

Early Attachment and Socioemotional Development of Adolescence and Adulthood: The Mediating Role of Emotion Regulation and Self-Esteem

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Abstract. Investigating the pathways by which the quality of early attachment influences socioemotional outcomes is worthy for better comprehension and intervention of the legacy of early attachment. This article focuses on the mediating role of emotion regulation and self-esteem in correlation between early attachment and socioemotional development in adolescence and adulthood, by reviewing and analysing current empirical studies (mostly are longitudinal). The findings imply that: 1) Early attachment and subsequent socioemotional outcomes are significantly mediated by both emotion regulation and self-esteem. 2) Early attachment has an impact on the abilities, particular strategies, and physiological foundations of emotion regulation; these factors will predict later development. 3) Global and domain-specific self-esteem, which can affect both the overall degree and specific domains of socioemotional adaptation, are linked to early attachment. 4) Distinct attachment figures (father- or mother-child connection) and various forms of instability in early attachment may have unique influences on subsequent development. Moreover, future research on detailed examination of these mechanisms is proposed, as well as the intervention approaches focusing on improving emotion regulation and self-esteem for those who are insecurely attached early years.

1 Introduction

1.1 Legacy of early attachment

The term "early attachment" describes the emotional connection that establishes in the first few years of life between a baby and their primary caregiver, usually their mother or father [1]. According to attachment theory, early attachment is thought to have a significant influence on later socioemotional development in adolescence or even adulthood [1]. A wealth of evidence has supported the link between early attachment security and positive developmental outcomes like improved peer competence and fewer internalizing and externalizing problems over time, while early avoidant or anxious attachment styles, which are indicative of insecure attachment styles, are linked to maladaptation or psychopathology in later life [2,3].

Therefore, it is important to investigate the routes by which the quality of early attachment influences socioemotional outcomes in adolescence and adulthood, as well as the degree to which these outcomes are influenced. Not only will the answers to these questions aid in the understanding of psychopathology and adaptational issues, but they will also serve as a source of inspiration for further preventive, intervention, and treatment strategies.

1.2 Mediational variables

To explore the pathways through which early attachment influences development, current researches have analysed the potential mediators between early attachment and developmental outcomes [3-7]. It is found that the relationship between early attachment and developmental outcomes has been discovered to be mediated by two important mediational variables: emotion regulation (ER) and self-esteem (SE) [4-7].

Thus, in an attempt to conduct a more thorough study on the legacy of early attachment, this article firstly reviews and analyses current studies (mostly are longitudinal studies). Then, this article focuses on the role of ER and SE in individuals' early attachment and development in adolescence and adulthood, as well as the mechanism of their effects. Finally, it also offers guidance and inspiration for further researches and practices.

2 Variables

2.1 Emotion regulation

Emotion regulation (ER) refers to one's capability to effectively modulate, manage, and modify one's emotion

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experiences, expressions, and reactions in order to adaptively cope with various situations and challenges that can usually lead to negative impact on individual's well-being. In order to control internal feelings, physiological reactions, attention, motivation, and behaviours to adjust to biological or social demands and accomplish personal goals, ER encompasses processes of initiating, avoiding, inhibiting, maintaining, or modulating the occurrence, intensity, and duration of emotions [4,8,9].

ER strategies refer to the behaviours or strategies individuals utilize to cope with stress by regulating their emotional processes. Recent literatures highlight generally three types of strategy patterns of ER [4,8]:

Firstly, the adaptive or balanced one. This kind of strategy features approach-oriented problem-solving (taking proactive steps to address and resolve problems without fixating on their origins or outcomes), collaborative engagement (free to seek support from close others or partners), and balanced emotion (open, comfortable, and self-assured expression and recognition of emotions).

Secondly, the hypo-regulation strategy. Differing from the balanced regulation, individuals who prone to employ this type of strategy always display deactivating emotion (expression of feelings is toned down, instead, individuals try to hide or restrain them), avoidance (lack of engagement and do not seek for support from close others to limit the hurt and disappointment), and superficial problem-solving (communications and approaches of problem-solving lack depth).

