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## **Attachment and cognition: a review of the literature**

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## CHAPTER 1

# ATTACHMENT AND COGNITION: A REVIEW OF THE LITERATURE

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### Abstract

This chapter provides a review of the empirical literature on the relationship between the quality of attachment and cognitive development. First, a brief review of attachment theory is presented and the influence of the attachment bond between care-giver and child on the child's cognitive development is examined theoretically. Subsequently, the empirical literature is reviewed, focusing on exploratory and problem-solving competence, parental teaching style, metacognition and high-risk samples. Despite a number of caveats, the authors conclude that the findings of the research reviewed are promising. At the close of the chapter, the authors present a heuristic model of the relationship between attachment and cognition, which points to possible directions for future research.

### Introduction

In this chapter we will review the literature pertaining to the role of the quality of the first attachment relationship between child and care-giver in the cognitive development of the child. The term "cognitive" is very broad and includes such diverse phenomena as intelligence, memory, reasoning, attention, language, and metacognition. These phenomena cover the range from nonconscious to conscious, from automatic to strategic processes (Williams, Watts, MacLeod, & Mathews, 1988). Our review is limited to studies that have examined attachment security as measured from the viewpoint of attachment theory in relation to a wide range of cognitive processes, such as reasoning, attention, and language. Studies that have examined cognitive development in relation to the general affective climate in the care-giver-child relationship have been omitted,

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because limiting our review to research on attachment theory provides an appraisal of the value of attachment theory in explaining individual differences in cognitive development.

### Attachment Theory

Attachment theory is a theory of human social–emotional development. John Bowlby (1969, 1973, 1980) maintains that the human infant is endowed with an “attachment behavioral system,” with which it ensures the proximity of primary care-givers (or “attachment figures”). Attachment behaviors include crying, reaching, smiling, and crawling. According to Bowlby, attachment behavior is evolutionary adaptive behavior, because it has ensured protection from predators in our “environment of evolutionary adaptedness.” He has also mentioned the possibility that it allows the infant to learn various necessary survival skills from its attachment figure(s) (Bowlby, 1969/1989, p. 224).

On the basis of regular interaction with its attachment figure(s), the infant develops a mental representation of this (these) relationship(s). Bowlby (1973, 1980) termed these mental representations “internal working models,” thereby emphasizing their dynamic (“working”) nature (see also Crittenden, 1990). With increased cognitive ability, the models become increasingly sophisticated. Mary Ainsworth was the first to recognize individual differences in attachment behavior and internal working models of attachment relationships in 1-year-old infants (Ainsworth, Blehar, Waters, & Wall, 1978). She developed a laboratory procedure, the so-called Strange Situation, which exposes the infant to increasing levels of stress. The child’s attachment behavior system is activated by exposing the child to an unfamiliar playroom, interaction with an unfamiliar adult, and two brief separations from the child’s attachment figure. The infant’s behavior during the two reunions with the attachment figure reveals the status of its relationship with the attachment figure. Ainsworth *et al.* (1978) distinguished three types of attachment: secure (also called B), anxious–avoidant (A), and anxious–ambivalent (C). Subsequent research has revealed a fourth type: anxious–disorganized (D; Main & Solomon, 1986, 1990).

Securely attached infants are characterized by seeking proximity to the attachment figure upon reunion. When distressed by the separation, they are relatively quick to recover and resume their exploration of the toys and room. Ainsworth (1973) coined the term “secure base from which to explore” to describe the role of the attachment figure for a securely attached infant. Infants who are anxious–avoidantly attached to their care-giver display avoidant behavior at reunion. The avoidance might be displayed by averting the face or diverting attention to the toys. With these infants, the attachment–exploration balance is tilted heavily toward exploration. However, the quality of their exploration is often low compared to secure children’s exploratory behavior (see below). Anxious–ambivalently attached infants show a mixture of seeking proximity and resistant, angry behavior toward the attachment figure upon reunion. Sometimes they are difficult to soothe, and are generally slow to resume exploration again. In this case, the attachment–exploration balance leans considerably towards the attachment-side. Anxious–disorganized infants display the absence of a consistent

strategy for dealing with the stress induced by the Strange Situation procedure. For instance, they may demonstrate a combination of avoidant and ambivalent behavior, or disorganized behavior (e.g., freezing, stereotypic behavior). Several studies have documented the stability of these various internal working models of attachment over time, at least in middle class samples (Main, Kaplan, & Cassidy, 1985; Waters, 1978).

