

The emotional blueprint: parenting styles and the making of adolescent emotion regulation

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Abstract. Adolescence is a key period for the rapid growth of emotional reactivity and regulation. Beyond neural and cognitive maturation, parenting styles significantly shape adolescents' emotion regulation. This article systematically explores how parenting styles influence the development of adolescent emotion regulation along six pathways: neural mechanisms in the brain, physiological mechanisms (e.g., sleep), cognitive and motivational chains, behavioral risk pathways, cultural and gender moderating variables, and clinical intervention perspectives. The study found that authoritative parenting facilitates mature prefrontal and limbic system connections, improves sleep quality, promotes cognitive reappraisal and a sense of hope, and reduces the incidence of high-risk behaviors such as self-injury. Authoritarian, permissive, and neglectful parenting significantly interfered with the development of the emotion regulation system and increased the risk of psychological distress. Cultural beliefs and gender roles also play a moderating role. This study emphasized the importance of parent-focused interventions and future directions are also discussed.

Keywords: Brain neural mechanism, physiological mechanism, Improve sleep quality

1. introduction

Adolescence is a period of transition from family dependence to independent social roles, during which adolescents need to find a balance between the heightened emotional fluctuations, increasing autonomy, and complex social relationships of heightened emotional experience, awakening sense of autonomy, and complexity of social relationships. Emotional regulation, as a core psychological function, helps adolescents maintain internal stability and adapt effectively to external stressors in the face of stress, conflict, and uncertainty. Research has shown that good emotion regulation is not only associated with higher academic performance, self-esteem, and relationship satisfaction, but also significantly reduces the risk of psychological problems such as anxiety and depression. Therefore, understanding the neurosurgical, cognitive, and social mechanisms underpinning emotion regulation is important for preventing psychological distress and promoting overall social functioning in adolescents.

Although emotion regulation is partially based on the natural maturation of an individual's neurological and cognitive abilities, research has consistently pointed out that its developmental process is also heavily influenced by the social environment. The family, and in particular parenting styles, is widely regarded as the environment in which adolescents are socialized at the earliest and most sustained stages of their development. The recent British drama *Adolescence* presented a poignant case of a teenage boy, Jamie, committing a violent act that sparked a national reflection on family dynamics and adolescent mental health. Although Jamie's parents appeared to care about Jamie on the surface, their disengaged, emotionally absent parenting style exemplified the neglectful parenting style, characterized by low warmth and low control (Baumrind, 1966). Their failure to provide emotional scaffolding, behavioral boundaries, and open communication made Jamie vulnerable to online radicalization, emotional dysregulation, and ultimately explosive violence. This case emphasizes the urgent need to understand how emotional development in adolescence is shaped or disrupted by the parenting environment.

Different types of parenting behaviors, such as supportive communication, emotional socialization strategies, and disciplinary and control styles, may influence the way adolescents identify, express, and regulate their emotions through pathways such as modeling, emotional response, or quality of interaction. In recent years, with the development of brain imaging techniques and physiological monitoring tools, researchers have been able to further reveal how parenting behaviors shape the

emotion regulation system at neural, physiological, cognitive, and behavioral levels, including neural mechanisms, physiological responses, and behavioral manifestations.

Despite the fragmented evidence in the literature, there is still a lack of integration and systematic analysis of these pathways. This paper focus on the variable of 'parenting style' to answer the central question: How do parenting behaviors influence the development of emotion regulation through multidimensional mechanisms? Seven representative empirical studies were selected for methodological rigor and disciplinary diversity, covering neuroscience, physiological psychology, developmental psychology, and clinical intervention, in the hope of painting a more complete and systematic theoretical picture from an interdisciplinary perspective, and providing theoretical foundations and empirical support for future research and practical interventions.

2. Core Concepts

2.1. Parenting styles

2.1.1 Authoritative parenting style

Authoritative parents are both warm and rule-abiding, capable of establishing stable relationships with their children, helping them learn to express and manage their emotions, and enhancing their self-awareness and self-control. According to Baumrind's classification, authoritative parenting is generally recognized as contributing to the development of good emotional regulation in adolescents. This approach helps adolescents develop secure attachments and enhances self-control. Authoritative parenting can provide positive resources in terms of cognitive, emotional, and social interactions.

