Psychological Bulletin
1995, Vol. 117, No. 3, 387–403

0033-2909/95/$3.00

Adult Attachment Representations, Parental Responsiveness, and Infant Attachment: A Meta-Analysis on the Predictive Validity of the Adult Attachment Interview

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About a decade ago, the Adult Attachment Interview (AAI; C. George, N. Kaplan, & M. Main, 1985) was developed to explore parents' mental representations of attachment as manifested in language during discourse of childhood experiences. The AAI was intended to predict the quality of the infant–parent attachment relationship, as observed in the Ainsworth Strange Situation, and to predict parents' responsiveness to their infants' attachment signals. The current meta-analysis examined the available evidence with respect to these predictive validity issues. In regard to the 1st issue, the 18 available samples ($N = 854$) showed a combined effect size of 1.06 in the expected direction for the secure vs. insecure split. For a portion of the studies, the percentage of correspondence between parents' mental representation of attachment and infants' attachment security could be computed (the resulting percentage was 75%; $\kappa = .49$, $n = 661$). Concerning the 2nd issue, the 10 samples ($N = 389$) that were retrieved showed a combined effect size of .72 in the expected direction. According to conventional criteria, the effect sizes are large. It was concluded that although the predictive validity of the AAI is a replicated fact, there is only partial knowledge of how attachment representations are transmitted (the transmission gap).

The theory of attachment was developed by John Bowlby (1973) to explain the nature of a child's tie to his or her parent in terms of its biological function and to account for the disturbing behavioral responses observed in infants subjected to prolonged separations from significant attachment figures. Recently, a central hypothesis within attachment theory has emerged that suggests that parents' mental representation of childhood attachment experiences—as manifested in language—strongly influences the quality of their child's attachment to them. It is hypothesized that an adult's evaluation of childhood experiences and their influence on current functioning becomes organized into a relatively stable "state of mind" with respect to attachment (Main, Kaplan, & Cassidy, 1985, p. 68). This state of mind, or mental representation, is defined as a set of rules "for the organization of information relevant to attachment and for obtaining or limiting access to that information" (Main et al., 1985, p. 67). Individual differences in the parents' mental representation of attachment are thought to determine their responsiveness to the child's attachment signals and, therefore, to direct the child's socioemotional development, particularly the attachment relationship with the parent.

This move to the level of mental representations in attachment theory and research (Main et al., 1985) implies an emphasis on the cognitive organization and reconstruction of childhood attachment experiences in line with work on mental representations in the cognitive sciences (Mandler, 1983; Schank & Abelson, 1977). The representational approach avoids some of the problems inherent in the traditional clinical and retrospective studies on the influence of childhood experiences on adult functioning. Clinical and retrospective data suggest, for example, that abused children are more likely to become abusive parents than children who have not been abused and that, in general, many emotionally troubled adults experienced childhoods with insecure or disrupted attachment relationships. Estimates of the strength of the association between early experiences and later functioning, however, differ widely (Belsky, 1993; Kaufman & Zigler, 1987). The self-report measures used in most of these studies are based on an overly optimistic view of the autobiographical memory capabilities of the respondents to describe their "objective" experiences (van IJzendoorn, 1992; Wagenaar, 1986), and the studies strongly emphasize the continuity of development across the lifespan. Bowlby (1988) suggested, however, that the link between early attachment experiences and adult attachment relationships can be disrupted. For example, positive attachment experiences with a partner or therapist might bring about the reconstruction of an originally insecure attachment representation.

Nature of the Adult Attachment Interview

The introduction of the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985) can be considered a simple but

Parts of this article were presented at the PAOS/RUL symposium Personality, Developmental Psychology, and Psychopathology, Leiden, The Netherlands, June 1993.

This study was supported by a PIONEER award from the Netherlands Organization for Scientific Research (PGS 59-256).

I am grateful to the authors of the studies included in this meta-analysis for their kind cooperation in making the details of their results available and to Mary Main and Erik Hesse for their ideas and comments. I thank Marianne de Wolff, Marian Bakermans-Kranenburg, Hylda Zwart-Woudstra, Marcel de Haas, and Carlo Schuengel for their comments on earlier drafts of this article.

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revolutionary shift in attention from the objective description of childhood experiences to the current mental representation of these experiences and from the contents of autobiographical memories to the form in which this autobiography is presented. The AAI is based on two assumptions: (a) Autobiographical memory is the ongoing reconstruction of one's own past, in light of new experiences, and (b) idealization of the past, particularly negative childhood experiences, can be traced by studying the form and content of the autobiographical narrative separately. The AAI is a semistructured interview that probes alternately for general descriptions of relationships, specific supportive or contradicting memories, and descriptions of current relationships with parents. Parents are asked to provide attachment-related memories from early childhood and to evaluate these memories from their current perspective (George et al., 1985). After a warm-up question about the composition of the family of origin, participants are asked for five adjectives that describe their childhood relationship to each parent and why they chose these adjectives. Also, they are asked to which parent they felt closest; what they did when (as a child) they were upset, hurt, or ill; what they remember about separations from their parents; and whether they ever felt rejected by their parents. Furthermore, they are asked how they think their adult personalities have been affected by these experiences; why, in their view, their parents behaved as they did; and how the relationship with their parents has changed in the course of time. Finally, a portion of the interview focuses on experiences of abuse and of loss of important figures through death, both as a child and as an adult. The 15 questions are asked in a set order, and probes are standardized.

The coding of AAI transcripts is based not on the participants' description of childhood experiences per se but on the way in which these experiences and their effects on current functioning are reflected on and evaluated. The participants' presentation of their experiences is considered relevant only as it is judged to adhere to or violate coherent discourse. (Note, for example, that a participant's autobiographical memories may either support or contradict the adjectives selected to describe the relationship with his or her parents.) The nature of an adult's attachment representation is considered to become manifest in the coherence of his or her discourse during the AAI. Grice (1975) identified four maxims of a coherent discourse: quality ("Be truthful and have evidence for what you say"), quantity ("Be succinct, and yet complete"), relation ("Be relevant"), and manner ("Be clear and orderly"). The coding manual of the AAI presents several scoring systems to evaluate participants' coherence in the use of language (Main & Goldwyn, 1993).

The coding system of the AAI yields three major adult attachment classifications that represent three distinct forms of discourse related to attachment experiences. Participants are classified as *autonomous* or secure when their presentation and evaluation of attachment-related experiences is coherent and consistent and their responses are clear, relevant, and reasonably succinct. Not only individuals with supportive childhood experiences, but also those with apparently difficult backgrounds, can be classified as autonomous if they are coherent in discussing and evaluating these (negative or positive) experiences (Main & Goldwyn, in press). Participants are classified as *dismissing* when they describe their parents in highly positive terms that are unsupported or that are contradicted later in the interview (e.g., "She was loving" and, later, "I went outside when I hurt myself because I knew she would get angry with me"; Main & Goldwyn, 1993). These contradictions—violations of the maxim of quality—appear to go unnoticed. Also, dismissing participants often insist that they are unable to remember childhood attachment experiences, but recent studies indicate that they do not lack autobiographical memory for childhood events not related to attachment (Bakermans-Kranenburg & van IJzendoorn, 1993; Sagi et al., 1994). Main (1990) suggested that dismissing participants tend to minimize their attention to attachment-related experiences. Participants are classified as *preoccupied* when they show a confused, angry, or passive preoccupation with attachment figures. The interview transcripts of preoccupied participants often display violations of manner such as the use of jargon and nonsense words and often contain long, grammatically entangled sentences that violate the maxim of quantity. For these individuals, the interview questions seem to stimulate excessive attention to attachment-related memories at the cost of loss of focus on the discourse context (i.e., once started on a given topic, the participant becomes lost or confused or cannot stop talking; Main, 1993). Both dismissing and preoccupied participants are considered to be insecure (Main & Goldwyn, in press). Finally, participants may be classified as *unresolved/disorganized* with respect to potentially traumatic experiences involving loss or abuse. Indications of lack of resolution of trauma, as assessed in the AAI, are manifested in momentary lapses in the monitoring of reasoning or discourse during the discussion of such experiences. Participants classified as unresolved/disorganized are always given an additional (dismissing, autonomous, or preoccupied) category placement, and unresolved/disorganized participants can and are placed in any of the three categories as alternates (Main & Hesse, 1990).

