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The Minnesota Transracial Adoption Study: A Follow-Up of IQ Test Performance at Adolescence

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Members of 101 transracial adoptive families were restudied 10 years after the initial research (Scarr & Weinberg, 1976, 1978). In this article we report on IQ scores and school achievements of the black and interracial children and other adopted children, and the biological offspring of the adoptive families at mid- to late-adolescence. Because of changes in tests and in norms, members of the adoptive families, including parents, scored on average lower at Time 2 follow-up than at Time 1. There were no differences between the transracial adoptees and the biological offspring of the adoptive parents in IQ score change from Time 1 to Time 2. In general, the results support the original findings: Being reared in the culture of the tests and the culture of the schools benefits all children's IQ scores and school achievements.

INTRODUCTION

In 1976, we reported findings of the Minnesota Transracial Adoption (TRA) Study (Scarr & Weinberg, 1976), a project designed to test the hypothesis that black and interracial (i.e., at least one black parent) children reared by white families perform on IQ and school achievement tests as well as other adoptees. We posited that these black and interracial adoptees would perform as well as

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other adoptees because they are growing up in "the culture of the tests and the schools;" that is, they are being exposed to more of the economic, health care, and socialization influences that promote high performance on measures of IQ and school achievement. In addition, the sample we studied included many families with both adoptees and birth children. Sources of individual differences among adoptees and birth children could be studied without fear of possible differences between the adoptive families and those with birth children (Scarr & Weinberg, 1977). This article is a report of the IQ test performance of these families 10 years later.

Summary of Findings of Initial Study

Briefly, in 1976 we found that:

1. Adoptive parents and their biological children in the 101 participating families scored in the bright-average to superior range of age-appropriate IQ tests.
2. The 130 black and interracial adopted children scored above the white population average for the same U.S. region (M = 100) and were performing adequately in school. In fact, we found the average IQ of the black/interracial children adopted in the first 12 months of life to be 110, some 20 points above the average IQ for black children being reared in the black community. Nevertheless, as found by other researchers, the adopted children scored on average below the birth children of these families. This was true not only for black/interracial adoptees, but also for white and Asian/Indian adoptees.
3. We interpreted these data to indicate that: (a) putative genetic racial differences do not account for a major portion of the IQ performance difference between racial groups, and (b) black and interracial children reared in the culture of the tests and the schools perform as well as other adopted children in similar families, as reported by other researchers.
4. The personality and social adjustment of the parents, biological offspring, and adopted children (ages 4–12) in these families was, on average, quite good.

We believe that findings from our first study have supported the malleability/plasticity of IQ test and school performance of socially classified black and interracial children. Such malleability appears to be a result of being reared in middle- to upper-middle-class environments: environments that represent the culture of these tests and schools.

Ten years later, we restudied the adopted children (average age = 17) and the birth children (average age = 20), as well as other members of their families. After an extensive search for the 101 families, we collected data on intellectual performance and academic achievement, on personality and psychopathology,

and on family members' life adjustment. The objective of this longitudinal study was to see how these children were faring approximately a decade after they were initially studied. What was their current level of intellectual performance, school achievement, and personal and social adjustment? What might account for any change in performance or adjustment over that interval? We were also interested in the status of other family members and the quality of the families' adaptation to their unique circumstances. We were provided the rare opportunity to explore systematically the impact of a potentially stressful situation on families at a point in their lives when adolescent problems may emerge to disrupt their adaptation. This report is limited to an examination of the follow-up IQ and school achievement data, and the magnitude and correlates of changes over time in IQ test performance.

METHOD

Subjects

Table 1 indicates our success rate in locating families and recruiting their participation. We found 96 of the original 101 families. Members of 93 families participated; only 2 families refused, and 1 family was inaccessible. Five families were lost to follow-up.

Generally, subject attrition was minimal, even though this is a problem that often plagues longitudinal research. A total of 426 subjects (over 80% of the original sample) participated in the study; 398 were seen in person, and most of these individuals took the IQ tests. Five fathers and one transracial adoptee (TRA) had died.

TABLE 1
Families and Family Members Samples, 1975 Versus 1986

	1975	1986					
		Participating			Not Participating		
Original Sample		Total	In Person	Phone	Refused	Not Seen/ Not Found	Deceased
Families	101	93			2	6	
Fathers	99	82	76	6	6	6	5
Mothers	100	89	87	2	5	6	0
Adopted black/interracial	130	105	101	4	11	13	1
Adopted white	25	18	17	1	4	3	0
Adopted Asian/Indian	21	14	13	1	4	3	0
Biological offspring	143	118	104	14	13	12	0
Total	518	426	398	28	43	43	6

Note. 96 of 101 families were located; 426 of 518 subjects participated; 398 of 518 subjects were seen in person.

