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Factors Predicting Adult Attachment: Insight from Infancy-Caregiver Interactions

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Abstract. Adult attachment patterns in relationships originate from early attachment experiences and continually influence individuals across the lifespan. This study will focus on three key factors that influence the formation of attachment: the Internal Working Model, caregiver sensitivity, and emotional regulation. The Internal Working Model proposes that infants develop different types of attachment depending on caregivers' responses to their proximity needs. Based on the model, Anisworth extends it to the three attachment patterns, which are secure, avoidant, and ambivalent. These three styles of attachment are associated with how different caregiver-child and romantic pairs are affected by the caregiver's sensitivity and the recipient's ability to regulate emotions. This study later emphasizes that caregiver sensitivity predicts secure attachment in infancy and also highlights the continuity of such a secure pattern in adult attachments. In addition to caregiver responses, recipients' ability to regulate emotion also influences the quality of an attachment. Higher levels of emotional regulation and expression predict a secure attachment pattern in both infancy and adulthood.

Keywords: attachment, Internal Working Model, caregiver sensitivity, emotional regulation

1. Introduction

Humans are inborn seeking a connection with others. Since infancy, children innately exhibit attachment behaviors such as crying and clinging to maintain a close bond with their caregivers. The term attachment behavior was first introduced by Bowlby to describe a biological tendency of infants to approach their mothers [1]. According to Attachment and Loss, mothers play a crucial role in the relationship between caregivers and infants by providing a secure base that allows infants to explore the outside world [1]. After Bowlby's groundbreaking theory laid the foundation for child-caregiver attachment, Ainsworth later brought "the strange situation" study to illustrate toddlers' attachment responses in situations of separation and reunion with their mothers [2]. Based on the observation of the eight episodes from "The Strange Situation" study, Ainsworth identified the child-caregiver relationship into three patterns: secure attachment, avoidant attachment, and ambivalent attachment [2]. Differing by different attachment patterns, toddlers exhibit various reactions to their mothers' departures and reunions. With the development of attachment theory, Hazan and Shaver later complemented that attachment dynamics not only appear between infants and caregivers but also extend to adult romantic relationships [3]. More specifically, Hazan and Shaver illustrated that

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adults share the same attachment characteristics with the child-caregiver relationship bond as Bowlby and Ainsworth proposed in the late 1960s. The similarities between the two attachment models provide a basis for the stability of attachment patterns across a person's lifespan.

Corresponding to Bowlby's internal working model, the continuity of attachment roots in early experiences in which infants interact with their caregivers [4]. Throughout infancy to adulthood, individuals transfer either secure or insecure models that they learn from early childhood attachment to romantic relationships. However, the continuity of attachments raises a key question: why do some infants and lovers attach to secure relationship bonds, while some attach to avoidant and ambivalent attachment patterns? Caregivers, as those who build bonds with individuals earliest, how sensitively they respond to infants' proximity requirement may correlate with different attachment patterns [5]. Apart from the relationship with caregivers, the emotional regulation strategies that are controllable by individuals also play an important role in mediating the attachment styles of a relationship [6]. In order to explore which specific factors influence attachment status and how they affect it, the present study will examine the role of these factors in infancy and romantic attachment by studying the characteristics of internal working models, caregiver sensitivity, and emotion regulation strategies in the following sections.

2. Internal Working Model (IWM)

According to Bowlby, the internal working model unconsciously guides infants in beliefs about the relationship between themselves and their caregivers [7]. In other words, young toddlers adjust their expectations and behaviors in response to how their caregivers interact with them. As infants cry when separated from their mothers, greet when reunited with their mothers, and cling to their mothers when scared, how caregivers respond to these behaviors may lead to different attachment patterns in parent-infant relationships [1]. Supported by Bowlby's attachment theory, Ainsworth's "The Strange Situation" study provided empirical evidence for child-caregiver attachment. The study structured separation and reunion episodes between infants and mothers, to reflect the real-life situations where caregivers leave and subsequently return to their children. Based on observation of how infants respond in the situations, Ainsworth identified three organized attachment styles, which are secure, avoidant, and ambivalent attachment [2]. Secure toddlers were willing to explore an unfamiliar environment where their mothers were beside them. As caregivers departed, the toddlers became distressed and alarmed, which reflected in stopping exploration and seeking contact with caregivers. But as mothers returned, they alleviated their discomfort. Although avoidant toddlers also demonstrated an ability to explore their surroundings, they showed little interest in maintaining proximity with their attachment figures due to failing to construct a secure relationship bond. Specifically, securely attached children noticed their mothers leaving, whereas an avoidant toddler would automatically ignore their mothers' presence, in whatever experience of separation or reunion with their caregivers. When avoidant children departed and reunited with their caregivers, they minimized their emotional reactions and expressed little upset from separation [8]. In contrast to avoidantly attached infants, ambivalent toddlers overemphasize maintaining close contact with their caregivers that reluctant to explore on their own. Unlike avoidant children who appeared indifferent to caregiver separation, ambivalent toddlers displayed exaggerated distress and upset to attract their mothers' attention. As the name ambivalence implies, ambivalent children often yearned for strong attachment bonds with their caregivers, but they remained distressed and refused comfort, even after the caregiver returned [8]. In summary, infants with different attachment patterns showed distinct expectations and behaviors toward their caregivers. These differences support the internal working model theory that early interactions shape children's beliefs about themselves and others. It is

