

DEVELOPMENTAL STUDIES OF PARENT-CHILD RESEMBLANCE IN INTELLIGENCE¹

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A number of developmental studies have reported that the mental test scores of children under two years have little or no relationship to parental ability as measured by the number of years of schooling, ratings of intelligence, or test scores (1, 2, 6). When these same children are retested at later ages, their mental test scores are found to be significantly correlated with parental ability. A crucial question is the extent to which these age changes in relationship are due to environmental factors, or to intrinsic differences in the patterns of mental growth. One way in which this increasing resemblance can be evaluated is by comparing the age changes in the correlations which occur among children reared by their own parents in contrast to those reared apart from their parents.

In this report we shall compare the age changes in relationship for two distinct groups, each of over 100 children, who were tested at various ages between 21 months and 16 years; and then contrast this trend with that reported by Skodak and Skeels for 100 adopted children who were tested four times between their second and fourteenth year (6).

In the Guidance Study at the University of California Institute of Child Welfare, a sample of 252 children who were representative of those born in Berkeley during an 18-month period were divided into equivalent subsamples called the "Guidance" and "Control" groups. This division of the main sample was made on the basis of certain socioeconomic variables before the mental testing program was begun (5). The children in the two groups were first brought to the Institute for mental tests at the age of 21 months. The tests used at this age level and at the subsequent testings during the preschool years were the California Preschool Schedules (*see*

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Table 1). Beginning at six years, the 1916 Stanford Revision of the Binet Scale was the test used, with a shift to the 1937 Revision at age eight. The parents were not given intelligence tests but the number of years of schooling is known for both parents. In addition, in the Guidance group, ratings (on a seven-point scale) of the mothers' intelligence were made when the children were between 3½ and 4½ years by staff members who had had

TABLE I
CORRELATIONS OF THE CHILDREN'S MENTAL TEST SCORES WITH THE MOTHERS' EDUCATION AND RATINGS OF HER INTELLIGENCE

G = Guidance Group C = Control Group

Age in Years	Mental Test Given Children	Number of Cases			RELATION OF THE CHILDREN'S MENTAL TEST SCORES X			
					Mother's Education			Ratings of Mother's Intelligence
					G	C	G+C	G
					<i>r</i>	<i>r</i>	<i>r</i>	<i>r</i>
1¾	Calif. Preschool	117	117	234	.13	.00	.06	.11
2	Calif. Preschool	113	...	113	.07	..	.07	.08
2½	Calif. Preschool	114	...	114	.10	..	.10	.06
3	Calif. Preschool	116	113	229	.10	.08	.09	.17
3½	Calif. Preschool	107	108	215	.27**	.25**	.26**	.39**
4	Calif. Preschool	105	106	211	.22*	.25**	.23**	.38**
5	Calif. Preschool	104	106	210	.45**	.25**	.35**	.53**
6	Stanf.-Binet (1916 Rev.)	109	102	211	.27**	.37**	.32**	.40**
7	Stanf.-Binet (1916 Rev.)	104	104	208	.35**	.33**	.33**	.51**
8	Stanf., Form L	100	98	198	.34**	.32**	.33**	.54**
10	Stanf., Form L or M ..	105	92	197	.33**	.34**	.34**	.52**
12 or 13	Stanf., Form L or M ..	98	94	192	.38**	.38**	.38**	.54**
14 or 15	Stanf., Form L or M ..	90	78	168	.39**	.30**	.35**	.59**

* Significant at the 5 per cent level.

** Significant at the 1 per cent level.

many hours of discussion with the mothers.² The correlation between these ratings of the mothers' intelligence and the number of years of schooling of the mothers is +.73. In fact, in this study all measures which reflect the ability of the parents were intercorrelated to about the same extent (socioeconomic status correlates with both mothers' and fathers' schooling +.73; mothers' and fathers' schooling correlate +.74). The

² Ratings used were an average of these ratings made independently for each mother by a psychiatric social worker and Dr. Jean W. Macfarlane, Director of the Guidance Study. The ratings were made without reference to the mental test scores of the children who were tested on the then new California Preschool Scales. These scales were scored in final form several years after the parental ratings were assigned.

