion regulation development (Silvers, 2022).

One psychological competency that has received ample interest in the field and that seems to emerge in early adolescence concerns regulatory emotional self-efficacy beliefs (RESE; Caprara et al., 2008). RESE refer to beliefs about one's own competencies in managing and modulating negative emotional states and in allowing oneself to experience and express positive emotional states. From a theoretical perspective on the nature of emotion regulation, it has been proposed that RESE supports children's emerging ability to

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effectively regulate emotions (Bandura, 1997; Caprara et al., 2008). That is, it has been proposed that the more children view themselves as capable of managing their emotional states, the better they actually are in modulating their affective experience and expression (Bandura et al., 2003). These considerations relate to the broader view that how humans conceive of themselves and their competencies affects their behavioral performances (e.g., Harter, 2015; Yeager et al., 2019).

Consequently, a vivid line of research examined the structure and psychological consequences of people's self-efficacy regarding emotion regulation (for review see Alessandri et al., 2015). Previous work revealed relations with emotion regulation strategies, psychosocial functioning and mental health, such as the development of self-esteem, more prosocial behavior, and less depressive symptoms across adolescence and adulthood (Bandura et al., 2003; Caprara et al., 2009; Di Giunta et al., 2022; Gunzenhauser et al., 2013; Valois et al., 2015; for review see Alessandri et al., 2022). Interestingly, most research on RESE focused on adolescence so far, a period marked by increased introspectiveness and dynamic changes of emotion regulation processes (Harter, 2007; Silvers, 2022). For example, Bassi and colleagues (2018) revealed links between RESE and daily affect experiences: the higher adolescents' self-efficacy beliefs regarding negative affect, the less intense sadness and the more intense contentment they experienced in daily-life situations. In adolescence and young adulthood, individuals with higher RESE typically report lower loneliness, lower internalizing and externalizing symptoms, and greater well-being (Caprara et al., 2010; Di Giunta et al., 2018; Jin et al., 2020). In detail, RESE was shown to mediate the relation between parent and peer attachment security and internalizing symptoms (Pan et al., 2016). The importance of RESE for psychosocial functioning was highlighted by Bandura and colleagues (2003) in a two-wave longitudinal study with adolescents. Higher self-efficacy about regulating negative affect contributed to lower levels of depression both concurrently and distally two years later, while taking into account concurrent levels of depression. Taken together, self-efficacy beliefs about emotion regulation relate to a number of psychological outcomes and thus seem to present an important aspect of human development. Yet, despite the longstanding and vivid interest in RESE, no empirical research addressed the early ontogenetic factors that support the development of adolescents' RESE so far.

This is an unfortunate situation as, on the one hand, knowledge on the antecedent factors might further our understanding on how to support the emergence of RESE. On the other hand, it constitutes an empirical touchstone for theoretical considerations on the developmental origins of RESE. Indeed, different theoretical viewpoints speak to this question and allow for hypotheses about the ontogenetic predictors of RESE. The current study relied on an existing longitudinal study and drew on prominent theoretical frameworks to investigate which factors relate to the development of regulatory emotional self-efficacy beliefs in adolescence. Thereby, the current study aimed at furthering our understanding of the developmental origins of RESE and at advancing the theoretical landscape on self-efficacy in the context of emotion regulation.

Notably, RESE is conceptualized as comprising distinct facets. Self-efficacy beliefs about regulating negative emotions (NEG) are distinguished from self-efficacy beliefs about expressing positive emotions (POS) (Bandura et al., 2003; Caprara et al., 2008). Within RESE NEG, a distinction is drawn between beliefs about regulating despondency (DES) and regulating anger (ANG) (Caprara et al., 2008; Di Giunta et al., 2017). All RESE facets are important for adaptive human functioning, but the degree to which these facets are related or independent remains debated. While some studies found relations between these facets (Alessandri et al., 2009; Pan et al., 2016), others highlighted their difference (Caprara et al., 2008; Di Giunta et al., 2017). For example, POS and NEG seem to have different developmental trajectories, with POS increasing and NEG decreasing across adolescence (Caprara et al., 2013). Assuming that RESE comprises different facets – POS, DES, ANG – developmental theorizing would predict that the internal structure of RESE may be mirrored by specific predictors. We investigated this possibility by assessing whether or not the examined predictors are specifically related to one of the facets of RESE or generally important for the development of all facets of RESE.

From a theoretical point of view, the current study targeted different factors that could function as predictors of RESE. First of all, we integrated considerations stemming from attachment theory (Bowlby, 1973; Bretherton, 1991), assuming a social origin of representations about the self and emotion regulation (Brumariu, 2015; Fonagy et al., 2002; Morris, Criss, et al., 2017). Second, we drew on theoretical considerations on emotion-related regulation (Eisenberg et al., 2005; Izard et al., 2011) and on regulatory competencies (Eldesouky & Gross, 2019; Mauss & Tamir, 2014) as RESE reflects judgments about self-regulatory processes in the context of emotions. Finally, given the self-evaluative nature of RESE, we integrated theoretical considerations on the interrelation of self-evaluatory processes and the self-concept (Harter, 2007). Thus, the current study integrated a social perspective, cognitive perspectives, and a self-related perspective on the developmental origins of RESE. In particular, we examined the role of parent-child interaction, emotion knowledge, goal maintenance competencies, and global self-worth. We will introduce these considerations successively in the following paragraphs.

First, from a social-interactional (e.g., Carpendale & Lewis, 2004) and attachment theoretical point of view (Bretherton, 1991; Thompson, 2016), self-efficacy beliefs are proposed to develop based on social interactions (Bandura, 1997; Schneewind, 1995). Following this theoretical foundation, a perspective considering caregiver-child interaction is essential when studying the ontogenetic origins of self-efficacy beliefs. From an attachment theoretical perspective, early interactions with a caregiver form children's representation of close relationships and, importantly for our research question, their internal model about their own competency in social interactions (Bretherton, 1991; Thompson, 2016). Children derive these representations from repeated interaction experiences (Ainsworth et al., 1978; De Wolff & van Ijzendoorn, 1997). Consequently, the quality of the representation depends on the quality of the caregiver-child interaction. A framework that allows for a detailed view on the parent-child interaction quality is the Emotional Availability framework (Biringen et al., 2014). Parental interaction qualities are described along four dimensions: Sensitivity, Structuring, Non-Intrusiveness, and Non-Hostility. Reacting sensitively to the child's emotion expression implies an adequate, affectively warm reaction to the child's signal and supports the child in regulating their emotion. This, in turn, should influence children's representation about their own competency in doing so. Showing hostility towards the child, on the other hand, confronts the child with a distressing event while the child may still lack the competence to regulate the upcoming emotion. This leaves the child

