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Exploring the mediating role of empathy in the relationship between emotion regulation and self-efficacy among adolescents

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ABSTRACT

Emotion regulation (ER), empathy, and self-efficacy are key components of adolescent development. While these constructs have often been examined separately, their associations have received limited attention, particularly in non-Western contexts. This study examines the relationships among two types of ER (i.e., cognitive reappraisal [CR] and expressive suppression [ES]), empathy, and self-efficacy within the socio-cultural context of Algerian adolescents. A cross-sectional study was conducted involving 459 adolescent students. Participants completed the Self-Efficacy Questionnaire for Children, the Basic Empathy Scale, and the Emotion Regulation Questionnaire for Children and Adolescents. Pearson correlation analyses indicated significant positive associations among CR, empathy, and self-efficacy. Moreover, ES was significantly associated with self-efficacy but not empathy. Mediation analysis indicated that empathy significantly mediated the relationship between CR and self-efficacy, while the direct effect of CR on self-efficacy remained significant. However, empathy was not a significant mediator in the association between ES

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and self-efficacy. Overall, the results highlight interconnected patterns among two types of ER, empathy, and self-efficacy during adolescence. This study contributes to a clearer understanding of how these psychological constructs relatewithin the specific socio-cultural context of Algerian adolescents and adds to the broader literature on adolescent psychological development.

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KEYWORDS Emotion regulation; empathy; self-efficacy; adolescents; mediation analysis

Introduction

Adolescence is a critical developmental stage marked by cognitive and emotional changes that shape behavior and decision-making (Blakemore & Mills, 2014; Dahl et al., 2018). Central to this stage is emotion regulation (ER), the process of managing and modifying emotional responses to support adaptive functioning across contexts (König, 2019; Pekrun, 2012), as conceptualized within Gross's Process Model of Emotion Regulation (Gross, 1998, 2015). Theoretical models integrating emotion and social cognition highlight that regulatory abilities influence how adolescents process social information, set goals, and select responses (Lemerise & Arsenio, 2000). One key mechanism in this process is empathy, the capacity to understand and share others' feelings. Adolescents with better ER are more likely to exhibit higher empathy, which can in turn enhance self-efficacy – the belief in one's ability to achieve goals through organized action (Bandura, 1997). Despite extensive research on ER and self-efficacy, few studies have explored whether empathy mediates this relationship, particularly among Algerian adolescents. This study aims to address that gap by investigating whether empathy serves as a mediator between ER and self-efficacy. It seeks to clarify the mechanism through which emotional competencies enhance adolescents' confidence and goal-directed behavior.

Emotion regulation in adolescence

ER refers to the diverse processes—both conscious and automatic—through which individuals influence the onset, intensity, duration, and expression of their emotional experiences. These processes enable individuals to modulate affective responses in accordance with personal goals, situational demands, and social norms. Within Gross's Process Model of Emotion Regulation, ER is conceptualized as a dynamic sequence of regulatory processes operating at different stages of the emotion-generative trajectory. By flexibly adapting emotional responses, effective ER supports psychological well-being, social functioning, and adaptive behavior across

various contexts (Gross, 1998, 2002, 2015; Gross & John, 2003; C. Liu et al., 2024; T.-Y. Liu et al., 2024). ER processes are crucial for maintaining emotional balance and supporting overall well-being (König, 2019; Pekrun, 2012; Phillips & Power, 2018). The process of ER during adolescence represents a significant developmental phase characterized by substantial changes and refinements. As adolescents are transitioning from childhood to adulthood, they encounter new challenges and stressors that necessitate the development of more sophisticated regulatory skills (Manouchehri, Aljaberi, et al., 2025; Young et al., 2019). Evidence suggests that adolescence is a critical period for the maturation of ER capacities, marked by normative improvements alongside pronounced interindividual variability (Silvers, 2022).

Within the process model of emotion regulation proposed by Gross (1998), ER is organized around two core components that operate at different points in the emotion-generative process. The model distinguishes between antecedent-focused regulation, which occurs before emotional responses are fully generated, and response-focused regulation, which occurs after emotional responses have been activated. Cognitive reappraisal (CR) and expressive suppression (ES) represent the two central components through which these regulatory processes are conceptualized in the model.

Recent systematic evidence confirms that Gross's Process Model remains the most widely adopted conceptual framework in ER research, with the majority of contemporary studies grounding their theoretical and methodological approaches in this model (Martínez-Priego et al., 2024). Despite the proliferation of ER measures, this review highlights the continued centrality of reappraisal and suppression as the two core regulatory components defined within the model. In line with this position, Petrova and Gross (2023) emphasize that recent developments in the field do not call for abandoning the process model, but rather for greater precision in how its core strategies are operationalized across contexts.

