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The Relationship Between Quality of Attachment in Infancy and IQ in Kindergarten

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ABSTRACT. In this study, we hypothesized that securely attached infants would in kindergarten perform better on an intelligence test than anxiously attached children. No difference was expected between children of working mothers (working more than 15 hours outside the home) and children of full-time homemakers. Mother-child pairs ($N = 77$; average age of child was 24 months) were observed during the Strange Situation procedure; three years later, 65 children completed the Leiden Diagnostic Test for measuring intelligence level. Results showed that the securely attached reference group attained the highest IQ. The working status of the mother did not appear to make a difference.

IN ATTACHMENT THEORY, quality of attachment is supposed to have some consequences for future cognitive development: Securely attached children are expected to perform better in problem-solving situations compared to anxiously attached children. In longitudinal research, securely attached children have been more active in exploring the environment at age 2½ (Hazzen & Durrett, 1982) and at age 5 (Arend, Gove & Sroufe, 1979). They have also been more eager to learn (Waters, Wippman, & Sroufe, 1979) and more enthusiastic when solving problems (Matas, Arend, & Sroufe, 1978). Bus &

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Van IJzendoorn (1985) found that the reading abilities of securely attached preschoolers were more advanced. They also appeared socio-emotionally better adapted to explore new environments and phenomena, to solve new tasks, and to overcome frustrating barriers compared to anxiously attached children. Securely attached children seem to be more ego-resilient and more optimally ego-controlled (Stroufe, Fox, & Pancake, 1983; Van IJzendoorn & Van Vliet-Visser, 1986).

In this study, we hypothesized that the greater activity, enthusiasm, and emotional adaptedness of securely attached children in exploring and solving new tasks results in higher overall cognitive performance (e.g., intelligence level) compared to anxiously attached children. Children who were securely attached at 2 years of age were expected to perform better on an IQ test three years later, compared to anxiously attached children. We also hypothesized that the working status of the mother would not be related to the child's IQ because home-makers and working mothers, if their attachment relationship to the child is qualitatively comparable, should create the same conditions for cognitive development (for a review of the literature, see Goossens, 1987).

Method

Subjects

At the average age of 24 months (range: 23 to 25 months), 77 children and their mothers were tested using the Strange Situation procedure. About 50% of the mothers were working 15 hours or more per week outside the home; the rest were full-time home-makers. Eighty-four percent ($n = 65$) of the 77 children participated in the follow-up study three years later. There were no indications that the nonparticipants were a specific subset of the original sample (Van IJzendoorn & Van Vliet-Visser, 1986). The mean age of the children in the second stage of the study was 64 months (range: 56 to 72 months).

Procedures

Strange Situation. The videotapes of the Strange Situations were scored on four interactive scales—proximity, contact, avoidance, and resistance—during the reunion episodes (Ainsworth, Blehar, Waters, & Wall, 1978). Inter-coder reliability ($n = 22$) ranged from .77 to .97. On the basis of these interactive scales and of descriptive notes on the other episodes, the children were classified as A, B or C group children (see Grossmann, Grossmann, Huber, & Wartner, 1981). Agreement was 95.5%; for the subcategories it was 91.5%. The scores on these scales, and the classification, were derived from Goossens (1987). Contrary to Vaughn, Deane, and Waters (1985, p. 112),

but in accordance with Lamb, Thompson, Gardner and Charnov (1985, p. 31), we found the Strange Situation to be a valid procedure for 24-month-old children. Although 24-month-olds appeared to be more active on proximity seeking than younger children (1 to 1½ years old), no age differences were found on the scales for resistance and avoidance or on the classification (Goossens, Van IJzendoorn, Kroonenberg, & Tavecchio, 1985).

Leiden Diagnostic Test. To get an indication of the level of intelligence, each child completed five subtests of the Leiden Diagnostic Test (LDT): block design, word span, repeating sentences, picture indicating, and comprehension. The LDT is a standardized IQ test for Dutch children. Reliability and validity figures can be found in Schroots (1979). Two female experimenters applied the LDT to 35 and 30 children, respectively. A two way analysis of covariance did not show significant experimenter, sex of child, or Experimenter \times Sex of Child effects. The covariate socioeconomic status did have a significant effect, however.