with negative affect without adequate support to regulate it and thus most likely no experience of competence in emotion regulation. Supporting the relevance of caregiver-child interaction for the self, previous studies revealed relations of child self-concept with caregiver-child interaction qualities and attachment quality (Laible et al., 2004; Pali et al., 2022; Paulus et al., 2018; Verschueren et al., 2012). An impact on self-efficacy beliefs is suggested by research showing relations of adolescents' self-reported attachment and parenting characteristics with adolescents' RESE (Di Giunta et al., 2022; Pan et al., 2016) and, more generally, by research showing links between attachment and children's social self-efficacy (Coleman, 2003) and self-regulation capacities (Boldt et al., 2020). While previous studies focused on parenting aspects and self-efficacy beliefs within adolescence close in time, they support the idea that children come to feel self-efficient by experiencing their capacity to regulate emotions in the context of close interactions. Indeed, developmental work has highlighted the role of family context and caregiver influences for the development of emotion regulation across childhood and adolescence (Eisenberg, 2020; Eisenberg et al., 1998; Morris, Houltberg, et al., 2017; Silvers, 2022). Yet, despite these lines of research, no study examined to which extent early parent-child interaction influences the development of RESE in adolescence. Taken these different perspectives together, caregiver-child interaction can be considered an important source of self-evaluative judgments and emotion-related regulation.

From a cognitive perspective, developmental theorizing has highlighted the role of emotion knowledge in the development of emotion-related regulation (Eisenberg et al., 2005; Izard et al., 2011). Emotion knowledge describes the "accurate understanding of the expressions, feelings, and functions of discrete emotions" (Izard et al., 2011, p. 44). Forming cognitive representations about own competencies in regulating particular emotions (such as anger and despondency) implies a form of reasoning about emotions. It thus relies on the ability to identify and describe emotions, that is, emotion knowledge in general. Moreover, adequate emotion regulation strategies are dependent on the nature of the emotion (Cole, 2014), suggesting that emotion knowledge plays a role when engaging in and reasoning about emotion regulation. Previous research supports the significance of emotion knowledge by demonstrating links with emotion regulation and social competencies in childhood and adolescence (Di Maggio et al., 2016; Izard et al., 2001; Mostow et al., 2002; for review see Trentacosta & Fine, 2010). Knowledge about emotions might thus serve as a basis for evaluating own abilities to regulate emotions.

Emotion regulation draws on a variety of cognitive capacities, from controlling attention to cognitively changing the emotional response, which in turn relies on the abilities to inhibit responses and flexibly switch between mental states (Ochsner & Gross, 2005). One central cognitive element of emotion regulation is the capacity to maintain goals, given that emotion regulation can be described as a goal-directed regulatory ability (Eldesouky & Gross, 2019; Mauss & Tamir, 2014). Having a desired emotional endpoint, i.e., an emotion goal, activated is considered as foundational for regulating emotions toward that end. Similarly, viewing emotion regulation from a functional perspective, regulatory efforts are motivated by the individual's goal in a particular situation (Thompson, 1994). Consequently, a key factor for goal-directed regulation of emotions is the ability to maintain goals and, more broadly, general self-control abilities. The interrelation of cognitive control and emotion regulation, particularly reappraisal strategies, has been empirically supported (Lantrip et al., 2016; McRae, Gross, et al., 2012; McRae, Jacobs, et al., 2012; Ochsner & Gross, 2005). Cognitive control in affective contexts is considered particularly crucial for emotion regulation development in adolescence (for review see Schweizer et al., 2020). It allows adolescents to flexibly attend to goal-relevant information and thereby functions as a cognitive basis for successful regulation. Self-efficacy beliefs about own regulatory competencies are proposed to build on actual regulatory competencies as well (Bandura, 1997). Consequently, cognitive control, including the abilities to flexibly switch between mental states and to maintain a goal, might promote self-efficacy beliefs about emotion regulation competencies. The current study examines the role of goal maintenance, including the capacity of cognitive flexibility, as one cognitive foundation for RESE.

Taking an agentic view on the self (Bandura, 2008), self-efficacy beliefs are a core part of the self-system. They reflect judgments about competencies of the self in specific situations and thereby subserve human agency. An overall evaluation of the self in general is reflected in an individual's global self-worth. Positive self-worth constitutes a basis for the confidence that is required to engage in different actions (Harter, 2007). Consequently, global self-worth likely predicts judgements about own competencies, including RESE. Supporting this notion, Caprara et al., 2013 reported self-esteem at age 16 to predict self-efficacy beliefs 8 years later. Relatedly, previous research suggests that self-efficacy beliefs contribute to self-esteem (Caprara et al., 2006; 2010). It remains thus interesting to study the impact of antecedent differences in self-worth on the emergence of RESE in adolescence.

Taken together, while research has highlighted the developmental significance of regulatory self-efficacy beliefs and explored its development in adolescence, the field lacks an understanding of the earlier ontogenetic factors that relate to the emergence of RESE. The current study aimed at filling this gap by integrating different theoretical frameworks and testing the impact of four key psychological processes and mechanisms on the different facets of RESE.

1.1. Current Study

The current study relied on a longitudinal dataset to examine the role of parent-child interaction, goal maintenance, emotion knowledge, and global self-worth. Regulatory emotional self-efficacy beliefs were assessed using the RESE scale (Caprara et al., 2008) at 12 years, an age when RESE can be meaningfully measured. It is comparable to the youngest age groups used in previous studies addressing RESE (Di Giunta et al., 2018; Mesurado et al., 2018; Pan et al., 2016). To examine the role of caregiver-child interaction, we coded maternal interaction quality in a mother-child interaction at 4 years using the Emotional Availability framework (EA; Biringen et al., 2014) along the four dimensions of sensitivity, structuring, non-intrusiveness, and non-hostility. Around 4 years, children start to form explicit beliefs about the self based on concrete behaviors and characteristics (Harter, 2007). Thus, experiences of regulating emotions within the caregiver-child interaction at that age might shape the formation of such self-efficacy beliefs from early on. Expressive and receptive emotion labeling as measure of emotion knowledge was assessed at 4 and 5 years; age groups comparable to

