



## Parental emotional availability as a mediator in family relationships and adolescent emotion regulation

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### ABSTRACT

This cross-sectional study examined the relationship between family relationships and emotional regulation among adolescents, as well as explored the role of parental emotional availability as a mediating variable, using the Brief Family Relationship Scale (BFRS), the Questionnaire of Emotion Regulation for Children and Adolescents (ERQ-CA), and the Lum Emotional Availability among Parents. Participants were 421 Algerian adolescents ( $M = 12.36$  years) in middle school. Data were analyzed using mediation analysis in JASP software version 0.18. The findings suggested that mothers' emotional availability significantly mediated the relationship, whereas fathers' emotional availability did not. The mediation of mothers' emotional availability is partial, whereas fathers' emotional availability does not mediate the relationship between family relationships and adolescent emotion regulation. The findings suggest that a more comprehensive understanding of the differences between mothers' and fathers' emotional availability is needed for future studies.

### 1. Introduction

The family holds a significant position as one of the primary life contexts influencing children's healthy development. Within this family context, interactions and relationships, particularly the parent-child relationship, play a crucial role in a child's development (Frosch et al., 2021; Repetti et al., 2015). A child's development is intricately entwined within a complex network of relationships, with the child's relationships with family members standing out as highly impactful. Within the familial structure, the relationships within the marital, parental, and sibling subsystems hold significant implications for the emotional development of young children. These interactions, rooted in family systems theory, constitute discrete subsystems within the larger family structure, comprising numerous family members. Each family member's

characteristics can affect the functioning of these subsystems, creating reciprocal relationships in which changes in one can affect the others (Leerkes & Bailes, 2019; Manouchehri, Aljaberi, Lin, Sabah, Lin, et al., 2025).

The acknowledgment of the crucial significance of early high-quality family-child relationships has prompted a shift in focus toward identifying the relational determinants that influence child development outcomes (Frosch et al., 2021). Marital relations and parent-child ties have been found to be key factors positively influencing the mental health of children and adolescents (Li et al., 2020; Manouchehri, Aljaberi, Lin, Sabah, Ali, et al., 2025). Furthermore, research has demonstrated bivariate correlations among marital relationships, parenting approaches, and the quality of sibling relationships (Yu & Gamble, 2008). Additionally, certain characteristics of couples, such as marital

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satisfaction and parental pressure, have been found to significantly contribute to explaining variability in their children's psychological adjustment (García et al., 2006).

Families have a crucial impact on shaping and maintaining children's emotions. They serve as the backdrop for emotional experiences, providing primary socialization and emotional support. Within the family context, emotions are intertwined with social relationships (Erickson & Cottingham, 2014). Emotion regulation develops within the family setting, where intricate social interactions and familial connections profoundly affect how children express their emotions and their capacity to manage them. The development of emotion-regulation skills occurs within the child's social environment, and family dynamics influence the child's growing proficiency in emotion regulation in various ways. Furthermore, a supportive family environment plays a crucial role in enhancing individual adjustment, encompassing both internalizing and externalizing behaviors and social competence. It also promotes the acquisition of effective emotion regulation skills, ultimately empowering children to establish friendships and cultivate positive social interactions (Kovacs, 2023; Zhang et al., 2021).

### 1.1. Family relationships and emotion regulation

Emotion regulation (ER), a complex multidimensional process, involves conscious and unconscious management of emotions to achieve desired goals. It evolves throughout life, significantly impacting personal and social well-being. Particularly crucial during adolescence, ER shapes emotional experiences in learning environments, fostering positive emotions while mitigating negative ones. It is influenced by neurobiological growth, individual temperament, and social factors such as parental guidance, and it encompasses various strategies to recognize, evaluate, and modify emotional reactions, emphasizing the quality and timing of emotional experiences for optimal functioning and well-being (Kok, 2020; König, 2020; Pekrun, 2012; Phillips & Power, 2018; Stifter & Augustine, 2019).

Morris et al. (2007) explore how the family context shapes the development of children's ER. They highlight three primary mechanisms through which the family impacts ER: observational learning, specific parenting approaches, and the overall emotional atmosphere within the family. Parental attributes, such as ER and mental well-being, shape their interactions with their children. Child-specific characteristics, such as reactivity and developmental stage, further influence the family's role in ER. The authors propose that the family's impact on ER ultimately affects children's overall adjustment.