Validity of the Adult Attachment Interview

In an extensive psychometric study, Bakermans-Kranenburg and van IJzendoorn (1993) found AAI classifications to be stable over a 2-month period in a sample of mothers, as well as independent of differences between respondents in verbal and performance IQ, autobiographical memory not related to attachment, and social desirability. The results of the semistructured interview showed no interviewer effects. The authors concluded that the AAI demonstrated remarkable reliability and discriminant validity. This conclusion was supported by a replication study in a sample of young adults who participated twice in the AAI across a 3-month period and completed a different set of cognitive and memory tests (Sagi et al., 1994). In two other studies, the AAI's long-term stability over 1.5 years (Benoit & Parker, 1994) and discriminant validity with respect to narrative styles (Waters et al., 1993) were established. Waters et al. (1993) interviewed their participants on a non-attachment-related topic, namely their job experiences. They used an interview format

similar to that of the AAI, and they coded the interviews according to a coding system adapted from the AAI system. They found that discourse style during the job interview was not related to discourse style during the AAI. In the same study, a significant association between the Henmon–Nelson Test of Mental Ability (Lamke & Nelson, 1973) and security of adult attachment was found. In five other studies using more established IQ measures, however, this association was absent (Bakermans-Kranenburg & van IJzendoorn, 1993; Rosenstein & Horowitz, 1993; Sagi et al., 1994; H. Steele & Steele, 1994; Ward, Botyanski, Plunket, & Carlson, 1991). The AAI shows only weak associations with content-based retrospective parenting style measures, such as the Parker, Tupling, and Brown (1979) Parental Bonding Instrument and Epstein's (1983) Mother-Father-Peer Scale (van IJzendoorn, Kranenburg, Zwart-Woudstra, Van Busschbach, & Lambermon, 1991; Waters et al., 1993; Zeanah et al., 1993), that have been found to be less predictive of infant–parent attachment (van IJzendoorn et al., 1991). The AAI also seems to be independent of general personality measures, such as the O'Brien (1988) Multidimensional Self-Esteem Inventory (Zeanah et al., 1993). Although more research should be done (e.g., on the relation between the AAI and the Minnesota Multiphasic Personality Interview; Hathaway & McKinley, 1970), the reliability and discriminant validity of the AAI appear promising, and a closer look at its predictive validity seems warranted.

The AAI was developed with the aim of differentiating mental representations of attachment-related experiences in parents whose infants had been judged to differ in patterns of attachment behavior as assessed in the Ainsworth Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978; Ainsworth & Wittig, 1969), a structured laboratory procedure in which infant and parent are involved in two brief separations and reunions. Infants are judged as *secure* if they are eager to explore the laboratory playroom in the presence of the attachment figure but show signs of missing the attachment figure when he or she leaves. On reunion, these infants actively seek interaction, are comforted immediately by contact, and soon return to exploration and play. Secure infants, then, appear able to strike a balance between attachment and exploratory behavior. Infants who are judged as *insecure–avoidant,* in contrast, begin exploring the playroom at once but show little or no response to leave taking. Even in the absence of the attachment figure, they continue to explore the environment and, on reunion, avoid the parent, looking away and turning toward the toys. The continuous exploration of these infants during the Strange Situation can be considered a strategy aimed at minimization of attachment behavior. Spangler and Grossmann (1993) found that, during separation, the heart rates of avoidant infants were as elevated as those of secure infants despite their exploration and that rises in cortisol before and after involvement in the strange situation tended to be greater for avoidant than for secure infants. Infants judged as *insecure–resistant* often become apprehensive immediately on entering the playroom and remain relatively uninterested in exploration. These infants appear preoccupied with the whereabouts of their attachment figures throughout the procedure, show great distress on separation, and combine contact seeking with contact resistance on reunion. In addition, insecure–resistant children cannot be easily comforted, and they remain distressed until the end of the procedure. Having parents who are inconsistently responsive, insecure–resistant infants may need to maximize the display of attachment behavior in potentially threatening circumstances (Main, 1990). Recently, Main and Solomon (1990) discovered a fourth category: *disorganized/disoriented.* These infants show temporary loss of a consistent strategy for dealing with the stress involved in the Strange Situation and display (often briefly) disorganized or disoriented behavior in the parents' presence (e.g., stereotypical movements, anomalous movements, or the freezing of all movement with a disoriented expression). There is no evidence, however, of constitutional factors contributing to this type of behavior in normal samples (Main & Solomon, 1990). In the Spangler and Grossmann (1993) study, disorganized infants showed the sharpest rise in cortisol after the Strange Situation procedure, indicating that they were under considerable stress. Because disorganized behavior is a momentary interruption of an organized strategy, the disorganized/disoriented category is assigned together with a best-fitting, alternative insecure–avoidant, secure, or insecure–resistant classification (Main & Solomon, 1990).

The infant–parent attachment relationship is the outcome of interactions between the infant and the parent in the course of the child's 1st year of life. It is hypothesized that parental representations of past and present attachment experiences affect the degree of sensitivity and responsiveness with which parents react to infant attachment signals. The importance of the role of sensitive responsiveness in the development of an attachment relationship has been documented in both correlational (Ainsworth et al., 1978; Isabella, 1993; Isabella & Belsky, 1991; Smith & Pederson, 1988) and experimental studies (van IJzendoorn, Juffer, & Duyvesteyn, 1995). It has been shown that responsive parents tend to have infants who are securely attached, whereas insensitive or unresponsive parents run a higher risk of having children who are insecurely attached. From the perspective of an adult attachment representation, it may well be that autonomous adults are better able to respond adequately to infant attachment signals than are dismissing or preoccupied adults. More specifically, autonomous adults may not be inclined to preserve a particular (insecure) state of mind by restricting or distorting their perceptions of their infants' signals. Dismissing parents, in contrast, might rebuff their child's attachment behavior in stressful situations because the expression of such behavior may serve as a stimulus for untoward attachment-related memories. It is therefore hypothesized that dismissing parents tend to reject their child's bids for attachment and to create an insecure–avoidant response. Preoccupied parents, on the other hand, may still be focused primarily on their own attachment experiences and therefore unable to attend to their child's attachment signals in a predictable manner. In addition, in attempts to compensate for negative attachment experiences, these parents may at times respond excessively and inappropriately to their children. Inconsistent responsiveness has, in fact, been shown to be related to insecure–resistant attachment status as assessed in the Strange Situation (Ainsworth et al., 1978). Finally, it has been postulated that frightened/frightening parental behavior may be the mechanism linking unresolved adult attachment status with disorganized infant Strange Situation responses. Main and Hesse

(1990) have suggested that a parent still unresolved with respect to traumatic experiences may at times exhibit frightened/frightening behavior. When the parents themselves, rather than the environment, are a source of alarm, the infant's usual strategy for coping with stress may temporarily become disorganized (Main & Hesse, 1990).

In summary, AAI research focuses on two predictive validity issues. First, the crucial test for the AAI's validity is the correspondence between parents' attachment representations and infant attachment. Second, to explain this correspondence, the association between adult attachment representations and parental responsiveness to the child's attachment signals has been explored. Because a number of studies pertaining to each of these validity issues have been carried out during the past decade, a meta-analysis can now take stock of the available evidence, compare the results of the two directions of study, and identify issues of emerging relevance. Furthermore, AAI studies are expensive to carry out because the verbatim transcription of the interviews and the laborious coding procedure are time consuming and require well-trained researchers. It is therefore rare to have large samples. In addition, the participants are usually unequally distributed across AAI categories, and therefore researchers often have to collapse categories before analyzing their data, which results in loss of information. A meta-analysis increases confidence in overall results and can derive information from the finest distinctions in the AAI (the three-way and four-way classifications). It may also reveal the dependency, if any, of study outcomes on study characteristics such as design features.

Method

Database

Pertinent studies were identified through PsycLit and through personal communication with Mary Main, who was one of the constructors of the AAI (George et al., 1985) and its coding system (Main & Goldwyn, 1993) and who, together with Erik Hesse and Mary Ainsworth, has trained most of the researchers in this field. Other leading researchers in the field were consulted as well. Recent proceedings of meetings of the Society for Research in Child Development, the International Society for the Study of Behavioral Development, and the International Conference of Infant Studies were used to update and check the completeness of the current collection of AAI studies. To collect complete and comparable data for each study, I had to communicate with several authors, who proved willing to share unpublished data. I have included only studies in which adult attachment classifications were used (Main & Goldwyn, 1993), because extensive reliability data are available for these classifications (Bakermans-Kranenburg & van IJzendoorn, 1993). The AAIs and the Strange Situations were coded independently, by coders unaware of the other classification, in the studies considered for inclusion here. The focus was primarily on the three-way dismissing, autonomous, and preoccupied classifications of the AAI because relatively few studies included the complicated unresolved/disorganized classification or the related Strange Situation classification for disorganized/disoriented behavior. Data on the four-way attachment classifications were therefore part of the meta-analysis in a more exploratory way.

Concerning the relation between AAI and Strange Situation classifications, I tried to derive detailed information from the publications on the three or four categories separately to enable testing of the correspondence between adult and infant attachment for each of the classifications. In some studies, the Attachment Q-Set (Waters & Deane, 1985) was used as an index of attachment security (Eiden, Teti, & Corns, in press; Posada, 1993). The Attachment Q-Set has been shown to be valid (Vaughn & Waters, 1990), and the measure can be used in a wide age range (12–36 months). It provides a continuous security score but does not differentiate between insecure attachment categories.