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relationship between these indices of parental ability and the children's mental test scores was reported earlier for the age period 21 months to eight years (2).

The correlation between the education of the mothers and the children's mental test scores at 21 months was negligible but between 3 and 3½ years, the relationship became significant (see Table 1). To check the

EDUCATION OF MOTHER IN RELATION TO CHILD'S IQ

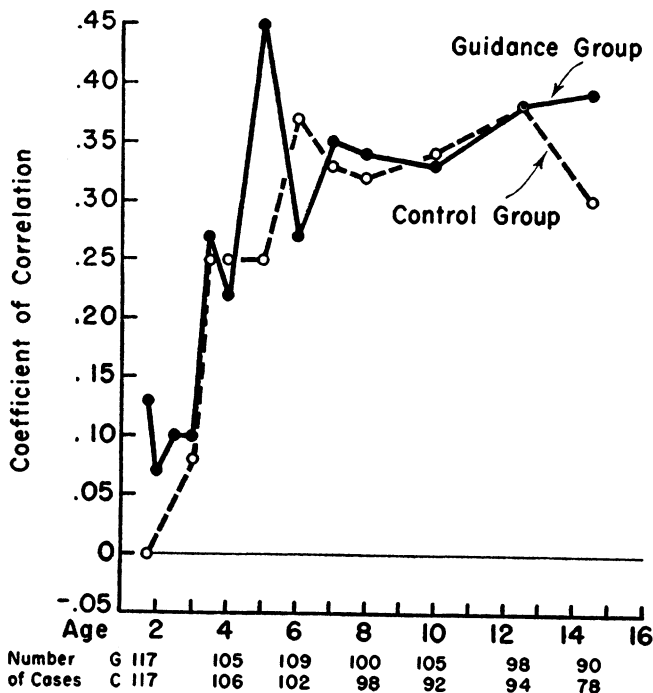


FIGURE 1—Education of mother in relation to child's IQ.

validity of this age trend, correlations were computed separately for the two subsamples of the total Guidance Study sample. The results of this comparison are shown in Table 1 and Figure 1. The finding that these subsamples exhibit essentially the same age changes in relationship suggests that the trend is a valid one and would be duplicated in comparable developmental studies; in fact, Bayley (1) has reported a similar trend in the Berkeley Growth Study.

In a study of 100 adopted children, Skodak and Skeels report that adopted children whose true mothers tested quite low in intelligence earned mental test scores which were substantially higher than those of their mothers (6). In addition, these authors report the relation of various

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indices of ability of the true mothers to the mental test scores of their children at four successive age levels. It is these correlations which interest us and which we wish to compare with the relationships obtained in the Guidance Study for children reared by their own mothers.

Regardless of the index used (IQ or number of years of schooling), Skodak and Skeels found that the correlation between the *true* mother's ability and her child's mental test scores at approximately two years of age is insignificant. By the time the adopted children reached four years on the average, the correlations between their IQs and the true mothers' education and intelligence are $+ .31$ and $+ .28$, respectively. These correlations are significant at the 5 per cent level. In contrast these authors found *no* relationship at any age between the mental test scores of these same children, who were adopted in the first months of life, and their *foster*, or adopting, mothers' education. These highly significant results are especially interesting when compared with the findings for the groups of children who have always lived with their own parents (1, 2).