Neuroimaging studies indicate that adolescence is characterized by increased engagement of prefrontal regions during ER tasks, suggesting a heightened capacity for top-down control (Silvers, 2022). Notably, caregiving experiences and the parental socialization of emotions influence regulatory capacities throughout this developmental stage (Sabatier et al., 2017). Furthermore, positive parenting practices are correlated with improved ER outcomes in adolescents (Gupta & Gehlawat, 2020; Manouchehri, Aljaberi, et al., 2025), while negative parenting practices (for example, because of mental health problems or addiction problems of parents) are correlated with problems in ER and poor health in adolescents and young adults (Manouchehri, Aljaberi, et al., 2025; van Namen et al., 2023, 2025). In summary, adolescence constitutes a critical and dynamic phase for the

development of ER skills, which have enduring effects on mental health and overall well-being.

Self-efficacy in adolescence

Self-efficacy, as conceptualized by Bandura, refers to individuals' judgments of their capabilities to organize and execute the courses of action required to attain designated types of performances. These efficacy beliefs influence how people think, feel, motivate themselves, and behave, particularly in situations that involve difficulty, uncertainty, or stress (Bandura, 1997). Within social–cognitive theory, self-efficacy is not a generalized trait but a context-specific belief system that shapes goal setting, emotional reactions, and persistence in the face of obstacles (Bandura, 1977).

Building on this foundational perspective, more recent definitions emphasize the functional role of self-efficacy in guiding behavior across specific domains. Accordingly, self-efficacy is defined as the belief in one's ability to successfully accomplish tasks and achieve goals in particular situations (Miller & Kass, 2023; Sabah et al., 2023). Such beliefs exert a substantial influence on motivation, effort investment, and perseverance, especially when individuals encounter challenges or setbacks (Hao, 2024). Individuals with high self-efficacy tend to exhibit more confidence and resilience, whereas those with low self-efficacy may avoid challenges and give up more easily (Kennelly & Oke, 2024). Self-efficacy is shaped by personal experiences, observing others, social encouragement, and physical feedback (Miller & Kass, 2023). Within this framework, ER and empathy play pivotal roles in the formation of efficacy beliefs. Bandura (1997) identifies the management of physiological and affective states as a primary source of self-efficacy; thus, ER functions as an independent precursor that enhances efficacy by reducing stress and negative emotional arousal. Furthermore, empathy serves as a socio-cognitive mechanism that facilitates the processing of vicarious experiences and social feedback. As we will discuss in the 'Current Study' section, these theoretical connections form the basis of our investigation into how ER and empathy interact to predict adolescent development (Bandura, 1997). It is crucial for adolescent development, as research by Andretta and McKay (2020) indicates that adolescents with high academic, social, and emotional self-efficacy experience the best well-being outcomes. Kleppang et al. (2023) noted that mastery experiences significantly contribute to building self-efficacy, accounting for considerable variance. Tsang et al. (2012) also demonstrated how self-efficacy, influenced by personal successes and social feedback, affects behavior and development of youth. Taheri et al. (2023) found that socio-demographic factors, such as parental education and employment history, influence adolescents' self-efficacy

levels, indicating the need for targeted training based on these factors. Collectively, these studies highlight the essential role of self-efficacy in promoting well-being and development in adolescents.

Empathy in adolescence

Empathy refers to the capacity to recognize, understand, and share the emotional states of others, encompassing both cognitive components (e.g., perspective-taking) and affective components (e.g., emotional resonance) (Fan et al., 2011; Stern & Cassidy, 2018). As a core socio-emotional competence, empathy plays a central role in adolescents' social and emotional development (Robinson, 2008; Stern & Cassidy, 2018).

Empirical evidence indicates that empathy undergoes important developmental changes during adolescence. For instance, Overgaauw et al. (2017) found that higher levels of empathy are associated with greater attention to others' emotions, enhanced friendship quality, and decreased bullying among children and teenagers aged 10–15. Similarly, Gaspar and Esteves (2022) reported that empathy continues to increase from adolescence into adulthood and varies by gender, with girls generally exhibiting higher levels of empathy. Their findings also suggest that empathic abilities are closely linked to the capacity to decode emotional expressions, highlighting the cognitive – emotional processes underlying empathic responding. Recent meta-analytic evidence further indicates that ER is positively associated with empathic responding during childhood and adolescence, underscoring the close developmental and functional links between these two socio-emotional capacities (Yavuz et al., 2024). This association suggests that adolescents' ability to manage their emotional arousal may support their capacity to attend to and understand others' emotional states. In addition to its links with ER, empathy has been theoretically and empirically linked to self-efficacy within social–cognitive frameworks. In particular, Schurz (2018) demonstrated that empathy – especially the perspective-taking component – mediates the relationship between vicarious experiences and self-efficacy. From this perspective, empathic understanding may facilitate adolescents' ability to learn from others' experiences and translate social information into beliefs about their own capabilities. Taken together, these findings underscore empathy as a central socio-emotional capacity during adolescence, characterized by developmental variability and theoretically meaningful connections with ER processes and self-efficacy beliefs. As discussed in the following sections, this integrative perspective provides a coherent foundation for examining the mediating role of empathy in the relationship between ER and adolescents' self-efficacy.