In her pioneering Baltimore study, Ainsworth related the three types of attachment then recognized to individual differences in care-giver behavior towards the infants (Ainsworth *et al.*, 1978). During intensive home observations in the first year of life, she found that mothers of secure infants were generally more sensitive and responsive to their infants' signals than mothers of anxiously attached infants. Mothers of avoidantly attached infants were the most insensitive and tended to dislike physical contact with their infants. The mothers of the ambivalent children were inconsistently responsive and somewhat inept in their care-giving role. Subsequent independent research has confirmed the finding that mothers of securely attached infants are more sensitively responsive than mothers of anxiously attached infants (Grossmann, Grossmann, Spangler, Suess, & Unzner, 1985; Smith & Pederson, 1988). Few studies have focused on the difference between care-givers of the avoidant and ambivalent categories. Those that have have generally found that mothers of anxious-avoidant infants are characterized by an intrusive and interfering care-giving style (Smith & Pederson, 1988; Isabella, Belsky, & Von Eye, 1989; Lewis & Feiring, 1989; Isabella, 1990). Mothers of ambivalent infants tend to be understimulating (Belsky, Rovine, & Taylor, 1984). Since the anxious-disorganized attachment category has only recently been documented, research into its antecedents is scarce. Main and Hesse (1990) have hypothesized that this attachment type may be the result of frightened or frightening behavior on the part of the attachment figure. Such behavior is thought to be the result of unresolved grief due to loss or trauma.

Research into the antecedents of the different attachment types has recently received a new impetus due to the development of the Adult Attachment Interview by Mary Main and colleagues (AAI; George, Kaplan, & Main, 1984; Main *et al.*, 1985; Main & Goldwyn, in press). This interview allows classification of the internal working model of attachment in adolescents and adults into four categories (Dismissing, Secure, Preoccupied, Unresolved). The interview focuses on the subject's mental representation of his/her past relationship with parents (or other major attachment figures), rather than on factual biography. General descriptions of the parents (or other attachment figures) are compared to descriptions of more specific episodes relating to the parents, and inconsistencies and incoherencies are generally considered signs of insecure attachment. Dismissing attachment is revealed in a favorable image of the parent(s) at the general semantic level, accompanied by an inability to support this image with favorable episodic memories from the past. Dismissing adults tend to idealize their past attachment figures and claim to not remember much from their childhood. The interviews often show that the parents of these individuals were rejecting and unloving. Secure adults provide a coherent picture of their past and present relationship with their parents on the AAI. They tend to value attachment experiences and relationships, and lack idealization or preoccupying anger. Preoccupied individuals are characterized by continuing preoccupied involvement with past or present relationships with the parents. This involvement is evinced by involving anger and/or passively trying to please the

parents. An unresolved status of attachment is revealed in incoherencies in discussions of past losses and/or trauma during the interview.

Six independent studies have shown nearly 80% agreement between the attachment status of the care-giver measured with the AAI, and his/her child, measured with the Strange Situation, on the level of anxious versus secure attachment, thus providing evidence for intergenerational transmission of internal working models of attachment (see van IJzendoorn, 1992; van IJzendoorn & de Ruiter, 1991, for a review). The exact mechanism of intergenerational transmission is unknown. Main and Goldwyn (in press) have suggested that the secure adult is able to perceive attachment signals without much distortion because these signals do not threaten the existing mental representation of attachment, as is the case for the insecure adult. Modeling (grand-)parental child-rearing behavior could also be a mediator. Whatever the mechanism, it is very likely that a behavioral link via a construct such as parental sensitivity/responsiveness will be implied, since the child forms a mental representation of attachment on the basis of parental care-giving behavior. Several studies have documented this link between adult attachment and responsiveness to infant signals (Grossmann, Fremmer-Bombik, Rudolph, & Grossmann, 1988; Haft & Slade, 1989).

The development of an internal working model of attachment is paralleled by the development of an internal working model of self. The child who has received sensitive-responsive caretaking, develops a "secure" self-image of worthiness. The anxiously attached child, whose bids for contact and comfort have not received a sensitive response, develops a self-image of being unlovable. However, in the case of avoidant attachment this negative self-image appears to be masked by a defensive "good" self-image (Kobak & Sceery, 1988; Cassidy & Kobak, 1988). Ambivalent attachment status is accompanied by a relatively negative self-image (Kobak & Sceery, 1988).