the age groups in previous studies addressing the role of early emotion knowledge on later development (Denham et al., 2012; Izard et al., 2001; Trentacosta & Fine, 2010). Goal maintenance as a measure of cognitive control at 5 years to address the role of early individual differences in socio-cognitive competencies. Global self-worth was assessed at 8 years, an age when self-evaluations become more balanced, less overly positive compared to earlier ages, and therefore most likely a basis for future self-evaluations. Based on the previously reviewed theoretical considerations, we derived the following predictions. First, based on attachment theory and social-cognitive theory, we hypothesized positive maternal interaction qualities to predict regulatory emotional self-efficacy beliefs. Second, following theories on emotion-related regulation (Eisenberg et al., 2005; Izard et al., 2011), regulating emotions should be perceived as easier when being able to identify emotions. We thus hypothesized a positive effect of emotion labeling competencies on RESE. Third, we expected a positive relation between goal maintenance skills and regulatory emotional self-efficacy beliefs based on theories that point out the role of regulatory goals for regulatory competencies (Eldesouky & Gross, 2019; Mauss & Tamir, 2014). Fourth, based on theoretical considerations that beliefs about own competencies are based on children's global self-worth (Caprara et al., 2013) that emerges early in development (Cimpian et al., 2017), we hypothesized a positive relation between global self-worth and self-efficacy beliefs.

In order to assure that relations with self-efficacy beliefs are attributable to the respective predictor and not to cognitive functioning in general, we controlled for verbal intelligence as an indicator of cognitive functioning in all analyses. Moreover, given similarities between RESE and temperamental characteristics, as both concern emotion-related self-regulation, the field has experienced a theoretical debate on the question whether or not RESE and temperament are indeed separate constructs (Alessandri et al., 2015; Di Giunta et al., 2017). In particular, 'surgency/extraversion', which describes outwardly expressed excitement, resembles the expression of positive emotions as reflected in RESE POS. 'Negative affectivity' and 'effortful control' describe affective and regulatory characteristics as also reflected in all facets of RESE. To contribute to this debate and to specifically examine RESE, we controlled for temperament in all analyses. Finally, this study allowed to exploratively examine whether different facets of regulatory emotional self-efficacy (POS vs. NEG; DES vs. ANG within NEG) are subserved by different predictors. Identifying distinct predictors would speak for the notion that these facets are indeed separate factors of self-efficacy skills.

2. Methods

2.1. Participants

The study was part of an ongoing longitudinal study on socio-cognitive development across childhood and adolescence (see Sodian et al., 2016, 2020). For the current study, we relied on five measurement points of the longitudinal study. The full sample included 155 children (68 female, mostly White). Sample sizes varied across measurement points because families moved away or were temporarily unavailable. The first measurement point (T1) that we included in the current study was at around 4 years ($M = 4;2$ years;months, $SD = 1$ months, range 48–54 months; $n = 130$), the second (T2) at around 5 years ($M = 5;0$, $SD = 1$, range 59–63; $n = 126$), the third (T3) at around 6 years ($M = 5;10$, $SD = 1$, range 69–73; $n = 121$), the fourth (T4) at around 8 years ($M = 8;0$, $SD = 1$, range 95–104; $n = 118$), and the fifth (T5) at around 12 years ($M = 12;2$, $SD = 1$, range 144–151; $n = 102$). For the sake of simplicity, we refer to the measurement points as assessing children roughly at 4, 5, 6, 8, 12 years of age, although children's age at each measurement point varied around the respective age. For example, at the measurement point of 5 years, some children were just at the end of 4 years, and children at the measurement point of 6 years were mostly just at the end of 5 years (as evidenced in the age ranges). Children came predominantly from middle-class families and were initially recruited from local birth records in a European city. We complied with the APA ethical principles and the ethics committee of the faculty of psychology and educational sciences, University of Munich, had the study approved. Children were accompanied by a caregiver, who provided informed written consent at every session.

2.2. Measures

At 12 years, child regulatory emotional self-efficacy was assessed. We examined the following variables as predictors: child expressive and receptive emotion labeling at 4 and 5 years, maternal interaction quality in a mother-child interaction at 4 years, goal maintenance at 5 years, and child global self-worth at 8 years. Child temperament assessed at 4 years and verbal IQ assessed at 6 years served as control variables in the present study.

2.2.1. Child emotion labeling at T1 and T2 (4 and 5 years)

Children's affective labeling was assessed based on Denham (1986) and Ensor and Hughes (2005). First, in order to assess expressive emotion labeling, children were presented with eight pictures of emotional expressions one by one (happy, sad, angry, fearful; each expression both male and female). For each picture, children were instructed to have a look at the child's face and to report how the child feels. Second, in order to assess receptive emotion labeling, children were presented with all four pictures of the same gender simultaneously (male and female pictures successively). They were asked to identify on which picture the child looks happy, sad, angry, or fearful in turn. Thus, each task (expressive and receptive emotion labeling) consisted of eight trials. For both tasks, the set of gender-matched pictures was presented first and the order of emotions was randomized. For each trial, participants received a score of 2 if they identified the correct emotion and a score of 1 if they identified the correct valence (positive/negative) but not the exact emotion. Scores were summed across trials, resulting in a final score ranging between 0 and 16 for expressive and receptive emotion labeling at each measurement point.

2.2.2. Maternal interaction quality at T1 (4 years)

In order to assess maternal interaction characteristics, a mother-child free-play situation was rated using the Emotional Availability (EA) Scales by Biringen (2008). We focused on the four maternal scales of the EA system: *Maternal sensitivity* refers to the mother's ability to recognize and respond appropriately to the child's expressions while being genuinely affective and warm. *Maternal structuring* refers to the mother's ability to scaffold the interaction in a way that sets limits appropriately, encourages autonomous exploration, while the child receives these inputs in a constructive way. *Maternal non-intrusiveness* refers to the mother's ability to follow the child's lead and to interact without interfering or over-stimulating the child. *Maternal non-hostility* refers to the degree to which the mother's face and voice lacks any negativity, including both openly exhibited negativity and covert hostility. In order to assure inter-rater reliability, a second independent observer coded 35 % of the mother-child interactions. Cohen's kappa was excellent for all scales, with κ =.83 for sensitivity, κ =.89 for structuring, κ =.83 for non-intrusiveness, and κ =.82 for non-hostility.