Thirdly, the hyper-regulation strategy. This type of strategy can be regarded as the other extreme, features hyperactivating emotion (excessively emotional displays and attempts to evoke feelings in other people), ruminative engagement (reliant on partners and continuously thinking about the causes or effects of issues as well as one's own emotions), and self-focused problem-solving (prioritizing personal desires and needs, seeking attention and care).

In addition to different explicit ER strategies and behaviours, the level of individual's ER is also reflected in many physiological index [5]. Physiological factors serving as indicators of ER encompass the body's reaction to stress in physiological terms, such as heart rate variability (HRV), which is measured by respiratory sinus arrhythmia (RSA), electrodermal activity (EDA), which is measured by skin conductance level (SCL), as well as the functional activity in the neural systems [5,9,10]. These neurobiological markers gave the researchers a more objective basis to observe the ER ability of individuals, and brings the researchers closer to the truth of the development of emotional regulation.

2.2 Self-esteem

Self-esteem (SE) refers to the self-assessment of one's value and capability, influenced by developmental experiences and cognitive ability. SE encompasses person's overall beliefs and feelings about themselves, including their competence, abilities, appearance, and

belongingness, evolving through life experiences [7,11]. SE can be categorized into two main types: global SE and domain-specific SE.

Global SE is a person's overall assessment of themselves across various aspects of life, such as academic or professional accomplishments, interpersonal relationships, and individual attributes. It is contended that people who were exposed to caregivers who are emotionally distant, rejective, and unsupportive often feel themselves as incompetent, unlovable, and worthless, leading to low global SE [11].

However, SE is commonly understood as a multidimensional concept. Thereby, domain-specific SE has been proposed for adequate comprehension of SE. This concept refers to the evaluation of oneself within specific areas or domains, such as academic, social and physical SE. Each domain reflects on individuals' perceptions of their competence and value within specific areas of their lives [11]. A person might, for example, have a high SE in academics but a low SE in social and physical domains. Therefore, the importance that an individual places on their intellectual, athletic, and social accomplishments, respectively, determines their global SE.

Moreover, scholars have identified SE as comprising two elements: self-liking and self-competence [7]. Self-liking refers to the overall self-evaluation influenced by perceived positive regard from others, while self-competence involves concrete self-evaluation on the basis of personal abilities and attributes. To illustrate, a person may lack capability on several domains of life, but has a positive feeling of self, it is possible for the person to have a globally high SE.

SE is reckoned to be associated with a vast number of developmental outcomes. Considerable studies pointed out that high SE can be beneficial to numerous life domains for life span, including better relationships, performance at school and work, and mental and physical health, while low SE may be a contributor to psychopathology [6,7]. Thus, SE is another crucial variable during lifelong development.

3 Early attachment and emotion regulation in adolescence and adulthood

3.1 Attachment types and emotion regulation strategies

According to the current literatures, it is regulatory abilities to module one's emotion experiences that can account for when and why the parent-child attachment relationship has such wide-ranging impacts on individuals' adjustment, adaption and psychopathology.

It is theoretically believed that individuals' capability of ER is based on the early interaction with their caregivers [1]. In early years, caregivers can provide comfort during distress and offer a secure base for infants to explore their surroundings safely. If the secure attachment is established, infants may demonstrate open and

comfortable expression of emotions, and feel free to signal their needs to others. Contrarily, they may feel insecure and start to employ hypo or hyper regulation strategies to protect themselves from stress or negative feelings. However, whether early demonstration of ER style can continue to adolescence and adulthood remain exploring.

In a recent study, 102 households with mothers, dads, and kids from the community were included to examine the relationships between early attachment experiences and ER, social adjustment in preadolescence [4]. Children's attachment security with each parent was evaluated at the age of 2, by the Attachment Q-Set after examining the parent-child interactions in laboratory sessions. ER measures, including responses to frustration, were assessed at ages 3, 4.5, and 5.5 through laboratory delay tasks and parent-child control interactions. Regulation outcomes, such as managing negative emotions and internalizing adult values, were measured at ages 10 and 12, by both children-rated and parents-rated inventories and observation of children in different interactive settings. Results found that early attachment security with both of the parents at 2 was positively related to children's ER abilities at preschool age (did better in laboratory delay tasks, parent-child control contexts, and anger-managing situations).