In summary, the experiences in the first relationships with primary care-givers shape a child's internal working models of self and relationships. These working models will in turn have an impact on subsequent experiences, in that they function as mental templates the individual brings to subsequent interactions. Information processing, memory, and ideation, as these concern the self and relationships, are influenced by the model, creating selective input, which tends to stabilize the model. The potential influence of these qualitatively different models of attachment on a child's social and emotional development seems self-evident and has been documented by a substantial body of research (e.g., Erickson, Sroufe, & Egeland, 1985; Lamb, Thompson, Gardner, & Charnov, 1985; Main *et al.*, 1985; Sroufe, Egeland, & Kreutzer, 1990).

### Attachment and Cognitive Development: A Theoretical Note

How does the affective quality of the care-giver-child relationship, i.e., the quality of the attachment bond, influence the child's cognitive ability? A number of hypotheses can be formulated. First, the securely attached child can use his attachment figure as a *secure base* from which to explore the world. His confidence in the care-giver's physical and psychological availability lays the basis for autonomous exploration and problem solving (Bretherton, 1985). Thus, we would expect securely attached children to be more willing to approach and persist in tasks than their insecurely attached peers.

Second, their greater trust in their care-givers enables securely attached children to better elicit and accept their care-givers' assistance. Third, we expect a secure internal working model, and thus harmonious adult-child interaction, to enhance the flow of information between adults and children (Estrada, Arsenio, Hess, & Holloway, 1987). Fourth, security of attachment is hypothesized to affect metacognitive processes, i.e., knowledge about cognition and regulation of cognition. A secure internal working model of attachment tends to be coherent, noncontradictory and nondefensive, whereas the insecure model is characterized by multiple contradictory models (cf. idealizing the parent without supportive episodic memories). Main (1991) has argued that these multiple models indicate that metacognitive knowledge has yet to develop or that there have been failures in corrective metacognitive monitoring.

It seems evident that the importance of the attachment bond between care-giver and child is especially relevant for theories of cognitive development which emphasize social influences on cognition. Vygotsky (1978) has made the strongest claim for the role of social interaction, especially between adult and child, in cognitive development. According to his theory the higher psychological functions are internalized by the child via social interaction with adults. In Piaget's theory (1932, 1968), social interaction is not considered as important in cognitive development. Piaget also emphasized the importance of symmetrical (peer) interaction in contrast to Vygotsky's asymmetric (children and adults or children and older children) interaction in facilitating cognitive development. It seems plausible that attachment quality will facilitate or inhibit socially mediated cognitive development in both asymmetric and symmetric interactions. So far, research in the area of attachment and cognitive development has focused on asymmetric (mostly mother-child) interaction, as a result of which the literature review in the next section does not include research on symmetric interaction.

We will discuss the research literature on attachment and cognition along the lines of the hypotheses formulated in this section. First, we will review research pertaining to the hypothesized relationship between the child's security of attachment and exploratory and problem solving competence (first and second hypotheses). Second, we will review empirical studies on the instructional behavior of the attachment figure during problem solving sessions with the child (third hypothesis). Third, we will focus on (the lack of) research in the area of attachment and metacognition. Finally, we will separately discuss studies of the relationship between attachment and cognition in high-risk samples.

### Attachment and Cognitive Development: Empirical Research

Although the nature-nurture debate on cognitive development seems to have subsided, since both "camps" have acknowledged the importance of the other, nurturists, and, accordingly, attachment theorists, have to acknowledge that genetic factors play a large role in cognitive development. Nurturists have to be particularly careful not to attribute to nurture what is actually due to nature: the problem of indirect genetic mediation. Ideally, all studies examining the relation between the quality of the infant-care-giver relationship and cognitive sequelae in the child should control for care-giver IQ. This, however, is not the case in most studies in this area, which should be kept in mind when evaluating the findings reported here.

*Exploratory and Problem-Solving Competence*

Main (1973) found that toddlers who were securely attached as infants had longer attention spans during free play. Tracy, Farish, and Bretherton (1980) found no evidence for a relationship between attachment status and exploratory competence in a correlational study with 40 infants. However, Belsky, Garduque, and Hrnčir (1984) found that securely attached infants were more competent in free play than insecurely attached infants, i.e., they showed less disparity between the highest level of play exhibited spontaneously and the highest level elicited by an experimenter. Hazen and Durett (1982) also found securely attached toddlers to be more active in exploring their environment.

