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The Secure Base Effect in Adolescent Development: Attachment, Parenting, Brain Development, and Identity Formation

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Abstract. The secure base effect is a central concept in attachment theory. The reliable emotional foundation provided by caregivers supports adolescents' psychological exploration, adjustment, and growth. This review focuses on adolescence and examines the manifestations and mechanisms of the secure base effect during this developmental period, together with its influence on identity formation. By synthesizing literature from developmental psychology, neuroscience, and sociology, the review indicates that the secure base is not merely a state of dependence but an important prerequisite for healthy self-exploration. It helps adolescents achieve identity formation by providing emotional security, supporting autonomy, and reducing excessive dependence on peer approval. In addition, the review offers a framework for understanding adolescent development in family and social contexts. Existing evidence is mainly correlational and disproportionately drawn from Western samples. Therefore, future longitudinal, cross-cultural, and neuroimaging studies are needed to clarify causal and developmental mechanisms and to test the generality of the secure base effect across diverse family and cultural settings. Such work would also strengthen theoretical and practical understanding of caregiver support during adolescence.

Keywords: Secure base effect, Attachment theory, Adolescent brain development, Parenting styles, Identity formation

1. Introduction

The interaction patterns between adolescents and their parents often change during puberty. Adolescents may show a stronger need for autonomy, more frequent conflicts over opinions, and greater sensitivity to parental control. This phenomenon is closely related to brain development and attachment theory. Attachment theory, proposed by John Bowlby and further developed by Mary Ainsworth, provides a foundational framework for understanding how early intimate relationships with caregivers shape an individual's subsequent social and emotional behavioral patterns [1, 2].

The "secure base effect" describes an attachment mechanism whereby when individuals are confident that a reliable and accessible attachment figure is available, they can explore their surroundings more securely and return to that figure for support when facing stress or difficulties. A secure base usually develops gradually in early parent-child relationships. During adolescence,

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however, as the need for autonomy increases and peer relationships become more important, the function of the secure base and the pattern of parent-child interaction also change. This concept is particularly important during adolescence because this period involves neurobiological, psychological, and social transformations. The secure base can influence how adolescents adapt to new social environments, cope with stress, and form a sense of identity.

This article aims to provide a narrative review of the secure base effect during adolescence and to explore its underlying neurobiological mechanisms. It focuses on three aspects of the secure base effect during adolescence: first, how adolescent brain development and emotion regulation mechanisms are related to the secure base effect, second, how different parenting styles affect the formation and maintenance of parents as a secure base, and third, how parent and peer relationships jointly influence adolescents' exploratory behavior and identity formation.

2. Theoretical foundations

2.1. Attachment theory and the secure base concept

Attachment theory was a major theoretical framework in developmental psychology. This theory holds that the close relationship established with the primary caregiver in early life influences how people cope with stress, trust others, and form romantic or personal relationships in the future [1]. Attachment types are typically classified into four categories: secure attachment, anxious attachment, avoidant attachment, and fearful-avoidant attachment. Secure attachment is characterized by the ability to trust others, maintain close interactions, and express one's needs clearly. Anxious attachment is characterized by fear of rejection or abandonment and by frequent seeking of comfort and confirmation. Avoidant attachment is characterized by a tendency to maintain greater psychological distance, discomfort with excessive closeness, and a tendency to hide inner troubles. Fearful-avoidant attachment reflects both a desire for close relationships and a fear of intimate contact. This pattern may be related to unstable, contradictory, or threatening experiences in early relationships, such as a caregiver's emotional instability or inconsistent responses to the child.

The secure base is a core concept in attachment theory. The secure base effect refers to the phenomenon in which infants or individuals treat an attachment figure as a source of protection and support when exploring the external world. Individuals gain a sense of security because they know that reliable supporters are available, which enables them to explore the surrounding environment more actively and to seek support when facing stress or difficulties.

2.2. Adolescent brain development

With respect to the secure base effect, the interaction between the prefrontal cortex and the amygdala is of great significance. The prefrontal cortex is a brain region that matures relatively late and has a longer developmental course, it is responsible for advanced cognitive functions such as emotion regulation, social cognition, planning, and decision-making. Its maturation continues through adolescence and even into early adulthood. The amygdala is a group of nuclei located deep in the temporal lobe, mainly involved in the rapid detection of threatening stimuli and related to fear, anxiety, and other emotional responses. It has extensive bidirectional connections with regulatory regions such as the orbitofrontal cortex, anterior cingulate cortex, and dorsolateral prefrontal cortex. Amygdala function is already present during childhood, but after entering adolescence, along with changes in sex hormone levels, its sensitivity to social and emotional stimuli may increase further. Therefore, when adolescents perceive socially evaluative stimuli such as criticism, rejection, or

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being controlled, the affective response system and the cognitive control system may develop out of sync. This asynchrony may be the neural basis for the uneven development of emotional sensitivity and regulatory capacity in adolescents [3].