Mother-child and father-child attachment security showed two indirect effects (see Fig. 1.): security at 2 to ER in delay tasks at 3-5.5 to internalize adult values at 10-12, and security at 2 to anger regulation at 3-5.5 to control negativity in social interactions at 10-12.

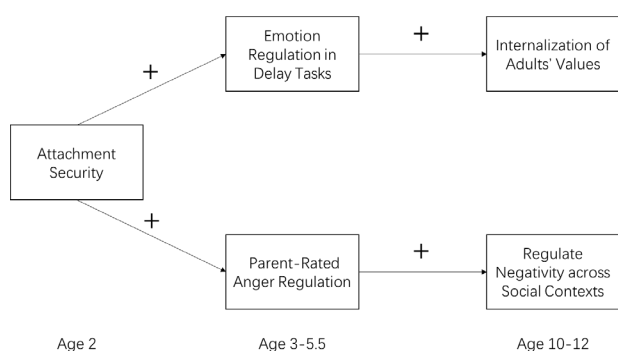


Fig. 1. Two mediational pathways in both mother-child and father-child relationships [4].

Two mediational pathways were exclusively observed in mother-child relationships (see Fig. 2.): from security (at 2) to anger regulation (at 3-5.5) to regulation of negative emotional tone (at 10-12); and from insecurity (at 2) to defiance and angry outbursts (at 3-5.5) to trigger a negative emotional trajectory within the relationship (at 10-12).

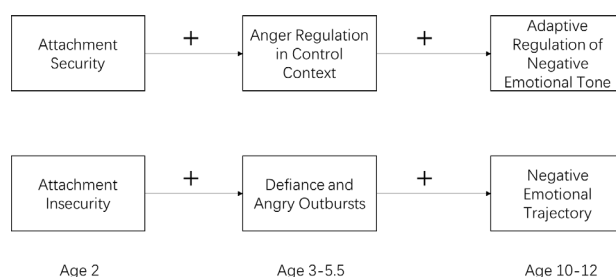


Fig. 2. Two mediational pathways exclusively in mother-child relationship [4].

The study used multiple methods to measure attachment security, emotional regulation, and social adjustment of participants at three time points, especially the combination of observation and parental assessment to measure multiple dimensions of emotional regulation, making the conclusions of the study very powerful and detailed. At the same time, the influence of paternal and maternal attachment security is distinguished, suggesting the unique role of maternal attachment, and strongly illustrating the central position of ER as the main mediator in the legacy of early attachment in adolescence.

Adult subjects likewise showed similar results. Using information from the Minnesota Longitudinal Study of Risk and Adaptation (MLSRA), 102 participants in a longitudinal study showed the effects of infant attachment assessed at 12 and 18 months (through the process of Strange Situation) on ER strategies in romantic relationships at ages 20, 23, 26, and/or 35 [8]. Results suggested that stable insecure infants (those who were rated attachment insecure at both 12 and 18 months) exhibited greater hypo-regulation strategies instead of balanced-regulation strategies 20-25 years later, while unstable insecure infants (those who were rated attachment insecure at only 12 or 18 months) showed greater hyper-regulation strategies. These findings spotlighted the association between infant attachment and specific emotional regulation strategies in adulthood. This study used the data from MLSRA, which is a unique longitudinal study that began at 1975-76 that offers valuable samples, rendering the conclusion of this study increasingly solid. Besides, in this study, the author proposed the concept of stable and unstable insecurity instead of avoidant and anxious attachment classifications used traditionally. The relationship between early attachment and later ER strategies may be clarified by this modification, which emphasizes the stability of infant insecurity. It may also reveal different caregiving histories and early surroundings that impeded children's development of adaptive ER.