Many studies highlight the role of families in shaping and preserving children's emotions. When parents demonstrated positive emotions, engaged in physical affection, or participated in leisure activities with their children, children were more likely to display positive emotional expressions (Bai et al., 2016). Moreover, a child's negative emotionality and ER have been connected to the way parents respond to their children's positive and negative emotions (Shewark & Blandon, 2015). Additionally, children's ability to manage negative emotions and their self-regulation skills have been linked to parents' attitudes toward emotion (Meyer et al., 2014). Children's perceptions and assessments of parent-child conflicts are influenced by the home's emotional climate, which can lead to maladaptation (Fosco & Grych, 2007). Emotions and the strategies individuals employ to regulate them are integral components influencing family functioning (Duca et al., 2023).

Additionally, family functioning and ER are positively correlated, particularly among adolescents (Shafiq et al., 2023). Children's ability to regulate their emotions and develop protective mechanisms is significantly predicted by their early familial relationships. Functional family relationships tend to foster effective ER, whereas dysfunctional relationships may lead to an increased reliance on defense mechanisms as coping strategies (Lindblom et al., 2016). Moreover, family factors exert a considerable influence on children's ER, alongside the central importance of parental relationships (Chen et al., 2022). Certain factors stand

out as important indicators of children's ER abilities, such as a healthy family climate and maternal affection and sensitivity. Conflicts between parents indirectly affect children's ER as well (Fosco & Grych, 2013). Personality development and ER are also influenced by family connections (Yu et al., 2021). This comprehensive research emphasizes the crucial role of family relationships in shaping individuals' capacity to regulate their emotions effectively.

### 1.2. Emotional availability of parents as a mediator

Emotional availability (EA) in parents is a comprehensive concept that characterizes the quality of interactions between parents and children. It includes parental aspects such as nonhostility, structuring, sensitivity, and nonintrusiveness, as well as child-related dimensions concerning responsiveness and involvement. EA reflects the emotional connection marked by support, sensitivity, warmth, and closeness between parents and children. This relational concept emphasizes mutual accessibility and the capacity to comprehend and respond appropriately to each other's communicative signals, incorporating elements from attachment theory, the theory of emotions, and the construct of maternal sensitivity (Bentenuto et al., 2020; Biringen, 2000; Criscuolo et al., 2023).

Similarly, research underscores the crucial role of fathers in children's development, particularly the importance of their EA (Bergmann & Klein, 2020). However, compared with mothers, fathers generally exhibit lower EA in sensitivity and structuring (Bergmann et al., 2012). Various factors, including job-related stress, coping abilities, child-focused beliefs, and marital harmony, significantly affect fathers' EA (Goldberg et al., 2002). Moreover, fathers' EA can be influenced by the gender of their children, with fathers displaying higher sensitivity and lower intrusiveness, especially toward their eldest child (Haller-Haaboorn et al., 2014). Additionally, well-educated fathers with partners who maintain supportive relationships with their children tend to provide greater support and less intrusiveness (Cabrerá et al., 2007).

Moreover, the presence of fathers has been associated with enhanced cognitive development and increased perceived competence among children (Dubowitz et al., 2001). Similarly, research consistently underscores the substantial impact of a mothers' EA on her child's development. Research has shown that experiencing increased stressors is associated with a decline in mothers' EA but not with fathers' EA (Dungan et al., 2023). Mothers' EA, which includes sensitivity and non-intrusiveness, has been associated with the children's attachment behavior, behavioral problems, and depressive symptoms of children during middle childhood (Easterbrooks et al., 2012). Additionally, the importance of maternal mind-mindedness, which involves understanding and responding to a child's mental states, has been emphasized as a means of promoting EA (Lok & McMahon, 2006).

Parents' EA can serve as a mediator in various aspects of child development. For instance, research indicates that maternal EA observed at 12 months mediates the relationship between earlier maternal EA and the child's compliance at 16 months (Volling et al., 2002). EA has also been described as the "connective tissue" in parent-child relationships, with an emphasis on its function in emotional interactions during childhood (Easterbrooks & Biringen, 2009). Furthermore, parental EA predicts self-esteem and interpersonal competence (Yücel & Tuzcuoğlu, 2021).

### 1.3. Present study

In Algeria, rapid social, economic, and political changes are reshaping family dynamics, significantly affecting adolescents (Sabah, Aljaberi, Hajji, et al., 2023; Sabah, Aljaberi, Lee, et al., 2023; Sabah et al., 2024). Algeria has a notably young population structure. As of 2023, the total population was approximately 46 million, of which children aged 0–17 years represented 35.4% (approximately 16 million), and adolescents aged 10–19 years constituted 17% of the