Results and Discussion

In Table 1, the means and standard deviations of intelligence level per attachment classification are listed. The mean IQ score of the sample (111) is well above the average for the Dutch population at the same age (about 100). The socioeconomic status of the sample, however, is also above average. On an occupational index extending from unskilled labor (1) to high-level academic occupations (6), the mean socioeconomic status of the sample is 4.6 (see Van

TABLE 1
Means and Standard Deviations of IQ
per Attachment Classification

Attachment classification	<i>n</i>	IQ	
		<i>M</i>	<i>SD</i>
A1	2	108	13.4
A2	8	110	11.6
B1	18	108	12.6
B2	10	112	12.3
B3	9	120	13.8
B4	14	107	12.9
C1	2	118	3.5
C2	2	114	4.9
Total	65	111	12.6

Westerlaak, Kropman, & Collaris, 1975). In light of this, the relatively high mean score on the intelligence test may be explained by the recruitment of the sample from the higher socioeconomic classes.

Because some of the attachment categories are rather small, a few have been joined together to form four groups: A + C, B1, B2 + B3, and B4. The reference group comprises the B2 + B3 group (secure children). The most negative deviation, the insecurely attached children, were placed in the A + C category. The dependently attached children were classified as B4 (Van IJzendoorn, Goossens, Kroonenberg, & Tavecchio, 1985; Van IJzendoorn, Tavecchio, Goossens, Vergeer, & Swaan, 1983).

To test the hypotheses about the relationship between quality of attachment, working status, and intelligence level, a 2×4 analysis of covariance was computed, with working status of the mother and attachment classification as factors and socioeconomic status as covariate. Results of the ANCOVA showed a significant regression of the covariate: $F(1, 56) = 12.0$, $p = .001$. The higher the socioeconomic status of the subjects, the higher their score on the LDT was. This result is comparable to the outcomes of other studies on the relationship between socioeconomic status and IQ (see Schroots, 1979). Furthermore, the attachment classification appeared to have a significant effect: $F(3, 56) = 3.2$, $p = .03$. The reference group, B2 + B3, had the highest intelligence level. The marginal subcategories B1 and B4 showed the lowest scores on the intelligence test. The anxiously attached children in the A + C group unexpectedly performed somewhat better than the marginal groups. The C group especially performed very well. An anxiously ambivalent relationship between mother and child does not appear to hamper cognitive development in the manner hypothesized. Because of the very small size of the subgroup, however, this outcome has to be replicated in other studies before interpreting it as falsifying evidence. There was no significant main or interaction effect for the working status of the mother.

Two way analyses of covariance (ANCOVAs) on the five subtests resulted in a significant main effect for attachment classification in the analysis on the subtest Comprehension, $F(3, 56) = 3.8$, $p = .016$. The securely attached reference group, B2 + B3, performed best on this verbal ability subtest. The same outcome can be reported for the ANCOVA on Word Span, $F(3, 55) = 3.8$, $p = .015$. (The ANCOVA showed a significant factor by covariate interaction; therefore, a correction for nonparallel slopes was made.) This subtest is also an indication of verbal ability. The influence of attachment quality seems to be greater for the verbal aspect in the intelligence test than for the performance aspect. Securely attached children outperformed the anxiously attached children and the marginal B1 and B4 groups in verbal ability tasks.

The only ANCOVA with a significant main effect for working status of the mother was the analysis of Word Span: $F(1, 55) = 4.5$, $p = .039$. Chil-

dren of working mothers had higher scores than children of full-time homemakers. This result falsifies, of course, the suggestion that inevitably detrimental effects on preschoolers' intelligence level occur if their mothers work outside the home for more than 15 hours per week.

In conclusion, the securely attached reference group, B2 + B3, appeared to attain the highest intelligence level in kindergarten, as measured by the LDT. Recently, Lamb et al. (1985, p. 156) stated that no reliable predictive association between attachment status and later cognitive competence has yet been demonstrated. Although our sample size precludes definitive conclusions, we found some evidence for the cognitive superiority of the securely attached group. Quality of attachment in the second year of life does appear to make a difference for cognitive development. The marginal groups B1 and B4 performed less well, as was expected, and they did not differ much from the anxiously attached children. Ainsworth et al. (1978) emphasized the borderline status of B1 and B4 children, and demanded more research to give them a definitive position in the classification system. In line with earlier studies on the status of B4 children (Van IJzendoorn et al., 1983, 1985), our results indicate a substantial difference in cognitive development between dependently and securely attached children.

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