Exploring the interplay of emotion regulation, self-efficacy, and empathy: a developmental and social–cognitive perspective

Grounded in developmental and social – cognitive theory, the present study conceptualizes empathy as a theoretically coherent mediator in the relationship between ER (which encompasses dimensions such as CR and ES) and self-efficacy among adolescents. Rather than drawing solely on prior empirical studies in which empathy has been positioned as a mediator across varied constructs, the proposed model is derived from well-established theoretical frameworks that elucidate the functional organization and developmental sequencing of emotional, cognitive, and motivational processes during adolescence (Bandura, 1997; Fredrickson, 2001; Lemerise & Arsenio, 2000; Ryan & Deci, 2000). From a developmental standpoint, core capacities for ER, including the nuanced development of strategies such as CR and ES, typically emerge earlier and form a regulatory foundation upon which more complex socio-cognitive abilities – such as perspective-taking and empathic understanding – progressively develop across adolescence (Crone & Dahl, 2012). In parallel, contemporary neurodevelopmental models depict adolescence as a period marked by heightened social–affective sensitivity and motivational adaptability, during which ER becomes increasingly attuned to social goals and interpersonal contexts (Crone & Dahl, 2012). Within this developmental context, effective ER is posited to facilitate adolescents' engagement with socially salient situations, thereby fostering empathic understanding. According to the Integrated Model of Emotion Processes and Social Information Processing, ER constitutes a core regulatory component of social functioning, influencing how individuals attend to, encode, and interpret social and emotional cues (Lemerise & Arsenio, 2000). Within this model, individual differences in emotionality and regulatory ability shape the processing of affective information and the evaluation of potential social responses. Adolescents who are more capable of managing emotional arousal are theorized to allocate greater cognitive resources to understanding others' emotional states and intentions, thereby facilitating empathic engagement (Lemerise & Arsenio, 2000). In this sense, empathy can be conceptually situated as a socio-cognitive outcome that is supported by effective ER (CR, ES, or both), rather than as a regulatory capacity that precedes it.

The cognitive pathway linking ER to empathic functioning can be further elucidated through Fredrickson's (2001) Broaden-and-Build Theory of positive emotions. Effective regulation of negative affect increases the likelihood of experiencing neutral or positive emotional states, which are theorized to broaden individuals' momentary scopes of attention, cognition, and action. This broadened cognitive – attentional field may enable adolescents to move beyond self-focused emotional processing and engage more readily in perspective-taking, a core

component of cognitive empathy (Decety & Jackson, 2006; Fredrickson, 2001). Through repeated social interactions, such broadened and other-oriented processing is thought to contribute to the gradual development of interpersonal and psychological resources. In this regard, CR is a more effective strategy than ES for fostering the development of empathic functioning in adolescents. That is, reappraising one's positive cognitions (i.e., CR) can broaden momentary scopes and further develop empathy, while suppressing one's expression (i.e., ES) might not. However, there is scarce evidence in the literature to examine the two types of ER separately with empathy.

From an amotivational standpoint, empathy may function as a facilitating mechanism through which ER contributes to the development of self-efficacy beliefs. Self-Determination Theory posits that social experiences satisfying the basic psychological need for relatedness create conditions that support the emergence of perceived competence (Ryan & Deci, 2000). Empathic engagement, by fostering emotional connection and social belonging, is therefore theorized to support adolescents' experiences of effectiveness within interpersonal contexts. Although the construct of competence within Self-Determination Theory is conceptually distinct from self-efficacy, it is closely aligned with Bandura's notion of perceived capability, providing a motivational bridge between empathic social functioning and efficacy-related beliefs.

Consistent with Social Cognitive Theory, self-efficacy beliefs are shaped primarily through mastery experiences, social persuasion, and affective states (Bandura, 1997). Empathic social interactions – made more likely by effective ER – may offer adolescents repeated opportunities for successful, low-risk social engagement. These experiences can be encoded as social mastery experiences, which Bandura identified as the most influential source of self-efficacy beliefs. Accordingly, empathy can be conceptualized as an approximate psychological mechanism through which regulatory capacities are translated into efficacy-related judgments in social contexts. Finally, this theoretically derived model is supported by convergent empirical evidence.

A substantial body of research has documented positive associations between ER and self-efficacy, with adaptive strategies such as CR linked to higher levels of general self-efficacy among adolescents (Lande et al., 2023). Similarly, effective ER has been associated with improved coping and stronger efficacy beliefs under stress (Ramos-Cejudo et al., 2024). Conversely, low confidence in regulatory abilities has been linked to maladaptive outcomes, including self-injurious thoughts and behaviors (Spitzen et al., 2022). Moreover, recent meta-analytic evidence has demonstrated a robust association between emotional self-efficacy and adaptive developmental outcomes (Alessandri et al., 2023).