In Figure 2, the mother-child correlations for the total Guidance Study sample (combined Guidance and Control groups) are compared with those reported by Skodak and Skeels for the adopted children. It will be noted that the true mother-child correlational age trends in their study and ours are as alike as those shown in Figure 1 for the two subsamples of our group. The similarity in the changing relationships with age for the Guidance Study group who always lived with their parents as compared with the Skodak-Skeels group who never lived with their parents is impressive. However, the final correlations between the index of maternal ability (number of years of schooling) and the children's mental test scores is only $+ .35$ for the children reared by their true parents; and $+ .32$ for the children not reared by their true parents, indicating that less than 15 percent of the variance in the children's scores can be accounted for by this very rough index of the true mother's ability.

The fact that the individual differences in the adopted children's mental test scores are not related to the foster mothers' education at any age is also shown in Figure 2. This finding is surprising since the average IQ of the adopted children at $13\frac{1}{2}$ years was 106, while the average IQ of their true mothers was reported as only 86. A regression upward toward the mean is to be expected but not beyond the mean. Our interpretation of these findings is that the educational level of the true mother roughly indicates her intellectual capacity and this capacity is at least somewhat determined by genetic factors which she, in turn, transmits to her children. The difference in the level of ability of the adopted children and their true mothers may be due in part to systematic undermeasurement of the true mothers' intelligence and in part to the generally favorable environment provided by the foster families. It is conceivable, and it seems to us probable, that in this sample certain unmeasured family variables such as the affection and emotional support given the foster children were as important as

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purely intellectual stimulation in nurturing the mental growth and performance of these foster children.³

A better indication of the age changes in the mother-child resemblance would probably have been obtained if optimal test scores had been available for the mothers in these two studies. In the Skodak-Skeels investigation, 63 of the mothers were given individual mental tests but these mothers

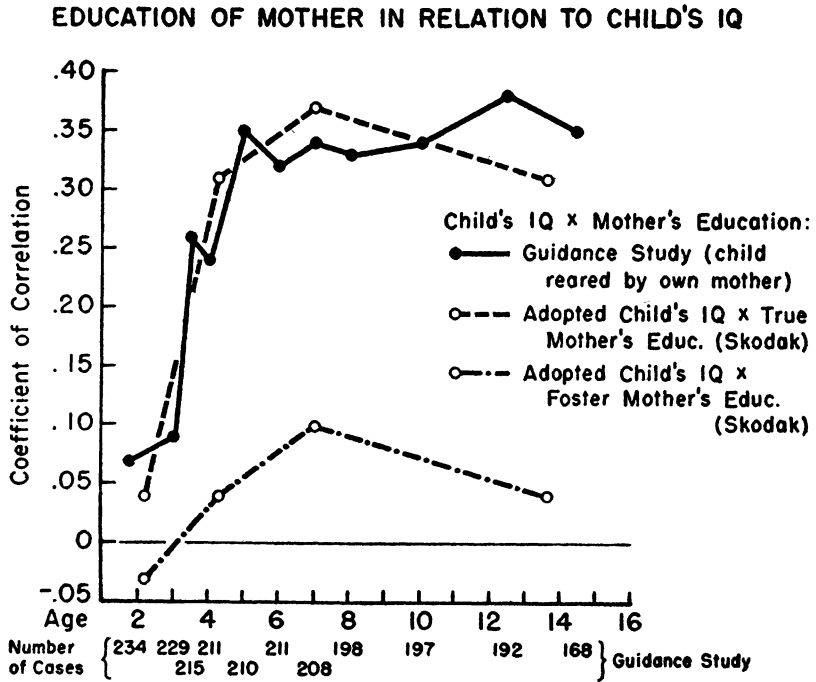


FIGURE 2—Education of mother in relation to child's IQ.

were tested shortly after the babies' births "usually after the mother had decided to release the baby for adoption." The authors note that "these IQs were consistent with other evidence of the mental adequacy of the mothers" and the "tests were never given when the mother was ill or obviously upset," but it is unlikely that these IQs reflect the optimum performance of which these mothers might have been capable under more favorable conditions. However, even these IQs showed age trends in relationship to the mental test scores of the children which were similar but tended to run a little higher than those obtained for the mothers' education.