2.1.2 Authoritarian parenting style

Authoritarian parents have a strong desire to control but lack response. They often maintain discipline through punishment and ignore their children's emotions. This can easily make teenagers depressed, self-denying, and even aggressive. Authoritarian parenting is overly strict, leading to suppression of the child's ability to express and regulate emotions.

2.1.3 Permissive parenting style

Permissive parenting is warm but lacks rules, which can lead to a lack of self-discipline and resilience. Although permissive parents offer sufficient care, they lack discipline and norms, which often results in poor impulse and decision-making skills.

2.1.4 Neglectful parenting style

Neglectful parenting is even more detrimental because the lack of basic attention and support may trigger emotional disorders and socialization problems. Neglectful parents do not pay much attention to their children and do not care about their emotions, resulting in diminished emotional safety and attachment security, and developing anxiety, depression, or impulsive behaviors.

2.2. Emotional regulation

Emotional regulation refers to how individuals influence which emotions they experience, when they experience them, and how they express and respond to those emotions (Gross, 2014).

3. Parenting Styles and Emotional Regulation: Key Findings

The development of emotion regulation is crucial in adolescents' growth process, which is not only related to the individual's ability to cope with stress and maintain mental health, but also has a profound impact on academic performance, interpersonal relationships, and even the construction of self-identity (Chervonsky & Hunt, 2019; Usán Supervía & Quílez Robres, 2021). Previous studies have shown that the formation of emotion regulation is not a single individual-driven process, but evolves through the interweaving of biological, cognitive, and environmental factors. Among them, the family is the earliest and most stable socialization system that adolescents come into contact with,

and parenting styles are decisive for the formation of adolescents' emotion regulation pathways. This paper will synthesize seven empirical studies to investigate the pathways and mechanisms of parenting styles on the development of adolescents' emotion regulation from six dimensions: neural mechanisms, physiological mediators, cognitive chains, behavioral risks, cultural contexts, and clinical interventions.

3.1. Neurological level: impact of parenting style on the brain's reward and regulation networks

In recent years, advances in neuroscience and technology have allowed researchers to look at how parenting 'shapes' the neural basis of emotion regulation at the level of brain networks, and Lee et al. (2024) carried out a fine-grained neuroimaging study focusing on the "reward system" and the "cognitive system" in the brains of healthy adolescents. The team performed resting-state fMRI scans on 42 Korean adolescents (mean age = 14.88, 61.9 % male) and used principal component analysis to categorize parenting behaviors into two dimensions: positive parenting and negative parenting. These two dimensions together explained 79 % of the variance in parenting behavior.

Functional connectivity between the left nucleus accumbens (NAc) and prefrontal cortex, including the left inferior frontal gyrus (IFG), right frontal operculum, and right lateral prefrontal cortex (PFC), was found to be significantly enhanced in adolescents with elevated hostility-control scores ($r = .54-.60$), while bilateral insula connections to the NAc also appeared to be enhanced. Nucleus accumbens connections likewise showed synchronous enhancement (Lee et al., 2024). These regions are widely recognized as core brain areas for processing social rewards, pleasurable stimuli, and impulse control. The NAc, as the central hub of the reward system, is supported by insula and prefrontal modulation. Functionally, this increased connectivity may not indicate maturation, but rather a "reward-system youthfulness lag," in which individuals are more responsive to immediate rewards but lack the capacity for long-term goal planning and delayed gratification.

In contrast, those who scored higher on the "love and autonomy" type of parenting showed a different neural pathway: these adolescents had significantly reduced functional connectivity between the right lateral prefrontal cortex and the hippocampus ($r = -.48$ to $-.52$, $p < .002$). This suggests that positive parenting styles contribute to the construction of more mature and efficient cognitive-emotional regulatory pathways. The prefrontal cortex is responsible for higher cognitive functions such as planning, impulse suppression, and emotion monitoring, whereas the hippocampus is closely associated with emotional memory and emotional context processing. Efficient communication between the two means that individuals can cope more effectively with emotional distress in the present through past experiences, and this ability to regulate is also the neural basis for good mental health. In other words, positive parenting shapes a more mature brain connection pattern, which contributes to the effective recognition, processing, and management of emotions.

