NATURE-NURTURE AND INTELLIGENCE: THE TWIN AND ADOPTION STUDIES AGREE

JOSEPH M. HORN, JOHN C. LOEHLIN, LEE WILLERMAN
Department of Psychology, University of Texas, Austin, Texas, USA

A large-scale adoption study is underway at the University of Texas where IQ test scores are available for over 1200 women who gave up their children for adoption immediately following delivery. The adopted children and their adoptive families are now being located and tested and, if current trends continue, complete data should eventually be available on over 400 families. About half of these families will contain two or more adopted children or both adopted and natural children. At present, data are available for 89 families. The results are consistent with twin data and support a genetic hypothesis. The biological mother-adopted child correlation is 0.37 whereas the adoptive mother-adopted child and adoptive father-adopted child correlations are only 0.22 and 0.04 respectively. There are 59 pairs of unrelated children reared together in this sample and the IQ correlation for these children is only 0.13.

Identical twins (even those separated near birth) are more alike in intelligence test scores than fraternal twins. This finding may mean that individual differences in intelligence are determined substantially by genetic differences between individuals. Critics of these twin studies have suggested that twin results should not be generalized to the larger population of singletons, particularly since the trait of intelligence is influenced by being born a twin. The average IQ of twins is at least a third of a standard deviation below the average IQ of singletons of the same socioeconomic class, and, for this and other reasons, data from other sources are needed before the twin results can be generally accepted.

Data from adopted children provide one source of information to supplement the twin data, and a large scale adoption study is underway at the University of Texas where IQ test scores are available for over 1200 women who gave up their children for adoption immediately following delivery. The adopted children and their adoptive families are now being localed and tested with a battery of IQ and personality tests. If current trends continue, complete data should eventually be available on over 400 families, and about half of these families will contain two or more adopted children or both adopted and natural children.

Data are currently available for 89 families and the results are consistent with the twin data and support a genetic hypothesis. Table 1 gives a summary of the data for the adoptive mothers (AM), adoptive fathers (AF), biological mothers (BM), and adopted children (AC) studied so far. The entries below the diagonal are the sample sizes and the entries above the diagonal are the correlations between the parents' Revised Beta IQs and the child's Wechsler or Stanford-Binet IQ. The AC column contains the correlations of greatest interest. Here you see that the biological mother-adopted child correlation is 0.37 whereas the adoptive mother-adopted child and adoptive father-adopted child correlations are only 0.22 and 0.04, respectively. Table 2 shows that an even better fit to a genetic hypothesis is obtained when the parent-child correlations are computed for the 62 oldest children in the sample. For this group, the biological mother-adopted child correlation is 0.44 whereas the adoptive parent-adopted child correlations remain the same as in Table 1. An earlier adoption work (Skodak M., Skeels H. 1949). A final follow-up study of one hundred adopted children (J. Genet. Psychol. 75: 85-125) had indicated that adopted children became more like their biological mothers than their adoptive parents as they grew older and our cross-sectional study seems to be replicating their longi-

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Table 1. *IQ correlations between parents and adopted children*

	AM	AF	BM	AC	
AM	89	0.31	0.35	0.22	These correlations are between parent's Revised Beta IQ and the child's Wechsler or Stanford-Binet IQ. These correlations have not been corrected for unreliability and restriction of range, but the latter is approximately equal for biological and adoptive parents.
AF	85	86	0.28	0.04	
BM	110	104	111	0.37	
AC	138	131	107	138	

tudinal one. It is also important to note that our biological mother-adopted child correlation for the older children is close to the biological mother-adopted child correlations for Skodak and Skeels' children at their oldest even though our biological mothers have an average IQ of 107 and the average IQ of the mothers in Skodak and Skeels was 86. The two studies together cover the IQ range from 55 to 140 and together make for a representative sample of biological mothers.

Table 1 also indicates that placement of the adopted children was selective. The correlations of 0.35 and 0.28 between biological mother and, respectively, the adoptive mother and father mean that all the parent-child correlations are inflated. However, the partial correlation corrections for selective placement only lower the biological mother-adoptive child correlation by 0.04 whereas the adoptive mother-adoptive child correlation is halved.

Table 2. *Parent child IQ correlation by age of child*

	AM	AF	BM
Child aged 9 or over (N = 62)	0.23	0.03	0.44
Child aged 8 or under (N = 76)	0.22	0.02	0.32

With a larger sample it will soon be possible to estimate directly the influence of selective placement on parent-child correlations. About 20% of the adoptive families have natural children and it is possible then to correlate the IQ of the biological mother with the IQ of the natural child born to the parents who adopted her baby. This correlation can only reflect the effect of selective placement and is the correction that will be used in future reports.

In adoption studies where all the children in the adoptive families are tested it is possible to check the heritability estimates derived from parent-child correlations with heritability estimates made from the correlations of unrelated children reared in the same family. For these children the common family environment is the only source of covariance and if such environmental factors are important contributors to the 0.5 correlation between biological sibs then these adopted sibs should correlate close to 0.5 as well.

So far, we have 59 pairs of unrelated siblings living in the same families and the correlation between their IQ scores is only 0.13. As an estimate of the influence of the environment this correlation agrees reasonably well with the average of the adoptive mother-adopted child and adoptive father-adopted child correlations presented in Table 1.

The various heritabilities that can be derived from these two sets of adoption data agree reasonably

well also and, most importantly, they agree with most of the estimates derived from comparisons of MZ and DZ twins and the studies of separated MZ twins.

It is true that twin investigators in the area of the cognitive processes usually and unavoidably violate some of the assumptions for the ideal use of the twin method. The question is really, however, just how robust are the assumptions? While adoption studies are not without problems of their own, fortunately most of these problems are unique to the adoption approach and hence the adoption results can be used to validate the twin method. In the area of intelligence the convergent validity between the two methods is very good.

When the study is completed the large sample size will make possible a number of informative analyses. The reaction range for intelligence can be estimated from the IQ scores of children with lower than average IQ biological mothers and higher than average IQ adoptive parents. The effects of selective placement, common family environment, parent-child influences, and genetic resemblance, can be separated and estimates made from the matrix of IQ correlations involving biological mothers, their adopted-away offspring, adoptive parents, and the natural children of the adoptive parents.

Dr. Joseph M. Horn, Psychology Department, University of Texas, Austin, Texas 78712, USA.

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