The current study

Previous research has consistently demonstrated significant relationships between ER and self-efficacy, as well as between empathy and various positive developmental outcomes (e.g, (Lande et al., 2023; Overgaauw et al., 2017; Romero et al., 2024). These studies suggest that effective ER can enhance adolescents' confidence in their abilities, and that empathy plays a central role in social and emotional functioning. However, most existing research has been conducted outside the Algerian context, leaving unclear how these constructs interact among Algerian adolescents. In particular, the mediating role of empathy in linking ER to self-efficacy has not been systematically examined in this socio-cultural setting. Addressing this gap, the present study investigates whether empathy mediates the relationship between ER and self-efficacy among Algerian adolescents. Moreover, the present study proposes two specific ERs instead of a global ER to investigate mediation effects. In particular, CR and ES were treated as separate independent variables to examine the mediator role of empathy. By focusing on this mediation pathway, the study aims to provide culturally relevant insights into the mechanisms by which ER (i.e., CR and ES) contributes to adolescents' self-perceptions of competence, thereby informing both theory and potential interventions to promote adolescents' emotional and psychological well-being. We additionally hypothesized that empathy mediates the association between CR and self-efficacy but not the association between ES and self-efficacy.

Methods

Procedures

The research was conducted during the 2023–2024 academic year, from December 2023 to March 2024. Approval to carry out the study in educational environments was first obtained from Hassiba Ben Bouali University of Chlef on 26 November 2023, through the Laboratory of Research on Society and Local Development Issues in Algeria, with the research team identified by the code (I05L03UN020120200002). Subsequently, the Directorate of Education in Chlef granted permission to proceed with the study, particularly regarding students under 18. The research involved students only after obtaining consent from them, their parents, and school administrators. Psychologists at the participating schools played a crucial role in ensuring the research ran smoothly. The study was presented to adolescents during school hours, with support from institutional professionals and psychologists. After securing consent from parents and students, their answers to a self-

Table 1. Participant demographics ($N = 459$).

Variable	n	%
Sex		
Male	169	36.82
Female	290	63.18
Sibling Rank		
Oldest	168	36.60
Middle	206	44.88
Youngest	85	18.52
Parents' Marital Status		
Currently married and both alive	401	87.36
Divorced and both alive	44	9.59
One deceased (either currently married or divorced)	14	3.05
Number of Siblings		
1–3	207	45.10
4–6	237	51.63
7 or more	15	3.27

administered, paper-based questionnaire were collected. The researcher later entered these responses into SPSS software. The questionnaire consisted of three scales and took approximately 15 minutes to complete.

Participants

The study sample comprised 459 adolescent students from various educational institutions in Chlef, Algeria. Participation in the research was voluntary, and the survey was conducted in a controlled classroom environment by researchers utilizing paper questionnaires during regular school hours, thereby minimizing distractions and ensuring uniform conditions. The inclusion criteria specified that participants must be adolescent students from different schools in Chlef, Algeria, who were willing to participate in the study. Additionally, participants were required to have at least one living parent and one sibling. The criteria requiring participants to have at least one living parent and one sibling were applied to ensure greater sample homogeneity and to control for family-context variability, given the central role of parental and sibling interactions in the development of ER, empathy, and self-efficacy during adolescence. Exclusion criteria encompassed (a) students who opted not to participate; (b) those who had no siblings (i.e., only child); and (c) those who had lost both parents. Table 1 summarizes the demographic characteristics of the sample. These variables are reported for descriptive purposes only and were not included as predictors or control variables in the analyses. The characteristics include sex (majority female, 63.18%), age (14–18 years), sibling rank (middle siblings constituting the largest group, 44.88%), parental marital status (both parents alive for the majority of participants, 87.36%), and number of siblings (the most common category being 4–6 siblings, 51.63%).

Measures

The Self-Efficacy Questionnaire for Children (SEQ-C), developed by Muris (2001), assesses adolescents' self-efficacy across three domains: social self-efficacy (e.g., 'How well can you become friends with other children?'), academic self-efficacy (e.g., 'How well can you pay attention during every class?'), and emotional self-efficacy (e.g., 'How well can you prevent to become nervous?'). The original version consisted of 24 items; each rated on a 5-point Likert scale, ranging from 1 ('not at all') to 5 ('very well'). The SEQ-C exhibits robust psychometric properties, with factor analysis substantiating its three-factor structure. The internal consistency is notably high, as indicated by Cronbach's alpha coefficients of 0.88 for the total score (Muris, 2001). Furthermore, the validity of the SEQ-C is reinforced by significant negative correlations with measures of depression, particularly within the academic and emotional domains (Muris, 2001). For use in Arabic-speaking contexts, the SEQ-C was translated by Hammad and Awed (2023) following a forward–backward translation method and demonstrated satisfactory to high internal consistency, with Cronbach's alpha values exceeding .81 across all subscales (Hammad & Awed, 2023). Scores for the SEQ-C were calculated as sum scores (i.e., by totaling the raw item scores) for each subscale and the total scale, consistent with the original validation study (Muris, 2001). The possible score ranges were 8–40 for each of the three subscales (social, academic, and emotional self-efficacy) and 24–120 for the total self-efficacy score. No missing data were encountered due to the supervised, in-class administration of the questionnaires. In the present study, Cronbach's alpha was 0.87.