3.2 Early attachment insecurity predicts the physiological foundation of emotion regulation

Furthermore, researchers have also detected the relationships between physiological indicators linked to ER and attachment insecurity.

An empirical study of teenagers pointed out that attachment avoidance, in conjunction with stress-induced

changes in respiratory sinus arrhythmia (RSA), was predictive of the adjustment of loss experiences [10]. In this study, 110 of 14-year-old adolescents were required to fulfilled a self-report attachment style towards mother, and participated in a Trier Social Stress Test with their RSA measured by the physiological equipment. At age 18, same participants (65% of the original) returned to the lab or completed a self-report questionnaire on loss experiences via mailings. RSA is a reliable biomarker of one's ER ability, for it represents the function of parasympathetic nervous system (PNS) that responsible for regulating individual's involuntary functions such as digestion, relaxation, and energy conservation. Diminished tonic RSA and excessive RSA reactivity are associated with low ER [5]. The results found the interaction between attachment style and RSA had a predictive effect on future adjustment. To be specifically, for adolescents with low stress-induced RSA, the higher their attachment avoidance, the more likely they are to have adjustment problems; For those with high RSA elevation in stressful situations, the higher their attachment avoidance, the fewer the adjustment problems. These results suggest that the effect of insecure attachment on future adaptation and development is not linear, but is influenced by an individual's ability to regulate emotions. Avoidantly attached individuals are susceptible to poor adaptation only when coupled with low self-regulatory capacity.

However, the above study only implied the complex association between early attachment and physiological ER without further examination. Another longitudinal investigation utilizing fMRI examined how infant attachment insecurity predicts the neural mechanisms involved in ER during adulthood [9]. From a longitudinal cohort of mothers who were tracked since delivery and included both non-depressed controls and those who had postnatal depression (PND), 54 participants were recruited. Infancy attachment was evaluated by Strange Situation method. Neural responses were investigated at 22 years using an established fMRI paradigm that assesses ER through active enhancement of positive affect and suppression of negative affect. The only significant difference of demographic characteristics found between securely and insecurely attached infants was the percentage of the mothers with PND (higher in insecure group). Additionally, it was showed that insecurely attached individuals at 18 months displayed increased activation in prefrontal regions (responsible for cognitive control) and reduced nucleus accumbens co-activation with the prefrontal cortex during attempts to regulate positive emotions 20 years later, implying poorer neural regulation of positive emotions compared to securely attached ones. This strong longitudinal evidence confirmed that the security of early attachment has an impact on the neural function of emotional regulation in adulthood, highlighting emotional regulation as the central mediator of attachment legacy.

4 Early attachment and self-esteem in adolescence and adulthood

4.1 Early attachment and global and domain-specific self-esteem

Theoretically, SE can be subdivided into global SE and domain-specific SE. The former refers to individual's general evaluation of self across various aspects of life, while the latter emphasizes the assessment of oneself within specific fields or domains, such as academic, social and physical SE [11]. Recent researches have examined the association between early attachment and these two types of SE in later life.

For instance, a recent study found a unique link between preschool father-child attachment (3-5 years old) and the implicit global SE of the same children in middle childhood (7-11 years old) [12]. Measurements were taken at two time points in this study. In Time 1, a total of 157 families with a preschool child took part in a modified separation-reunion procedure, wherein each parent interacted independently with the child. During this approach, five trained coders would assess the attachment between the child and each parent separately. In Time 2 (about 5 years later), 83 of previous families returned and self-reported evaluation of children's global SE using Name Liking Measure was implemented. The findings demonstrated that preschool-aged children with a stable attachment with their fathers are less likely to express low global SE and are more likely to have high global SE in middle childhood.