population (East & North Africa Regional, 2024). Despite high primary school completion rates (95%), secondary education shows a marked decline, with lower secondary completion at 69% and upper secondary at only 46%. A significant gender gap exists, with males showing considerably lower completion rates (93% primary, 60% lower secondary, 35% upper secondary) compared to females. Furthermore, 23% of upper secondary students are out of school, with males disproportionately affected (27% vs. 18% among females) (East & North Africa Regional, 2024). This notably young and educationally vulnerable population makes adolescent mental health a pressing public concern, particularly given the limited resources available to address it. With regard to mental health, Algeria faces critical resource limitations: the country has only 67 child and adolescent psychiatrists (0.42 per 100,000 population), no stand-alone policy for child or adolescent mental health, and only two outpatient mental health facilities specifically for children and adolescents (World Health, 2022). The disability-adjusted life years attributed to mental disorders stand at 1861.0 per 100,000 population, reflecting a substantial burden (World Health, 2022). Moreover, 84% of children aged 1–14 years are exposed to violent forms of discipline at home (East & North Africa Regional, 2024), a factor widely associated with emotional and behavioral difficulties in adolescence (Sabah et al., 2026). These mental health challenges do not occur in isolation; they are deeply embedded within the broader context of shifting family structures that characterize contemporary Algerian society.

Algerian family structures are undergoing a significant transformation, moving from traditional extended family models toward more modern nuclear and single-parent configurations. Historically, Algerian households have been predominantly patriarchal, with the father or grandfather holding positions of authority and extended family networks serving as primary social safety nets (Sabah et al., 2025; Soltani, 2025). As of 2019, a nuclear families (couples with children) accounted for 65.05% of households, extended families for 20.65%, and single-parent households for 6.65% of all family units (Soltani, 2025). This shift has been accompanied by notable changes in marital trends: the marriage rate declined from 9.88% in 2014 to 9.24% in 2015, while the divorce rate increased from 15.75% to 16.23% over the same period (Soltani, 2025). These transformations in Algerian family dynamics underscore the importance of examining how shifting family structures influence adolescent emotional well-being and regulation. Understanding how these structural changes affect adolescents requires attention not only to the family as a unit, but also to the specific relational dynamics and challenges that adolescents encounter within and beyond the home.

Introducing new family-related research is essential to assess family functioning amid this evolving landscape. Unfortunately, Algerian adolescents grapple with a distressing prevalence of violence and bullying (Sabah et al., 2022). Tackling these challenges demands a comprehensive approach that recognizes the intricate relationship between societal changes, family dynamics, and adolescent well-being in Algeria (Aljaberi et al., 2023; Sabah, 2023; Sabah & Alduais, 2024; Sabah et al., 2021). Central to this relational dynamic is the role of the mother, who occupies a particularly influential position in the lives of Algerian adolescents. In Algerian society, mothers have long played important roles in guiding their adolescent children and closely monitoring their daughters' behavior. There is also a lasting emotional bond between Algerian mothers and their sons, which significantly influences family dynamics. This emphasizes how important mothers are in molding and directing Algerian adolescents' lives (Petot et al., 2011; Sabah, Aljaberi, Hajji, et al., 2024; Sabah, Aljaberi, Hamouda, et al., 2024). Literature supports the hypothesis that family context, including family relationships, is linked to the regulation of emotions in children and adolescents (Chen et al., 2022; Fosco & Grych, 2013; Leerkes & Bailes, 2019; Morris et al., 2007).

Building on this evidence, the present study sought to understand the mechanism by which family relationships translate into emotional outcomes for adolescents, with a particular focus on parental EA as a potential explanatory pathway. The purpose of this study was to use the parental EA variable to elucidate the expected association between family relationships and ER. It has been shown that the development of children and adolescents is impacted by the EA of both parents when providing care. The concept of EA has been identified as a potential framework for exploring how the caregiving environment influences child development. EA pertains to the capacity of the parent–child pair to engage in a positive emotional connection (Clark et al., 2021). The emotional development of children is influenced by parenting styles that shape their emotional growth (Oktaviani et al., 2023). Exposure to high levels of stress has been associated with reduced mothers' EA, whereas higher levels of well-being have predicted higher EA of fathers (Dungan et al., 2023). Parents' EA, whether from the mother or the father, influences the overall mental well-being of individuals aged 16 to 25 who continue to reside with their parents (Gökçe & Yılmaz, 2018). Regarding maternal dimensions of EA, they have been associated with the performance of children in middle childhood, encompassing regulated and disorganized attachment behaviors, school-related behavior issues, and self-reported symptoms of depression (Easterbrooks et al., 2012). These studies indicate that considering parental EA is crucial to understanding the relationship between family relationships and adolescents' ER.