³ The importance of various non-intellectual environmental factors to the mental test scores of the children in the Guidance Study will be presented later in a report entitled "Mental Growth in Relation to Intellectual and Non-Intellectual Parental Variables."

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The mother-child correlations in the Guidance Study are higher when based on ratings of the mother's intelligence than when education is used as an index of the mother's ability (Table 1). They are, in the former instance, comparable with the correlation of .49 reported by Jones in a study in which testing procedures for both parents and children were carefully controlled (4).

INTELLIGENCE OF MOTHER IN RELATION TO CHILD'S IQ

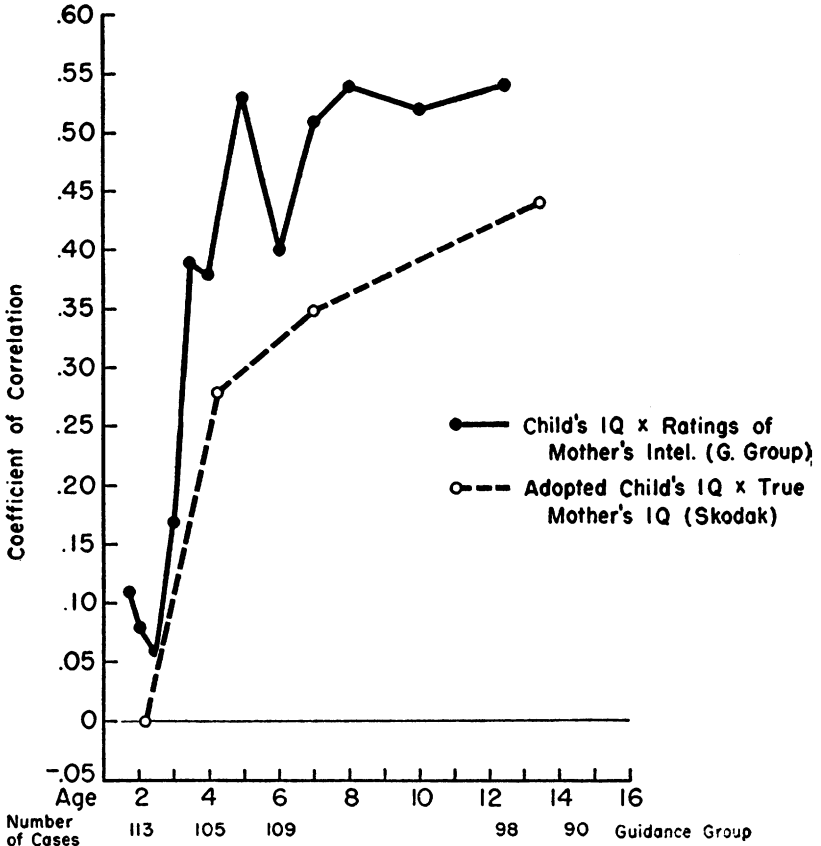


FIGURE 3—Intelligence of mother in relation to child's IQ.

In Figure 3, the age change in mother-child resemblance in intelligence reported by Skodak and Skeels for 63 of the adopted children is compared with the findings for the Guidance group where the measure of maternal intelligence was an averaged rating. The correlations obtained in the Guidance group are higher than those reported for the adopted children. This latter difference may be due to differential environmental stimulation

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by the more intelligent mothers in the Guidance group but there is also the likelihood in the Skodak-Skeels study of an unequal effect of stress on the mothers' IQs. These findings certainly suggest that the variations in the magnitude of the correlations depend somewhat on the sensitivity of the measures of maternal intelligence, but the question of whether the differences in the correlations shown in Figure 3 are entirely attributable to differences in the validity of the measures of mothers' intelligence cannot be answered by these studies.