Our follow-up sample is similar in most respects to the original sample. Time 2 participants do have adoptive parents with slightly higher IQ scores and SES at Time 1 than do nonparticipants, but the Time 1 IQ scores and preadoptive experiences of children did not differentiate Time 2 participants from nonparticipants.

Time 1 Data

The data bank for the study at Time 1 included the following:

1. *Adoption Record Abstract* for each adoptee including:

    - birthdate;
    - number and dates of preadoption placements;
    - evaluation of the quality of preadoption placements (rated by our research team);
    - date of placement in adoptive home;
    - biological parents' age at child's birth, educational level, race, and occupation of mother, and, if available, IQ.

2. *Adoptive Family Demographics* and detailed personal interview with mother.
3. *Family Index,* a questionnaire on home life and family life-style.
4. *School aptitude and achievement test data* on children (gathered for all school-age children).
5. *Cognitive measures:*

    - *Raven's Matrices* (age appropriate);
    - *Stanford-Binet, WISC,* or *WAIS* (age-appropriate).

6. *Personality measures* (Junior Eysenck Personality Inventory, Rotter Locus of Control, and the Parental Attitude Research Instrument).

Time 2 Data

For the current study, the follow-up battery included:

1. *Parent Interview.* Similar to the interview used in the earlier study, this structured protocol considered: current family demographics; medical, educational, and occupational status of children and parent(s); family life-style; family relationships; and parental perceptions of children's adjustment to school/occupation, children's social adaptation, and the impact of transracial adoption on parents and all children in the family. A history of parent and child referrals for medical and psychological services was also taken.
2. *Adolescent/Young Adult Interview.* Three versions (transracially adopted,

other adopted, and biological children) were used. This interview considered the perceptions of participating children within the family, particularly their account of school/occupation and social adjustment, parent relationships, sibling and peer relations, the effects of transracial adoption on their family and on them individually (dating, marriage, peer and community abuse or acceptance, self-esteem, and racial awareness), and their current perspectives on transracial adoption.

3. Short form of the Wechsler Adult Intelligence Scale–Revised (1981)/ Wechsler Intelligence Scale for Children–Revised(1974) (age appropriate), consisting of four subtests (Vocabulary, Arithmetic, Block Design, and Picture Arrangement).
4. A set of measures assessing various aspects of personality, family relations, and adjustment, including:

   - Minnesota Multiphasic Personality Inventory (MMPI),
   - Junior Eysenck Personality Inventory,
   - Rosenberg Self-Esteem Scale,
   - Family Adaptability and Cohesion Evaluation Scales II (FACES II),
   - Parent–Adolescent Communication Scale,
   - Family Satisfaction and Family Strengths Scales,
   - Strong-Campbell Interest Inventory,
   - Interviewer Ratings of the family environment and of adoptive family members on selected dimensions, and examiners' impressions of the testing situation.

Procedures

At Time 2, we administered an abbreviated version of the WAIS–R or WISC–R (depending on the subject's age) consisting of four subtests (Vocabulary, Arithmetic, Block Design, and Picture Arrangement). The combination of these four subtests has been shown to correlate above .90 with Wechsler full-scale test scores and is generally accepted as a shortened version of both tests (Doppelt, 1956; Kaufman, 1976; Silverstein, 1982). Deviation quotients for subjects' full-scale IQs were calculated using procedures outlined by Tellegen and Briggs (1967). The scoring of every test protocol was verified by one member of the research team who had had extensive psychometric experience.

Clearly, the selection of appropriate examiners for a family study is a critical aspect of the design. We chose a team of graduate students who had completed at least a year long course in psychoeducational assessment at the University of Minnesota and who had participated in a training session on assessment for this study. Among the 10 examiners were 3 men and 7 women, including 1 black man. Most testers were assigned randomly to members of the family; the black examiner was assigned to TRA subjects. The tests and interviews were administered in the family homes during the two visits.

In our first study, we had decided to see families in their homes because many of the children, then preschoolers, could be intimidated by coming to the university. We felt that testing in the home would enable us to assess their best performance and adaptation. Whenever possible, we returned to the homes at Time 2 because our first experiences had been positive. Also, collecting data in the home context allowed us to have a broader view of the family and its life-style. Seeing families in their homes required travel to various locations around the U.S. Thus, most data were collected directly from the adoptive families. Some data on the biological parents of the adopted children and the children's preadoption histories came from adoption records. Achievement and aptitude scores were supplied by school districts for all school-age children to whom such tests had been administered.

Each family received a clinical report, individually written for each family member and for the family members living out of the home, summarizing IQ, MMPI, and Strong-Campbell Interest Inventory performance.