For the relation between AAI and parental responsiveness, I did not have specific hypotheses as to the differential responsiveness of the insecure classifications, and therefore I tested only the secure versus insecure contrast. In most cases, the current practice of measuring responsiveness does not really allow for differentiating sharply between dismissing and preoccupied parents' interactions with children, and specific information about the insecure categories was often absent. Studies on the association between adult attachment representations and sensitive responsiveness are still scarce. I therefore included studies on infants as well as on toddlers. Although the concept of sensitive responsiveness is not considered to change across this age period, the measures should be adapted to the specific behavioral repertoire of the children. In studies on toddlers, the emphasis is on emotional support and the quality of assistance parents offer their children in problem-solving tasks (Erickson, Sroufe, & Egeland, 1985).

The selection procedure yielded 14 studies (18 samples) on the relation between AAI and Strange Situation classifications and 8 studies (10 samples) on the relation between AAI classifications and parental responsiveness. Earlier meta-analyses in the area of attachment were based on smaller numbers of studies (Fox, Kimmerly, & Schafer, 1991, 11 studies; Goldsmith & Alansky, 1987, 13 studies). Most of the studies have been published or are in press. From the first set, 16 of 18 samples have been published or are in press; from the second set, all samples have been published or are in press. The inclusion of unpublished studies in meta-analyses is considered important to prevent publication biases from inflating the results (Mullen, 1989; Rosenthal, 1991). Because the AAI has become a frequently used paradigm, the present collection of studies should be considered as the current reflection of a growing number of AAI studies.

Meta-Analytic Procedures

In primary-level studies, the unit of analysis is the participant; in a meta-analysis of several primary-level studies, the unit of analysis is the outcome of those studies. Because of this difference in unit of analysis, the meta-analytic approach must be based on a different set of statistical techniques. These techniques should, for example, take into account the fact that data in meta-analyses are usually based on different sample sizes and therefore lack the homogeneity of variance required for conventional statistics (Mullen, 1989; Rosenthal, 1991). In the present meta-analysis, the statistical tests associated with the pertinent studies were transformed into a few common metrics for effect size: the correlation coefficient (r), the standardized difference between the means of two groups (d), and Fisher's Z.

Several meta-analytic procedures were applied to these common metrics (Mullen, 1989). First, to combine effect sizes according to the weighted Stouffer method, I used the following formula:

$$\text{Fisher's } Z = \frac{\sum w_j \text{ Fisher's } Z}{\sum w_j},$$

where w_j represents the sample sizes of the studies and Fisher's Z represents the Fisher's Z value associated with the effect sizes of the studies.

Second, I used tests for homogeneity of study results to indicate whether such results were sampled from different populations. The formula for the test for homogeneity of effect sizes is $\chi^2_{(k-1)} = \sum(N_j - 3)$

(Fisher's Z − Fisher's $\bar{Z}$)^2, where k is the number of studies included in the meta-analysis. Furthermore, a disjoint cluster analysis of effect sizes (Hedges & Olkin, 1985) was carried out on the basis of the following statistic:

$$U = \left(\frac{\Sigma \sqrt{N_j - 3}}{k} \right) \text{ Fisher's } Z_j.$$

The differences between rank-ordered and adjacently ranked Us were then tested against a preset significance level (in this case, $\alpha = .10$), and tests were conducted to determine whether the set of studies could be divided into significantly different subsets.

Finally, to estimate the probability that the variability of the effect sizes of the included studies could be significantly explained by the predictor variables, I used the following formula (Mullen, 1989):

$$Z = \frac{\Sigma \lambda_j \text{ Fisher's } Z_j}{\sqrt{\Sigma \frac{(\lambda_j^2)}{(N_j - 3)}}}.$$

I included the following predictor or moderator variables in the meta-analyses: (a) parent (whether fathers or mothers were involved in the AAI study), (b) nationality (whether the AAI study was carried out in the United States or in another country), (c) sample selection (whether or not participants were recruited randomly), (d) design (whether the design of the study was retrospective, concurrent, or prospective), (e) age of the children during Strange Situation procedure or responsiveness measurement, (f) socioeconomic status of the sample (lower class, middle class, or upper-middle class), (g) sample size, and (h) publication year. For the meta-analysis on adult attachment and responsiveness, I also included the type of responsiveness measure (free play or instruction) as a predictor. In addition to these predictors, I included amount of training in coding the AAI and in coding the disorganized/disoriented category of the Strange Situation. For the AAI, the lowest training level was the required 2-week workshop, including the coding of some 20 training transcripts afterward; the highest level was participation in more than one (advanced) workshop. For disorganized/disoriented coding, the lowest level was no formal training, the average level was participation in supervised disorganized/disoriented training, and the highest level was participation in repeated training activities (M. Main, personal communication, November 11, 1993).

The predictors were selected because it was hypothesized that they might explain some of the variability in effect sizes between the studies. The Main et al. (1985) study found a stronger association between maternal attachment representations and infant attachment than between paternal attachment representations and infant attachment, and the question arose as to whether this trend would appear across several studies. Furthermore, in attachment theory, the issue of the cross-cultural and intracultural validity of attachment measures has been discussed intensively (van IJzendoorn & Kroonenberg, 1988); the use of the AAI in several countries and socioeconomic groups provided the opportunity to test at least some aspects of its cross-cultural and intracultural validity. It also seemed important to test whether the type of design and the sample selection procedure were associated with the effect sizes. The ideal design, of course, would be a longitudinal one in which the AAI is measured prenatally to prevent any influence of the infant–parent attachment relationship on the parental attachment representation (Benoit & Parker, 1994; Fonagy, Steele, & Steele, 1991). But the AAI has been proven to be stable over time, and the differences between designs were expected to be relatively small. Selected samples were expected to be associated with larger effect sizes. Characteristics of the measures involved (AAI, Strange Situation, and sensitive responsiveness) also seemed to be important predictors; it was expected that, with less training, the effect sizes would become smaller because of a larger error component. Lastly, I included the traditional meta-analytic predictors (i.e., age of participants, sample size, and publication year). Because the measures are less widely used and validated in older children, it was expected that in samples with older children the effect sizes might be somewhat smaller than in samples with younger children. In general, smaller sample sizes and earlier publication dates are expected to be associated with larger effect sizes (Mullen, 1989). Analyses were performed with Mullen's statistical package Advanced BASIC Meta-Analysis. All cross-tabulation data included in the meta-analysis were recomputed with the statistical program Fisher 3.0 (Verbeek & Kroonenberg, 1990).

The meta-analyses on the association between parental attachment representations and infant attachment were supplemented with cross tabulations of the frequencies of the AAI and the Strange Situation classifications. This approach does not allow for homogeneity and predictor testing, but it presents the core data in a way in which AAI studies usually report the findings. Adjusted standardized residuals were computed for each cell. These residuals indicate the direction and size of the deviation of the observed frequencies from those expected from the marginal distributions. A positive deviation means that the cell has a higher proportion of cases in that category than expected; a negative deviation means that the cell has a lower proportion.

Results

Parents' Attachment Representations and Children's Attachment: Three-Way Classifications

The first hypothesis concerned the relation between parents' representations of their own attachment experiences and the quality of the attachment relationship with their children. It was hypothesized that autonomous parents would form a secure bond with their children, whereas dismissing and preoccupied parents were thought to form an insecure–avoidant and an insecure–ambivalent attachment relationship, respectively. In Table 1, data on 18 pertinent samples are presented.

From these studies, I derived the three-way AAI (dismissing, autonomous, and preoccupied) and Strange Situation (avoidant, secure, and ambivalent) classifications. To enable testing a well-defined hypothesis (Mullen, 1989), I cross tabulated AAI and Strange Situation classifications in three separate steps. First, autonomous versus nonautonomous AAI classifications were cross tabulated against secure versus nonsecure Strange Situation classifications. Second, dismissing versus nondismissing classifications were cross tabulated against avoidant versus nonavoidant classifications; data were available for 13 studies. Third, preoccupied versus nonpreoccupied classifications were cross tabulated against ambivalent versus nonambivalent classifications; data were available for 13 studies, and in 3 studies preoccupied or ambivalent classifications were absent (DeKlyen, 1992, and Greenberg, Speltz, DeKlyen, & Endriga, 1991, comparison mothers; M. Steele, Steele, & Fonagy, in press, fathers; van IJzendoorn et al., 1991, fathers). Because the chi-square statistic presupposes expected values of larger than 5, I had to compute one-tailed Fisher exact probability values in some cases (Verbeek & Kroonenberg, 1990). Fourteen studies included mothers, and 4 studies included fathers. The Ward and Carlson (in press; see also Levine, Tuber, Slade, & Ward, 1991) study concerned adolescent mothers, the

Table 1
Meta-Analytic Database for the Relation Between Parental Attachment and Children's Attachment (Forced Classifications)