TABLE 2

CORRELATIONS OF THE CHILDREN'S MENTAL TEST SCORES WITH THE FATHERS' EDUCATION

G = Guidance Group C = Control Group

Age in Years	Mental Test Given Children	Number of Cases			Relation of the Childrens' Mental Test Scores to the Father's Education		
		G	C	G+C	G	C	G+C
1 ¼	Calif. Preschool	117	117	234	.10	.06	.07
2	Calif. Preschool	113	...	113	-.05	..	-.05
2½	Calif. Preschool	114	...	114	.03	..	.03
3	Calif. Preschool	116	113	229	.01	.19	.11
3½	Calif. Preschool	107	108	215	.17	.25**	.21**
4	Calif. Preschool	105	106	211	.17	.30**	.24**
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14 or 15	Stanf., Form L or M	90	78	168	.48**	.26*	.37**

* Significant at the 5 per cent level.

** Significant at the 1 per cent level.

The correlations between the number of years of schooling of the father and the children's mental test scores at successive ages are reported for the Guidance and Control groups separately and combined in Table 2. Although there are a few coefficients in this table which appear too high or too low in relation to the trend (e.g., the correlations of +.40 at five years for the Guidance group and +.43 for the Control group at seven years), the age changes are similar to those found between the mental test scores of these children and the mothers' education. The relationship between the number of years of schooling of the father and the children's test scores is negligible at 21 months (+.07) and 3 years (+.11) but is

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significant at the 5 per cent level at 3½ years (+.21) and reaches a high of +.40 at 7 years, thereafter ranging from +.34 to +.39. The trend of the age changes in relationship between the children's mental test scores and the fathers' schooling is similar in the two groups (Guidance and Control) in spite of the above mentioned inconsistencies. In Figure 4, the correlations for these two groups combined are compared with the findings for adopted children in relation to the education of their true fathers. The correlations

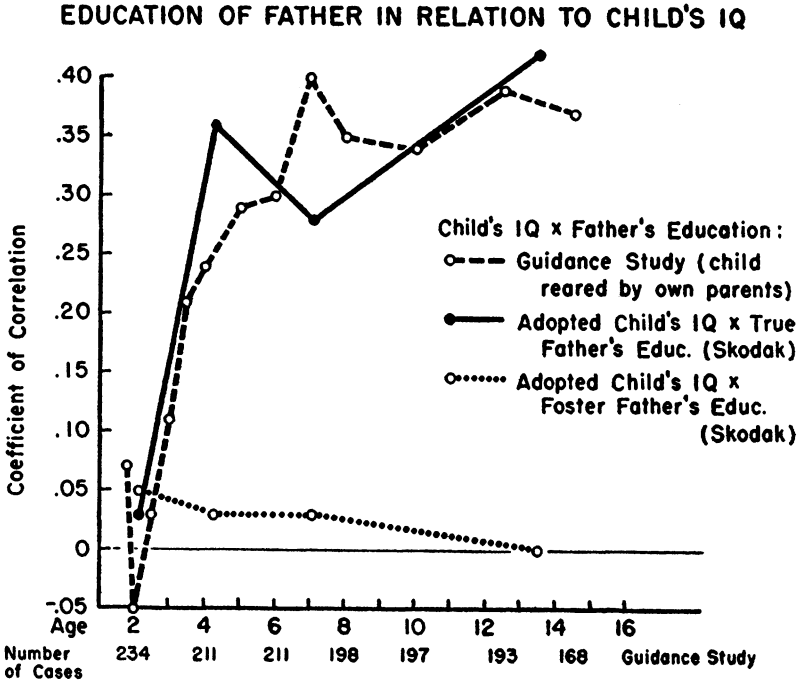


FIGURE 4—Education of father in relation to child's IQ.

between the mental test scores of the adopted children and the education of their true fathers were computed from the raw data presented by Skodak and Skeels (*see* Table 3). The impressive fact shown by Figure 4 is that the trend in relationships for the adopted children resembles so closely that found for the children reared by their own parents. Since the relationships obtained in the Guidance Study are no higher than those found for the adopted children, we may infer that the more highly educated fathers do not offer differentially more stimulating environments to their children. This inference is confirmed by the findings for the foster fathers shown in Table 3.