Despite the growing body of evidence supporting these associations, a critical gap remains in the Algerian context. Despite the existing literature on family dynamics and adolescent well-being in Algeria, there is a noticeable gap in understanding the specific role of parental EA in mediating the relationship between family relationships and adolescents' ER. While previous studies have examined various aspects of family dynamics and their impact on adolescent development (Aljaberi et al., 2023; Sabah & Alduais, 2024; Sabah et al., 2021), the role of parental EA as a mediator in this relationship remains relatively unexplored in the Algerian context. Understanding this mediation mechanism is crucial for developing targeted interventions to support adolescent well-being amidst the rapid societal changes occurring in Algeria. Based on the identified research gap, the aims of the present study were to investigate the association between family relationships and ER in Algerian adolescents, and to examine the role of parental EA as a mediator in this relationship.

## 2. Methods

### 2.1. Study design

The research employed a cross-sectional study design to investigate the relationships among family relationships, parental EA, and ER among male and female adolescents (aged 11–17 years) attending middle and secondary schools in the state of Chlef, Algeria. According to Algeria's National Statistical Yearbook (Statistiques, 2019) (2017/18), Chlef province had 152 middle schools enrolling approximately 89,259 students (aged 11–15), and 68 secondary schools enrolling approximately 35,304 students (aged 15–18), giving a combined adolescent school population of roughly 124,563 students across the two educational levels relevant to this study. Girls represented approximately 47–55% of enrolled students at these levels. The province is thus a mid-sized Algerian wilaya with a substantial adolescent school population, making it a suitable and representative site for a study of this kind. A convenience sampling approach was used, and data were collected from different schools across Chlef province based on ease of access.

The independent variable examined was family relationships, referring specifically to the quality and dynamics within the family unit. The mediating variable was parental EA, which refers to the parents'

capacity to engage in positive emotional interactions with their children. Lastly, the dependent variable analyzed was ER, which refers to adolescents' ability to manage their emotions effectively.

## 2.2. Data collection procedure

Data were collected through a self-administered questionnaire completed by students in their classrooms during regular school hours. Prior to data collection, formal permission was obtained from school principals, who serve as the institutional authorities responsible for approving research activities conducted within their schools in the Algerian educational system. Principals were informed that participation was entirely voluntary and that all data would be used solely for scientific research purposes and would pose no adverse effects on students. Following institutional approval, no further parental consent was sought, as the study posed no risk or harm to participants and was conducted in full accordance with local research practices and ethical guidelines governing school-based research in Algeria. The questionnaires were administered in person by a research team based in Algeria, under the supervision of a specialized school psychologist. Students completed the questionnaires individually within their classrooms during regular school hours. During administration, students were asked to answer all questions and not leave any items blank to minimize missing data.

## 2.3. Ethical considerations

Ethical approval for this study was obtained from the Research Ethics Board of the Faculty of Human and Social Sciences at Hassiba Benbouali University of Chlef (approval number: 457/2022). All participants provided informed consent prior to taking part in the study. In the Algerian school-based research context, institutional consent from school principals constitutes the formal authorization to conduct research with students, as school principals are recognized as the responsible institutional authorities for all activities carried out on school premises. This procedure is consistent with established ethical and administrative guidelines for school-based research in Algeria, particularly for studies that pose no risk or harm to participants. Students were fully informed about the purpose of the study, assured of the confidentiality and anonymity of their responses, and reminded that their participation was entirely voluntary and that there would be no consequences for withdrawing.

## 2.4. Sample

A total of 421 middle school students, aged 11–17 years, were recruited via convenience sampling from educational institutions in the state of Chlef, Algeria. The participants had an average age of 12.74 years, with a standard deviation of 1.21. In terms of gender distribution, the participants consisted of 219 males (52%) and 202 females (48%). Additionally, the study assessed participants' birth order, revealing that 168 individuals (39.9%) were the eldest child, 182 (43.2%) were middle children, and 71 (16.9%) were the last-born in their families.

The sample size was considered adequate for the planned statistical analyses. Several methodological guidelines recommend a minimum sample size of 200 for simple confirmatory factor analysis (CFA) or structural equation modeling (SEM), and at least 400 participants for more complex models (Hair et al., 2021; Kline, 2023).

## 2.5. Instruments

### *The revised Brief Family Relationship Scale (BFRS)*

The original version of the Brief Family Relationship Scale (BFRS), developed by Moos and Moos (1994), comprises 27 items. It includes sub-scales for Cohesion, Expressiveness, and Conflict, with each sub-scale consisting of 9 items. These dimensions evaluate different facets

of family relationships. In the current research, a modified version of the scale proposed by Fok et al. (2014), consisting of 16 items, was used. This adaptation included 7 items for Cohesion, 3 items for Expressiveness, and 6 items for Conflict. Participants responded to the scale using an analog scale with three semantic anchors placed below it, representing different levels of response: "Not at all", "Somewhat", and "A lot". For the scale used in this study, the Cronbach's alpha was 0.77, and Omega was 0.78, indicating a satisfactory level of internal consistency.