3.2. Physiological basis: sleep as a mediating variable of parenting influence on emotion regulation

In addition to neural mechanisms, parenting styles can also indirectly influence children and adolescents' emotion regulation through more fundamental physiological mechanisms, such as sleep. Chen and Jin (2024) used a sample of 531 mother-child pairs from three kindergartens in Guangdong, China. They explored the pathways between authoritative parenting (i.e., high warmth + high demands) and children's emotion regulation using a moderator-mediator model. It was found that authoritative parenting significantly reduced children's sleep problems, and decreased sleep quality further undermined adolescents' emotion regulation capacities. This finding reveals a key physiological pathway: good parenting style creates a stable, structured family rhythm and routine that improves sleep quality, and good sleep in turn helps to restore and integrate neural pathways for emotion regulation.

More detailed analyses show that this mechanism is more pronounced in only children. Only children lack emotional support from their siblings, and their sleep environment is more dependent

on the emotional security provided by their parents. This means that in a single parent-child structure, parenting styles not only more significantly affect sleep quality, but also more directly influence emotional regulation. Accordingly, the researchers suggest that 'sleep problems' can be regarded as a physiological link between the effects of authoritative parenting on emotion regulation, and an important mediating variable between family education and psychological functioning.

3.3. Cognitive and motivational chains: impact of positive parenting on psychological resilience

Upon entering mid-adolescence, adolescents' emotion regulation systems must rely on more complex cognitive strategies and motivational systems when facing multiple pressures such as academic, interpersonal, and identity-related stress. Through a large sample of 681 high school students, Xin (2025) verified the influence of parenting styles on psychological resilience and proposed a dual-mediation model of impact of 'cognitive reappraisal on sense of hope.'

Specifically, positive parenting styles significantly enhanced adolescents' cognitive reappraisal strategies (e.g., reinterpretation of situations, positive perspective shifting), which in turn increased their levels of hopefulness (i.e., positive expectations and goal-directedness for the future), thereby significantly increasing psychological resilience (total indirect effect $\beta = .20$, $p < .001$). In contrast, negative parenting diminishes levels of hope by reinforcing adolescents' expressive inhibitory strategies (i.e., repressing emotions and forcibly hiding them), which in turn decreases psychological resilience ($\beta = -.12$, $p < .001$). These pathways form a complete 'parenting style–cognition–motivation–adaptation' chain, indicating that parenting style not only influences behavioral outcomes but also regulates cognitive and emotional structures at a deeper level.

More empirically, the study conducted an eight-session school psychodrama intervention to enhance adjustment strategies and sense of hope. The results indicated that three weeks after the intervention (effect size $d \approx 0.90$), the intervention group showed significant improvements in emotion regulation strategies, particularly cognitive reappraisal and emotional acceptance, as well as increased levels of hope and psychological resilience, and the effects were sustained in the short term. This finding suggests that the cognitive pathways supported by positive parenting styles are laterally malleable, providing strong theoretical support for educational interventions.

3.4. Behavioral expression level: dual risk pathways of apathetic and high-pressure parenting

The heterogeneity of parenting styles is not only reflected in the strength of the dimensions but also in the effect of the variability of the combination of forms on risky behaviors. Ao et al. (2025) classified the parenting styles of 3,199 junior high school students in Hunan Province using Latent Class Analysis and identified three typical parenting styles: warm and controlling (47.4%), indifferent and neglectful (34.4%), and harsh control (18.2%). The latter two were significantly positively correlated with predicting non-suicidal self-injurious (NSSI) behaviors compared to the warm-controlling style, and both were mediated by emotional regulation difficulties.

In particular, the 'cold and neglectful' type represents emotional detachment and lack of boundaries, resulting in confusion and suppression of the child's emotional recognition and expression. The 'harsh and controlling' type is a combination of high pressure and emotional deprivation, leaving adolescents without a mechanism to rely on when facing conflict or uncontrolled emotions. Of particular note, the path coefficient of harsh control on emotional regulation difficulties was as high as $\beta = .341$, and its indirect effect accounted for 48.4% of the total effect. This suggests that this parenting style is an important trigger for disorders in the emotion regulation system and is highly likely to provoke high-risk behaviors such as self-harm, making it a family variable that must be focused on in psychological interventions.

3.5. Cultural and gender variables: moderators of parenting style effects

The psychological effects of parenting styles are not entirely consistent across different cultural backgrounds, religious values, and family belief systems. Haslam et al. (2020) found in a study of

387 parents in Australia and Indonesia that although the main effect of ‘authoritative parenting contributes to emotion regulation’ was valid in both cultures, the effect was more pronounced in parents with lower traditionalist values. For those with higher traditionalist values, the positive effect of authoritative parenting was weakened (interaction $\beta = -.18$). This suggests that while country culture is important, individual-level value identity and belief systems are more important in determining the actual impact of parenting styles.