RESULTS

This report describes the follow-up IQ test and school achievement test performance of the transracial adoptive families, as well as the nature and correlates of changes in IQ performance over time. Although methods for analyzing change data based on residual gain scores historically have been favored by many statisticians (see, e.g., Cronbach & Furby, 1970; Lord, 1963; McNemar, 1958), we used difference scores (Time 1 IQ minus Time 2 IQ) as our change index because of their interpretive ease and because of recent findings suggesting their psychometric adequacy (Rogosa, 1989). Descriptive statistics for Time 1 IQ, Time 2 IQ, change in IQ over time, and the Time 1 − Time 2 IQ correlations for each family member group are presented in Table 2.

Rank Order of Family Member Groups on IQ

It can be seen that the rank order of IQ scores for the various family member groups is the same at Times 1 and 2; that is, fathers achieved the highest mean scores, followed by mothers, biological offspring, adopted white, adopted black/interracial, and adopted Asian/Indian groups. On average, the IQ test performance of all family members declined from initial testing to follow-up. This decline may be accounted for, in large part, by the updating of intelligence test norms since Time 1 (see Flynn, 1984). The IQ decline tended to be greater for both adoptive and biological offspring than for adoptive parents. Despite the tendency for IQ test performance to decline in this sample, the follow-up mean IQ performance of black and interracial adoptees remained above the average IQ for blacks reared in the black community.

TABLE 2
Time 1 and Time 2 IQ Means and Correlations

Family Member	Time 1[a]	Time 1[b]	Time 2[c,d]	IQ Change[e]	r(T1/T2)[f]
Fathers					
M	120.8	121.7	117.1	4.6	.82
SD	10.0	9.5	11.5	6.7	
n	(99)	(74)	(74)	(74)	
range	93–140	96–140	92–145	−15–28	
Mothers					
M	118.2	119.1	113.6	5.5	.69
SD	10.1	9.7	10.5	7.9	
n	(99)	(84)	(84)	(84)	
range	96–143	98–143	85–136	−13–22	
Biological offspring					
M	116.7	116.4	109.4	7.0[g]	.62
SD	14.0	13.5	13.5	11.7	
n	(143)	(104)	(104)	(104)	
range	81–150	86–150	78–146	−24–36	
Adopted black/interracial					
M	106.3	106.1	96.8	9.3[g]	.57
SD	13.9	14.7	12.0	12.6	
n	(130)	(101)	(101)	(101)	
range	68–144	68–144	71–134	−26–38	
Early placed					
M	110.2	110.8	99.2	11.6[h]	.49
SD	12.1	12.7	11.1	12.1	
n	(86)	(68)	(68)	(68)	
range	86–144	86–144	73–134	−14–38	
Later placed					
M	98.5	96.5	91.7	4.8[h]	.55
SD	14.2	14.2	12.3	12.6	
n	(44)	(33)	(33)	(33)	
range	68–140	68–140	71–122	−26–30	
Black/white					
M	109.0	109.5	98.5	11.0[i]	.48
SD	11.5	11.9	10.6	11.5	
n	(68)	(55)	(55)	(55)	
range	86–136	86–136	73–134	−11–38	
Black/black					
M	96.8	95.4	89.4	6.0[i]	.49
SD	12.8	13.3	11.7	12.7	
n	(29)	(21)	(21)	(21)	
range	80–130	80–130	75–112	−26–28	
Adopted white					
M	111.5	117.6	105.6	12.0	.63
SD	16.1	11.3	14.9	11.7	

(*continued*)

TABLE 2 (Continued)

Family Member	Time 1[a]	Time 1[b]	Time 2[c,d]	IQ Change[e]	r(T1/T2)[f]
n	(25)	(16)	(16)	(16)	
range	62–143	92–138	79–140	−18–29	
Adopted Asian/Indian					
M	99.9	101.3	96.2	5.2	.62
SD	13.3	11.1	15.9	12.5	
n	(21)	(12)	(12)	(12)	
range	66–129	80–119	73–122	−14–23	

[a]WAIS, WISC, Stanford-Binet.
[b]Time 1 mean IQ for those subjects for whom there were also Time 2 IQ data.
[c]WAIS–R and WISC–R, derived from abbreviated forms.
[d]Includes only subjects who were in the original sample.
[e]IQ change = Time 1 mean IQ minus Time 2 mean IQ.
[f]*r*(T1/T2) = the correlation of Time 1 IQ with Time 2 IQ.
[g]Contrast of IQ change for adopted black/interracial group versus biological offspring group, $t(203) = 1.42$, $p = .156$, $d = .20$.
[h]Contrast of IQ change for early-placed black/interracial adoptees versus later-placed black/interracial adoptees, $t(99) = 2.96$, $p = .004$, $d = .57$.
[i]Contrast of IQ change for black/white group versus black/black group, $t(74) = 1.62$, $p = .110$, $d = .42$.