### *The Lum Emotional Availability of Parents (LEAP)*

The LEAP scale, developed by Lum and Phares (2005), is a 15-item instrument used to evaluate parental EA during participants' adolescence. This scale measures the extent of parental EA and allows respondents to rate it from 1 (Never) to 6 (Always). The total score on the LEAP ranges from 15 to 90, with higher scores indicating greater parental EA. Lum and Phares (2005) reported that the scale addresses a gap in research on this subject and has undergone rigorous psychometric testing, demonstrating reliability and validity. It is designed to independently assess children's and adolescents' perceptions of their mothers' and fathers' EA, making it a valuable tool for identifying potential emotional or behavioral issues based on these perceptions. In the current study, Cronbach's alpha for emotional availability was 0.89 for fathers and 0.87 for mothers, and Omega was 0.89 for fathers and 0.87 for mothers, indicating a satisfactory level of internal consistency.

### *Adapted version of Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA)*

ER Questionnaire for Children and Adolescents (ERQ-CA) is a vital instrument widely utilized in scientific research. Stemming from the original ERQ, initially formulated by Gross and John (2003), the ERQ-CA provides a thorough assessment of ER strategies, specifically focusing on Cognitive Reappraisal (CR) and Expressive Suppression (ES). The questionnaire comprises ten items, with six dedicated to evaluating CR and four to evaluating ES. Respondents engage with the scale through a 7-point Likert-type response format. Elevated scores on each scale indicate a greater inclination toward the corresponding ER strategy. In the current study, an adapted version of the ERQ, namely the ERQ-CA by Gullone and Taffe (2012), was chosen to suit a non-adult sample. This adaptation involved simplifying item language and improving the efficiency of the response scale, reducing it from 7 to 5 points, ranging from 'strongly disagree' (1) to 'strongly agree' (5). These adjustments enhance the instrument's relevance and ease of use in the context of the present research. Regarding the scale's reliability in the current study, Cronbach's alpha was 0.719 and Omega was 0.716.

## 2.6. Statistical analysis

SPSS version 26.0 was used for descriptive and correlational analyses. Descriptive analysis involved calculating the arithmetic mean, standard deviation, skewness, and kurtosis to assess the data distribution. Pearson correlation coefficient was computed to examine the relationships among the study variables. Subsequently, a mediation analysis was conducted using JASP version 0.18 to investigate the mediating role of parental EA in the relationship between family relationships and ER in adolescents. We considered family relations as the independent variable and ER as the dependent variable, incorporating EA of the father and the mother as mediating variables. To estimate the effects in the mediation analysis, bootstrapping with 1000 samples was implemented.

## 3. Results

### *Initial variables analysis*

First, the skewness and kurtosis of the four variables were computed to verify the sample's normality. The outcomes demonstrated that all four variables fell within the acceptable range of -2 to +2. Next, the correlations between these four variables were determined, revealing positive associations among them. A summary of the initial variable

**Table 1**  
Summary of Variable Statistics and Correlations

Variables	M	SD	Skewness	Kurtosis	r			
					Family relationships	Emotion regulation	Emotional Availability of Father	Emotional Availability of Mother
Family relationships	37.95	6.04	-0.14	-0.89	-	-	-	-
Emotion regulation	32.71	8.37	-0.24	0.048	0.31**	-	-	-
Emotional Availability of Father	64.89	15.95	-0.59	0.08	0.47**	0.33**	-	-
Emotional Availability of Mother	71.22	13.60	-0.79	0.57	0.49**	0.38**	0.74**	-

\*\*p < 0.01.

analyses is presented in Table 1. Table 1 provides a detailed overview of descriptive statistics for key study variables. Family relationships had a mean score of 37.95 with an SD of 6.04, showing a normal distribution (Skewness: -0.147, Kurtosis: -0.896). ER, with a mean of 32.72 and an SD of 8.37, indicates a normal distribution (Skewness: -0.246, Kurtosis: 0.048). Fathers' EA has a mean of 64.89 and an SD of 15.95, indicating a slightly negatively skewed distribution (Skewness: -0.593) and normal kurtosis (0.089). Mothers' EA, with a mean of 71.22 and an SD of 13.60, exhibits a normal distribution (Skewness: -0.792, Kurtosis: 0.575).