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TABLE 3

CORRELATIONS BETWEEN THE CHILDREN'S MENTAL TEST SCORES AND THE FATHERS' EDUCATION (SKODAK-SKEELS)

<i>Average Age of Adopted Children in Years</i>	<i>Mental Test Given Children</i>	<i>True Father's Education × Child's IQ</i>		<i>Foster Father's Education × Child's IQ</i>	
		<i>N = 60</i>	<i>N = 100</i>	<i>r*</i>	<i>r</i>
2-2	Kuhlman or 1916 Stanford-Binet			+ .03	+ .05
4-3	Stanford-Binet (1916 Rev.)			+ .36**	+ .03
7-1	Stanford-Binet (1916 Rev.)			+ .28**	+ .03
13-6	Stanford, 1937 Revision			+ .42**	+ .00

* These correlations were computed from the original data published by Skodak and Skeels (6).

** Significant at the 1 per cent level.

INDIVIDUAL MENTAL GROWTH RECORDS

The mental growth patterns for individual children have been considered in relation to the parental ability. The method used was to convert both the children's mental test scores and the average of the number of years of schooling of the parents into standard scores, and then note the age level at which the child's mental test SD score reaches the parental SD score with respect to educational level. Using this technique, Bayley presents three cases from the Berkeley Growth Study in which the mental test SD scores of the children reaches the parents' relative educational level at ages 4, 8, and 16 years, respectively, after a period of scoring above or below the parental status (1). Inspection of individual mental growth records in the Guidance Study also suggests that there are marked differences in the ages at which the children's scores reached the parental level of ability, as indicated by their education. Twelve cases are shown in Figures 5, 6, 7.

In Figure 5, the mental test scores of four children of highly educated parents are shown. These children begin to resemble their parents in ability at ages 2½, 4, 8, and 18 years, as judged by the comparison of the standard mental test scores of the children and a standard score based on the averaged years of education of the two parents.

Figure 6 shows the low or decreasing IQs of children of parents of average or less than average education. Here again, the children vary with respect to the age at which their mental scores are comparable with the educational level of their parents.

In Figure 7, the scores of four children whose IQs fluctuate markedly may be seen in relation to their parents' education level. At certain ages,

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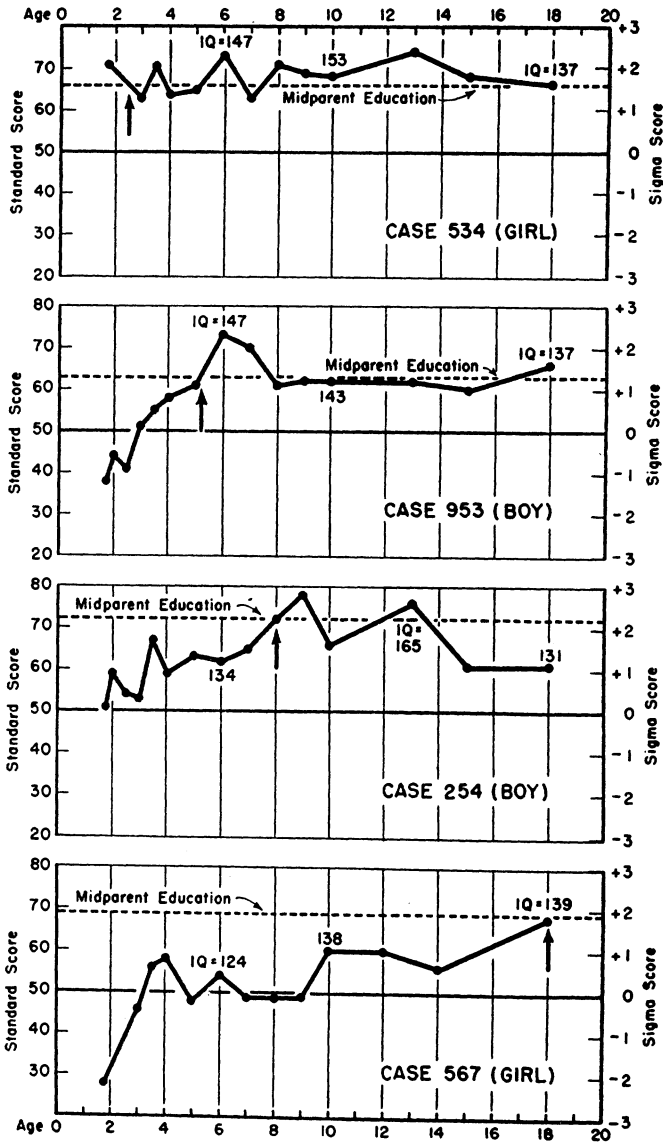