2.2.3. Goal maintenance at T2 (5 years)

We used a goal maintenance task following Marcovitch et al. (2007). This task is an adaption of the Dimensional Change Card Sort (DCCS, Zelazo, 2006). The DCCS requires children to sort bivalent picture cards first, in a pre-switch phase, following one dimension (e.g., shape), and second, in a post-switch phase, following the other dimension (e.g., color). For example, a set of test cards needs to be sorted to two target cards (blue circle and red triangle), either based on the shape or color of the test cards according to the currently valid rule. In the standard DCCS version, all test cards are conflict cards (blue triangle and red circle), meaning they differ from the target cards and require children to attend to the rule in order to sort the card correctly. Conflict cards thus call for attention towards the rule in every trial. The adapted version employed here additionally includes redundant test cards. These test cards are identical to the target cards and can be sorted without paying attention to the rule. Including redundant cards in addition to conflict cards thus disrupts children's attention to the rule. Solving all trials correctly requires children's cognitive flexibility to correctly respond to the rule switch and children's ability to maintain the goal (i.e., currently valid rule), even though its activation is not encouraged in every trial. The task in the present study included the target cards *blue circle* and *red triangle*, with 3 redundant trials (blue circle, red triangle, red triangle) and 3 conflict trials (red circle, blue triangle, red circle) presented in intermixed order. For each trial, children received a score of 1 if they correctly sorted the card in the post-switch phase and a score of 0 if they failed to sort the card correctly in the post-switch phase. Children who did not pass at least two (of three) pre-switch conflict trials were excluded from the analyses on this task ($n = 28$). For the current study, we summed up scores across conflict trials only, that is, trials in which test- and target-cards differ and which are equivalent to the standard DCCS, leading to a final score ranging from 0 to 3.

2.2.4. Global self-worth at T4 (8 years)

In order to assess child self-concept, the Self-Perception Profile for Children (Harter, 2012) were used. For the current study, the dimension "global self-worth" was analyzed. Children rated their global self-perceptions on 6 items using a 4-point scale. The mean across these items was taken as a final score. Higher scores indicate a more positive global self-worth. Internal consistency in the current sample was good with Cronbach's α =.79.

2.2.5. Regulatory emotional self-efficacy beliefs at T5 (12 years)

In order to assess adolescents' regulatory emotional self-efficacy beliefs, we employed the Regulatory Emotional Self-Efficacy (RESE) scale by Caprara et al. (2008), slightly adapted for a youth sample. The scale comprises subscales on the perceived capacity to regulate despondency/distress (DES, 5 items, e.g., "How well can you keep from getting discouraged in the face of difficulties?") and anger/irritation (ANG, 4 items, e.g., "How well can you avoid getting angry when others keep giving you a hard time?"), and to express positive affect such as enjoyment and gratitude for good things and successes (POS, 4 items, e.g., "How well can you express joy when good things happen to you?"). Children replied on a 5-point scale. A combined score that reflects the perceived capacity to regulate negative affect (NEG) was computed by averaging DES and ANG scores. Cronbach's alpha as a measure for internal consistency was acceptable for all subscales in the current sample (DES: α =.76; ANG: α =.79; POS: α =.70; NEG: α =.79).

2.2.6. Control variables

Temperament at T1 (4 years). Child temperament was assessed via mother-report using the CBQ very short form (Putnam & Rothbart, 2006). The questionnaire consists of three subscales with 12 items each: Surgency, negative affect, effortful control. Answers are given on a 7-point scale. For each subscale, the mean across the respective items was computed. Internal consistency was acceptable to good for all subscales (surgency: α =.70; negative affectivity: α =.73; effortful control: α =.63).

Verbal IQ at T3 (6 years). Child verbal IQ was assessed using the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III, Petermann, 2009). The final score for verbal IQ was computed based on the subtests Vocabulary Test, Similarities, and Information.

2.3. Analyses

We computed four separate multiple linear regressions for the outcome variables DES, ANG, NEG, and POS to test our hypotheses about predictors in confirmatory analyses. For each model, the procedure was as follows: In a first step, we included the control variables gender, verbal IQ, and temperament with forced entry. To account for child temperament, the subscales 'negative affectivity' and 'effortful control' were included in all models. The subscale 'surgency' was only included in the model for POS, because expression of positive affect but not regulation of negative affect entails an outwardly directed excitement, as reflected in surgency/extraversion. In a second step, we included all remaining predictors using a stepwise procedure: maternal interaction quality (sensitivity,

structuring, non-intrusiveness, non-hostility), child expressive and receptive emotion labeling at 4 years and at 5 years, goal maintenance, and global self-worth. The stepwise procedure retains predictors in the model that contribute to predicting the dependent variable and excludes predictors that don't. Even when predictors are intercorrelated, it thus identifies the combination of most explanatory predictors. Missing data due to children's varying attendance across measurement points was handled using pairwise exclusion in order to keep the sample size as large as possible and thus higher statistical power. The resulting shared sample sizes between the predictors and outcome variables, which were considered at each step, are reported in the tables for each model. In order to examine the stability of our analytical procedure, we additionally computed multiple regressions including all predictors simultaneously (instead of a stepwise procedure) and we additionally computed the analyses based on data with mean imputation (instead of pairwise exclusion). These additional results, which closely mirror the pattern of the original results, are reported in the Supplementary Material.

2.4. Transparency and openness

A post-hoc power analysis for single regression coefficients with our given sample size of 155 and an alpha-level of .05 revealed a power of .94 to detect a small-to-medium sized effect of Cohen's $f^2 = 0.08$, with f^2 being the ratio of the variance explained by a predictor and the error variance of the multiple regression model (Faul et al., 2009). This effect size of interest corresponds closely to the smallest effect size of a single predictor in our models ($f^2 = 0.07$ for effect of goal maintenance on RESE ANG). All data, analysis code, and research materials are available from the first author. Data were analyzed using IBM SPSS Statistics, Version 27. This study's design and its analysis were not pre-registered.

3. Results

Descriptive statistics are presented in Table 1. Zero-order correlations are provided in Table 2. RESE scales about negative emotions (DES, ANG) were positively interrelated. RESE POS was not correlated with any other RESE scale. In the following, we will describe the four resulting models of the stepwise regression procedures focusing on the different aspects of RESE (DES, ANG, NEG, POS). Collinearity was no problem in the final models, indicated by Variance Inflation Factors of <5 for all predictors in all final models. Neither verbal intelligence nor any of the temperament facets turned out as significant predictor of any RESE scale.