Table 1 also presents the correlation coefficients (r) among the variables under investigation: family relationships, ER, fathers' EA, and mothers' EA. The results indicated a statistically significant positive correlation between family relationships and ER ( $r = 0.31, p < 0.01$ ), as well as between father's EA and family relationships ( $r = 0.47, p < 0.01$ ). Likewise, family relationships were positively and significantly correlated with mothers' EA ( $r = 0.49, p < 0.01$ ). In addition, ER showed significant positive correlations with both fathers' EA ( $r = 0.33, p < 0.01$ ) and mothers' EA ( $r = 0.38, p < 0.01$ ). Finally, a notably positive correlation was found between fathers' EA and mothers' EA ( $r = 0.74, p < 0.01$ ).

*Parental emotional availability as a mediating variable between family relationships and emotion regulation in adolescents*

Mediation analyses were conducted to assess the impact of family relationships on ER, mediated by fathers' EA and mothers' EA (Fig. 1). The results of the path coefficients (Table 2), showed no statistically significant effect of fathers' EA on ER. The path coefficient was estimated at 0.073, with a z-value of 1.070 and a p-value of 0.284 and the 95% Confidence Interval ranged from -0.043 to 0.207. By contrast, mothers' EA demonstrated a significant impact on ER, with an estimated path coefficient of 0.248 (z-value = 3.622,  $p = < 0.001$ , 95% CI [0.125, 0.369]). Similarly, family relationships showed a significant effect on

ER, with a path coefficient of 0.027 (z-value = 3.121,  $p = 0.002$ , 95% CI [0.009, 0.046]).

Moreover, family relationships had substantial associations with both fathers' EA (path coefficient = 0.079, z-value = 11.112,  $p < 0.001$ , 95% CI [0.066, 0.093]) and mothers' EA (path coefficient = 0.081, z-value = 11.536,  $p < 0.001$ , 95% CI [0.068, 0.094]). These findings indicate that family relationships plays a crucial role in shaping ER, with partial mediation by the parents' EA.

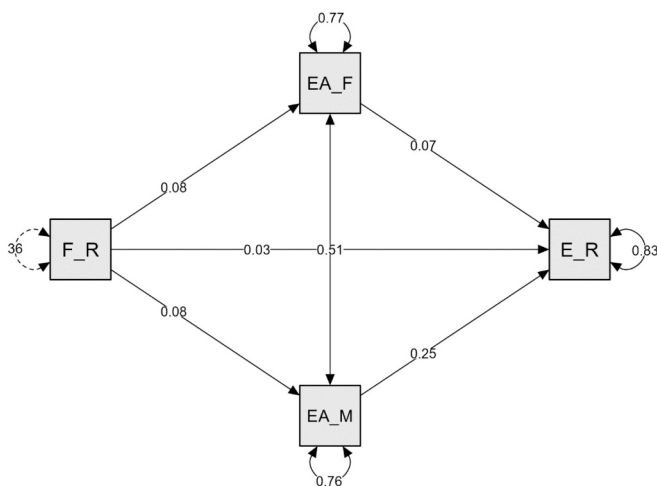
Table 3 presents the results of a multiple mediation analysis, shedding light on the relationships between family relationships, fathers' EA, mothers' EA, and ER. The direct effects illustrate that family relationships has a statistically significant impact on ER, with a path coefficient of 0.027 ( $z = 3.121, p = 0.002$ , 95% CI [0.009, 0.046]). The table also presents the indirect effects, showing how family relationship indirectly influences ER through the mediation of fathers' EA and mothers' EA. Notably, the indirect path through fathers' EA has an estimated coefficient of 0.006 ( $z = 1.065, p = 0.287$ , 95% CI [-0.003, 0.017]) and was not statistically significant, while the indirect path through mothers' EA is statistically significant, with an estimated coefficient of 0.020 ( $z = 3.456, p = < 0.001$ , 95% CI [0.010, 0.032]). These indirect effects underscore the importance of considering the mediating role of maternal EA in the relationship between family relations and ER. However, it is worth noting that the mediating role of maternal EA appears more crucial than that of paternal EA.

In addition, the table presents the total effects, demonstrating that when considering all pathways, family relationships has a total effect of 0.053 ( $z = 6.882, p < 0.001$ , 95% CI [0.036, 0.070]) on ER. Lastly, the total indirect effects (with both mediators in the equation simultaneously) emphasize the impact of the indirect pathways, with a significant total indirect effect of 0.026 ( $z = 5.244, p < 0.001$ , 95% CI [0.015, 0.037]). This result underscores the substantial role played by the mediating variables, fathers' EA and mothers' EA, in linking family relationships with ER.

In summary, the direct effect was statistically significant, the total effects indicated statistical significance, and the mediation that passed through mothers' EA was statistically significant, while the mediation that passed through fathers' EA was not statistically significant. In conclusion, mothers' EA mediates the relationship between family relationships and ER, whereas fathers' EA does not.