FIGURE 5—High or increasing IQs of children of highly educated parents.

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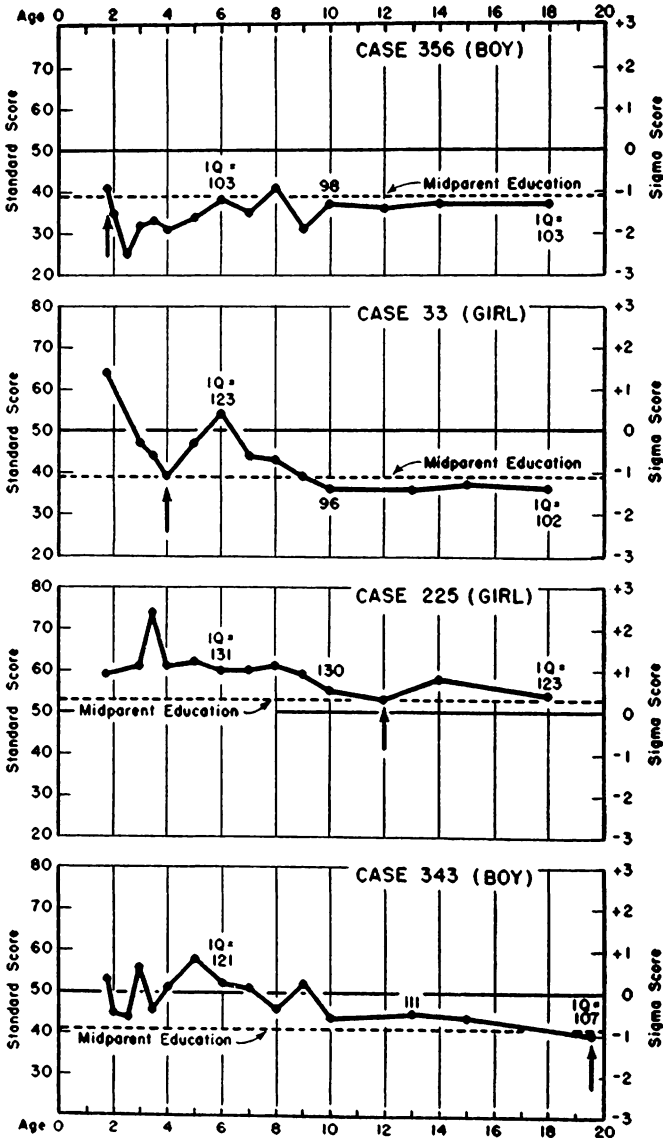


FIGURE 6—Low or decreasing IQs of children of parents of average or little education.