This study employed a longitudinal study design to measure the impact of early childhood attachment security with father and mother on later global SE, respectively, revealing the unique role of paternal attachment. This finding complements the previous academic tendency to emphasize mother-child attachment only. However, the operational definition of SE in this study was how much children liked their own names, which is a general assessment of implicit global SE. Therefore, its specific scope is limited; Moreover, more than half of the participants did not return in Time 2, which may lead to inaccurate results. For example, those who were willing to continue the study might be individuals with relatively high SE. Besides, the unique relationship between SE and paternal attachment obtained in this way may only show several sides of SE, and does not mean that the effect of maternal attachment on children's SE is not significant. Thus, more dimensional measures of SE may bring researchers closer to the truth of the association between early attachment and SE development.

Another study on adolescents with attachment disorders revealed the specific domains of SE may be worse in youth with reactive attachment disorder (RAD) or disinhibited social engagement disorder (DSED) [11]. RAD and DSED are two types of attachment disorders catalogued in DSM-5, the former is characterized by inhibited symptoms during interactions with caregivers or others, while the latter features the disinhibited form. All 306 participants were residents living in Norwegian

residential youth care (RYC) between 2011 and 2014 (aged 12-23 years), while a total of 10,480 students in general population were recruited as the control group. In this study, adolescents' (only those in RYC) RAD and DSED symptoms were assessed by a semi-structured psychiatric interview for caregivers, and the updated Self-Perception Profile for Adolescents (SPPA) was used to measure the SE of participants in both the RYC and general population. It assessed both the overall and domain-specific SE for scholastic competence (SC), social acceptance (SA), athletic competence (AC),

physical appearance (PA), romantic appeal (RA), close friendship (CF), and self-worth (SW). It was illustrated that teenagers with RAD diagnoses showed higher CF and lower SC than the general population, while those diagnosed with DSED had lower SC, SA, AC, PA, and SW. Furthermore, compared to adolescents in RYC without RAD/DSED diagnoses, adolescents with DSED showed lower SA and SW. Higher RAD symptoms were related to lower SA, AC, RA, and CF, while higher DSED symptoms were related to lower SC (see Fig. 3).

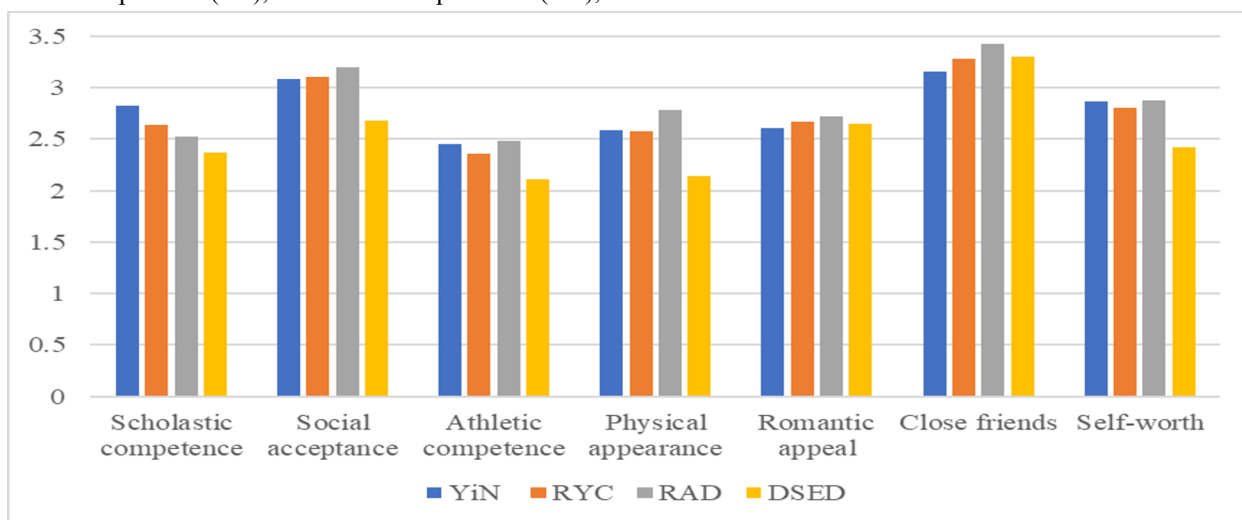


Fig. 3. Comparison of mean values of self-esteem in specific domains among different groups of children [11].
 Note: Groups include: teenagers in the general population (YiN); teenagers in RYC without DSED and RAD diagnoses (RYC); teenagers in RYC with DSED diagnoses (DSED); and teenagers in RYC with RAD diagnoses (RAD).