Study	N	Classification: Autonomous Statistic	Autonomous d	Dismissing Statistic	Dismissing d	Preoccupied Statistic	Preoccupied d
Main & Golwyn (in press; mothers)	32	11.567[a]	1.50	.0016[b]	1.22	.0001[b]	1.75
Grossmann et al. (1988; Bielefeld, Germany; mothers)	20	.0069[b]	1.32				
Grossmann et al. (1988; Regensburg, Germany; mothers)	45	13.343[a]	1.30				
Ainsworth & Eichberg (1991; mothers)	45	16.411[a]	1.52	.0001[b]	1.28	.0015[b]	0.98
van IJzendoorn et al. (1991; mothers)	26	.0074[b]	1.09	.0343[b]	0.76	.50[b]	0.00
Fonagy et al. (1991; mothers)	96	22.537[a]	1.11	18.119[a]	0.96	.1848[a]	0.09
Ward & Carlson (in press; adolescent mothers)	74	12.827[a]	0.92	20.255[a]	1.23	38.728[a]	2.10
Bus & van IJzendoorn (1992; mothers of low socioeconomic status)	32	.52[c]	1.22				
Main & Goldwyn (in press; fathers)	35	4.609[a]	0.78	.0285[b]	0.68	.0025[b]	1.08
van IJzendoorn et al. (1991; fathers)	29	.1225[b]	0.44	.50[b]	0.00	—	—
Radojevic (1992; fathers)	44	9.031[a]	1.02	.0021[b]	0.95	.3515[b]	0.12
Steele et al. (in press; fathers)	90	12.910[a]	0.82	12.021[a]	0.79	—	—
DeKlyen (1992; normal mothers)	24	.0212[b]	0.91	.0484[b]	0.72	—	—
DeKlyen (1992; clinical mothers)	24	.3376[b]	0.17	.0162[b]	0.97	.0086[b]	1.11
Posada (1993; mothers)	49	.003[b]	0.85				
Eiden et al. (in press; mothers)	47	.0205[b]	0.62				
Benoit & Parker (1994; mothers)	85	32.239[a]	1.58	.0007[b]	0.74	25.086[a]	1.31
Zeanah et al. (1993; mothers)	57	20.216[a]	1.48	36.537[a]	2.67	.0002[b]	1.04
Combined	854	.47[c]	1.06	.45[c]	1.02	.42[c]	0.93

Note. Dashes indicate nonapplicability as a result of empty categories.
[a] Chi-square value (1 degree of freedom). [b] One-tailed Fisher exact probability value. [c] Pearson correlation coefficient.

Bus and van IJzendoorn (1992) study involved mothers of very low socioeconomic status, and the DeKlyen (1992; DeKlyen, Endriga, Speltz, & Greenberg, 1992; Greenberg et al., 1991) study included mothers of children with oppositional behavior problems. Fonagy et al. (1991), Ward and Carlson (in press), Radojevic (1992), M. Steele et al. (in press), and Benoit and Parker (1994) used prospective designs; that is, parental attachment was measured before the birth of the baby to prevent the infant–parent attachment relationship from influencing the parental representation of attachment.

Table 1 shows that sample sizes varied from 20 to 96, and the combined samples included 854 dyads. For the secure versus insecure split, the effect sizes (*d*s) ranged from 0.17 (r = .09, Fisher's Z = 0.09) to 1.58 (r = .62, Fisher's Z = 0.72). The combined effect size was 1.06 (equal to a Fisher's Z of 0.51), r = .47 (biserial r = .59; Cohen, 1988). The relation between parental attachment and children's attachment was therefore quite strong (Rosenthal, 1991); the explained variation amounted to 22% (35% on basis of the biserial r), and it would take 1,087 studies with null results to diminish the combined one-tailed p level (Z = 13.29, p = 5.87E-30, one-tailed) to insignificance (Rosenthal, 1991).

Because samples with different types of participants (fathers or mothers) and designs (retrospective, concurrent, or prospective) were lumped together in the overall meta-analysis, the issue of homogeneity and the explanation of the variability in the combined effect sizes were crucial. Tests for homogeneity did not show significant heterogeneity of effect sizes, $\chi^2(17, N = 854) = 18.94, p = .33$, one-tailed. Also, a disjoint cluster analysis (with $\alpha = .10$) did not yield significantly different clusters of samples. These tests suggest that the sample of effect sizes could have been derived from a single population of studies. The samples nevertheless show enough variation in effect sizes to warrant the exploratory search for an explanation of the variability between the studies (Mullen, 1989). Maternal attachment tended to be related more strongly to children's attachment (d = 1.14, r = .50) than did paternal attachment (d = 0.80, r = .37). The standardized normal deviate for difference in the size of the effects was 1.64 (p = .05, one-tailed). Characteristics of the sample did not explain variability between the studies. Manner of sample selection (p = .14, one-tailed) and sample size (p = .16, one-tailed) were not related to differences in effect size. Characteristics of the participants involved in the studies also did not explain the variability: Nationality (p = .23, one-tailed) and socioeconomic status (p = .27, one-tailed) were unrelated to effect sizes. The age of the children was related to effect size (p = .02, one-tailed). In the case of samples with older children, the relation between adult attachment and security of parent–child attachment was weaker. Although a prospective design with prenatal measures for parental attachment would seem to be the most adequate approach, the variability in effect sizes was not explained by type of design. Retrospective designs appeared to yield about the same effect sizes as concurrent and prospective designs (p = .20, one-tailed); for the continuous predictor (a retrospective design was weighted as 1, a concurrent design as 2, and a prospective design as 3), the p value was .37, one-tailed. Amount of AAI training was not related to effect size (p = .13, one-tailed).

For the split between the dismissing classification versus the other classifications, the effect sizes (*d*s) ranged from 0.00 to 2.67 (r = .80, Fisher's Z = 1.10). The combined effect size was 1.02 (equal to a Fisher's Z of 0.49), r = .45. Tests for homogeneity showed significant heterogeneity of effect sizes, $\chi^2(12; N = 661) = 31.57$, p = .002, one-tailed. The disjoint cluster analysis (α = .10) showed that, in comparison with the other studies, the van IJzendoorn et al. (1991) study on fathers yielded an exceptionally low effect size (0.00) and the study of Zeanah et al. (1993) on mothers yielded an exceptionally large effect size. Maternal dismissing attachment was more strongly related to children's avoidance (d = 1.17, r = .50) than was paternal dismissing attachment (d = 0.68, r = .32). The standardized normal deviate for the difference in size of the effects was 2.52 (p = .006, one-tailed). The age of the children was related to effect size (Z = 3.52, p = .0002, one-tailed); in samples with older children, effect sizes were smaller. Furthermore, samples from the United States showed larger effect sizes than samples from other countries (Z = 2.55, p = .005, one-tailed), and random samples showed larger effect sizes than selected samples (Z = 2.42, p = .008, one-tailed). The other moderator variables were not significantly related to differences in effect sizes.

In the case of the preoccupied classification versus the other classifications, the effect sizes (*d*s) ranged from 0.00 to 2.10 (r = .72, Fisher's Z = 0.91). The combined effect size was .93 (comparable to a Fisher's Z of 0.45), r = .42. Tests for homogeneity showed significant heterogeneity in this set of studies, χ^2 (9; N = 518) = 47.56, $p < .001$. The disjoint cluster analysis (α = .10) showed the following clusters: (a) Main and Goldwyn (in press; mothers), Ward and Carlson (in press); Ainsworth and Eichberg (1991), Main and Goldwyn (in press; fathers), DeKlyen (1992; clinical mothers), Benoit and Parker (1994; mothers), and Zeanah et al. (1993; mothers) and (b) van IJzendoorn et al. (1991; mothers), Fonagy et al. (1991; mothers), and Radojevic (1992; fathers). Age of participants appeared to be a significant predictor; the Z value for comparison of effect sizes was 3.16 ($p < .0001$, one-tailed). Samples with older participants showed smaller effect sizes. Samples from the United States differed from samples from other countries; the Z value for comparison of effect sizes was 4.33 ($p < .0001$, one-tailed). The cluster of samples from The Netherlands, Great Britain, and Australia showed a combined effect size (*d*) of 0.47 (r = .23, Fisher's Z = 0.23), whereas the U.S. samples showed a combined effect size of 1.39 (r = .57, Fisher's Z = 0.65). The other moderator variables were not significantly related to effect sizes.

For a portion of the studies, I was able to cross tabulate the Strange Situation and AAI classifications. The Grossmann, Fremmer-Bombik, Rudolph, and Grossmann (1988); Bus and van IJzendoorn (1992); Posada (1993); and Eiden et al. (in press) studies had to be excluded because either continuous scales were used for children's attachment security or the three-way AAI classifications were lacking. In Table 2, the data on 13 samples (N = 661) are presented.

From Table 2, it can be derived that the correspondence between parental and infant attachment classifications was 75% (κ = .49) for the secure–insecure split; the insecure categories were collapsed to obtain a two-way classification for attachment representations, as well as children's attachment. Correspondence for the three-way cross tabulation was 70% (κ = .46). The standardized residuals showed that an autonomous parental attachment representation was less compatible with an insecure infant attachment. The studies with prebirth parental attachment classifications (Benoit & Parker, 1994; Fonagy et al., 1991; Radojevic, 1992; M. Steele et al., in press; Ward & Carlson, in press) showed 69% correspondence for the three-way classifications (κ = .44, N = 389). The cross tabulation did not, of course, allow for homogeneity and predictor testing, and it excluded some of the studies.