**4. Discussion**

This study aimed to investigate the relationship between family relationships and ER, and to explore the potential mediating roles of EA of both the father and the mother in this relationship. In line with earlier research (Shafiq, Hanif, & Shafiq, 2023), a positive association was identified between family relationships and ER. Notably, the mediation analysis revealed that mothers' EA partially mediated this relationship, whereas no mediating effect was observed for the fathers' EA in the connection between family relationships and ER among adolescents. The results indicated a significant role of maternal EA in the relationship between family relationships and ER, whereas paternal EA did not show



**Fig. 1. Path plot** EA\_F: → Emotional Availability of Father, EA\_M: Emotional Availability of Mother, F\_R: Family Relationship, E\_R: Emotion Regulation.

**Table 2**  
Path coefficients results.

			Estimate	Std. Error	z-value	p	95% Confidence Interval	
							Lower	Upper
Emotional Availability of Father	→	Emotion Regulation	0.073	0.068	1.070	0.284	-0.043	0.207
Emotional Availability of Mother	→	Emotion Regulation	0.248	0.068	3.622	< 0.001	0.125	0.369
Family Relationship	→	Emotion Regulation	0.027	0.009	3.121	0.002	0.009	0.046
Family Relationship	→	Emotional Availability of Father	0.079	0.007	11.112	< 0.001	0.066	0.093
Family Relationship	→	Emotional Availability of Mother	0.081	0.007	11.536	< 0.001	0.068	0.094

Note: Standard errors using the delta method, confidence intervals corrected for bias through percentile bootstrap, and maximum likelihood (ML) estimation

**Table 3**  
Mediation analysis involving unstandardized parameter estimates for multiple variables.

	Estimate	SE	z	p	95% CI Lower	Upper
<b>Direct effects</b>						
Family Relationship → Emotion_Regulation	0.027	0.009	3.121	0.002	0.009	0.046
<b>Indirect effect</b>						
Family Relationship → Emotional Availability of Father → Emotion Regulation	0.006	0.005	1.065	0.287	-0.003	0.017
Family Relationship → Emotional Availability of Mother → Emotion Regulation	0.020	0.006	3.456	< 0.001	0.010	0.032
<b>Total effects</b>						
Family Relationship → Emotion Regulation	0.053	0.008	6.882	< 0.001	0.036	0.070
<b>Total indirect effects</b>						
Family Relationship → Emotion Regulation	0.026	0.005	5.244	< 0.001	0.015	0.037

a significant mediating effect, aligning with existing literature on parental EA (Bentenuo et al., 2020; Biringen, 2000; Criscuolo et al., 2023). However, the observation that fathers generally exhibit lower EA, particularly in sensitivity and structuring compared to mothers, supports the present findings. Various factors, including job-related stress, coping abilities, child-focused beliefs, and marital harmony, may significantly affect fathers' EA, further supporting the nuanced understanding of paternal influence (Goldberg et al., 2002).

The study's focus on maternal EA is well-supported by existing research emphasizing the substantial impact of a mothers' EA on her child's development. The correlation between increased stressors and reduced mothers' EA, the influence of maternal EA on attachment behavior, behavioral issues, and depressive symptoms in middle childhood, along with the significance of maternal mind-mindedness in promoting emotional availability (Dungan et al., 2023; Easterbrooks et al., 2012; Lok & McMahon, 2006) all support the conclusions of the study. Additionally, the literature on parental EA as a mediator in various aspects of child development is also reflected in this study's findings. The mediating link between maternal EA and the child's compliance at 16 months, the function of EA as a "connective tissue" in parent-child relationships, and its ability to predict self-esteem and interpersonal competence all provide additional backing for the study's assertion regarding the mediating role of maternal EA (Volling et al., 2002; Easterbrooks & Biringen, 2009; Yücel & Tuzcuoğlu, 2021).

The present study's results emphasizing the significant role of maternal EA in family relationships and ER, align well with the cultural context of Algerian society. In Algerian culture (Petot et al., 2011), mothers closely monitor their daughters' behavior, indicating active involvement in the upbringing and guidance of their children. The lasting emotional bond between Algerian mothers and their sons, which significantly influences family dynamics, further reinforces the central role of mothers in shaping and guiding adolescents' lives in Algeria. Against this cultural backdrop, the finding that maternal EA plays a crucial role in family relationships and ER is not only consistent with existing literature but also aligns with the specific cultural emphasis on mothers' influence in Algerian society. The close monitoring of daughters' behavior and the lasting emotional link with sons suggest that mothers' EA is deeply intertwined with the dynamics of parent-child

relationships in the Algerian context. Therefore, the study's results, indicating that mothers' EA plays a pivotal role in family relationships and regulation, resonate well with the cultural context described, highlighting the influential and guiding role that mothers play in the lives of adolescents in Algerian society. The findings underscore the cultural relevance and importance of understanding the unique dynamics of parent-child relationships within specific sociocultural contexts.