This study not only subdivided the specific domains of SE, but also subdivided the specific manifestations of attachment insecurity, and reached very refined conclusions. However, due to the lack of diagnostic tools for attachment disorder in adolescents and the cross-sectional design of the study, the conclusions obtained may not adequately reflect a causal or predictive relationship.

4.2 Self-esteem as a mediator between early attachment and psychopathology

Additionally, SE can not only be affected by early attachment, but can also become a contributor to multiple developmental outcomes [6,7]. Thus, it is worth investigating whether SE can serve as a powerful mediator between early attachment and later psychopathology.

Researchers examined the longitudinal correlation between attachment patterns in preschool age and the anxiety and depression symptoms at preadolescence, as well as the mediating role of SE [6]. In this research, a total of 68 mother-child dyads were recruited. Measurement of attachment pattern was conducted in Time 1 (when children were aged 3-4), through a separation-reunion procedure, some structural games and questionnaires for mothers; Assessment of children's anxiety and depression symptoms through Dominic Interactive Questionnaire, and the assessment of SE

through a questionnaire about a child's feelings of self-competence in multiple domains, were implemented in Time 2 (when children were aged 11-12). Results demonstrated that SE acted as a mediator, partially mediating the correlation between disorganized attachment in preschool age and depressive symptoms in preadolescence. However, the model was not fitted when it comes to anxiety.

The longitudinal study uncovered the fact that SE can be a mediating factor between early attachment and later depressive symptoms, though future studies can set control variables or measure the SE in two time points for improvement. Moreover, the authors also discussed why this model did not occur in anxiety symptoms, speculating on the role of ER. This speculation also corroborates the point of view in present article and can be one of the topics of future research.

A more recent study put forward similar conclusion into adulthood [7]. In this study, SE is regarded as a mediator between childhood attachment and adult attachment. Additionally, SE can predict psychological distress through affecting adult attachment. This conclusion was derived from a multiple-mediator model analysis of the link between childhood and adulthood attachment, SE, and psychological distress, involving 1708 adult participants. Childhood attachment was measured by an inventory asking participants to recall their attachment during childhood; Adulthood attachment was measured using Experience in Close

Relationships Scale; SE was measured by Rosenberg's SE Scale assessing individual's self-competence and self-liking; Psychological distress was measured using the Kessler Psychological Distress Scale. The final model was showed in Fig. 4.

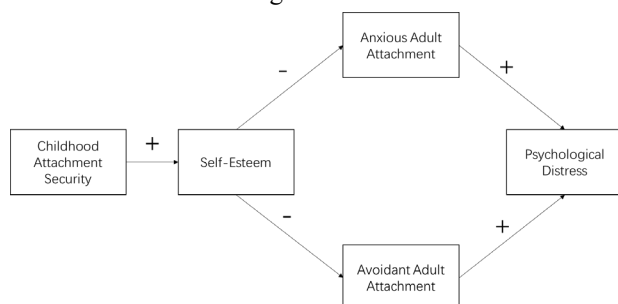


Fig. 4. The multiple mediator model: The role of self-esteem and adult attachment [7].

The large sample size of this study made the statistical inference of the conclusions very reliable. Meanwhile, unlike other previous studies, this study used the recall method to measure childhood attachment, emphasizing the influence of individuals' perception and narrative of early attachment in adulthood, supplementing previous research methods, and confirming the mediating role of SE in the relationship between attachment and mental health from another aspect.

5 Discussion and suggestion

5.1 Current findings

This article reviews recent research (mostly are longitudinal work) on early attachment and socioemotional development in adolescence and adulthood, with a focus on the function of emotion regulation (ER) and self-esteem (SE) in this process. The findings show that ER and SE have been extensively demonstrated as two significant mediators between early attachment and later development.