For self-efficacy beliefs on regulating despondency (DES, Table 3), the final model includes maternal non-hostility and expressive emotion labeling at 4 years as significant predictors. The less hostile mothers were in interacting with their child and the better children were at naming emotions (having emotion concepts) at four years, the better children perceive themselves in managing despondency-distress at twelve years.

For self-efficacy beliefs on regulating anger (ANG, Table 4), maternal non-hostility at 4 years and goal maintenance at 5 years emerged as significant predictors. The less hostile mothers were in mother-child interaction at age four and the better children were at maintaining a goal at age five, the better they perceive themselves in managing anger-irritation at age twelve.

For self-efficacy beliefs on regulating negative affect in general, combining despondency and anger (NEG, Table 5), the final model includes the significant predictors of the separate models on DES and ANG, that is, maternal non-hostility and expressive emotion

Table 1
Means, standard deviations, and sample size for RESE and predictors of interest.

Variable	M	SD	n
Assessed at T1 (4 years)			
Maternal sensitivity	4.24	1.16	115
Maternal structuring	4.63	1.11	115
Maternal non-intrusiveness	5.42	1.20	114
Maternal non-hostility	5.53	1.20	115
Child expressive emotion labeling	6.70	2.44	128
Child receptive emotion labeling	12.44	2.95	126
Temperament: surgency	4.59	0.80	120
Temperament: negative affectivity	3.94	0.94	120
Temperament: effortful control	5.50	0.75	120
Assessed at T2 (5 years)			
Child expressive emotion labeling	7.98	2.33	123
Child receptive emotion labeling	13.94	2.21	123
Child goal maintenance	2.20	1.18	97
Assessed at T3 (6 years)			
Verbal IQ	105.62	10.14	120
Assessed at T4 (8 years)			
Child global self-worth	3.34	0.61	117
Assessed at T5 (12 years)			
RESE DES	3.05	0.64	101
RESE ANG	3.00	0.78	101
RESE NEG	3.02	0.59	101
RESE POS	4.09	0.54	101

Table 2
Zero-order correlations between all variables.

Variable	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Maternal sensitivity (4y)	.82***	.54***	.69***	−.05	−.10	−.07	.02	−.03	.04	−.09	−.01	.16	.11	.17	.03	.12	−.05	−.05
(2) Maternal structuring (4y)	-	.26***	.53***	−.08	−.15	.00	−.03	−.06	−.03	−.04	−.02	.12	.11	.12	.02	.07	.08	−.02
(3) Maternal non-intrusiveness (4y)		-	.68***	.01	.05	−.11	.07	.15	.12	−.02	−.11	.20*	−.01	.08	.11	.12	−.22*	.04
(4) Maternal non-hostility (4y)			-	−.01	.11	−.01	−.05	.06	.11	−.11	.01	.09	.11	.22*	.26*	.30**	−.11	−.01
(5) Temp. surgency (4y)				-	.05	−.20*	.10	−.02	.03	.17	.03	.05	.04	.00	.13	.09	.07	.05
(6) Temp. negative affectivity (4y)					-	.11	−.04	.03	.09	−.06	−.20	−.11	−.04	−.11	−.09	−.12	.04	−.15
(7) Temp. effortful control (4y)						-	−.09	.04	.01	−.10	−.06	.03	−.11	−.06	−.02	−.04	.22*	−.33***
(8) Expressive emotion labeling (4y)							-	.30***	.21*	.29**	−.02	.27**	−.01	.29**	.09	.22*	.06	.02
(9) Receptive emotion labeling (4y)								-	.13	.32***	−.12	.05	−.06	.09	.07	.10	−.02	.01
(10) Expressive emotion labeling (5y)									-	.18*	−.05	.12	−.09	.00	.06	.04	−.05	−.22*
(11) Receptive emotion labeling (5y)										-	.00	.16	−.01	.01	−.18	−.11	.09	−.06
(12) Goal maintenance (5y)											-	.12	.11	.18	.27*	.27*	.19	.01
(13) Verbal IQ (6y)												-	−.09	.02	−.02	−.00	.11	−.13
(14) Global self-worth (8y)													-	.05	.03	.05	.20	.17
(15) RESE DES (12y)														-	.36***	.79***	.06	−.01
(16) RESE ANG (12y)															-	.86***	−.02	.14
(17) RESE NEG (12y)																-	.02	.09
(18) RESE POS (12y)																	-	−.28**
(19) Gender																		-

Note. Gender [0 = female; 1 = male].
* $p < .05$
** $p < .01$
*** $p < .001$

Table 3

Multiple linear regressions on RESE Despondency with standardized regression coefficient and p-value for each predictor. The first model includes all predictors with forced entry. Model 2 and Model 3 (final model) present the models when including the other predictors in a stepwise manner.

| | | RESE Despondency | | | | | | | | |
| | | Model 1 | | | Model 2 | | | Model 3 | | |
	n	β	p	95 % CI	β	p	95 % CI	β	p	95 % CI
Gender	101	−.04	.733	[−.37,.27]	−.05	.671	[−.37,.24]	−.06	.630	[−.37,.23]
Verbal IQ	96	.01	.946	[−.01,.02]	−.08	.527	[−.02,.01]	−.11	.348	[−.02,.01]
Temperament: negative affectivity	92	−.11	.343	[−.24,.08]	−.12	.319	[−.23,.08]	−.15	.191	[−.25,.05]
Temperament: effortful control	92	−.06	.651	[−.26,.16]	−.03	.816	[−.23,.18]	−.02	.861	[−.21,.18]
Emotion Labeling (expr.,4 years)	97				**.30**	.011	[.02,.14]	**.32**	.005	[.03,.14]
Maternal Non-Hostility	87							**.26**	.019	[.02,.26]
ΔR², p					**.08**	.011		**.07**	.019	
R², p		.02	.873		.10	.167		**.17**	.036	

Note. n indicates the shared sample size between each predictor and the dependent variable. Gender [0 = female; 1 = male]. Coefficients in bold, if p <.05.