Matas, Arend and Sroufe (1978) found that securely attached children engaged in significantly more symbolic play during a free play session at 2 years of age than avoidant and ambivalent children. The securely attached children were also more enthusiastic, compliant, and persistent, ignored the mother less, exhibited fewer frustration behaviors, and scored higher on positive affect and lower on negative affect (whining/crying) during two problem-solving tasks. Competence in problem-solving could not be reduced to differences in Developmental Quotient. Twenty-six of the 48 children of the Matas *et al.* study were seen again for a number of laboratory tasks when they were 4–5 years of age (Arend, Gove, & Sroufe, 1979). They were also rated by their nursery school or kindergarten teacher on ego-resiliency and ego-control (Block & Block, 1979). Ego-resiliency may be considered a competence construct since it is defined as the capacity to respond flexibly, persistently, and resourcefully, especially in problem situations (Arend *et al.*, 1979). Children who as infants were classified securely attached scored significantly higher on ego-resiliency on both teacher-rated and laboratory-based measures. They also scored significantly higher on three measures of curiosity.

The Matas *et al.* and Arend *et al.* studies are widely cited to demonstrate the relationship between attachment status and interaction during problem solving at the toddler/preschool age. However, both studies came from the same research laboratory, which called for independent replication. Frankel and Bates (1990) published such a replication and found that secure toddlers displayed more on-task time, less aggressive behavior and less verbal negativism during the problem-solving tasks than insecure toddlers. However, they could not replicate the Matas *et al.* finding of a significant difference on compliance, ignoring maternal commands, frustration or whining/crying.

Oppenheim, Sagi, and Lamb (1988) conducted a study of 59 5-year-old kibbutz children, whose attachments to mother, father and metapelet had been assessed in the Strange Situation when they were 11–14 months old. The children were rated on the California Child Q-set (CCQ; Block & Block, 1979) and the Preschool Behavior Q-set (Baumrind, 1968) by their kindergarten teachers and metaplot. There were no significant associations between infant–mother and infant–father attachments and the 5-year ratings, but infants who had been securely attached to their metaplot at 1 year were rated less ego-controlled, more emphatic, dominant, purposive, achievement-oriented, and independent than anxious–ambivalently attached infants (there were no avoidantly attached children in the sample).

van IJzendoorn, van der Veer, and van Vliet-Visser (1987) performed a follow-up

study of children who had been tested in the Strange Situation at 24 months of age. Parents and kindergarten teachers rated the children on the Dutch version of the CCQ (van Lieshout *et al.*, 1983). Securely and anxiously attached children did not differ significantly in ego-resiliency, neither in parent nor teacher ratings. According to the teachers, anxiously attached girls showed less optimal ego-control, but anxiously attached boys showed optimal control. It is difficult to compare the findings of this study with those of earlier ones because the analyses were conducted using a division into four attachment groups: A+C, B1, B2+B3, and B4.

Crowell and Feldman (1988) studied behavior during problem-solving in a mixed sample of clinical and nonclinical groups (mean age = 37.5 months). In this study, mothers' internal working models of attachment, as measured by the AAI, were related to mother's and child's behavior in the problem solving session. Differences in the child's behavior were largely revealed in variables assessing the child's affect, and less so by task behavior. Children of insecurely attached mothers were less affectionate, more negative and avoidant, more controlling and anxious, and showed more subdued and angry affects. However, there were no differences on such task behaviors as persistence, self-reliance and enthusiasm, between children of secure and insecure mothers. The mixed nature of the sample may be partly responsible for the lack of significant findings on task behaviors. The children of preoccupied mothers scored significantly lower on persistence than those of dismissing mothers.