IQ Differences Among Adoptee Groups

We compared the offspring groups' Time 2 IQ test performance, as well as their changes in IQ from Time 1 to Time 2. As a group, the black/interracial adoptees showed lower Time 2 average IQ test performance than the biological offspring, $t(203) = 7.12$, $p < .001$, $d = .99$,[1] similar to the findings for Time 1 IQ. Nonetheless, the groups did not differ in their average *IQ decline*[2] from Time 1 to Time 2, $t(203) = 1.42$, $p = .156$, $d = .20$.

Age at follow-up was significantly correlated with Time 2 IQ ($r = .23$, $p = .008$) and there was a trend for its correlation with IQ decline ($r = -.14$, $p = .071$) for biological offspring but not for black/interracial adoptees. Nonetheless, partialling out age at follow-up did not erase the Time 2 IQ difference between biological offspring and black/interracial adoptees.

We also examined differences in Time 2 IQ and in IQ decline among the various adopted groups. White adoptees showed significantly higher Time 2 IQ test performance than black/interracial adoptees, $t(115) = 2.66$, $p = .009$, $d = .72$, but not Asian/Indian adoptees, $t(26) = 1.61$, $p = .119$, $d = .62$, although the number of adoptees in the latter group was small. There were no adopted group differences in IQ decline.

[1]The symbol *d* is commonly used to represent the effect size for a particular group comparison, which consists in this case of the difference in two group means divided by the pooled standard deviation (Kirk, 1982, p. 40).

[2]Given that most individuals declined in IQ from Time 1 to Time 2, we use IQ decline synonymously with IQ change throughout this article.

Effects of Age at Adoption on IQ

In our original study (Scarr & Weinberg, 1976), we found that black/interracial adoptees who were placed in the first year of life had significantly higher IQ test scores on average than adoptees placed after their first year. At Time 2, the early adoptees continued to perform better than the late adoptees, $t(99) = 3.06$, $p = .003$, $d = .65$, but they also showed greater IQ decline from Time 1 to Time 2, $t(99) = 2.61$, $p = .010$, $d = .55$.

Effects of Biological Parents' Race on Adoptees' IQ

As in our original study, we compared the follow-up IQ performance of adoptees with two black biological parents (black/black group) with that of adoptees having one white and one black biological parent (black/white group). As in the IQ results at Time 1, adoptees with one black and one white biological parent showed higher Time 2 IQ performance than adoptees with two black biological parents, $t(74) = 3.26$, $p = .002$, $d = .84$, as well as a nonsignificant tendency toward greater IQ decline, $t(74) = 1.62$, $p = .110$, $d = .42$.

Time 2 IQ, Biological Parents, and Adoptive Experience

In our original study, various biological parent, adoptive experience, and adoptive family characteristics were related to individual differences in black/interracial adoptees' IQ test performance. In the present study, we examined the relation between these same characteristics and Time 2 IQ and IQ change (see Table 3, p. 126).

Virtually all of the biological parent, adoptive experience, and adoptive family variables that were significantly related to Time 1 IQ were also significantly related to Time 2 IQ, although the magnitude of these relations was diminished in most cases. Biological mother's education was significantly related, and there was a trend for biological fathers' education to be related to Time 2 IQ. Transracial adoptees whose biological mothers were white or Asian continued to have higher IQ test performance at Time 2 than those whose biological mothers were black. Age at placement, quality of preadoptive placements, number of preadoptive placements, and time in adoptive home continued to be related to IQ at Time 2. The correlations of Time 2 IQ with these adoptive experience variables were not as strong as they were with Time 1 IQ, as might be expected given the greater time interval between these adoptive experiences and IQ assessed in late adolescence.

Relation of Time 2 IQ to Adoptive Family Characteristics

An interesting pattern of correlations with adoptees' Time 2 IQ was observed for the adoptive family variables. The correlations of Time 2 IQ with adoptive fathers' occupation and adoptive family income were near zero, as they were with Time 1 IQ. The correlations of adoptive mothers' and adoptive fathers' education with IQ at Time 2 dropped as compared to their correlations with IQ at

TABLE 3
Correlations of Biological Parent Characteristics, Adoptive Experiences, and Adoptive Family Characteristics with Black/Interracial Children's Time 1, Time 2, and IQ Change