The Basic Empathy Scale (Dallagi-Belkilani et al., 2024), developed by Jolliffe and Farrington (2006), assesses both affective and cognitive empathy in adolescents. The scale consists of 20 items that are categorized into two dimensions: affective empathy (sample item: '*My friend's emotions don't affect me much*') and cognitive empathy (sample item: '*I find it hard to know when my friends are frightened*'). Responses are measured using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Scores for the BES were calculated as sum scores (i.e., by totaling the raw item scores) for each subscale and the total scale, consistent with the original validation study (Jolliffe & Farrington, 2006). The possible score ranges were 11–55 for affective empathy, 9–45 for cognitive empathy, and 20–100 for the total empathy score. No missing data were encountered due to the supervised, in-class administration of the questionnaires. The BES has exhibited robust psychometric properties, including a two-factor structure validated through confirmatory factor analysis (Jolliffe & Farrington, 2006). Furthermore, the scale demonstrates positive correlations with related constructs, such as agreeableness and parental supervision, indicating strong concurrent validity (Jolliffe & Farrington, 2006). The scale's reliability is evidenced by

Cronbach's alpha coefficients of 0.87 for affective empathy and 0.79 for cognitive empathy, which reflect good internal consistency (Jolliffe & Farrington, 2006). The scale was translated into Arabic by Dallagi-Belkilani et al. (2024) using a forward – backward translation procedure involving bilingual experts. The Arabic version of BES showed good internal consistency, with Cronbach's alpha values of 0.76 for affective empathy and 0.72 for cognitive empathy (Dallagi-Belkilani et al., 2024). In the present study, Cronbach's alpha was 0.77.

The Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA) is a modified version of the Emotion Regulation Questionnaire, originally developed by Gross and John (2003) for adults. In 2012, Gullone and Taffe adapted this instrument for use with children and adolescents aged 10 to 18 years. The ERQ – CA assesses two primary ER strategies. First, CR, the ability to change the way one thinks about potentially emotion-eliciting situations in order to alter their emotional impact (6 items; total possible score 6–30. Sample item: '*When I want to feel happier, I think about something different*'). Second, ES, the inhibition of ongoing emotional expressive behaviour (4 items; total possible score 4–20. Sample item: '*I keep my feelings to myself*'). Items are rated on a 5-point Likert scale ranging from 1 ('strongly disagree') to 5 ('strongly agree'), with higher scores indicating greater use of the respective strategy. The ERQ-CA has demonstrated robust psychometric properties, with internal consistency reliability (Cronbach's alpha) values of $\alpha = 0.79$ for the Reappraisal subscale and $\alpha = 0.73$ for the Suppression subscale, as reported by Gullone and Taffe (2012). Furthermore, the measure exhibited stability over 12 months. Construct validity was affirmed through confirmatory factor analysis, while convergent validity was established through correlations with personality measures and depression scales (Gullone & Taffe, 2012). The ERQ-CA was translated into Arabic by El Keshky (2018) using a forward–backward translation procedure, and the Arabic version demonstrated high internal consistency, with Cronbach's alpha values ranging from 0.75 to 0.79 (El Keshky, 2018). In the present study, the Cronbach's alpha value was 0.74 for the Reappraisal subscale and $\alpha = 0.60$ for the Suppression subscale.

Data analysis

The present analysis employed SPSS version 26 to compute descriptive statistics and conduct correlation analyses, while R software with the lavaan package was used to conduct mediation analysis in structural equation modeling. Descriptive statistics, encompassing means, standard deviations, skewness, and kurtosis, were calculated to evaluate the distributions of CR, ES, empathy, and self-efficacy. Skewness indicates the asymmetry of the data distribution, whereas kurtosis reflects the 'tailedness' of the distribution. Skewness values ranging from -1 to $+1$ are deemed excellent, and kurtosis

values should ideally fall within the interval of – 2 to +2, thereby providing a succinct overview of the distribution and characteristics of the variables (Sabah et al., 2024; Sabah, Hammadi, et al., 2025).

A mediation model was constructed using SEM with self-efficacy as the dependent variable, empathy as the mediator, and CR and ES as two separate independent variables. All main study variables were specified as latent constructs, except for CR and ES. Specifically, self-efficacy was modeled as a latent variable indicated by the social, academic, and emotional self-efficacy subscales of the SEQ-C. Empathy was modeled as a latent variable indicated by the cognitive and affective empathy subscales of the BES. CR and ES were directly derived from the CR and ES subscales of the ERQ-CA. In this measurement model, the subscales served exclusively as observed indicators loading onto their respective latent constructs; no observed composite, summed, or averaged scores were created or analyzed. Thus, the use of different subscales reflects a measurement-model approach in which latent constructs are defined by multiple theoretically meaningful indicators, in accordance with standard SEM practices, rather than the creation of total or composite observed scores. This approach allows each dimension to retain its distinct contribution while capturing shared variance at the latent level. Several fit indices were used to evaluate the mediation model: comparative fit index (CFI) >0.90, Tucker-Lewis index (TLI) >0.90, root mean square error of approximation (RMSEA) <0.08, and standardised root mean square residual (SRMR) <0.08 (Aljaberi et al., 2022; Byrne, 2013; Kline, 2023). Moreover, the proposed mediation model included direct (d: CR with self-efficacy after including empathy in the model; and e: ES with self-efficacy after including empathy in the model), indirect (ac: mediated effect of empathy in the association between CR and self-efficacy; be: mediated effect of empathy in the association between ES and self-efficacy), and total effects (for CR: direct effect d plus indirect effect ac; for ES: direct effect e plus indirect effect be) (Hayes, 2017; MacKinnon, 2012; Sabah, Aljaberi, Martin, et al., 2025).