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undeniable that the three attachment models laid a foundation for the development of early attachment.

However, Ainsworth's study was later criticized for its limited context. Her research was mainly conducted and concluded in the United States, but it failed to clarify whether the early attachment patterns adapt to other cultures. In addition, the study emphasized the role of material caregiving in early attachment, while overlooking the participation of other family members in interacting with infants [9]. In China, given the diverse context of childcare from the United States, working mothers may ask their parents or parents-in-law for help with childcare. Xing and colleagues recruited families in which both mothers and grandparents were involved in childcare, and grandparents took care of infants while the mothers were at work [10]. Through comparing the early attachment interaction between infants and their mothers and between infants and their grandparents, Xing and her team suggested that infants were more likely to develop secure attachments with their mothers than with their grandparents. Despite frequent separations due to work obligations, the findings indicate that young toddlers still tend to perceive their mothers as their primary attachment figures. Similar to Ainsworth's "The Strange Situation", both infants in American cultures and Chinese multi-caregiver contexts develop an early attachment with their mothers, which indicates that infant-mother attachment theory adapts widely and is more fundamental than one's immediate cultural surroundings. As Hazan and Shaver proposed, the way adults form attachments mirrors the patterns in infant-caregiver relationships [11]. Given that mothers as primary caregivers play a crucial role in shaping these early bonds, this paper will explore how caregiver sensitivity influences the formation of adult attachment styles.

3. Caregiver sensitivity

Caregiver sensitivity predetermines how children securely attach to their caregivers in early attachment [1]. The characteristic of sensitivity refers to ways that caregivers respond to approaching behaviors when infants instinctively seek closeness with them. Dunst and Kassow proposed two indicators to define the sensitivity when caregivers interact with their infants, which are explicitness and implicitness [5]. Aiming for an explicit framework of sensitivity, caregivers are measured by their ability to respond to infants' attachment requirements in a consistent routine. Meanwhile, the interaction between the primary caregivers and the infant serves to reinforce a parallel attachment pattern with another caregiving member. For implicit features, caregivers are measured by whether they show comfort and positive attitudes to support infants [5]. The sensitive caregivers respond to infants' proximity-seeking behaviors shape secure attachment in early life. Once the caregiving experience is formed in early childhood, the attachment pattern remains stable in adult relationships [12]. In other words, people transform from child-caregiver attachment into an attachment relationship with partners. Just as sensitive caregivers respond to infants' attachment needs, sensitive romantic partners fulfill adults' needs for closeness and emotional comfort. Zaya's study provided evidence that early caregiving experiences predict an attachment pattern in adult romantic relationships. The study recruited infants and adults who were engaging in a romantic attachment [13]. Zaya and her team compared the interaction patterns between child-caregiver pairs and adult attachment styles. The study provided a designated playroom and instructed the infants to engage in play activities with their mothers. During the interaction, researchers used a CARE index to assess mothers' behaviors that belonged to the categories of sensitive, controlling, and unresponsive. In addition to documenting attachment behaviors during infancy, the study employed a self-report questionnaire in adulthood to measure participants' tendencies to reject or depend on their romantic partners. The findings suggested that higher maternal sensitivity during infancy

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predicted more secure romantic attachment in adulthood, which is specifically characterized by a lower level of avoidance and anxiety. The lower sensitivity and high controlling caregiving behaviors were associated with greater avoidance in both maternal and adult romantic attachments. Consistent with these findings, Luo et al. also emphasized that sensitive caregiving lays a crucial foundation for healthy relational development in children, which supports Zayas et al.'s emphasis on the importance of early maternal sensitivity [14].