2.3. Functions of the prefrontal cortex and amygdala in emotion regulation

For adolescents, family and parents are important sources of emotional support and constitute the "secure base" in their attachment system. When adolescents encounter unfamiliar peers or external environments, they may remain somewhat vigilant. To integrate smoothly into a group and avoid exclusion, top-down cognitive control centers such as the prefrontal cortex need to continuously participate in emotion regulation and behavioral control to maintain an external appearance consistent with social norms. However, when adolescents return home and face their parents, the familiar and safe family environment may reduce their sensitivity to social evaluation and external threats, and may also reduce the need to continuously monitor their social self. In this case, adolescents may express the stress, frustration, and negative emotions accumulated during the day more directly. This does not mean that the prefrontal cortex stops functioning, rather, it may be related to adolescents' higher sense of security in the family environment. Because they know that expressing emotions in the family environment usually does not threaten the caregiver relationship, they may show more direct emotional reactions [4].

Research by Gobbini et al. revealed that when individuals viewed familiar and close faces, such as those of their mothers and friends, amygdala activation was lower than when they viewed unfamiliar faces. This provides neuroimaging evidence suggesting that familiar social relationships may serve as a safety signal that reduces threat responses. The experiments by Gobbini et al. aimed to explore whether the brain's response to familiar faces mainly comes from visual familiarity or also involves social-emotional connections. To distinguish these two factors, the researchers designed three types of faces for comparison. The experiment recruited healthy adult participants, and the stimulus materials included "personally familiar faces" (participants' friends or family members), "celebrity faces," and "stranger faces." These faces differed in visual familiarity and also had varying degrees of social-emotional connection. The study found that personally familiar faces elicited different neural response patterns compared with celebrity faces and stranger faces. For personally familiar faces, the brain response involved not only visual recognition but also social-emotional connections and the processing of relevant social knowledge, accompanied by a lower amygdala response. This finding provides a reference for understanding the sense of security in intimate relationships and its potential neural mechanisms [5]. It should be noted that this study was conducted with adults, so its results mainly provide a basis for understanding the relationship between familiar relationships and amygdala responses, but they cannot directly prove the secure base effect in parent-child relationships during adolescence.

3. Parenting styles and the formation of a secure base

During adolescence, the parenting style adopted by parents is of great significance. Parents' stable emotions and patient guidance can serve as an external source of emotion regulation and, over time, help adolescents develop greater self-regulation and stability. Parenting styles theory categorizes parenting styles based on two dimensions: responsiveness and demandingness. Baumrind initially proposed three main types: authoritative, authoritarian, and permissive. Subsequent studies further included the neglectful (or non-involving) parenting style [6].

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3.1. Four parenting styles

Parenting styles theory is based on two core dimensions, "responsiveness" and "demandingness," which divide parenting styles into four types: permissive, neglectful, authoritative, and authoritarian. Baumrind initially proposed the first three types, and subsequent research expanded the framework to include the neglectful style as a fourth category [6]. Permissive parents respond highly to their children but rarely set rules or enforce consequences, and they may even avoid conflict. Research suggests that permissive parenting may be associated with an increased risk of internalizing symptoms such as anxiety in adolescents [7]. Neglectful parents lack both responsiveness and demandingness. After meeting basic survival needs, they provide insufficient emotional support and rule constraints. This environment may increase the risk of disorganized attachment and maladjustment, and related studies typically find that such adolescents have lower psychological and social abilities and higher levels of dysfunction [8]. Authoritative parents offer warmth and support while setting clear and reasonable rules and are willing to explain the reasons behind those rules. This type of parenting is usually associated with more positive developmental outcomes, such as higher self-esteem, social skills, academic achievement, and independent moral judgment. Parent-adolescent conflicts are also more likely to be resolved through communication [8]. Authoritarian parents emphasize absolute obedience and often use punishment and coercion, lacking emotional warmth. Adolescents may gradually reduce seeking emotional responses from their parents, and in the long term, this may increase the risk of low self-esteem, lack of independence, and internalizing symptoms [7], and may lead to anxious or avoidant attachment strategies.

3.2. The impact of parenting styles on attachment and adolescent development

Parenting style affects the quality of parent-child interaction, which in turn influences adolescents' trust in their parents and their expectations of stability. Authoritative parenting is generally more conducive to the formation of a secure base: parents provide warmth and support while maintaining clear and reasonable boundaries, enabling adolescents to gradually develop an internal representation that "parents can be relied on and rules can be predicted." If parents lack responsiveness or maintain inconsistent boundaries over a long period, adolescents may reduce their reliance on parents for support and develop insecure attachment strategies. However, attachment type is not determined solely by parenting style, it is also influenced by temperament, peer relationships, school environment, and social culture. The effectiveness of the secure base largely depends on adolescents' expectations regarding the consistency and predictability of their parents' behavior. Therefore, parents' own emotion regulation and boundary maintenance are crucial.