Consistent with contemporary mediation analysis practices, the significance of the indirect effect was assessed using a non-parametric bootstrapping method with 1,000 resamples, which generates robust confidence intervals (Gaspar & Esteves, 2022) without assuming normality of the sampling distribution of the indirect effect (Hayes, 2017). This approach is preferred over traditional methods, such as the Sobel test, due to its higher statistical power and accuracy in estimating mediation effects (Hayes, 2017; MacKinnon, 2012). This procedure was applied to the structural paths between latent variables, further supporting the interpretation of mediation effects without relying solely on composite observed scores. The analysis also allowed for an evaluation of whether empathy partially or fully mediates the relationship between two types of ER (i.e., CR and ES) and self-efficacy,

providing reliable and interpretable insights into the underlying mechanisms (Sabah, Aljaberi, El-Mir, et al., 2025).

Results

Initial variables analysis

Table 2 presents the descriptive statistics for CR, ES, empathy, and self-efficacy. Skewness and kurtosis values indicate that ER, empathy, and self-efficacy were normally distributed or close to normal. Moderate positive correlation was found between CR and empathy ($r = 0.26$, $p < 0.01$), as well as between CR and self-efficacy ($r = 0.35$, $p < 0.01$). In addition, a positive correlation was found between empathy and self-efficacy ($r = 0.27$, $p < 0.01$). ES showed a positive correlation with CR ($r = 0.36$, $p < 0.01$) and self-efficacy ($r = 0.23$, $p < 0.01$), while no significant correlation was observed between ES and empathy ($r = -0.007$, $p > 0.05$).

Empathy as a mediator in the relationship between emotion regulation and self-efficacy among adolescents

The SEM fit indices were satisfactory (CFI = 0.96, TLI = 0.93, RMSEA = 0.06, and SRMR = 0.05), indicating the good fit between the data and our proposed mediation model (Figure 1). Based on the satisfactory fit, results of mediation analysis (Table 3; Figure 1) are scrutinized. In particular, the direct effect of CR on self-efficacy ($\beta = 0.24$, $p < 0.001$) and that of ES on self-efficacy ($\beta = 0.17$, $p = 0.001$) were statistically significant. Moreover, the indirect effect of CR on self-efficacy through empathy was also significant though relatively weak ($\beta = 0.12$, $p = 0.01$). However, the indirect effect of ES on self-efficacy through empathy was not significant ($\beta = -0.01$, $p = 0.29$), considering that ES was neither significantly associated with empathy ($p = 0.24$). Both total standardised effects were significant, and the total effect of CR on self-efficacy ($\beta = 0.36$, $p < 0.001$) was larger than that of ES on self-efficacy ($\beta = 0.16$, $p = 0.001$). These results indicate that empathy partially mediates the relationship between CR and self-efficacy, but not

Table 2. Mean, SD, and correlation between study variables.

	Mean	SD	Skewness	Kurtosis	Correlation			
					CR	ES	Empathy	SE
CR	20.95	4.63	−0.65	0.61	—	—	—	—
ES	13.33	3.36	−0.45	0.09	0.36**	—	—	—
Empathy	60.09	10.94	−0.40	2.15	0.26**	−0.007	—	—
SE	74.19	14.86	−0.10	0.58	0.35**	0.23**	0.27**	—

Note: CR = cognitive reappraisal in emotion regulation; ES = expressive suppression in emotion regulation; SE = self-efficacy; *$p < 0.01$.

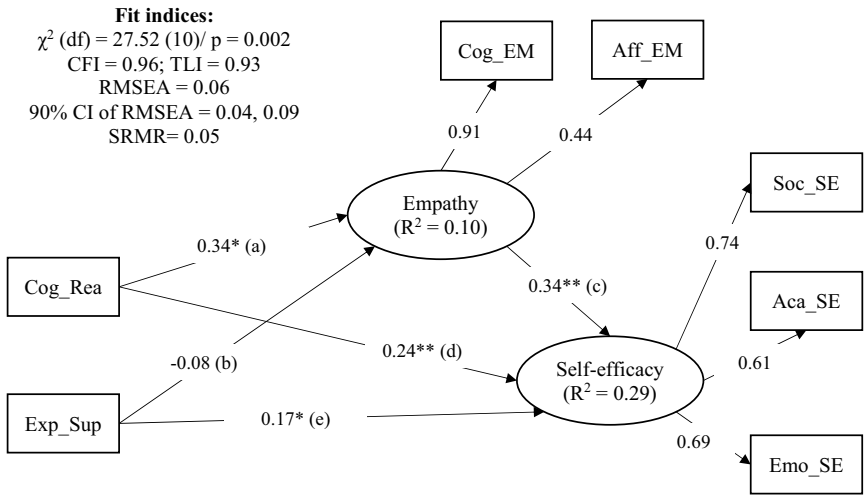

Figure 1. Path plot with standardised coefficients and fit indices. *Note*: Cog_Rea = cognitive reappraisal in emotion regulation; Exp_Sup = expressive suppression in emotion regulation; Cog_EM = cognitive empathy; Aff_EM = affective empathy; Soc_SE = social self-efficacy; Aca_SE = academic self-efficacy; Emo_SE = emotional self-efficacy; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardised root mean square residual; CI = confidence interval. *$p < 0.01$; **$p < 0.001$.