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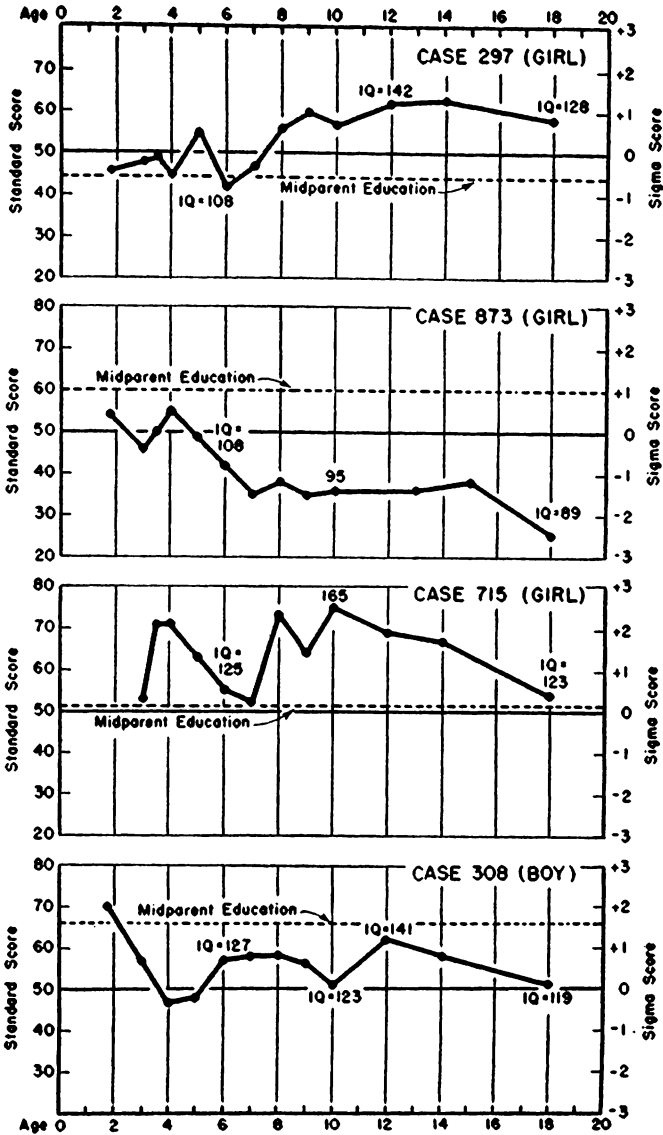


FIGURE 7—Children whose IQs vary in relation to parental education.

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the IQs of these children reach a status which is comparable with that of their parents and then deviate to a position which is substantially above or below that of the parents. Case 873 is an unusually shy, inhibited girl who was so withdrawn that she did not want to go to school. The mother of this girl said that she was less precocious than her other children so perhaps this decreasing IQ may be accounted for in part by emotional factors and in part by the fact that she has less capacity than would be expected in this family. Consideration of these cases suggests the great individuality in patterns of mental growth and that, although the trend is toward an increasing resemblance between parents and children, the patterning varies markedly.

SUMMARY AND CONCLUSIONS

The increasing parent-child resemblance in mental ability found for two groups of children reared by their own parents has been compared and found to be similar to that reported for a group of children reared from early infancy by foster parents (6). The ability measures used in both studies were, for the children, individually administered intelligence tests, and for the parents, the number of years of schooling; and additionally for the mother, test scores and ratings. The finding that the parent-child resemblance in ability follows the same age changes in the two studies, even though the true parents did not rear the children in the Skodak-Skeels group, suggests that the existing relationship is largely due to genetic factors which tend to become manifest in the child during the later preschool years. Although the group age trends in relationship for both the adopted and non-adopted children are similar, the extent of the relationship is of low predictive value. There were wide individual differences in the ages at which children achieved mental test standard scores which were comparable with their parents' standard scores.

The fact that the parent-child resemblance is no greater for children reared by their own parents and the further fact reported by Skodak-Skeels of no relationship between the children's mental test performance and the foster parents' ability suggest that the education of the parents per se is not an environmentally important factor and that the obtained parent-child correlations reflect individual differences which are largely genetically determined.

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