Regarding the impact of ER, results indicate that, firstly, early attachment security may be associated with the ability to regulate later on, such as controlling anger or negative emotions in social situations, which may eventually help with socioemotional adaption, and it is hypothesized that mother-child attachment has a unique function in this pathway [4]; Second, distinct early attachment styles will indicate the specific strategies for ER. For instance, stable insecurity during infancy may lead to a hypo-regulation strategy in adulthood, while unstable insecurity is associated with a hyper-regulation strategy [8]. Thirdly, early attachment can affect the physiological index of individual's capability in ER over time such as parasympathetic functioning and related neural systems [9,10].

As for the impact of SE, firstly, results suggest that both global and domain-specific SE can be affected by early attachment, and it is hypothesized that father-child attachment may bring a unique contribution [11,12];

Secondly, compared with a general population, adolescents with diagnosis of attachment disorders may develop lower SE in multiple domains [11]; Thirdly, SE can be a important mediator between early attachment insecurity and depressive symptoms and psychological distress in adolescence and adulthood [6,7].

5.2 Implications

Given the current findings summarized in this article, better comprehending of the mechanism of the profound impact of early attachment on later development can be demonstrated, as well as the inspiration for future practical interventions.

Firstly, ER is a mediator for early attachment to affect later development, which means that the impact may be an emotional process. This may suggest that emotional attunement between caregivers and infants is crucial in early parenting, suggesting the possible effects of caregivers' emotional sensitivity, ER ability, and empathy, as well as their interaction with infant temperament. This could be a direction of future research.

Secondly, the mediating effect of SE suggests another pathway of early attachment' influence. It seems to be an index of the internal working model, suggesting that early attachment not only affects some explicit emotional behaviors or physiological structure, but also affects an individual's perception of whether he or she is capable and worthy of love. These implicit processes require more creative approaches to examine and measure in future studies.

Thirdly, the mediating effects of ER and SE bring inspiration and hope to practitioners. Current findings suggest that the effects of early attachment can be interfered with and changed. For example, practitioners can improve an individual's social adaptability by providing early training to improve emotional regulation skills, or by improving the parasympathetic system and nervous system function related to emotional regulation. At the same time, the effects of SE suggest that assertive training, or improving self-care through psychotherapy, can effectively buffer the negative effects of early attachment insecurity.

6 Conclusion

This article aims in demonstrating the mediating role of emotion regulation (ER) and self-esteem (SE) in association between early attachment and development in adolescence and adulthood. Current findings suggest: 1) ER and SE are two significant mediators between early attachment and socioemotional development in adolescence and adulthood. 2) The abilities, specific strategies as well as the physiological underpinnings of ER are affected by early attachment, and will have predictive effect on later development. 3) Both global and domain-specific SE are related to early attachment, and can influence the global level and specific domains of socioemotional adaptation. 4) Different insecurity types of early attachment, as well as its different

attachment figure (mother- or father-child attachment) may have distinct impact on later development.

Based on above conclusions, future directions for research can be: 1) Investigating the mediating effects of ER and SE in the same model, researchers can compare the effect size of the two and investigate the interaction effect. 2) Examining other factors that affect an individual's ER ability, as well as methods (with evaluation of their validity) that can improve ER capability and enrich the strategies. 3) Examining the factors that affect individual SE, especially in specific domains, and methods (with evaluation of their validity) that can improve SE in different domains. 4) More detailed exploration of whether different types of attachment style, as well as different attachment objects, have different pathways to affecting future socioemotional development. 5) Longitudinal studies with longer time spans, smaller sample loss rates, and more varied measurement methods.

Moreover, for practitioners, this article suggests: 1) If possible, to implement early prevention to promote positive parenting and sensitive discipline for early insecure families. 2) To focus on the improvement of ER ability, or enrichment of the strategies for adolescents or adults who are insecurely attached early years. 3) To focus on the technology for enhancing global and domain-specific SE for those who have insecure early attachment.

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