Table 4

Multiple linear regressions on RESE Anger with standardized regression coefficient and p-value for each predictor. The first model includes all predictors with forced entry. Model 2 and Model 3 (final model) present the models when including the other predictors in a stepwise manner.

| | | RESE Anger | | | | | | | | |
| | | Model 1 | | | Model 2 | | | Model 3 | | |
	n	β	p	95 % CI	β	p	95 % CI	β	p	95 % CI
Gender	101	.14	.261	[−.17,.61]	.14	.261	[−.16,.59]	.14	.230	[−.14,.58]
Verbal IQ	96	−.01	.916	[−.02,.02]	−.04	.712	[−.02,.01]	−.07	.548	[−.02,.01]
Temperament: negative affectivity	92	−.07	.541	[−.26,.14]	−.11	.354	[−.28,.10]	−.06	.614	[−.24,.14]
Temperament: effortful control	92	.04	.772	[−.22,.29]	.04	.727	[−.20,.29]	.06	.636	[−.18,.30]
Maternal Non-Hostility	87				**.28**	.015	[.04,.33]	**.28**	.014	[.04,.32]
Goal maintenance	78							**.26**	.023	[.03,.32]
ΔR², p					**.08**	.015		**.06**	.023	
R², p		.03	.744		.10	.156		**.17**	.038	

Note. n indicates the shared sample size between each predictor and the dependent variable. Gender [0 = female; 1 = male]. Coefficients in bold, if p <.05.

labeling at 4 years and goal maintenance at 5 years.

For self-efficacy beliefs on expressing positive affect (POS, Table 6), global self-worth emerged as significant predictor. The more children overall like themselves as a person, the better they perceive themselves in expressing positive affect at 12 years. Beyond that, gender significantly contributed to the model, with girls scoring higher on POS than boys.

Given the high correlation and conceptual similarity of some predictors, we conducted additional exploratory regression analyses to assess the robustness of the findings. These analyses were computed with the following modifications of predictors: the mean across maternal sensitivity and structuring served as an aggregate score of positive parenting behavior; the mean across expressive emotion labeling at age 4 and 5 served as a measure of expressive emotion labeling; the mean across receptive emotion labeling at age 4 and 5 served as a measure of receptive emotion labeling. The pattern of results was unchanged for RESE POS and RESE ANG, with gender and global self-worth significantly predicting RESE POS and maternal non-hostility and goal maintenance predicting RESE ANG. For RESE DES and RESE NEG, expressive emotion labeling, now aggregated across the age of 4 and 5 years, was no longer a significant predictor. Besides of that, the pattern of results remained the same.

4. Discussion

Self-efficacy beliefs in emotion regulation play a pivotal role for human mental health and social functioning (Bandura, 1997). They have been shown to develop in adolescence (e.g., Bandura et al., 2003; Caprara et al., 2008; Valois et al., 2015) and to correlate with daily affective experiences, prosocial behavior, and psychological adjustment (Alessandri et al., 2022; Bassi et al., 2018; Mesurado et al., 2018). Yet, little is known about the developmental conditions that relate to the development of RESE. Understanding the factors that promote the development of RESE is an important endeavor for developmental research. The current study tested the impact of key social and cognitive factors in a longitudinal study ranging from early childhood to adolescence. Most central, maternal non-hostility, emotion knowledge, and goal maintenance predicted RESE regarding negative emotions (DES, ANG), while global self-worth predicted RESE regarding positive emotions. These findings support a distinct effect of social, cognitive, and self-related factors in childhood on adolescents' RESE, with the importance of each factor differing between RESE domains. Overall, our findings support the proposal that the different RESE domains, while overlapping, represent distinct capacities. The pattern of results is indicative of partly independent developmental trajectories and highlights the role of child-caregiver relationship quality, emotion

Table 5

Multiple linear regressions on RESE Negative Emotions (Anger and Despondency) with standardized regression coefficient and p-value for each predictor. The first model includes all predictors with forced entry. Model 2, Model 3, and Model 4 (final model) present the models when including the other predictors in a stepwise manner.

		RESE NEG (ANG & DESP)												
		Model 1			Model 2			Model 3			Model 4		
	n	*β*	*p*	*95 % CI*	*β*	*p*	*95 % CI*	*β*	*p*	*95 % CI*	*β*	*p*	*95 % CI*
Gender	101	.07	.577	[−.21,.37]	.07	.590	[−.20,.36]	.06	.625	[−.21,.34]	.06	.583	[−.19,.34]
Verbal IQ	96	−.00	.974	[−.01,.01]	−.04	.740	[−.02,.01]	−.11	.341	[−.02,.01]	−.14	.213	[−.02,.01]
Temperament: negat. affectivity	92	−.11	.350	[−.22,.08]	−.15	.191	[−.24,.05]	−.15	.169	[−.23,.04]	−.10	.346	[−.20,.07]
Temperament: effortful control	92	−.01	.952	[−.20,.19]	−.00	.995	[−.18,.18]	.02	.838	[−.16,.20]	.04	.729	[−.14,.20]
Maternal Non-Hostility	87				**.32**	.006	[.05,.26]	**.34**	.003	[.06,.27]	**.33**	.002	[.06,.26]
Emotion Labeling (expr., 4 y.)	97							**.26**	.026	[.01,.12]	**.27**	.015	[.01,.12]
Goal maintenance	78										**.27**	.015	[.03,.24]
ΔR^2, *p*					**.10**	.006		**.06**	.026		**.07**	.015	
R^2, *p*		.02	.824		.12	.096		**.18**	.025		**.25**	.005	

Note. n indicates the shared sample size between each predictor and the dependent variable. Gender [0 = female; 1 = male]. Coefficients in bold, if p <.05.

Table 6

Multiple linear regressions on RESE POS with standardized regression coefficient and p-value for each predictor. The first model includes all predictors with forced entry. Model 2 presents the final model when including the other predictors in a stepwise manner.

| | | RESE POS | | | | | |
| | | Model 1 | | | Model 2 | | |
	n	β	p	95 % CI	β	p	95 % CI
Gender	101	−.22	.069	[−.50,.02]	−.26	.030	[−.53, −.03]
Verbal IQ	96	.07	.556	[−.01,.02]	.09	.429	[−.01,.02]
Temperament: negative affectivity	92	−.01	.946	[−.14,.13]	−.00	.980	[−.13,.13]
Temperament: effortful control	92	.17	.174	[−.05,.29]	.18	.128	[−.04,.30]
Temperament: surgency	92	.11	.326	[−.08,.23]	.11	.336	[−.08,.22]
Global self-worth	97				**.27**	.018	[.04,.43]
ΔR^2, p					**.07**	.018	
R^2, p		.11	.122		**.18**	.026	

Note. n indicates the shared sample size between each predictor and the dependent variable. Gender [0 = female; 1 = male]. Coefficients in bold, if p <.05.

understanding, and self-regulation skills in the emergence of RESE.