Table 3. Results of the proposed mediation model in direct, indirect, and total effects.

Effect Type	Pathway	β	SE	Boot CI	Boot p
Direct Effects	CR → Self-Efficacy (d)	0.24	0.07	0.12, 0.37	<0.001
	CR → Empathy (a)	0.31	0.10	0.15, 0.54	0.001
	ES → Self-Efficacy (e)	0.17	0.05	0.07, 0.28	0.001
	ES → Empathy (b)	−0.08	0.07	−0.21, 0.05	0.24
	Empathy → Self-Efficacy (c)	0.34	0.08	0.18, 0.50	<0.001
Indirect Effects	CR → Empathy → Self-Efficacy (ac)	0.12	0.05	0.03, 0.20	0.01
	ES → Empathy → Self-Efficacy (be)	−0.01	0.01	−0.04, 0.01	0.29
Total Effects	CR → Self-Efficacy (d+ac)	0.36	0.05	0.25, 0.47	<0.001
	ES → Self-Efficacy (e+be)	0.16	0.05	0.06, 0.25	0.001

Note: CR = cognitive reappraisal in emotion regulation; ES = expressive suppression in emotion regulation; β = standardised coefficient; SE = standard error; Boot CI = 95% confidence interval of standardised coefficients using bootstrapping method; Boot *p* = p-value derived from bootstrapping method.

the relationship between ES and self-efficacy. Moreover, although the indirect path from CR to self-efficacy was statistically significant, its magnitude is modest compared with the direct effect, highlighting that ER associates with self-efficacy primarily directly, with a small contribution via empathy. In summary, the mediation effect of empathy in the relationship between CR and self-efficacy was small and partial; moreover, there was no mediation effect of empathy in the relationship between ES and self-efficacy.

Discussion

This study examined the mediating role of empathy in the relationship between two types of ER (i.e., CR and ES) and self-efficacy among Algerian adolescents. The findings revealed positive correlations among CR, empathy, and self-efficacy, indicating that adolescents with enhanced CR exhibit stronger empathetic tendencies and higher self-efficacy. This observation is consistent with prior research suggesting a positive association between effective ER and self-efficacy (Lande et al., 2023) as well as increased empathy (Overgaauw et al., 2017). Mediation analyses further demonstrated that empathy partially mediates the relationship between CR and self-efficacy, whereas no such mediation was observed for ES, which showed a direct – but not indirect – association with self-efficacy.

From a theoretical perspective, the partial mediating role of empathy in the CR–self-efficacy relationship can be explained by the functional characteristics of CR as an antecedent-focused strategy. By reframing the emotional meaning of situations, CR preserves cognitive resources necessary for emotional clarity and reflective processing (Gross, 1998, 2002, 2015; Gross & John, 2003). This regulatory pattern facilitates social responsiveness and the maintenance of close interpersonal relationships, thereby creating favorable conditions for empathic engagement (Butler et al., 2003). Empathy, in turn, contributes to self-efficacy by enhancing social competence, increasing the likelihood of successful interpersonal interactions, and reinforcing positive social feedback. Simultaneously, the remaining direct effect of CR on self-efficacy suggests that effective emotional mastery through reappraisal independently strengthens adolescents' sense of competence, contributing to more stable self-evaluations and self-esteem (Warnholtz et al., 2025). Together, these findings indicate that CR promotes robust self-efficacy through both intrapersonal regulatory success and authentic interpersonal engagement.

In contrast, the absence of an empathic mediating pathway for ES underscores that the mechanisms linking ER to self-efficacy are not uniform across strategies. ES, as a response-focused strategy, involves the inhibition of outward emotional expression after emotional responses have been generated, a process that consumes cognitive resources and disrupts reciprocal emotional signalling essential for empathy (Gross, 1998, 2002, 2015; Gross & John, 2003). Experimental evidence shows that ES reduces interpersonal rapport and increases interactional stress, thereby constraining the development of empathic bonds (Butler et al., 2003). Although ES may yield a short-term, perception-based sense of control by enabling adolescents to conceal emotional expressions, this form of efficacy appears fragile and unstable, as reflected in lower and more variable self-esteem (Warnholtz et al., 2025).

Consequently, ES seems to foster a superficial sense of self-efficacy that is disconnected from genuine emotional exchange and social understanding, failing to activate empathic processes that support enduring and socially grounded self-efficacy (Lonigro et al., 2023).