A number of investigators have studied the relationship between attachment quality and Developmental Quotient or Intelligence Quotient. The majority have failed to find a significant difference between secure and insecure infants in DQ (Matas, Arend, & Sroufe, 1978; Joffe, 1981; Pastor, 1981; Waters, Wippman, & Sroufe, 1979). Three studies reported a significant difference. Main (1973) found secure infants to be more competent on the Bayley test at 20 months. van IJzendoorn, Sagi, and Lambermon (1992) reported a follow-up on Dutch and Israeli children who had been observed in the Strange Situation with their father, mother, and professional care-giver. The Dutch children were assessed when they were around four with the McCarthy Developmental Scale (MOS; van der Meulen & Smrkovsky, 1985), and the Israeli children were assessed at five with the WPPSI test (Lieblich, 1974). In the Dutch sample, attachment network security (a composite score based on the attachment status of the three dyads in the network) showed a low, but significant correlation with DQ. In the Israeli sample, the correlation was somewhat higher and significant on both the network and the family composite score. Finally, van IJzendoorn and van Vliet-Visser (1988) found that securely attached (B2+B3) 5-year-old children scored significantly higher on a standardized IQ test for Dutch children. The marginally secure categories (B1 and B4) scored lowest, but did not differ significantly from A+C children.

Bus and van IJzendoorn (1988a) were first to study attachment security in relation to interaction in reading sessions and emergent literacy skills in a cross-sectional design. Attachment status was assessed using the Strange Situation procedure in 1½ year olds, and using Main *et al.*'s (1985) 1-hour reunion procedure at 3½ and 5½ years. They found that securely attached children explored stories and illustrations more than anxiously attached children. Bus and van IJzendoorn (1988b) also found a positive relationship between preschoolers' reading interests and attachment security measured 3 years earlier, independent of intelligence and degree of preparatory reading



instruction. For an extensive review of these and more recent studies on attachment and emergent literacy, we refer to the chapter by Bus in this issue.

### *Parental Teaching Style*

In several of the studies mentioned in the previous section on problem-solving competence, the behavior of the parent during the problem-solving tasks was also systematically assessed. Matas *et al.* (1978) designed two seven-point rating scales, Supportive Presence (SP) and Quality of Assistance (QA), which were also used in a number of subsequent studies (e.g., Crowell & Feldman, 1988; Frankel & Bates, 1990). The SP-scale measures the extent to which the parent appears attentive and available to the child and supportive of its efforts. Providing a “secure base” by helping the child feel comfortable working at the task and being involved, as shown by parental attentiveness, form the core of the SP construct. The scale for QA measures the degree to which the parent helps the child see the relationship between actions required to solve the problem and giving minimal assistance needed to keep the child working and directed at a solution to the problem without solving it for him (e.g., initially giving space, timing and pacing of cues, providing cues the child can understand, cooperating with the child; Matas *et al.*, 1978). The QA construct could be considered a measure of sensitive scaffolding behavior (Wood, Bruner, & Ross, 1978).

Matas *et al.* (1978) found that mothers of securely attached infants scored significantly higher on SP and QA than mothers of insecurely attached infants. The two insecure groups did not differ significantly on the two scales. Arend *et al.* (1979) did not assess the behavior of the mothers during the laboratory visit at 4–5 years. However, they did find that mothers’ SP and QA measured at 2 years predicted 5-year ego-resiliency in the child, measured in the laboratory situation. Frankel and Bates (1990) replicated the Matas *et al.* finding of significantly lower scores on QA and SP for mothers of insecure vs. mothers of secure infants. Interestingly, they also found that positive involvement at home, as measured at 6, 13, and 24 months showed a significant correlation with the quality of interaction during problem solving at 24 months. Crowell and Feldman (1988) averaged the scores on SP and QA into a composite variable called “mother’s help and support.” They also classified the mother’s style of assistance on the most difficult problem-solving task into one of three groups: (1) promotion of autonomy and learning, (2) confusing or chaotic, and (3) directive or controlling. The results showed that mothers classified as secure by the AAI were significantly more supportive and helpful than mothers classified as dismissing and preoccupied. Sixty-two percent of the secure mothers demonstrated a teaching style that promoted learning and self-discovery. Most of the mothers in the dismissing group (78%) were directive or controlling, whereas the preoccupied mothers showed both controlling (35%) and confusing/chaotic (60%) instruction styles.