	Time 1 IQ	Time 2 IQ	IQ Change	*n*
Biological Parent Characteristics				
Biological Mothers' Race[a]	−.47***	−.38***	−.18*	90
Biological Mothers' Education	.29**	.23*	.12	82
Biological Fathers' Education	.42*	.28+	.19	28
Adoptive Experiences				
Age at Placement	−.46***	−.30***	−.25**	101
Time in Adoptive Home	.27**	.20*	.12	101
N. of Preadoptive Placements	−.36***	−.22*	−.21*	85
Quality of Preadoptive Placements	.42***	.30**	.19*	85
Adoptive Family Characteristics				
Adoptive Mothers' Education	.20*	.11	.12	101
Adoptive Fathers' Education	.38***	.14+	.31***	101
Adoptive Fathers' Occupation	.00	.03	−.03	100
Joint Family Income	−.07	−.02	−.06	100
Adoptive Fathers' IQ	.18*	.20*	.02	99
Adoptive Mothers' IQ	.10	.18*	−.05	100

[a]0 = *white* or *Asian*, 1 = *black*.
+p < .10. *$p < .05$. **$p < .01$. ***$p < .001$ (all *p*s one-tailed).

Time 1. In contrast, the correlations of adoptive mothers' and adoptive fathers' IQ with adoptees' Time 2 IQ increased slightly as compared to their correlations with adoptees' Time 1 IQ.

Hierarchical Regression Analyses of the Relation of Time 2 IQ to Biological Parent, Adoptive Experience, and Adoptive Family Characteristics

Two hierarchical regression analyses were conducted predicting Time 2 IQ, one entering the biological family variables first, the second entering the adoptive variables first, similar to analyses of Time 1 IQ in the original study. The results of these hierarchical regression analyses are presented in Table 4.

In Step 1 of the first hierarchical regression analysis, biological mothers' race and biological mothers' education were entered as predictors. These variables accounted for 16% of the variance in Time 2 IQ scores. In Step 2, the adoptive family and adoptive experience variables were entered into the regression equation; none of these variables made a significant contribution to predicting Time 2 IQ above the variance explained by the biological variables, although as a group they accounted for an additional 7% of the variance in Time 2 IQ.

Similar results were obtained when the adoptive experience and adoptive family variables were entered before the biological variables in the hierarchical

TABLE 4
Multiple Regression Analysis of Predictors of Time 2 IQ in Black/Interracial Adoptees

	R	R^2 change	*F* change	*df*	*p*
Biological Variables Entered First					
Step 1[a]	.40	.16	6.38	2, 69	.003
Step 2[b]	.48	.07	0.57	10, 59	.835[c]
Adoptive Variables Entered First					
Step 1[d]	.41	.17	1.26	10, 61	.272
Step 2[e]	.48	.06	2.24	2, 59	.115[f]

[a]At Step 1, the biological family variables were entered.

[b]At Step 2, the adoptive experience and the adoptive family variables were entered.

[c]Biological mothers' race significantly predicted Time 2 IQ (semipartial $r = -.29, t = -2.60, p = .011$) when the biological variables were entered into the equation at Step 1. None of the adoptive variables significantly predicted Time 2 IQ when entered at Step 2.

[d]At Step 1, the adoptive experience and the adoptive family variables were entered.

[e]At Step 2, the biological family variables were entered.

[f]There was a trend for quality of placements to predict Time 2 IQ (semipartial $r = .22, t = 1.87, p = .066$) when the adoptive variables were entered into the equation at Step 1. None of the biological variables significantly predicted Time 2 IQ when entered at Step 2.

regression analysis. The adoptive variables as a group accounted for 17% of the variance in Time 2 IQ, still a nonsignificant contribution in variance explained. Only one of these variables, quality of preadoptive placements, showed a trend to predict Time 2 IQ. When the biological parent characteristics were entered in Step 2, these accounted for an additional 6% of the variance in Time 2 IQ, also a nonsignificant incremental contribution.

Relation of IQ Change to Biological Parent, Adoptive Experience, and Adoptive Family Characteristics

A number of the biological parent, adoptive experience, and adoptive family characteristics were significantly correlated with IQ change, as shown in Table 3. Black/interracial adoptees with a white or Asian biological mother experienced greater IQ decline than adoptees with a black biological mother. Adoptees who were placed earlier, who had fewer preadoptive placements, and who had higher quality preadoptive placements experienced greater IQ decline. Only one adoptive family characteristic seemed to be related to IQ decline. Adoptive fathers' education was significantly positively correlated with IQ decline from Time 1 to Time 2.

Hierarchical Regression Analyses of the Relation of IQ Change to Biological Parent, Adoptive Experience, and Adoptive Family Characteristics

In the hierarchical regression analyses of IQ change, shown in Table 5, neither the biological nor the adoptive variables significantly predicted IQ change, although there was a trend for adoptive fathers' education.