4. Secure base, parent-child relationships, and identity formation

Adolescents begin to ask themselves who they are and what kind of person they want to become, and gradually develop relatively stable values, behavioral patterns, and interpersonal relationship models [9]. During this process, parents remain an important source of emotional support, but the significance of peer relationships continues to increase. A secure base can provide stable emotional support for adolescents, enabling them to maintain a sense of security when exploring new social relationships and developmental tasks [1, 2].

Erikson believed that the core developmental task of adolescence is "identity versus role confusion." Adolescents need to clarify their values, social roles, and future directions, and form a relatively stable identity [9]. Marcia further operationalized this process through the concept of

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identity status, providing an empirical framework for studying identity formation [10]. Stable family support can provide a sense of security for this process, enabling adolescents to engage more actively with new social environments and gradually develop an independent sense of self [2].

4.1. Social reorientation in adolescence and changes in parent-child and peer relationships

One of the important changes during adolescence is the reorientation of social relationships. The social reorientation theory proposed by Nelson et al. suggests that as individuals develop during adolescence, their attention to social information and peer relationships gradually increases, and their social motivations also change [11]. Compared with childhood, adolescents place greater emphasis on peer evaluation, social acceptance, and group affiliation. This change may be related to the development of adolescents' social cognition and reward-related neural systems [11].

Chein's research further indicates that the presence of peers can affect adolescents' reward processing and risk decision-making. The study found that compared with being alone, adolescents' sensitivity to potential rewards may increase when peers are present, and they exhibit more pronounced tendencies toward risky behavior [12]. This research explains, from the perspective of neural mechanisms, that peer relationships have a strong psychological and behavioral impact during adolescence. However, this does not mean that peers completely replace parents, rather, it reflects changes in adolescents' social environment and social motivations.

Therefore, social relationships during adolescence do not simply shift from "relying on parents" to "relying on peers," but rather manifest as a functional readjustment of family and peer relationships. Parents can still provide stable emotional support, while peers gradually become an important environment for adolescents to gain social recognition, exchange experiences, and develop their self-concept [7]. In contemporary contexts, social networking sites have become an important arena for adolescents' peer interaction and psychosocial development, extending peer relationships into digital environments [13].

4.2. The support functions of parents and peers

The role of the secure base does not disappear with the onset of adolescence, instead, its manifestation undergoes certain changes. Parents can still help adolescents cope with stress and uncertainty by listening, understanding, and providing emotional support, enabling them to maintain a certain psychological sense of security during their exploration of the external world. When adolescents encounter difficulties, the stable parent-child relationship can also provide them with channels to regain support and regulate emotions [2].

At the same time, the importance of peer relationships gradually increases. Peers can offer communication, understanding, and social recognition, meeting adolescents' needs for a sense of belonging and social support to a certain extent [1]. Even in digital social environments, parental and peer attachment remain relevant to adolescents' adjustment, as both have been found to predict Facebook addiction symptoms across developmental stages [14].

Therefore, the formation of the secure base during adolescence is not the simple disappearance of the role of parents, but a process of gradually diversifying support sources. The stable emotional support provided by parents and the social support in peer relationships jointly constitute an important foundation for adolescents' social adaptation and may further influence their identity formation [7, 11].

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5. Conclusion

This article explores the secure base effect and views it as a crucial psychological mechanism in adolescent development. The findings emphasize that the secure base is a fundamental psychological mechanism that promotes healthy adolescent development. From the perspective of neural mechanisms, the development of the prefrontal cortex and the amygdala is not synchronous, making adolescents more sensitive to emotions and social evaluation. A sense of security in the family environment may reduce their threat responses, allowing them to express emotions more directly, whereas peer interaction is related to heightened sensitivity of the reward system. Moreover, parenting styles and parenting quality are important factors influencing whether adolescents internalize their parents as a reliable secure base. This secure base provides the necessary sense of security for adolescents to establish their identity and explore, helping them to explore actively and eventually form a relatively stable identity. Adolescents increasingly rely on peers for support and emotional connection, but the secure base provided by parents remains an important protective factor, helping to avoid excessive reliance on peer recognition and supporting them to explore in a relatively stable emotional state. Overall, the secure base effect provides a framework for understanding healthy adolescent development. When individuals have a stable secure base, they are more likely to gain the confidence to explore, gradually grow, and achieve independence.

Due to the lack of empirical testing and long-term follow-up investigations, this article can only conduct an integrative analysis based on existing literature. Therefore, it cannot make strict inferences about the causal relationship between the secure base effect and adolescent developmental outcomes. Future research can adopt a longitudinal tracking design to examine dynamic changes in the quality of the secure base at different stages of adolescence and its bidirectional relationship with identity formation. In addition, existing literature mostly comes from Western samples. Future studies can include cross-cultural comparisons to test the universality and differences of the secure base effect in different family structures and cultural backgrounds. At the neural mechanism level, future research can combine longitudinal neuroimaging data to directly test how the developmental trajectory of functional connectivity between the prefrontal cortex and the amygdala regulates the relationship between the secure base and emotion regulation.

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