Londerville and Main (1981) examined four measures of maternal behavior (tone of voice, forcefulness of physical intervention, number of verbal commands, number of physical interventions) in a play session of 21-month-olds with an unfamiliar female person, and found that mothers of secure infants used warmer tones and were less forceful. In their follow-up study, van IJzendoorn *et al.* (1987) observed their mother–child dyads in four problem-solving tasks. Mothers’ behavior was measured

on three scales for emotional atmosphere (extent of smiling, sum total of positive and negative remarks, degree of maintaining physical distance) and three scales for instructional behavior (number of good prompts, number of interventions, speed of intervention when child performed suboptimally). The emotional climate factor did not differentiate the four attachment groups (A+C, B1, B2+B3, B4) on three of the tasks, but did on the most difficult task where the A+C group worked in the least favorable climate. Mothers of securely attached children did not give better instructions than mothers of anxiously attached children.

In the emergent literacy research, Bus and van IJzendoorn (1988a) found that mothers of secure children gave more reading instruction and disciplined less during reading-type interactions. These mothers seem to require more of their children in the area of reading, emphasizing reading instruction and proto-reading.

### *Metacognition*

The theoretical and empirical integration of attachment theory with metacognitive development is a very recent endeavor (Moss, 1992; Moss, Parent, Gosselin, & Dumont, this issue). There is research indicating that parental training in metacognitive strategies affects metacognitive development (Carr, Kurtz, Schneider, Turner, & Borkowski, 1989; Moss & Strayer, 1990), but no studies in the literature have yet examined the role of attachment security in metacognitive development. The study by Moss, Parent, Gosselin and Dumont (this issue) is the first attempt to empirically study this relation.

### *High-Risk Samples*

Studies of the relationship between attachment quality and cognitive development in high-risk samples should be considered separately from the studies in low-risk samples, since the high-risk environment includes a number of risk factors that influence cognitive development. Among them are lack of financial resources, single parent families, and psychiatric disturbance in the parent, each of which might interact with the quality of the affective bond.

In the Minneapolis study of disadvantaged families, attachment quality was systematically related to later social-emotional and cognitive development (i.e., ego-resiliency and ego-control) in a high-risk sample. Several different reports from this larger study showed significant predictions from early attachment status to later developmental outcomes, although prediction might have been positively affected by the fact that the samples were selected for stability of attachment from 12 to 18 months. It is well-known that attachment quality tends to be much less stable in high-risk than in low-risk samples (see Lamb *et al.*, 1985, Chapter 8 for a review). Sroufe (1983) studied 40 preschool children from a disadvantaged sample, who were enrolled in a special preschool program of the University of Minnesota. The teacher Q-sort of ego-resiliency and ego-control of the Arend *et al.* (1979) study was used, and their findings were essentially replicated. Children who had been securely attached as infants scored significantly higher on ego-resiliency than those who had been avoidantly and ambivalently attached, with the latter not differing from each other. Securely

attached children also scored significantly higher on a self esteem Q-sort measure. Erickson, Sroufe, and Egeland (1985) studied a disadvantaged sample consisting of the 40 children of the Sroufe (1983) study and 56 other children attending other preschools. Four of 7 observer behavior ratings (agency, dependency, social skills, compliance) in preschool class yielded significant differences, but none of the analyses distinguished B from both A and C children at the same time. The teacher-rated Preschool Behavior Questionnaire (PBQ; Behar & Stringfield, 1974) yielded 5 factors, of which two revealed significant differences between groups. Avoidant children were rated as more hostile than ambivalent children, and as giving up more easily than securely attached children. Unfortunately, the study of the Disadvantaged Minnesota sample did not include purely cognitive follow-up measures, such as problem-solving competence. In general, it seems that the differences between securely and insecurely attached children were somewhat attenuated in this sample, compared to the data from the middle class sample (see Matas *et al.*, 1978; Arend *et al.*, 1979).

Morisset, Barnard, Greenberg, Booth, & Spieker (1990) studied the impact of a number of environmental risk factors (SES, mother's conversational skills, and a composite including dyadic interaction and attachment status) on the child's 24-month Bayley scores and 36-month Preschool Language Scale (PLS; Zimmerman, Steiner, & Pond, 1979) in a disadvantaged sample. Hierarchical regression analyses revealed that the prediction of the 24-month scores was rather weak. However, 34% of PLS overall language quotient and 46% of Auditory Comprehension was predicted by the risk factors, of which 20% and 19%, respectively, were unique to the dyadic factor (mother-infant interaction and attachment). In a separate analysis comparing a group of children at extreme risk with a group of children at (relatively) low risk within this disadvantaged sample, the authors found that secure attachment operated as a protective factor with the extreme risk, but not the low-risk group.