Comparison of School Achievement Among Offspring Groups

Follow-up school achievement data were available for a limited number of biological offspring and adoptees and are shown in Table 6. Data are presented for the school achievement and aptitude test data in percentiles according to national norms, and for class rank percentile and grade-point average (GPA). The advantage of these kinds of school data is that they come from different school districts, reflect different standardized measures, and are not affected by any potential biases that may influence individual testing within the study.

Black/interracial adoptees appeared to maintain their mean level of achievement in vocabulary and reading, but appeared to decline in math from Time 1 to Time 2, though such conclusions must be tempered by the small number of adoptees with achievement data at Time 1. The mean percentile school achievement test performance in vocabulary and reading for the black/interracial adoptees at Time 2 was slightly above national norms, similar to Time 1. The black/interracial adoptees' achievement in these domains and in general aptitude was considerably below that of the biological offspring (all differences signifi-

TABLE 5
Multiple Regression Analysis of Predictors of IQ Change in Black/Interracial Adoptees

	R	R^2 change	*F* change	*df*	*p*
Biological Variables Entered First					
Step 1[a]	.17	.03	0.98	2, 69	.381
Step 2[b]	.47	.19	1.42	10, 59	.192[c]
Adoptive Variables Entered First					
Step 1[d]	.46	.21	1.63	10, 61	.121
Step 2[e]	.47	.01	0.24	2, 59	.788

[a]At Step 1, the biological family variables were entered.

[b]At Step 2, the adoptive experience and the adoptive family variables were entered.

[c]None of the biological variables significantly predicted IQ change when entered at Step 1. There was a trend for adoptive fathers' education to predict IQ change (semipartial $r = .19$, $t = 1.67$, $p = .099$) when the adoptive variables were entered into the equation at Step 2.

[d]At Step 1, the adoptive experience and the adoptive family variables were entered.

[e]At Step 2, the biological family variables were entered.

TABLE 6
School Achievement and Aptitude Percentile Data, 1975 Versus 1986

		Black/Interracial Adopted			White Adopted			Biological Offspring		
	p[a]	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
1975										
Vocabulary		57	29	20	—	—	—	73	12	48
Reading		55	29	24	—	—	—	74	26	77
Math		55	30	19	—	—	—	71	23	69
1986										
Vocabulary	*	57	26	43	62	30	7	70	25	55
Black/White		60	26	24						
Black/Black		54	26	11						
Reading	***	56	27	61	58	30	10	73	26	71
Black/White		59	26	35						
Black/Black		48	27	15						
Math	***	47	27	61	56	32	9	69	24	67
Black/White		50	27	33						
Black/Black	+	36	20	15						
Aptitude	***	38	25	48	61	24	13	66	25	76
Black/White		42	25	30						
Black/Black	*	17	12	5						
Class Rank	***	41	29	65	54	30	16	64	29	101
Black/White		40	31	37						
Black/Black		36	24	13						
G.P.A.	***	2.3	.7	88	2.8	.7	16	3.0	.7	105
Black/White		2.2	.7	48						
Black/Black		2.1	.7	19						

Note. All descriptive statistics are presented in terms of percentile rank, with the exception of GPA.

[a]Asterisks in the column p denote the statistical significance of the difference between the biological offspring and the black/interracial adopted offspring, or between the black/white and black/black adoptees.

$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$. (The white adopted group was not included in these analyses due to small sample size.)

cant, $p < .05$), but was very similar to the achievement of the white adoptees in vocabulary and reading, although somewhat lower in math and in general aptitude. These findings replicate those presented earlier for the individual Time 2 IQ measures.

The biological offsprings' average class rank was almost 10 percentile points higher than that of the white adoptees, whose average class rank was 13 percentile points higher than that of the black/interracial adoptees. Similarly, the biological offsprings' average high-school GPA was 0.22 points higher than that of the white adoptees, whose average high-school GPA was 0.5 points higher than that of the black/interracial adoptees. The differences between the biological

offspring and the black/interracial adoptees in GPA and class rank were statistically significant ($p < .001$).

We also compared achievement and aptitude in adoptees with two black biological parents with that in adoptees having one black and one white biological parent. Few differences emerged between these groups, save for the black/white group to show higher general aptitude ($p = .037$) and a tendency toward higher math achievement ($p = .086$) than the black/black group.