#### 4.1. Theoretical implications

The present study emphasizes the crucial role of maternal emotional availability in family relationships and ER. This finding aligns with existing literature that underscores the significant impact of maternal EA on the development of children and adolescents (Yücel & Tuzcuoğlu, 2021). Additionally, the observation that fathers generally show a decrease in EA is consistent with existing literature (Bergmann et al., 2012). This result highlights the prominent role of maternal EA in shaping family relationships and emotional interactions, where the mother plays a pivotal role in influencing the nature and overall quality of relationships within the family, in addition to shaping individuals' emotional experiences. The theoretical implications of the study extend to the cultural context of Algerian society, where there is an emphasis on mothers' influence in shaping and guiding the adolescents' lives. This underscores the need to consider nuanced cultural differences when understanding parent-child relationships.

#### 4.2. Practical applications

Given the crucial role of maternal emotional availability, the practical implications should inform how psychological intervention initiatives and parenting programs could prioritize enhancing it. This can include targeted educational initiatives to help mothers in overcome stressors and foster positive emotional interactions with their children. Recognizing the nuanced understanding of parental impact, practical applications may focus on systemic strategies to increase paternal emotional availability. This can be extended to the workplace through the implementation of employee assistance programs for managing

work-related stress and programs to enhance fathers' adaptability and communication skills. In Algerian society, acknowledging the cultural emphasis on the impact of motherhood is of utmost importance. Practical initiatives and parenting programs should be culturally sensitive, recognizing and respecting the important role of mothers in raising and guiding their children.

#### 4.3. Limitations and suggestions

The study has noteworthy limitations, primarily stemming from its focus on Algerian society, which may hinder the generalizability of its findings to other cultural contexts with distinct family dynamics. The cross-sectional design employed limits exploration of longitudinal changes in family relationships, emphasizing the need for future research using longitudinal approaches. Future qualitative studies on the impact of family dynamics could provide in-depth insight into how parent's EA supports adolescents' ER. It would also be helpful to explore in depth the impact of the presence or absence of the fathers' EA in other cultures as this study did not yield any significant findings from its sample. This study also did not take into account the structure of the family – whether the adolescents mainly came from intact families with both parents or from single-parent or blended families. The integrity of the family structure would have affected adolescents' perceptions of their parents' EA. These limitations underscore the importance of interpreting the study's findings within specific cultural and design contexts and advocate for future research that adopts longitudinal approaches and embraces diverse cultural perspectives to enhance the breadth of understanding in this field.

#### 5. Conclusion

To sum up, this study examined the complex interrelationships among family relationships, ER, and the mediating role of parents' EA, with particular emphasis on the cultural context of Algerian society. The results illustrate the distinctive role of mothers in the Algerian cultural context and emphasize the critical role of maternal emotional availability plays in shaping family bonds and regulating adolescents' ER. The study's findings are consistent with the body of research on parents' EA, which emphasizes the importance of mothers' EA while recognizing the complexity of fathers' roles. It is acknowledged that fathers are often less emotionally available than mothers, despite the continuous emphasis on the critical role that fathers play in a child's development. Furthermore, the study is consistent with Algerian culture, in which mothers actively mentor their teenage offspring. The findings are essential for understanding the enduring connection between mothers and their children and how it is intricately linked with their children's ability to developing healthy emotional regulation.

#### Ethics in publishing statement

Testify on behalf of all co-authors that our article submitted followed ethical principles in publishing

#### Ethics statement

Ethics approval was granted by the Faculty of Humanities and Social Sciences, University of Chlef. Ethics approval code: 2022/457. Informed consent was obtained from participants prior to completion of the questionnaire.

#### CRediT authorship contribution statement

**Musheer A. Aljaberi:** Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Abdul Aziz AL Mazruui:** Writing – review & editing, Resources, Investigation. **Aiche**

**Sabah:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Serena In:** Writing – review & editing, Resources, Methodology, Formal analysis. **Nabil Eid:** Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Methodology, Investigation, Formal analysis, Data curation. **Ebenezer Chitra:** Writing – review & editing, Visualization, Validation, Data curation. **Rukman Awang Hamat:** Writing – review & editing, Writing – original draft, Visualization, Resources, Investigation.

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#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### Data availability

The data supporting this research is storage and available on Open Science Framework (OSF) and can be accessed using the following link: [https://osf.io/4mx8d/overview?view\\_only=1b0e3d393f584bf497de596170b95c07](https://osf.io/4mx8d/overview?view_only=1b0e3d393f584bf497de596170b95c07).

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