Parental Attachment and Children's Attachment: Four-Way Classifications

In Table 3, nine studies with four-way classifications for the AAI (dismissing, autonomous, preoccupied, and unresolved/disorganized) as well as the Strange Situation (avoidant, secure, ambivalent, and disorganized/disoriented) are presented. For the secure versus insecure split, effect sizes (*d*s) varied from 0.11 (r = .04, Fisher's Z = 0.04) to 1.99 (r = .71, Fisher's Z = 0.88). The combined effect size was 1.09 (r = .48, Fisher's Z = 0.52). The diffuse comparison of effect sizes yielded χ^2 (8; N = 548) = 21.63, p = .006, one-tailed, and the disjoint cluster analysis resulted in three significantly different clusters of studies. The first cluster consisted only of the Ainsworth and Eichberg (1991) study, with the largest effect size; the second cluster contained only the Kolar, Vondra, Friday, and Valley (1993) study,

Table 2
Three-Way Cross Tabulation of Parental Attachment Classifications and Infant Attachment Classifications (Frequencies)

Infant attachment classification	Parental attachment classification						Total
	Dismissing		Autonomous		Preoccupied		
	n	Haberman value[a]	*n*	Haberman value[a]	*n*	Haberman value[a]	*n*
Insecure–avoidant	116	12.6	46	−10.3	27	−1.2	189
Secure	53	−10.1	304	12.7	46	−4.8	403
Insecure–resistant	10	−2.5	19	−5.0	40	9.5	69
Total	179		369		113		661

[a] Haberman's adjusted standardized residual.

with the smallest effect size; and the third cluster included the rest of the studies. The Kolar et al. study included a mixed Caucasian and African American sample from backgrounds of very low socioeconomic status (dyads enrolled in a nutritional supplement program). The authors suggested that, in the lower IQ ranges, the correspondence between the AAI and the Strange Situation was minimal because of comprehension problems. A focused comparison between effect sizes and socioeconomic status as a moderator variable yielded a Z value of 11.10 (p = 4.51E-24, one-tailed), and the relation was in the expected direction. Amount of training in coding the disorganized/disoriented category also appeared to be strongly related to differences in effect sizes (Z = 3.42, p = 3.13E-04, one-tailed); less training in the application of the complicated coding system was associated with smaller effect sizes. The other moderator variables were not significantly related to differences in effect sizes.

The effect sizes (ds) for the dismissing category varied from 0.11 (r = .05, Fisher's Z = 0.05) to 2.74 (r = .81; Fisher's Z = 1.12). The combined effect size was .92 (r = .42, Fisher's Z = 0.45). The diffuse comparison of effect sizes showed a significant result, $\chi^2(8; N = 548) = 37.68$, $p < .0001$, one-tailed. The disjoint cluster analysis set the Ainsworth and Eichberg (1991) study apart from the other studies in that the Ainsworth and Eichberg investigation showed a very large effect size. More recent studies showed smaller effect sizes than older studies (Z = 3.02, p = .001, one-tailed); samples with older participants showed smaller effect sizes (Z = 2.83, p = .002, one-tailed); studies from other countries showed smaller effect sizes than studies conducted in the United States (Z = 1.89, p = .03, one-tailed); random samples showed larger effect sizes than selected samples (Z = 2.10, p = .02, one-tailed); and less training in the disorganized/disoriented category was associated with smaller effect sizes (Z = 4.48, p = 3.84E-06, one-tailed). The other moderator variables were not significantly related to differences in effect sizes.

For the split between the preoccupied participants and the other participants, data from only seven studies were available. The effect sizes (ds) varied from 0.00 to 0.96 (r = .43, Fisher's Z = 0.46). The combined effect size was 0.39 (r = .19, Fisher's Z = 0.19). The set of studies was heterogeneous, $\chi^2(6; N = 433) = 14.69$, p = .02, one-tailed. Four studies showed almost no relation between the preoccupied and the insecure-ambivalent classifications (Ainsworth & Eichberg, 1991; Fonagy et al., 1991; Kolar et al., 1993; Radojevic, 1992), whereas the Ward and Carlson (in press), Benoit and Parker (1994), and DeKlyen (1992) studies showed some overlap between these two classifications. The preoccupied AAI and ambivalent Strange Situation classifications were only marginally related when the unresolved category was included in the coding system. The number of preoccupied and ambivalent participants, however, usually formed the smallest of all categories, particularly when the unresolved adult category and the disorganized/disoriented infant category were used; this might have led to a ceiling effect. Samples of higher socioeconomic status showed more correspondence than samples of low socioeconomic status (Z = 4.03, $p < .0001$, one-tailed). Retrospective designs yielded lower effect sizes than concurrent or prospective designs (Z = 2.00, p = .02, one-tailed). The other predictors were not related to effect sizes.

The unresolved adult category predicted the disorganized/disoriented infant category significantly (combined d = 0.65, r = .31, Fisher's Z = 0.32). The standardized normal deviate for the combination of probability levels was 6.28 ($p < .0001$). The M. Steele et al. (in press) study showed the smallest effect size (d = 0.00), whereas the Ainsworth and Eichberg (1991) study showed the largest effect size (d = 2.31, r = .76, Fisher's Z = 0.99). The diffuse comparison of effect sizes yielded $\chi^2(8; N = 548) = 37.15$, $p < .0001$, one-tailed. Again, the Ainsworth and Eichberg (1991) study was separated from the other studies in the disjoint cluster analysis because of its large effect size. Larger samples showed smaller effect sizes (Z = 1.69, p = .05, one-tailed); more recent studies also showed smaller effect sizes (Z = 2.32, p = .01, one-tailed), as did samples with older participants (Z = 2.37, p = .009, one-tailed) and those with concurrent or prospective designs (Z = 1.66, p = .05, one-tailed). The amount of training was strongly re-

Table 3
Adult Attachment Classifications and Strange Situation Classifications: Four-Way Cross Tabulation

		Classification							
		Autonomous		Dismissing		Preoccupied		Unresolved	
Study	N	Statistic	d	Statistic	d	Statistic	d	Statistic	d
Ainsworth & Eichberg (1991)	45	22.367[a]	1.99	29.357[a]	2.74	.50[b]	0.00	25.714[a]	2.31
Fonagy et al. (1991)	96	24.873[a]	1.18	21.327[a]	1.07	.305[b]	0.10	.0128[b]	0.47
Ward & Carlson (in press)	74	23.718[a]	1.37	25.319[a]	1.44	.0001[b]	0.96	.0004[b]	0.84
Radojevic (1992; fathers)	44	11.396[a]	1.18	.0046[b]	0.85	.50[b]	0.00	.0010[b]	1.05
Steele et al. (in press; fathers)	90	15.335[a]	0.91	10.069[a]	0.71			.50[b]	0.00
DeKlyen (1992)	25	.0034[b]	1.28	.0282[b]	0.83			.2108[b]	0.33
DeKlyen (1992; clinical group)	25	.0349[b]	0.78	.0075[b]	1.11	.0783[b]	0.59	4.812[a]	0.98
Benoit & Parker (1994)	88	25.673[a]	1.28	.025[b]	0.43	.0002[b]	0.80	14.529[a]	0.89
Kolar et al. (1993)[c]	61	0.11[a]	0.09	.335[b]	0.11	.33[b]	0.11	0.056[a]	0.06
Combined	548	.48[d]	1.09	.42[d]	0.92	.19[d]	0.39	.31[d]	0.65

[a] Chi-square value (1 degree of freedom). [b] One-tailed Fisher exact probability value. [c] Sample of very low socioeconomic status. [d] Pearson correlation coefficient.

lated to differences in effect sizes (Z = 5.59, p = 1.30E-08, one-tailed): Less training was associated with smaller effect sizes. The other moderators were not related to effect sizes.

The four-way cross tabulation of parental attachment classifications and infant attachment classifications is presented in Table 4. From Table 4, it can be derived that the correspondence for the secure–insecure split was 74% (κ = .49, N = 548) and the correspondence for the four-way classifications was 63% (κ = .42). The adjusted standardized residuals showed that the preoccupied category was the least predictive group. For the prebirth studies, the four-way correspondence was 65% (κ = .44, N = 392).

Parents' Attachment Representation and Parental Responsiveness

The second hypothesis concerned the behavioral correlates of parents' attachment representations. Parents' internal working models of attachment should be expressed in interactive behavior to be effective in shaping children's attachment. It was hypothesized that the coherence of the parents' discourse of their attachment biography would be associated with their responsiveness to the child. Ten studies addressed this issue. In Table 5, data on the pertinent studies are presented.