Theoretically most interesting, maternal interaction quality at age 4 predicted RESE eight years later. This key finding relates theoretical assumptions that representations about the self originate in early caregiver-child interactions (Bowlby, 1973; Brummelman & Thomaes, 2017; Fonagy et al., 2002; Thompson, 2016) to the area of metarepresentational beliefs about own emotion regulation competencies. That is, our findings extend our knowledge on the impact of early caregiver-child interactions on human development by demonstrating its relation to regulatory emotional self-efficacy beliefs. While there are strong theoretical reasons to assume such a relation, empirical research had remained scarce and limited (Di Giunta et al., 2022; Pan et al., 2022). Our study goes beyond it in two ways: First, the current study examined parenting characteristics in a parent-child interaction rather than self-reported, thereby assessing parents' actual interaction quality. Self-report measures are limited because predictor and criterion stem from the same source and the interpretation of results remains ambiguous. That is, it is possible that adolescents with higher RESE interpret their parents' behavior more positively because higher regulatory emotional self-efficacy beliefs allow them to be more optimistic, even concerning difficult aspects in their relationship. Our assessment of actual parent-child interaction quality several years earlier makes a stronger point for a genuine impact of parenting on the development of RESE. Second, our study covered a long developmental period from early childhood to adolescence and provided evidence for a relation of early caregiver-child interactions with adolescents' regulatory emotional self-efficacy beliefs, that is, long before RESE emerges (Bandura et al., 2003).

Taking into account the multifaceted nature of caregiver interaction qualities (Biringen et al., 2014), the findings highlight the unique contribution of non-hostility on self-efficacy beliefs. The less hostile mothers interacted with their child at four years, the more self-efficacy adolescents perceived for regulating despondency and anger. Hostility ranges from covert hostility such as subtle signs of impatience or anger to overt forms such as pejorative or threating comments and behaviors. When a mother reacts hostile to a child's behavior or emotion expression, the child likely experiences him-/herself as inducing negative emotions in others. The disruptive behavior conveys having done something wrong and thus no feeling of competence. Rather, the negative emotionality of the mother might induce negative emotions in the child, which, without adequate support in regulating this negative emotion, lead to low regulatory emotional self-efficacy. A second reason for the long-term effect of non-hostility might be its greater stability compared to other interaction characteristics. Tentative support for this possibility comes from a study by Bornstein et al., 2010, showing a mean-level change in maternal sensitivity, structuring, and non-intrusiveness, but not non-hostility, across 15 months. Thus, continuity of non-hostility between childhood and adolescence could contribute to its particularly pronounced and long-term effects on later outcomes.

Interestingly, the predictive effect of maternal non-hostility was present for both facets of RESE NEG but not for RESE POS. Although the lack of an effect for RESE POS presents no strong evidence for its absence, this pattern of results suggests that early experiences in caregiver-child interactions play a specific role for self-efficacy about managing negative emotions. The predominant role for regulating negative emotions aligns with attachment theoretical considerations: Particularly in times of distress, the attachment system is supposed to be activated (Bowlby, 1973). Children rely on their caregiver's support when in need. Thus, caregiver interactions are most influential for handling negative emotions and for establishing an internal working model that includes representations of how the child him-/ herself deals with negative emotions (Thompson, 2016). In contrast, children require less support for expressing positive emotions. Self-efficacy about expressing positive emotions might thus rely less on experiences in caregiver-child interactions. Yet, we note that the zero-order correlations showed a negative relation between non-intrusiveness and RESE POS. This indicates that the more intrusive caregivers were in early childhood, the more self-efficacy in expressing positive emotions was reported. However, this link was not present in the final regression model when all other predictors were taken into account. This suggests that caregiver-child interaction does not account for a unique proportion of variance in self-efficacy regarding positive emotions relative to other factors.

Next to interaction qualities, cognitive and self-regulatory factors that are involved in emotion regulation emerged as predictors of adolescents' RESE. Expressive emotion labeling at 4 years predicted self-efficacy beliefs about the regulation of despondency and goal maintenance at 5 years predicted self-efficacy beliefs about anger regulation. First, the findings support theories on the role of emotion

knowledge for emotion regulation (Eisenberg et al., 2005; Izard et al., 2011). Being able to identify and label particular emotions is a prerequisite for reasoning about the nature and causes of emotions and for drawing on emotion-specific regulation competencies. Consequently, emotion knowledge benefits evaluations of own emotion regulation competencies, as supported by our data. This finding extends the importance of emotion knowledge as identified in previous studies (for review, see Trentacosta & Fine, 2010) to the domain of self-efficacy beliefs. Yet, one has to note that specifically emotion labeling at 4 years, not at 5 years and also no aggregate measure across 4 and 5 years, related to RESE. It remains for future research to corroborate whether particularly early individual differences in emotion knowledge shape the development leading to RESE. Second, in support of theories on the role of regulatory goals (Eldesouky & Gross, 2019; Mauss & Tamir, 2014), the findings suggest that goal maintenance supports self-efficacy beliefs about anger regulation. Regulating anger requires to uphold the regulatory goal while anger induces an arousing negative emotional state. Goal maintenance as one form of cognitive control in childhood seems to provide a basis for later judgments about own anger regulating competencies. Notably, the relations supporting the role of cognitive factors are attributable to early emotion labeling and regulatory competencies and not to cognitive functioning in general. We controlled for verbal intelligence in our analyses and results were not reducible to cognitive functioning.

Adolescents' RESE about expressing positive emotions was predicted by global self-worth at 8 years. When evaluating own competency in regulating emotions, general self-worth thus seems to be one source. By showing a predictive effect from self-worth in childhood, the current study extends previous research on self-esteem from 16 years on and later RESE (Caprara et al., 2013). This finding can be additionally viewed in light of the potential conceptual overlap between self-efficacy and self-concept (Bong & Skaalvik, 2003; Marsh et al., 2019). In comparison to the self-concept, 'pure' self-efficacy is theoretically conceptualized as not including an affective evaluative component and thus no judgment about meeting own standards of worthiness (Bandura, 1997; Marsh et al., 2019). Global self-worth, on the other hand, as part of the self-concept reflects an affective evaluation of the self (Harter, 2007). The current findings demonstrate that at least RESE POS builds on an evaluative stance towards oneself in childhood and is thus intertwined with earlier self-concept. To which degree self-efficacy in emotion regulation shares traditional self-efficacy or self-concept features remains interesting for future research.