To summarize the research discussed here, our review supports the notion that attachment quality has impacts on the child's cognitive development. Research in both normal and disadvantaged samples has shown that a secure attachment bond makes for more harmonious interactions in task situations and enhances a child's cognitive competence. A parent who has a securely attached child or is securely attached her/himself, tends to show sensitive scaffolding behavior in problem-solving situations with the child. The research on the relationship between attachment quality and DQ/IQ was the least unequivocal, but this may be due to the fact that the genetic endowment of the child plays a larger part in determining DQ, as measured by standardized tests, than in determining exploratory behavior and general problem-solving skills.

Rogoff (1990) argued that the *freedom to express* seems critical in emotional development and the *freedom to err* critical in cognitive development. The research presented here has shown that both tend to converge, each representing acceptance of the child by the parent, and the parent's sensitively regulating his initiatives.

### Comment

The results of research on the relationship between attachment and cognitive development are definitely promising and we would like to close with a few comments and suggestions for future research. Research on the relationship between attachment

and cognitive development is a relatively recent endeavor, which may in part account for the scarcity of follow-up studies to school age and beyond. Long-term longitudinal studies are necessary if we want to demonstrate that the *early* social-affective bond with the care-giver makes a difference in later cognitive and educational development. The bulk of the studies are concerned with cognitive performance at the toddler and preschool age, when the child has not yet been exposed to a very large number of other possible influential agents, such as teachers and peers. As previously mentioned, the research so far has focused exclusively on asymmetric interactions, which seems to call for study of cognitive development in symmetric relationships.

Lamb *et al.* (1985) criticized attachment researchers' claims that early infant-care-giver attachment is *causally* related to later developmental outcomes, because they did not control for the concurrent quality of the care-giver-child relationship in most of their studies. This criticism is also applicable to the majority of the studies in our review. However, controlling for the concurrent quality of the relationship is required only if the influence of the *early* relationship is to be assessed independently from the concurrent relationship. If one is interested in the influence of attachment on cognition *per se*, controlling for concurrent factors is not very critical. Moreover, the quality of the internal working model of attachment tends to be relatively stable in middle class samples (Main *et al.*, 1985). An assessment of concurrent influences may be especially relevant in samples where attachment quality is subject to greater fluctuation due to environmental stressors.

A caveat in nearly all of the studies is the failure to measure the IQ of the child's care-giver. Although Barocas *et al.* (1991) have claimed that maternal IQ is not likely to be an important influence on the affective component of the maternal teaching style, it is not inconceivable that intelligence may be in some cases related to the quality of a parent's internal working model of attachment. We speculate that an individual with ample intellectual resources may be able to use these resources in such a way that his/her internal working model of attachment would be relatively open to new information and experiences. Intelligence might thus facilitate the development of a secure internal working model, even in individuals who have been exposed to rejecting and/or inconsistent parents in childhood and thus would be expected to develop into insecurely attached adults. However, one could also validly argue the opposite, namely that superior intelligence might increase the likelihood of intellectual defenses, such as rationalization, to stabilize an insecure internal working model by defending against processing information that is incongruent with the existing model. Only empirical research can determine which of these two speculations approaches reality most closely.

Attachment researchers have tended to focus largely on the differences in developmental sequelae between securely and insecurely attached children. Due to small sample sizes, more finegrained analyses, comparing avoidant and ambivalent children or focusing on the disorganized children, are rare. For theoretical insight into the specific developmental consequences of these different attachment strategies such studies are necessary. Main (1990) proposed that in the face of stress, avoidant children minimize attachment in favor of exploration, while ambivalent children maximize attachment to the detriment of exploration. Attachment theory predicts different outcomes with regard to cognitive development for children with these opposite strategies, i.e., avoidant and ambivalent strategies. Children who are classified as anxious-disorganized as infants

seem to be at particular risk, since they are found with high frequency in high-risk samples (children of depressive mothers; Lyons-Ruth, Connell, Grunebaum, & Botein, 1990; alcohol-abusing mothers; O'Connor, Sigman, & Brill, 1987; drug-abusing mothers; Rodning, Beckwith, & Howard, 1989; see van IJzendoorn, Goldberg, Kroonenberg, & Frenkel, 1992, for a review). Main *et al.* (1985) found that 6-year-old children who as infants had been classified as disorganized in the Strange Situation, displayed either directly punitive or anxious, overly bright "care-giving" behavior toward the parent upon reunion after an hour-long separation. The disorganized children performed worst with regard to fluency of discourse and openness in an interview concerning their family, compared to the avoidant, ambivalent and secure children. These behaviors (disfluency, lack of openness, controlling-punitive behavioral styles) are likely to have an impact on a child's cognitive growth.