Because some studies contained more than one indicator of parental responsiveness (Cohn, Cowan, Cowan, & Pearson, 1992; Crowell & Feldman, 1988, Eiden et al., in press; Ward & Carlson, in press) or presented relevant data only on subgroups (van IJzendoorn et al., 1991), separate meta-analyses were performed to combine effect sizes within studies. The resulting effect-size values are listed in Table 5 as basic statistics for the overall meta-analysis. The 10 studies covered 389 dyads, most of which were mother–child pairs. Effect sizes (ds) for the relation between parents' attachment representations and parental responsiveness ranged from 0.35 (r = .17, Fisher's Z = 0.17) to 1.37 (r = .57, Fisher's Z = 0.64). The meta-analytic combination of effect sizes yielded a combined effect size of 0.72 (r = .34, Fisher's Z = 0.35). It would take more than 155 studies with null results to bring the p value of 4.12E-10, one-tailed (Z = 6.19) above the critical alpha level (.05). Parental attachment appeared to account for about 12% of the variation in parental responsiveness, which can be considered a confirmation of the second hypothesis.

Effect sizes were tested for homogeneity, $\chi^2(9; N = 389) = 8.09$, p = .53, one-tailed. Disjoint cluster analysis (p = .10, one-tailed) also did not yield significantly different subclusters. Nevertheless, another attempt was made to explain the variability of effect sizes between the studies (Mullen, 1989). In samples with fathers, the correspondence between adult attachment and responsiveness tended to be stronger than in samples with mothers (Z = 1.67, p = .05, one-tailed). The variation of amount of training in this set of studies was too small to be related to differences in effect sizes. The other moderator variables were not significantly related to differences in effect sizes.

Discussion and Conclusion

The AAI was designed to generate information about the parental contribution to the attachment relationship with the child. This meta-analysis of pertinent studies confirms the results of the pioneering Main et al. (1985) study of the relations between parents' attachment representations and the security of the child's attachment relationship with the parents. In the case of the secure versus insecure classifications, the effect size (d) was 1.06 (N = 854), which, according to conventional criteria, is very large. Cohen (1988) suggested that an effect size of 0.20 should be considered small, an effect size of 0.50 would be moderate, and an effect size of 0.80 should be interpreted as large. The association is comparable to a percentage of correspondence between AAI and Strange Situation classifications of 75% (κ = .49). If it is supposed that, in the case of the secure–insecure split, about half of the infant attachment classifications might be predicted on the basis of chance, parental attachment predicts half of the remaining, meaningful variation in infant attachment. Several study characteristics, such as design and manner of participant recruitment and amount of AAI training, do not appear to be systematically related to variability of effect sizes between separate studies. The more controlled prospective design, in which the AAI is completed before the birth of the child and the Strange Situation procedure is carried out about 1.5 years later, did not yield smaller effect sizes than the

Table 4
Four-Way Cross Tabulation of Parental Attachment Classifications and Infant Attachment Classifications (Frequencies)

	Parental attachment classification								
	Dismissing		Autonomous		Preoccupied		Unresolved		
Infant attachment classification	n	Haberman value[a]	n	Haberman value[a]	n	Haberman value[a]	n	Haberman value[a]	Total n
Insecure–avoidant	62	10.3	29	−6.1	14	1.4	11	−3.6	116
Secure	24	−7.0	210	11.4	14	−3.4	39	−4.7	287
Insecure–resistant	3	−1.2	9	−1.9	10	5.2	6	0.0	28
Disorganized	19	−1.1	26	−6.8	10	−0.1	62	9.3	117
Total	108		274		48		118		548

[a] Haberman's adjusted standardized residual.

Table 5
Parental Attachment and Parental Responsiveness

Study	Measure	*N*	Statistic	*d*
Crowell & Feldman (1988)	Help and support	52	13.2[a]	1.03
	Confusing/controlling	52	14.444[b]	1.24
Combined		52		1.13
Grossman et al. (1988)	Sensitivity (home)	20	.05[c]	0.79
Crowell et al. (1991)	Support (drawing)	49	.05[c]	0.48
	Assistance (drawing)	49	.05[c]	0.48
	Support (story)	49	.05[c]	0.48
	Assistance (story)	49	.10[c]	0.37
	Involvement	49	.50[c]	0.00
	Organization	49	.01[c]	0.70
	Warmth	49	.05[c]	0.48
Combined		49		0.43
van IJzendoorn et al. (1991)	Sensitivity (laboratory; girls)	15	2.450[d]	1.36
	Sensitivity (laboratory; boys)	12	−0.235[d]	−0.15
Combined		27		0.65
Cohn et al. (1992)	Warmth	27	1.980[d]	0.79
	Structure	27	2.516[d]	1.01
Combined		27		0.90
Bus & van IJzendoorn (1992)	Troublesome interaction (reversed)	33	.30[c]	0.63
Ward & Carlson (in press)	Sensitivity (3 months)	80	.017[c]	0.49
	Sensitivity (9 months)	78	.0205[c]	0.48
Combined		78		0.48
van IJzendoorn et al. (1991; fathers)	Sensitivity (laboratory; girls)	18	1.025[d]	0.51
	Sensitivity (laboratory; boys)	11	3.453[d]	2.30
Combined		29		1.11
Cohn, Cowan, et al. (1992; fathers)	Warmth	27	4.183[d]	1.67
	Structure	27	2.739[d]	1.10
Combined		27		1.37
Eiden et al. (in press)	Positive affect	47	1.1851[d]	0.35
	Negative affect	47	2.5296[d]	0.75
	Anxiety	47	1.6951[d]	0.51
	Structuring	47	1.1123[d]	0.33
	Flexibility	47	1.1366[d]	0.34
	Intrusiveness	47	0.2063[d]	0.06
	Connectedness	47	0.3730[d]	0.11
Combined		47	.1718[e]	0.35
Combined		389	.34[e]	0.72

[a] *F* value (*df*s = 1, 50). [b] Chi-square value (1 degree of freedom). [c] *p* value. [d] *t* value (all *df*s are *N* − 2). [e] Pearson correlation coefficient.

retrospective designs of the earlier studies. The stable and large overlap between autonomy of the parent and security of the child is impressive because the measures are different: a semi-structured interview involving the coding of discourse characteristics versus a structured laboratory procedure involving the coding of infants' behavioral responses to reunions with their attachment figure. The statistical significance of this meta-analytic outcome cannot be reduced to insignificance in the next 1,087 studies, even if those studies yield only null results. In comparison with the Rosenthal (1991) fail-safe number, $5k + 10 = 100$ (k = number of studies included), this number is more than 10 times as large. The implication of this fail-safe number is that the file-drawer problem should not be a relevant concern here. It is not plausible that potential unpublished studies with null results residing in the file drawers of disappointed researchers would change the meta-analytic outcome considerably. If the next 20 AAI studies were to show negative results, however, I would, of course, be obliged to reconsider my conclusions.

Within the insecure AAI category, the dismissing and preoccupied classifications do not differ in their strength as predictors of the corresponding Strange Situation classifications when the unresolved category is not used (combined *r*s = .45 and .42, respectively). The unresolved category also shows overlap with the corresponding disorganized/disoriented infant attachment classification (combined $r = .31$). The predictive validity of the AAI, therefore, is not restricted to the global secure–insecure attachment distinction but extends to the three insecure AAI classifications as well. In the past, Strange Situation studies have been criticized because of this restriction (Lamb, Thompson, Gardner, & Charnov, 1985). The implication is that the AAI does meet one of the most important validity requirements: It shows considerable predictive validity on the level of the two-way, three-way, and four-way classifications. If one takes into account that neither the AAI nor the Strange Situation classifications can be coded completely reliably and therefore might contain some error component, the predictive validity figures become even more impressive (van IJzendoorn, 1992). A test's

reliability establishes an upper limit on its validity (Walsh & Betz, 1990), and it may be expected that, with further standardization of training, the effect sizes will turn out to underestimate the "true" degree of concordance between adult and infant attachment classifications. It was found here, for example, that less training in applying the complicated coding system for disorganized/disoriented parent–child attachment leads to weaker associations among the four-way AAI and Strange Situation classifications. Furthermore, several analyses showed that the effect sizes were smaller in samples with older children (preschoolers) than in samples with infants. Attachment measures for infancy have been validated more thoroughly than those for the preschool period (Greenberg, Cicchetti, & Cummings, 1990). Measurement errors related to age and training might, therefore, have lowered the combined effect sizes.