The current study identified predictors of beliefs about own emotion regulation capacities. Yet, it remains an open question to what extent these relations are particularly attributable to these self-beliefs or to what extent they apply to actual efficacy in regulating emotions. As pointed out by Bandura (1997), self-efficacy beliefs can be derived from different sources of information, with mastery experiences being one of them. Predictors identified in this study could either impact children's emotion regulation, which in turn shape self-efficacy beliefs, or directly affect self-efficacy beliefs by allowing to reason about the self and to form beliefs about own capacities (Schneewind, 1995). Previous studies showed that self-efficacy about anger/sadness regulation was related to anger/sadness dysregulation (Di Giunta et al., 2022) and, more generally, to externalizing/internalizing symptoms (Caprara et al., 2008; Di Giunta et al., 2018). These findings suggest that the capacity to regulate emotions and self-efficacy beliefs about it are closely related. For the predictors of RESE identified in the current study, one could speculate that cognitive factors like goal maintenance and emotion knowledge might be most directly linked with actual regulatory competencies, while maternal interaction qualities and self-worth might additionally directly shape views about the self. It remains a promising avenue for future research to investigate the dynamics of the relations between early origins of RESE, actual emotion regulation capacities and self-efficacy beliefs about it.

Next to providing insights about the origins of RESE, the findings contribute to the question whether RESE comprises different domains, i.e., NEG and POS, and, within NEG, DES and ANG. In line with previous research that showed different developmental trajectories for POS and NEG during adolescence (Caprara et al., 2013) and different correlates (Caprara et al., 2008; Di Giunta et al., 2017), the results support the distinctiveness of RESE by identifying unique predictors of POS and NEG early in development. POS was predicted by global self-worth whereas NEG was predicted by cognitive and social factors. This pattern of distinct predictors corresponds with the conceptual difference between POS and NEG, which differ not only in the valence of the regulated emotion but also in the underlying process. POS implies the self-efficacy to allow oneself to feel and express (positive) emotions, while NEG implies the self-efficacy to down-regulate and not being overwhelmed by (negative) emotions. For RESE about negative emotions, maternal interaction quality emerged as a predictor of self-efficacy beliefs about both anger and despondency regulation. Additional cognitive predictors differed between the two dimensions of RESE NEG: While RESE despondency was predicted by emotion labeling, RESE anger was predicted by goal maintenance. The emotion-specific predictors support a distinction within RESE NEG and match with findings that the choice and effectiveness of emotion regulation strategies differ between the to-be-regulated emotions (Southward, Heiy, & Cheavens, 2019; Webb, Miles, & Sheeran, 2012) and context in general (Troy, Shallcross, & Mauss, 2013). The study thus suggests that self-efficacy in emotion regulation builds not on a single underlying process but on different processes for different emotions. Nevertheless, our measure of RESE NEG was restricted to two negative emotions – despondency and anger. Caprara et al. (2013) targeted also self-efficacy beliefs about regulating fear, shame/embarrassment, and guilt. It remains thus for future research to investigate whether self-efficacy beliefs about the regulation of other emotions have different developmental origins.

Notably, theorizing on the nature of RESE experiences a debate on whether or not RESE is indeed distinct from temperament (Alessandri et al., 2015; Di Giunta et al., 2017). It can be argued that RESE and temperamental characteristics share similarities because they both bear on emotion-related self-regulation. Our study informs this debate by showing that all effects on RESE emerged beyond temperament while no aspect of temperament significantly predicted RESE. The assessment of temperament and RESE in the current study was eight years apart, leaving room for potentially greater overlap of the two constructs at a single time point. Yet, given the modest stability of temperament across childhood reported in previous research (Kopala-Sibley et al., 2018; Neppl et al., 2010), the current study suggests that RESE is distinct from temperamental characteristics.

5. Limitations and conclusions

While this study provides first insights into the ontogenetic origins of RESE, it comes with limitations and considerations for future research. First, the current study focused on the early predictors of RESE in early and middle childhood while RESE was assessed once in adolescence. It would be interesting to follow the further development of RESE over a longer time period and to explore in greater details which factors predict developmental change in RESE across adolescence and which factors show reciprocal relations with RESE across development. Second, following previous literature, the current study examined maternal interaction characteristics (Laible et al., 2019; Paulus et al., 2018). Yet, current research highlights the role of other caregiving persons for children's self development, most notably the father (Grossmann et al., 2002), and it would thus be worthwhile to explore their role in children's emerging regulatory emotional self-efficacy beliefs. Likewise, considering an ecosystemic perspective, it remains an open question how experiences with other frequent interaction partners, such as peers and teachers, modulate the influence of early parent-child interaction experiences. Third, our measure of emotion knowledge focused on children's recognition of another child's emotion expression, as commonly used in developmental research (Trentacosta & Fine, 2010). Yet, RESE requires that children reason about their own emotional experiences. Previous research suggests that differentiation of own emotions positively relates to the recognition of others' emotions in adults (Israelashvili et al., 2019). In addition, reasoning about own emotions requires language, that is, emotion labels as assessed in the current study. Nevertheless, it would be interesting to examine in the future whether children's perception of their own emotions differently relates to RESE. Fourth, the selection of predictors was generally constrained by the existing dataset. Data analysis was thus limited to measures from specific ages at which the variables of interest were assessed. Notwithstanding this limitation, drawing on this longitudinal study allowed us to cover theory-driven predictors across almost a decade of development.

To conclude, the current study provides novel insights into the developmental origins of self-efficacy beliefs about regulating despondency, regulating anger, and expressing positive affect. It identifies distinct predictors across a period of eight years and underscores the impact of early parent-child interaction, cognitive competencies, and self-worth for the emergence of beliefs about own emotion regulation competencies. The study thereby makes a novel contribution to research on RESE by shedding light on where these beliefs originate from. Given the beneficial effects of RESE on adolescents' psychosocial well-being, these findings provide an intriguing starting point for measures to strengthen RESE across development.

Author note

Data, materials, and analytic code are available from the first author. The analyses presented here were not preregistered.

CRediT authorship contribution statement

Markus Paulus: Writing – review & editing, Supervision, Conceptualization. **Daniela Kloo:** Writing – review & editing, Data curation. **Laura Di Giunta:** Writing – review & editing, Methodology, Conceptualization. **Natalie Christner:** Writing – original draft, Investigation, Formal analysis, Conceptualization.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.cogdev.2024.101512.

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