In addition, Jabeen et al.'s (2013) study among 194 adolescents in Pakistan also showed that parental roles had differential impacts on parenting effects. Authoritative parenting by both mothers and fathers positively predicted adolescents' emotion regulation ($\beta = .18$ and $.28$), whereas permissive parenting by both was negatively predictive ($\beta = -.26$ and $-.24$). It is noteworthy that although adolescents generally perceived their fathers as more authoritarian, the authoritarian style of fathers did not significantly affect regulation levels, which may be related to the positive interpretation of ‘father authority’ in Pakistani culture. Such studies highlight the need to treat cultural beliefs and family structure as moderating variables in empirical models of parenting styles, in order to avoid misinterpreting the complex family picture with generalized findings.

3.6. Clinical intervention perspective: emotional repair pathways starting from ‘changing parents’

In addition to quantitative research, clinical experience also provides empirical evidence for understanding the relationship between parenting styles and emotion regulation. Pearson (2014), through interviews with four Minnesota marriage and family therapists, found that the most effective strategy in actual family therapy interventions was not to directly address the adolescent's emotional problems, but rather to ‘change the parents first.’ Therapists emphasize that when dealing with adolescents who are emotionally disturbed or have difficulty regulating their emotions, the first priority is to help parents become aware of their own parenting patterns and to work with them through ‘Listen and Respond,’ ‘Positive Thinking,’ ‘Routine Structuring,’ and ‘Emotional Support with Boundaries’ to bring about change.

It is worth emphasizing that therapists generally agree that a ‘warm + bounded’ parenting style is not innate, but can be built up over time through therapeutic contextual modeling, continuous feedback, and cognitive restructuring. This offers positive hope for intervention in parenting styles: even when growing up in a negative parenting context, there is still room for restoration of the adolescent's emotional regulation if the family system is willing to actively engage in behavior change and reflective parenting practices.

4. Conclusion

Taken together, it can be clearly seen that parenting style not only determines the quality of the family atmosphere, but also profoundly influences the development of adolescents' emotional regulation through neural mechanisms, physiological bases, cognitive strategies, motivational regulation, cultural values, and behavioral patterns. Positive parenting styles promote the maturation of key brain regions such as the prefrontal lobe and hippocampus, enhance adolescents' cognitive reappraisal ability and sense of hope for the future, and provide a stable sleep environment and a sense of security at the family system level. In contrast, negative parenting styles may constitute a high-risk background for adolescents' emotional problems by delaying the development of the reward system, reinforcing emotional suppression strategies (which have been associated with heightened risk of internalizing disorders), and contributing to regulation difficulties compounded by cultural pressures.

It is worth emphasizing that parenting styles are not fixed attributes. Evidence from clinical practice and intervention studies suggests that parenting behaviors and attitudes are malleable and can be transformed through educational training, psychotherapy, and family guidance to improve adolescents' psychological trajectories. Although current research has initially constructed a

multidimensional model of parenting styles influencing adolescents' emotion regulation, there are still gaps that warrant further exploration. For example, most of the studies adopted cross-sectional designs, which limited the revelation of dynamic changes in variables over time and causal relationships; meanwhile, some studies had small sample sizes or were confined to specific cultural contexts, which constrained the extrapolation of the findings. Future studies can further validate the long-term effects and cultural adaptability of parenting styles by employing multi-wave longitudinal designs and mixed-method approaches, such as large-sample tracking and cross-cultural comparisons.

In addition, the current study has some limitations in terms of data sources, mainly relying on single reports from adolescents or parents, and lacks the integration of multi-source data from teachers, peers, or behavioral observations. Meanwhile, the cross-cultural validity of measurement instruments used to assess parenting styles has not been fully validated. Future research should more fully integrate behavioral observations, family structural variables, and intervention assessment data to explore in depth the actual influence mechanisms of parenting styles in diverse family contexts, and develop stage-by-stage and operational intervention models accordingly, in order to enhance the external validity and application value of the study. At the same time, attention should also be paid to the manifestations and regulatory paths of parenting styles under different socio-cultural structures, exploring their long-term mechanisms of action using a longitudinal design, and integrating the research results into school-based programs and family-oriented policy reforms to enhance adolescent emotional development, psychological well-being, emotional resilience, and adaptive social functioning.

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