The predictive validity of the AAI is weakest for the preoccupied category, particularly when the interviews are also coded for unresolved status. The preoccupied AAI classification and the ambivalent Strange Situation classification are only marginally related when the unresolved category is included. The meta-analytic results, as well as the cross tabulations, reveal this weak spot. It should be noted, however, that the number of preoccupied parents and ambivalent children is usually the smallest of all categories. In normal populations, the percentage of ambivalent children is about 12% (N = 1,584) when the three-way classification is used (van IJzendoorn, Goldberg, et al., 1992). In the case of the four-way classification, including the disorganized category, the percentage of ambivalent children becomes even smaller (8%; N = 306; van IJzendoorn, Goldberg, et al., 1992). In the current set of samples, ambivalent children constituted only 5% of the total number of children included in the four-way infant attachment classification (see Table 4). The small number of preoccupied parents and ambivalent children may have caused a ceiling effect. Furthermore, a disproportional number of unresolved participants seem to be recruited from the preoccupied category. The boundaries between preoccupation and the unresolved status might be less strict than the boundaries between the dismissing or secure category and the unresolved category. This would partly explain the number of preoccupied parents who have disorganized children. It remains to be explained, however, why preoccupied participants are more liable to be unresolved with respect to loss or other trauma and why they seem to be underrepresented in normal populations as compared with those in the other insecure categories. AAI studies with a specific focus on preoccupied participants are needed to answer these intriguing questions.

Fathers' attachment representations tend to be less strongly related to the security of the child–father attachment relationship than in the case of the mothers (combined rs = .37 and .50, respectively, for the secure–insecure split). Although the overall AAI classification distributions of fathers and mothers are about the same (van IJzendoorn & Bakermans-Kranenburg, in press), a meta-analysis of 5 studies on the interdependence of paternal and maternal attachment representations within couples revealed only a modest association for the secure–insecure split (r = .28; N = 226 couples; van IJzendoorn & Bakermans-Kranenburg, in press). That is, secure women and secure men tend to marry each other more often than chance would indicate, and the same holds true for insecure women and insecure men. But many couples consist of partners with diverging attachment representations (e.g., Cohn, Silver, Cowan, Cowan, & Pearson, 1992). Furthermore, in a meta-analysis of 11 studies on the interdependence of the infant–mother and the infant–father attachment relationship, Fox et al. (1991) found a comparable association for the same secure–insecure split (κ = .31, N = 672). That is, the security of the infant–father attachment relationship is modestly predictable on the basis of the security of the infant–mother attachment relationship. In many cases, a child may have a secure attachment relationship with his or her mother and an insecure relationship with his or her father. Thus, the weaker paternal influence on children's attachment security cannot be explained by the existence of a weak association between mother's and father's attachment representation or a strong association between the infant–mother and the infant–father attachment relationship. In that hypothetical case, mothers might determine the children's attachment relationship to the father through their influence on the children's attachment relationship to themselves.

Two other explanations for the weaker father influence can be suggested. First, the Strange Situation procedure for measuring infant–parent attachment has been developed and validated in infant–mother samples, and there are still not many validity data available to support the use of the procedure in infant–father samples. The Strange Situation therefore might not tap the essential features of an infant–father attachment relationship as adequately as those of the infant–mother attachment relationship. Second, in Western industrialized countries, the division of work and caretaking tasks is skewed. Under these conditions, fathers typically share fewer caretaking tasks and, in particular, do not share the responsibility for child rearing equally with their partners. This may lead to less frequent and less intensive involvement of fathers with their children and, therefore, to a weaker influence on the children's attachment relationships with the fathers. This latter interpretation, however, is not supported by the present finding that the fathers' AAI classifications tend to be somewhat more strongly related to sensitive responsiveness than mothers' classifications. The combination of these factors points to the need for more studies of the role of the father in children's attachment relationships. Children living with two parents may develop a different attachment relationship with each of their parents, and the parents may have diverging attachment representations. How children deal with such a complicated attachment network and under what conditions fathers may influence their children's attachment most strongly remain important issues for future investigation (van IJzendoorn, Sagi, & Lambermon, 1992).

The strong relation between mothers' representations of their attachment experiences and the child's attachment behavior in stressful circumstances might be interpreted as support for the idea that attachment basically indicates three strategies of communication about emotions of insecurity with the self and intimate others across the life span (Bretherton, 1990; Main, 1990): (a) open communication about feelings of security and insecurity, associated with autonomous attachment in adults and secure attachment in children; (b) a defensive strategy of communication about these feelings, associated with dismissing

attachment in adults and avoidant attachment in children; and (c) overinvolved preoccupation with feelings of security and insecurity, associated with preoccupied attachment in adults and resistant attachment in children. Because parents are more influential and effective in determining the parent–child relationship and interactions than their children (van IJzendoorn, Goldberg, et al., 1992), it is plausible that openness of communication is mainly transmitted from parents to children. The prospective studies (Benoit & Parker, 1994; Fonagy et al., 1991; Radojevic, 1992; M. Steele et al., in press; Ward & Carlson, in press) provide evidence for this suggestion.

A crucial issue, then, is how parents transmit their mental representations of attachment to their children. In attachment theory, sensitive responsiveness has, for years, been considered a likely vehicle for this transmission. The meta-analysis described here shows that a relation exists between parents' representation of attachment and their sensitive responsiveness in free-play and instructional settings. The security of parents' attachment explains about 12% of the variation in their responsiveness to their children. Parents appear to express their mental representation of attachment in more or less responsive behavior toward their children. Autonomous parents appear to perceive their children's attachment signals more accurately, and they are more able and willing to react promptly and adequately than are insecure parents. The understanding of the transmission of attachment through responsiveness is, however, far from complete. In Figure 1, some speculations about the transmission gap are graphically presented.

In Figure 1, arrows indicate causal influences. The letter *X* refers to the influence of parental attachment on responsiveness; the current results show that the size of this influence is equivalent to a correlation of about .34. The letter *Y* refers to the influence of parental responsiveness on children's attachment security, and the letter *Z* refers to the influence of parental state of mind on children's attachment through transmission mechanisms other than responsiveness. The total influence of parental state of mind on children's attachment security is equal to (X * Y) + Z and amounts to .47, according to the current results. In a meta-analysis on maternal responsiveness and children's attachment security, Goldsmith and Alansky (1987) found a modest effect size of .68 (r = .32) for those studies using the Ainsworth rating scales for sensitive responsiveness. If this figure is correct, the equation for sources of influence on children's attachment would be (.34 * .32) + Z = .47. In this case, the influence of parental state of mind on children's attachment through transmission mechanisms other than responsiveness would be Z = .36. In other words, the largest part of the influence would operate through mechanisms other than responsiveness as rated by the Ainsworth scales. The Goldsmith and Alansky meta-analysis might, however, have yielded a conservative estimate of the real effect size for the relation between parental responsiveness and children's attachment security. In recent years, for example, several primary-level studies, based on more sophisticated designs and measures, have reported stronger correlations between responsiveness and attachment (Isabella, 1993; Isabella & Belsky, 1991). But even if one supposes that the real effect size (r) is about .40, Z still amounts to .33.

Some speculative interpretations are suggested. First, through Arrows I and II (see Figure 1), unspecified influences on parents' and children's attachment have been represented. A portion of these influences may well be error variation caused by measurement procedures. These sources of error might be correlated and therefore inflate the relation between parents' and children's attachment. Because the measures are quite different (analyses of adult discourse vs. observation of infant behavior), this alternative hypothesis is not very plausible.

Second, Arrows I and II could, in part, describe common sources of systematic variation in both variables. In recent years, temperamental characteristics of children have been thought to explain at least some of the variation in children's attachment behavior (Vaughn, Lefeves, Seifer, & Barglow, 1989). At the same time, there is growing evidence for the idea

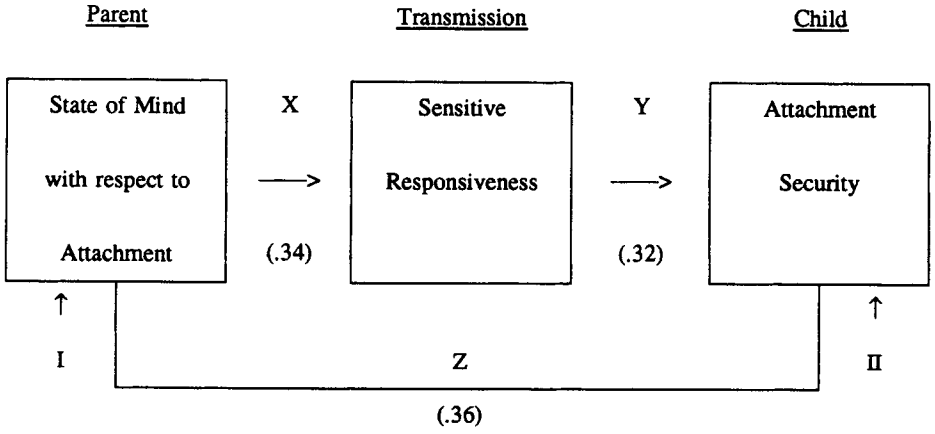

Figure 1. Parents' attachment representation and infant–parent attachment: the transmission gap. X = influence of parental attachment on responsiveness; Y = influence of parental responsiveness on children's attachment security; Z = influence of parental attachment representation on children's attachment through transmission mechanisms other than responsiveness. I = unspecified influences on parents' attachment; II = unspecified influences on children's attachment.

of some form of genetic transmission of basic temperamental characteristics such as activity level and irritability (Goldsmith, 1983; Plomin, DeFries, & McLearn, 1990). In transmitting their genes to the next generation, parents may therefore indirectly shape their children's attachment security, and this influence could (partly) account for Z (van IJzendoorn, 1992).