DISCUSSION

IQ Decline and IQ Rankings Across Family Member Groups

On average, all family members declined in IQ from Time 1 to Time 2. In interpreting this decline, one must keep in mind that different IQ tests were employed at Time 1 and Time 2. Depending on their ages, family members were tested using the Stanford-Binet Form L–M (Terman & Merrill, 1973), WISC, or WAIS in the original study, and using the WISC–R or WAIS–R in the follow-up study. Declines in IQ scores have been documented when individuals are retested on a revised form of an original measure, as well as when a test used at a first administration was normed earlier than a test used at a subsequent administration (see Flynn, 1984, for a review). For example, the decline in Full-Scale IQ score from the WAIS to the WAIS–R averaged 6.8 points across a number of studies (reviewed by Sattler, 1988) and was 7.5 points in a sample of 72 35–44-year-olds tested as part of the standardization of the WAIS–R (Wechsler, 1981). This is precisely the test combination used for adoptive parents in our study.

Similarly, substantial declines would be expected when individuals are tested with the Stanford-Binet or WISC at Time 1 and with the WISC–R or WAIS–R at Time 2 (Flynn, 1984), the situation that characterized nearly all biological children and adoptees in our sample. Although we cannot be certain how much of the IQ decline found across all family member groups is attributable to this phenomenon, it appears safe to say that most of this decline is a product of test revision and test norm obsolescence (Flynn, 1984).

Despite the decline in IQ test scores, the relative rankings of Time 2 test scores remained identical to that for Time 1 IQ scores. Adoptive fathers continued to perform slightly better, on average, than adoptive mothers, and both parent groups continued to perform better on average than their biological offspring. Biological offspring continued to rank higher in IQ scores than white adoptees, who were followed in ranking by black/interracial adoptees and Asian/Indian adoptees, respectively. Adoptees with two black parents scored lower than other family groups.

Recall, however, that the adoptees with two black parents were also adopted later, had more preadoptive placements, and lower quality placements than children with one black parent. Their biological mothers and fathers had lower educational levels than the black fathers and white mothers of the interracial

adoptees. Thus, parental race subsumes a number of biological and social differences between the two groups.

IQ Comparisons Among Offspring Groups

The major question addressed by the follow-up study was whether the malleability in black/interracial adoptees' Time 1 IQ test performance would be similarly manifest at Time 2. Would the beneficial effects of rearing environment on transracial adoptees' IQ continue into late adolescence and adulthood?

Although the biological offspring achieved significantly higher IQ scores at Time 2 than adoptees, there was no difference in IQ change among the groups, suggesting that the rearing environments continued to have positive effects on children in the adoptive families. Both biological offspring and adoptee groups scored in the average range of IQ based on the new norms for IQ tests.

These results are congruent with those of other recent adoption studies (Capron & Duyme, 1989; Horn, Loehlin, & Willerman, 1979; Moore, 1986; Schiff, Duyme, Dumaret, & Tomkiewicz, 1982) in demonstrating strong effects of the rearing environment on IQ, and go on to demonstrate that these effects are largely sustained over a 10-year period, when the adoptees are late adolescents or adults. These results also highlight the strong impact that dramatic environmental interventions can have on cognitive development (Rutter, 1985). The findings here demonstrate persistent beneficial effects of being reared in the culture of the schools and the IQ tests (Scarr & Weinberg, 1983).

That white families provide a rearing environment more closely tied to the tests and the schools can hardly be doubted. For example, Moore (1986) found differences in test-response style between black/interracial children adopted by white parents and those adopted by black parents. Moore also found that white adoptive mothers showed greater positive affect, encouragement, and support to their black/interracial adopted children than did the black adoptive mothers. These differences were related to the differences in IQ test performance between the two adoptee groups. Flynn (1984) also hypothesized that increased test sophistication and enhanced educational achievement may be responsible for a substantial portion of the IQ gains shown by Americans from 1948 to 1972. It seems reasonable that such cultural factors may also account, in part, for differences in the IQ test performance of black children reared by white adoptive parents and those reared in the black community.

Age at Adoption and Biological Parent Race Differences on IQ

Differences in IQ between early- and late-adopted black/interracial adoptees, and between adoptees who had two black biological parents or one black and one white biological parent persisted at Time 2. As in our original study, the early-adopted group continued to show higher IQ test performance at Time 2, but also showed greater IQ decline, than the late-adopted group. Similar differences for Time 2 IQ were found for the black/white group as compared with the

black/black group. In our original study (see Table 10 in Scarr & Weinberg, 1976), we pointed out that the black/white group had more favorable adoptive placement experiences, higher biological parent education, and higher adoptive fathers' education and adoptive mothers' IQ than the black/black group. This suggests that the effects and/or concomitants of early adoption, and of the selective placement and adoptive experiences associated with biological parents' race, continue into late adolescence, but are not as strong then as they are in childhood.