If future longitudinal studies into the school years are conducted, several different topics might be worth investigating. Attachment quality may have an impact on academic achievement via several different *pathways*. The intricate relationship between the internal working model of relationships and the working model of self draws attention to the area of *self-esteem* (Cassidy, 1990). Anastasi (1984) summarizes studies documenting the influence of general self-esteem on achievement. Insecure attachment is likely to lead to low self-esteem (especially ambivalent and disorganized children) or defensively "inflated" low self-esteem (avoidant children). The latter group might be particularly vulnerable to test anxiety, which in turn would have a negative influence on achievement. A second pathway might be formed by attentional and motivational processes. Achievement is influenced by the time spent at a task, and *time on-task* is greatly influenced by *persistence* (Anastasi, 1984). The attachment studies previously mentioned showed a relationship between attachment quality and persistence in working at problem-solving tasks. Achievement is also influenced by *attention control*. Where one places one's attention, how deeply attention is focused, and how long attention is sustained contributes to cognitive growth (Anastasi, 1984). Some of the studies reviewed have found evidence for a relationship between attachment and attention-curiosity (e.g., Arend *et al.*, 1979; Main, 1973). Also, the *motivation for environmental mastery* is an important contributor to cognitive development. For instance, Yarrow *et al.* (1983, 1984, cited in Anastasi, 1984) found that an infant's motivation for mastery was a better predictor of later competence than early measures of competence. Attachment theory proposes that exploration, which is closely related to mastery motivation, will be greatest in children who can use their attachment figures as a secure base from which to explore and who have internalized this base into a secure representation of other and self. Finally, the quality of the attachment bond may be especially influential in the development of metacognitive skills, such as goal structuring, selecting strategies, and evaluating solutions, all of which tend to have an impact on academic achievement. The pathways are summarized in Figure 1.1.

The model hypothesizes a number of mediating factors for the relationship between attachment quality and cognition. The mediators are not exclusive; other factors, such as behavior problems might also play a role. The model could serve a heuristic purpose in that it indicates possible research directions. It also emphasizes the need for further theorizing on the psychological (and possibly biological) mechanisms that cause affective factors to have an impact on cognitive processes.

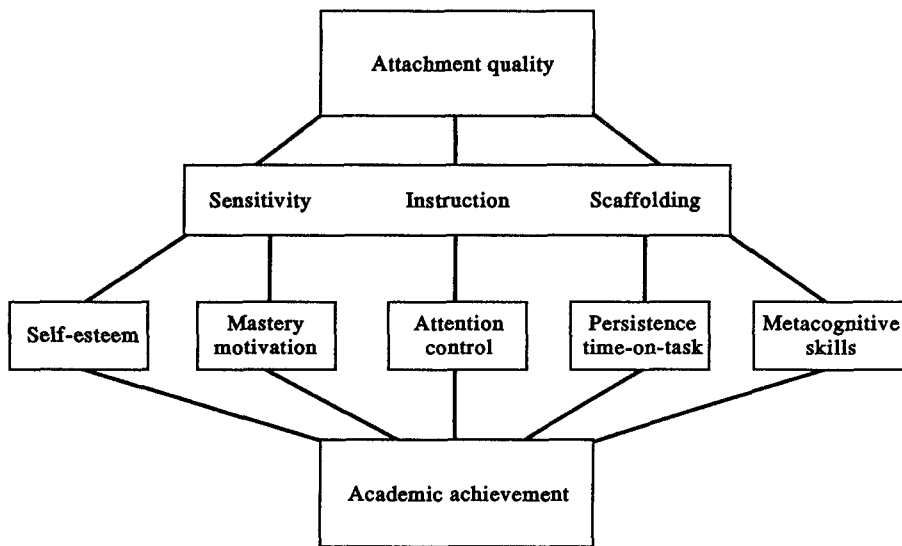


Figure 1 1 A model of pathways of the relationship of attachment to academic achievement

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