Our results align with the broader literature emphasizing the significance of ER during adolescence, a developmental stage characterized by new challenges that necessitate advanced regulatory skills (Young et al., 2019). Consistent with earlier findings, a recent meta-analysis by Alessandri et al. (2023) demonstrated a strong correlation between emotional self-efficacy and various positive adjustment outcomes. Furthermore, our research corroborated the positive relationship between ER and self-efficacy, indicating that effective ER is often associated with increased self-efficacy. Adolescents who adeptly manage their emotions tend to exhibit greater confidence in navigating diverse challenges. Additionally, those proficient in ER are more likely to believe in their capacity to surmount difficulties (Doménech et al., 2024). This positive correlation underscores the critical role of ER in shaping self-efficacy.

Cultural factors shape individuals' ER and self-efficacy. In collectivist cultures such as Algeria, the emphasis on interdependence may enhance individuals' skills in managing and recognizing emotions. Regulating emotions in such contexts is vital for maintaining social harmony and fostering effective interpersonal relationships. This cultural backdrop strengthens the association between ER and self-efficacy, as Algerian adolescents are likely to develop stronger ER skills in response to societal expectations of emotional sensitivity and collaboration. While previous studies have consistently identified a positive relationship between ER and self-efficacy, this relationship may hold particular relevance in Algeria. The cultural focus on interdependence and social connectedness may further amplify the correlation between ER and self-efficacy among Algerian adolescents, leading them to perceive themselves as more capable in their emotional competencies and reinforcing this connection.

The partial mediating role of empathy suggests that it facilitates but does not fully explain the association between CR and self-efficacy. This pattern indicates that CR contributes to self-efficacy through multiple pathways, operating both directly and indirectly via empathic processes. In line with meta-analytic evidence emphasizing the central role of self-efficacy in adaptive psychological functioning (Alessandri et al., 2023), the present findings suggest that CR is directly associated with higher levels of global self-efficacy, while empathy further strengthens this association by supporting social understanding and interpersonal functioning. Within this framework, empathy can be conceptualized as a complementary interpersonal mechanism that amplifies – but does not replace – the direct contribution of cognitive reappraisal to adolescents' global self-efficacy.

Empathy may be particularly influential in shaping adolescents' self-efficacy within collectivistic cultures, such as Algeria, where social harmony and connectedness are prioritized. Nevertheless, ER remains an independent factor explaining self-efficacy, as individuals who effectively self-regulate develop resilience and a sense of personal competence, both of which are essential for fostering self-efficacy, even within collectivistic contexts.

Implications

The present study enhances the understanding of adolescent development in Algeria and other culturally analogous countries. Several implications emerge from the findings. First, the results underscore the critical role of ER (especially CR), indicating that ER competencies are integral to empathy and self-efficacy among Algerian adolescents. This highlights the importance of implementing educational and psychosocial programs that explicitly target ER skills within school and community settings. Second, the identification of empathy as a mediating mechanism in the relationship between CR and self-efficacy suggests that interventions aimed at adolescent development may be more effective when they adopt an integrative approach, simultaneously fostering CR and empathy-related capacities. These findings offer relevant insights for educational and mental health policies in Algeria, as they point to modifiable psychological processes that can be strengthened to support adolescents' adaptive functioning and personal development. Finally, the study provides a foundation for the design of culturally sensitive interventions that are responsive to the specific psychological developmental needs of adolescents in the Algerian context.

Limitations

Notwithstanding the valuable contributions of this study, several limitations should be acknowledged. First, the cross-sectional design precludes definitive causal interpretations, and future longitudinal studies are needed to examine the directionality of relationships among ER, empathy, and self-efficacy. Second, the exclusive reliance on self-report measures from a single informant within a school context may introduce potential biases, including social desirability and shared method variance. Future research would benefit from employing multiple informants and diverse assessment methods, such as behavioral observations and reports from teachers or peers, to provide a more comprehensive understanding of adolescents' psychological functioning. Finally, the study was conducted with adolescents from the Chlef region of Algeria, which may limit the generalizability of the findings to other regions in Algeria or to North African contexts more broadly.

Conclusion

The current research offers valuable insights into the interplay between ER (including CR and ES), empathy, and self-efficacy among adolescents in Algeria. The results indicate a positive correlation between CR and empathy, as well as between empathy and self-efficacy, with empathy serving as a partial mediator in this relationship. However, ES was associated only with self-efficacy, not with empathy, and empathy was not a significant mediator of the association between ES and self-efficacy. These findings enhance our understanding of psychological development during adolescence in Algeria and underscore the significance of these constructs for fostering positive youth development.

Translating these findings into practical interventions and assessing their effectiveness in real-world contexts necessitates additional research. Furthermore, the development and evaluation of ER (especially CR) and empathy-building programs in Algerian educational institutions are expected to be significantly associated with adolescents' self-efficacy and psychological well-being. Consequently, this study establishes a basis for comprehensively exploring adolescent psychological development within the Algerian context. Ongoing research into these relationships and their practical implications will contribute to creating supportive environments that foster the healthy development of youth in Algeria, equipping them with the psychological tools necessary to navigate life's challenges from adolescence into adulthood.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

The dataset will be available from the corresponding author upon reasonable request.

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