DOCUMENT RESUME

ED 066 246 24 RC 006 364

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TITLE Effects of Early Educational Intervention in the Lives of Disadvantaged Children. A Report of Six Follow-up Studies of Children Who Were Enrolled in the Five-Year Durham Education Improvement Program, 1965-70. Final Report.
INSTITUTION Durham Education Improvement Program, N.C.
SPONS AGENCY National Center for Educational Research and Development (DHEW/OE), Washington, D.C.
BUREAU NO BR-1-I-124
PUB DATE 30 Jun 72
CONTRACT OEC-9-72-0005(057)
NOTE 147p.

EDRS PRICE MF-$0.65 HC-$6.58
DESCRIPTORS *Academic Achievement; Classroom Environment; *Disadvantaged Youth; *Educational Improvement; Elementary School Students; Family Status; Negroes; Preschool Children; *Reports; Sociocultural Patterns; *Statistical Studies; Tables (Data)
IDENTIFIERS *Durham; North Carolina

ABSTRACT

In 6 follow-up studies, hypotheses and questions regarding the effects of the Durham Education Improvement Program (EIP) were investigated. Grades of graduates were examined by analysis of variance and Wilcoxon matched-pair signed-ranks tests. I. Q. distributions at exit were fitted to the test norms. Tentative measures of hypothesized "ideal" classroom behavior were developed using the "Coping Analysis Schedule for Educational Settings" (CASES) and tested for construct validity. EIP school and length of treatment effects on the 2 measures were examined by analysis of variance. Sociocultural correlates of achievement differences between schools were isolated by step-wise regression analysis. Significant findings supported the effectiveness of the experimental treatments. EIP graduates earned higher grades in 4 subject areas. The construct validity of the CASES instrument was thoroughly upheld. One of the measures of hypothesized "ideal" classroom behavior, an Overall CASES Coefficient, was found a significant predictor of academic achievement. Family size, occupational status, and family income were found to be predictors of reading and language achievement. The CASES instrument and the Overall CASES Coefficient were found useful in predicting school achievement. Classroom social behavior, produced experimentally, was found to account, significantly, for gains in reading and language skills. Implications of the findings were discussed. (Author)

Final Report

Project No. 1-I-124
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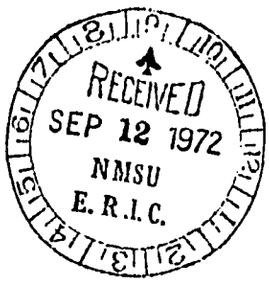
EFFECTS OF EARLY EDUCATIONAL INTERVENTION IN THE LIVES OF DISADVANTAGED CHILDREN

June 1972

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Office of Education

National Center for Educational Research and Development
(Regional Research Program)



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EFFECTS OF EARLY EDUCATIONAL INTERVENTION IN THE LIVES OF DISADVANTAGED CHILDREN

A Report of Six Follow-up Studies of Children Who Were Enrolled In the Five-year Durham Education Improvement Program 1965-70

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The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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ACKNOWLEDGEMENTS

The data gathered and stored during the five-year Education Improvement Program in Durham, North Carolina, were made available for the current series of studies through the cooperative efforts of several persons. Jim Dobbins, Ann Miller, and Tom Briley of the National Laboratory for Higher Education in Durham assisted in designing the six studies and in preparing the EIP data for storage, retrieval, and computer processing.

Clifford Ireland of George Washington University provided timely and capable technical assistance in making important design modifications and statistical interpretations during the precess of analysis.

Barclay Bean and John Hamilton were responsible for computer programming. Barclay Bean also assisted in data management and performed statistical transformations in several of the studies.

Studies requiring hand calculations were completed with the help of Demetri Papageorgiou. Betty Bell and Gay Seckler were responsible for typing the manuscript and preparing the report for publication. Dave Spohn provided the figures illustrating the findings in two studies.