Although Zayas et al.'s study proposed a dynamic link between sensitive caregiving and romantic attachment in adulthood, it lacks a longitudinal comparison that tracks early caregiving interactions and later romantic attachment patterns. Since the participants in the study were from two separate populations, it is limited in establishing a direct connection between early attachment experiences and specific adult attachment styles. Dagan et al. conducted a study that overcame the limitation of tracking participants' relationship status and attachment patterns from a temporal dimension. Dagan's study drew from a longitudinal investigation that participants followed from the age of 18, engaging in a follow-up assessment between ages 26 and 31, and being involved in a romantic relationship at the time of the follow-up. The study concluded that individuals who developed secure attachment representations in early caregiving relationships were more likely to experience higher-quality romantic relationships in adulthood [15]. In addition to Dagan and colleagues' study, Conner et al. assessed two longitudinal studies that compared caregiver attachment in infants and adolescents. The study found out the continuity of the infant-caregiver attachment from early childhood to adolescence [16]. Schoenmaker and her team also investigated the relationship between caregivers' sensitive behaviors in early attachment and secure attachment scripts in early childhood and young adulthood stages [17]. Together with Zayas's theoretical framework, these longitudinal studies reinforce the notion that early caregiver sensitivity serves as a reliable predictor of adult attachment patterns in romantic contexts.

4. Emotional regulation

The prior paragraph mentioned that caregiver sensitivity played a role in how caregivers' responsive behaviors predict a secure pattern in infancy attachment, and such early experience continually influences one's expectations for attachment models in adulthood and the quality of romantic relationships. The sensitivity and the responsiveness of maternal caregivers towards young children are important factors in predicting secure attachment in both early and romantic relationships. However, the infant-caregiver attachment relationship is reciprocal [18]. Specifically, in addition to mothers improving early attachment interactions with infants, infants may also improve their attachment relationships with caregivers through the ability to regulate emotions. As the foundation of early interactive dynamics, children with different attachment patterns tend to develop distinct emotion regulation strategies, and shape how caregivers perceive and respond to their emotional cues [19]. For instance, securely attached infants tend to seek support from caregivers during distressing situations and are more adept at expressing their emotional needs. In turn, caregivers are more likely to respond with a secure attachment to their children. Avoidant infants, on the other hand, rely more on inhibition and refuse to seek help from their caregivers, which bidirectionally influences parents to behave more ignorantly and respond less. Ambivalent children are poor at regulating their emotions, as reflected in their exaggerated distress when separated from or reunited with their parents. This is because their parents respond inconsistently to their proximity needs, and the caregivers' inadequate parental strategies then reinforce the insecure and anxious interaction with ambivalent infants [19].

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4.1. Children

As a bidirectional process between caregivers and care recipients influences attachment patterns together, certain characteristics of the recipient may affect the quality of interactions with caregivers in childhood and with romantic partners in later life. A series of recent studies has highlighted the role of emotional regulation and expressions in attachment patterns and the commonality of emotional regulation strategies across age groups. Spangler and Zimmerman conducted a 12-year longitudinal study to assess participants' attachment behaviors. The study recorded participants' attachment behaviors in the infancy period and classified the attachment patterns as secure, avoidant, and ambivalent. The experiment was designed two follow-up tasks to stimulate participants' anger and fear expressions, and asked participants to report their own feelings. The study compared emotional expression assessments from maternal caregivers and participants' emotional arousal, and found a greater concordance between securely attached participants' self-reports and caregivers' judgments of participants' emotional expressions. By contrast, insecure participants demonstrated a discrepancy in their self-reports of feelings with mothers' assessments. Securely attached participants also reported a relatively high awareness of anger, while insecurely attached participants tended to inhibit and misrepresent their negative feelings [20]. Moreover, from a meta-analysis perspective, Cooke et al. supported the findings that children in secure attachment models demonstrated more positive emotions and better ability in emotion regulation [21].