Correlates of Follow-Up IQ and IQ Change

In our original study (Scarr & Weinberg, 1976), we examined the correlations of black/interracial adoptees' IQ with biological parent, adoptive experience, and adoptive family variables in an effort to explicate some of the biological and social factors underlying variation in black/interracial adoptees' IQ scores. It was possible only to establish ranges of estimated variance accounted for by the two sets of variables, because the biological and social variables were confounded. At Time 2, almost all of the biological and adoptive variables that were related to Time 1 IQ were related to Time 2 IQ, though the magnitude of these correlations decreased somewhat. It was similarly impossible to disentangle biological parent characteristics of race and educational level from adoptive experience variables in the follow-up study. Biological mothers' education and race accounted for 6–16% of the variance in black/interracial adoptees' IQ scores, whereas adoptive experience variables accounted for 7–17%.

For unknown reasons, black mothers who eventually gave up their children for adoption did so later, and their children experienced more preadoptive placements of poorer quality than interracial children with white mothers. Thus, biological and social characteristics of the black/black and interracial children were confounded. Biological mothers' race remained the best single predictor of adopted child's IQ when other variables were controlled. Nonetheless, this relation may be due, in large part, to the role of unmeasured, social characteristics associated with biological mothers' race in the development of IQ.

Only a few of the biological parent, adoptive experience, and adoptive family variables were related to IQ decline. Adoptees with a white or Asian biological mother showed greater IQ decline than those with a black biological mother, suggesting that the effects of biological mothers' race on IQ are greater in childhood than in adolescence or adulthood. Adoptive fathers' education was the only adoptive family variable related to IQ decline, such that adoptive fathers' education was more strongly related to IQ in childhood than in adolescence or adulthood. This finding may be consistent with those of other studies (e.g., Scarr & Weinberg, 1978) in demonstrating decreased impact of shared environmental influences on IQ in adolescence and adulthood than in childhood. Nonetheless, other findings—such as the increase in correlations of adoptive mothers' and fathers' Time 1 IQ with adoptees' IQ from Time 1 to Time 2—suggest that

shared environmental influences on IQ play at least as large a role in adolescence and adulthood as in childhood. We will be studying developmental changes in both genetic and shared environmental influences on IQ in a more comprehensive manner in future articles by examining changes in familial correlations for IQ over time. These analyses will also incorporate the adoptive experience and adoptive family variables examined in this article.

A number of the adoptive experience variables were related to IQ decline. Specifically, adoptees who had fewer and better quality preadoptive placements, and who were placed at a younger age, showed greater IQ decline. Again, this finding appears to reflect the greater relation of these adoptive factors to IQ in childhood than in late adolescence or adulthood.

Follow-Up Data for School Achievement

Although we believe that IQ test performance represents a significant index of adjustment to adoption, we were interested in adjustment indices, such as school achievement, that possess additional "real-life" validity. At the secondary school level, the biological offspring of the adoptive families performed at about the 70th percentile on numerous indices of school achievement, in contrast to the adoptees who performed generally in the average range. The black/interracial adoptees appeared to maintain their vocabulary and reading achievement levels to the same degree as the biological offspring, showing greater decline only in math Achievement. Compared to the average scores of black/interracial children reared in the black community, the adoptees' scores are high, especially given that the schools they have attended are in middle- to upper-middle-class neighborhoods. The school achievement results lend additional support for the beneficial effects of being reared in the culture of the tests and schools (see Duyme, 1988, for similar effects of rearing environment on school achievement).

CONCLUSIONS

Our original study (Scarr & Weinberg, 1976) was intended primarily to examine the effects of cross-fostering on the IQ scores of black/interracial children. The focus was on the relative effects of genetic background *and* social environment on IQ levels and variations among socially classified black children. The results of the longitudinal follow-up continue to support the view that the social environment maintains a dominant role in determining the average IQ level of black and interracial children and that both social and genetic variables contribute to individual variations among them.

It may be instructive to consider the pattern of findings that would be expected if genetic background but *not* social environment contributed to the average follow-up IQ of black/interracial adoptees. First, we would expect them to show greater IQ decline than biological offspring, because their Time 2 IQ would regress back to their biological, but not their adoptive, parents' IQ levels. Second, we would expect their Time 2 IQ to be correlated with their biological

parents' education but not their adoptive parents' education or IQ. Third, we would not expect their Time 2 IQ to be correlated with adoptive experiences such as age at placement and time in adoptive home. The data did not support these hypotheses, thus suggesting the important role of social environment in adoptees' follow-up IQ.

We are currently analyzing further data on adjustment in these adoptive families. Future articles will provide a more detailed examination of the correlates of IQ change for both black/interracial adoptees and biological offspring, sex differences in the magnitude and correlates of IQ change, developmental changes in the relative influences of genetic and shared environmental factors on IQ, biometric model-fitting analyses of familial correlations for IQ at both time periods, and an investigation of the emotional and behavioral adjustment of adoptive family members when the adoptees are in late adolescence or early adulthood.

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