Third, the existing measures for sensitive responsiveness may not capture all relevant aspects of openness of communication, and other interactive mechanisms might be responsible for transmitting the parental state of mind to the child. In current measures of responsiveness, for example, the interchange between parents' and children's facial expressions of emotions is not strongly emphasized, and in most cases videotaped parent–child interactions do not allow for the coding of this potentially important source of transmission. Affect attunement may have to be emphasized (Haft & Slade, 1989). Furthermore, only a few studies have examined parent–child interactions in natural settings during the child's 1st year of life using global ratings to operationalize the complex responsiveness construct (e.g., Ainsworth et al., 1978). Several studies included in the present meta-analysis focused on the quality of parent–child interactions in the 2nd year of life or in the preschool period, and they used measures adapted to the specific behavioral repertoire of the children. The transmission gap might have been less broad when more studies were carried out during the 1st year of life.

Fourth, a combination of the first three interpretations might explain the gap between the current estimation of the total influence of parents' attachment on infants' attachment and the influence transmitted through parental responsiveness. Correlated measurement errors, genetic influences, and interactive transmission mechanisms yet to be discovered might, in combination, account for the transmission gap. It is important to note that the path coefficients in my model are based on large numbers of observations but a restricted number of convergent measures. In further (primary-level) studies, the use of multiple measures for the same constructs included in my model should be recommended.

Even if the problem of the transmission gap were to be solved, parental attachment representations predict only part of children's attachment security, and there might still be room for discontinuities that cannot be explained on the basis of measurement errors. Some autonomous parents might have insecurely attached children, and some insecure parents might have securely attached children. The study of these exceptions to the general rule is important for generating hypotheses about both the mechanisms and the limitations of the adult attachment paradigm. This paradigm has not yet addressed the ecological context in which the correspondence between the parents' attachment representations and the children's patterns of attachment behaviors is embedded. Most AAI studies have been carried out in Western, industrialized countries with similar family constellations. Within this limitation, it was found here that the studies from the United States showed somewhat stronger associations between parents' attachment and their children's attachment than the studies from other countries, and it was also found that samples of lower socioeconomic status tended to show weaker associations. These results support the possibility of contextual constraints on the predictive validity of the AAI. In Israeli kibbutzim with a home-based sleeping arrangement, the common association between maternal attachment representations and infant attachment was found. Home-based kibbutzim can be compared with child-rearing arrangements in which infants and young children spend more than 40 hr per week in day care (Belsky, 1988). The professional caregiver becomes an important attachment figure. Even in this extended attachment network, maternal and infant attachments are uniquely related. In the idiosyncratic child-rearing context of those Israeli kibbutzim in which infants spend the night in a communal arrangement, however, the transmission of attachment is found to be impeded (Aviezer, van IJzendoorn, Sagi, & Schuengel, 1994). AAI studies should be carried out in a wide variety of cultural settings to explore the limits of the instrument's predictive validity and to specify its contextual constraints.

Although the AAI measures the current mental representation of attachment and is not based on the assumption that adults are able to remember their childhood experiences accurately, the question remains of how crucial early attachment experiences are for the development of adult attachment representations (Sroufe, 1988). Bowlby (1984) contended, on one hand, that the organization of attachment becomes more and more stable and increasingly resistant to change after the first few years, during which the pattern of attachment is a property more of the couple than of the behavioral organization within the child itself. On the other hand, he left room for reorganization of attachment representations on the basis of positive attachment experiences later in life (Bowlby, 1988). In his view, the current attachment representation is formed on the basis of early attachment experiences but is also influenced by later relationships. A trusted friend, spouse, or therapist can provide a "secure base" for exploring and working through adverse childhood experiences and can enable the adult to "earn" a coherent and autonomous attachment representation (Main & Goldwyn, 1993). Some indirect evidence for this possibility has been provided by Rutter, Quinton, and Hill (1990), who found that institution-reared children with many disrupted attachment relationships in early childhood may become competent parents if, in early adult life, they experience the marital support of a nondeviant, warm, and confiding spouse. The set of AAI studies discussed here did not address the important issue of the stability of attachment representations across the individual life span, and they did not delineate the role of the early years in shaping the current adult representations of attachment. More important, because of their design, the studies were not able to focus on lawful discontinuities in the development of attachment representations across the individual life span; that is, it has not yet been studied which factors, under what conditions, disrupt the link between early attachment experiences and adult attachment representations. Therefore, Bowlby's contentions about stability and lawful discontinuities of attachment representations should still be considered speculative. In this respect, exciting new data may be expected from ongoing longitudinal studies measuring attachment representations of adolescents or young adults observed as infants in the Strange Situation procedure. Several longitudinal studies addressing

this issue are now in progress (e.g., those of Sroufe and colleagues in Minnesota, Main and colleagues in Berkeley, and Grossmann and colleagues in Regensburg, Germany).

Another promising line of research is the application of the AAI in the clinical domain. Although attachment theory started out as a theory for explaining deviant development (Bowlby, 1944, 1951), "normal" families and the socioemotional development of their members have been at the center of attachment research during the last three decades. The Strange Situation and the AAI were both developed in middle-class families without clinical characteristics. In search of theory-based instruments for describing and explaining clinical phenomena, clinical researchers have increasingly been using both the Strange Situation (for a review, see van IJzendoorn, Goldberg, et al., 1992) and the AAI (for a review, see van IJzendoorn & Bakermans-Kranenburg, in press). The Strange Situation has been shown to be very sensitive to dysfunctional parenting (van IJzendoorn, Goldberg, et al., 1992). In the clinical domain, the AAI has been welcomed as an instrument that attempts to go beyond symptomatology to the representational core of personality dysfunctioning. Insecure adult attachment representations are considered to be neither a necessary nor a sufficient condition for psychological dysfunctioning in adults or their children. Insofar as perturbations in development are environmentally influenced, it is hypothesized that dysfunctional development may, at least in part, be determined by a basic insecurity in adults as a consequence of their own histories of attachment relationships (Bowlby, 1973, p. 367).

A broad range of clinical problems has been studied to test this hypothesis. Crowell and Feldman (1988); DeKlyen (1992); DeKlyen et al. (1992); Crowell, O'Connor, Wollmers, Spraufkin, and Rao (1991); and Rosenstein and Horowitz (1993) focused on oppositional or conduct disorders in children and adolescents. Benoit, Zeanah, and Barton (1989) studied mothers of babies with a nonorganic failure to thrive. Benoit, Zeanah, Boucher, and Minde (1992) studied mothers of babies with a sleep disorder. Crittenden, Partridge, and Claussen (1991) concentrated on families with maltreated children. Children at high risk were studied by Davidson, Chazan, and Easterbrooks (1993). Finally, Allen and Hauser (1991; Allen, 1993) and Patrick, Hobson, Castle, Howard, and Maughan (1994) dealt with other psychiatric disorders such as depression and borderline personality. In a separate meta-analysis on this set of clinical studies, I found that the autonomy of adult attachment representations is strongly associated with clinical status ($d = 1.03$, $N = 688$), particularly when the four-way classification system including the unresolved category is used (van IJzendoorn, 1993). Thus, the predictive validity of the AAI receives support once more because the instrument systematically and predictably differentiates between families at risk and nonclinical families. On the basis of the current set of clinical AAI studies, however, it appeared difficult to relate type of clinical problem to type of insecure AAI classification in a reliable manner (van IJzendoorn & Bakermans-Kranenburg, in press). Therefore, a major issue for the research agenda remains the association between clinical status and adult attachment representation. Because of the importance of the unresolved and disorganized categories in clinical groups, adequate training in the application of the coding systems becomes even more important for clinical researchers.

In summary, the AAI shows the predicted associations with infant attachment and parental responsiveness, and its predictive validity is also supported in clinical studies. Several issues now become important. First, researchers should try to account for the "transmission gap"; that is, they should study the mechanisms through which parental attachment representations affect children's attachment relationships. The traditional bridge between parents and children—sensitive responsiveness—appears to be insufficient to explain the strong association between parents' and children's attachment. Second, researchers might use descriptions of discordant cases of adult and infant attachment and cross-cultural AAI studies to further refine the theory of adult attachment and, in particular, to explore its contextual constraints. Third, the stability and lawful discontinuity of attachment representations across the individual life span should be studied to determine the impact of early attachment experiences and the influence of attachment relationships later in life. Fourth, the role of fathers in the development of their children's attachment should be studied more intensively to account for the weaker influence of paternal attachment representations on the infant–father attachment relationship and to describe the development of a uniform mental representation of attachment on the basis of multiple attachment relationships. Finally, the associations between different types of mental and developmental disorders and different types of adult attachment insecurity should be studied, as well as the implications for diagnosis and treatment of disorders that are rooted in attachment insecurity.

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Received July 23, 1993
Revision received May 26, 1994
Accepted June 22, 1994 ■