4.2. Middle childhood

Extending the line of research to the middle childhood population, Abtahi and Kerns shifted the focus from emotional awareness to regulatory strategies. Their findings supported that securely attached children exhibited more positive emotions during the task and showed greater emotional recovery after the task ended. Conversely, avoidantly attached children displayed more negative emotions during the preparation and limited emotional recovery, and ambivalent children showed poorer emotional recovery and less consistent expression during the task [22]. In addition to the evidence that children with distinct attachment patterns exhibit different levels of emotion regulation, adults also vary in how they express and regulate emotions based on their attachment styles. To further investigate the differences in emotion regulation strategies in adulthood, Domic-Siede and his colleagues conducted an "Emotion Regulation Task" to examine the effectiveness of regulatory strategies across attachment categories. The study exposed either neutral or negative images to participating adults, and participants applied strategies to regulate their affect, including neutral, suppression, and reappraisal [23]. The findings revealed that securely attached participants tend to regulate their emotions via reappraisal, while insecurely attached individuals tend to rely more on suppression. Given that the reappraisal strategy refers to reinterpreting the emotional meaning of a situation to reduce its emotional impact, reappraisal is generally regarded as an adaptive strategy. The suppression strategy refers to the inhibition of outward emotional expressions and is considered relatively less effective. Individuals with a secure attachment pattern tend to apply more adaptive emotion regulation strategies. On the other hand, insecurely attached individuals, such as those with avoidant and ambivalent styles, tend to rely on maladaptive strategies to inhibit emotional expression.

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4.3. Adults

Although Domic-Siede et al. emphasised the different regulatory strategies employed by adults with secure and insecure attachment, the sample size was limited to 98 Chileans, which means the population in this study was limited in terms of diversity and reliability. In contrast, Eilert and Buchheim recruited 2,006 participants from various countries to examine the relationship between adult attachment patterns and emotional regulation strategies. The study examined the participants' emotion regulation strategies from a physiological perspective. Ultimately, the study found that securely attached adults used a more adaptive way to regulate their feelings, whereas insecurely attached adults relied more on emotional deactivation in their behavior, even in experiencing stressful situations [24]. Eilert and Buchheim's findings further support the association between secure attachment and the use of adaptive emotion regulation strategies. Consistent with the results of Domic-Siede and colleagues, their study found that securely attached adults are more likely to engage in strategies such as cognitive reappraisal, which effectively reduce emotional distress. Moreover, Eilert and Buchheim's study compensated for a population limitation present in previous studies. By incorporating cross-cultural perspectives and broader participant demographics, their research enhances the link between attachment security and effective emotional regulation [22]. Together, these findings converge to underscore that secure attachment fosters greater emotional flexibility, while insecure patterns are often associated with maladaptive regulation, such as suppression or inconsistent emotional awareness.

5. Discussion

Taken together, the internal working model provides a baseline for the attachment theory that care recipients form an expectation of proximity to approach caregivers. Ainsworth's "The Strange Situation" later classifies the interaction models between caregivers and infants into three attachment patterns. The study emphasized that how maternal caregivers respond to infants' attachment needs may form different attachment patterns. As caregivers participate in early attachment, the characteristics of responsive behaviors that caregivers exhibit to recipients may play an important role. Zayas et al. categorized maternal caregivers' responsive behaviors and found that when mothers use sensitive attachment behaviors to respond to infants' approaching needs in the early attachment period, the sensitive caregiving predicts a secure attachment in adult relationships. Moreover, the subsequent longitudinal studies confirmed the stable property of attachment patterns from early childhood to adulthood. As attachment figures' behaviors influence an attachment relationship, recipients' emotional regulation strategies reciprocally influence caregivers' judgements in an attachment relationship. Securely attached children are more likely to use adaptive strategies to elicit more supportive responses from caregivers. These emotion regulation patterns appear to persist into adulthood, where securely attached individuals similarly rely on adaptive strategies to reinforce a developmental continuity from early attachment periods to adult relationships.

Despite current studies providing perspectives on how specific factors predict attachment patterns in childhood and adulthood relationships, there remain limitations in the procedures of the studies. Studies like Zayas et al. examined two separate populations and lacked longitudinal tracking from infancy to adulthood. Future research may adopt more longitudinal designs to better capture how early sensitivity predicts later attachment outcomes. Second, studies such as Domic-Siede were limited by homogeneous samples, and the findings are restricted in generalizability. Future studies may benefit from recruiting more diverse and cross-cultural participants. Lastly, present research has rarely combined caregiver sensitivity with recipients' emotion regulation ability. Future studies may

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assess more about how caregivers' responsive behaviors and recipients' controllable capacity mutually impact an attachment model in early and adult attachment. Further work may explore how these two factors jointly shape attachment patterns throughout life.

6. Conclusion

Overall, early attachment experiences are shaped by the internal working model, caregiver sensitivity, and emotional regulation. These three factors jointly influence attachment patterns and support the continuity theory that the early attachment model continues to influence later adult relationships.

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