The Durham Education Improvement Program was a project of the Ford Foundation, funded under the auspices of the Southern Association of Colleges and Schools. The authors are especially grateful to the Ford Foundation both for its original grant and for its support of this current series of studies through a research fellowship to the senior author.

The authors assume responsibility for any shortcomings in the report.

Robert L. Spaulding
Mary R. Papageorgiou

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I. INTRODUCTION

A. Problem

During the mid-nineteen-sixties the Ford Foundation funded five large scale, early childhood "education improvement projects" in the South in an effort to stimulate innovation and change in existing dual, school systems and demonstrate the feasibility of compensating for early social, economic, and cultural deprivation through massive educational interventions in the lives of young, disadvantaged children. One of the five projects funded was located in Durham, North Carolina.

In September, 1965, a small-scale school system was created in four Durham neighborhoods of severe poverty as a vehicle for developing and testing a number of compensatory educational approaches. Between 1965 and June 1970, over 250 children, aged 2 through 10, participated in several closely monitored, innovative instructional programs.

The goals of the Durham Education Improvement Program were comprehensive. Among the most important were the following, as expressed in the original proposal to the Ford Foundation:

1. Knowledge regarding the early health status of disadvantaged children;
2. Discovery and dissemination of appropriate methods of child care in low-income settings;
3. Identification of typical child rearing patterns associated with educational and intellectual development;
4. Demonstration of model patterns of preschool education;
5. Development of support in the community and region for state funded Kindergartens;
6. Development of city and county school readiness screening techniques;
7. Improvement of existing early educational programs;

8. Improvement of educational programs at all age levels;

9. Development of predictors of readiness and the improvement of preschool readiness programs;

10. Improvement of junior and senior high school counseling programs for community and family life;

11. Introduction of new educational roles (new career opportunities);

12. Development of an objective monitoring system for new educational programs;

13. Improvement of in-service and pre-service teacher training programs in the Durham public schools, at Duke University and North Carolina Central University;

14. Improvement of coordination between the public schools and local universities;

15. Development of a significant emphasis on an early childhood educational component in the concurrently funded OEO anti-poverty program in Durham;

16. Provision of new preschool educational techniques to private and parochial schools;

17. Provision of a model instructional system for state and national observation; and

18. Stimulation of community interest and participation in the improvement of the public schools.

B. Specific Questions Investigated in EIP

In addition to the broad goals given above a number of specific questions were framed. Among them were these:

1. What are the relative effects of intervening at age 2 in comparison with intervention at ages 3, 4, 5, or 6?

2. What are the relative effects of variations in length of early educational intervention? That is, do children enrolled for two years demonstrate greater improvement than children enrolled for one year? Would a three-year educational intervention be more effective than a two-year compensatory program?

3. Is there an interaction between age of entry to the experimental EIP programs and the length of enrollment (affecting intellectual development and subsequent school achievement)?

4. What is the pattern of change before, during and after the experimental, compensatory intervention? Are gains (in social skills, I.Q., language performance, or academic skills) made uniformly throughout the treatment period? What losses in I.Q. take place in early childhood prior to intervention and how are such trends affected by the treatment? Are they terminated, reversed, or otherwise modified by the compensatory program?

C. Hypotheses

A number of specific effects on the development of the children in the experimental programs were hypothesized as follows:

Hypothesis 1

The effect of the experimental social behavior modification treatments used in the program will be to increase obedient, conforming behavior in teacher-directed classroom settings.

Hypothesis 2

The effect of the experimental social behavior modification treatments will be to increase independent, productive, socially integrative behavior in non-teacher-directed classroom settings (such as seat work or programmed learning situations).

Hypothesis 3

The effect of the experimental educational programs will be to improve the intellectual performance of the pupils to the point where the distribution of their Stanford-Binet I.Q. scores approximates the national norm (that is, a mean of 100 and a standard deviation of 16).

Hypothesis 4

The effect of the experimental educational programs will be to improve the academic performance of pupils to the point where, by the end of the third year of the ungraded primary the distribution of their achievement scores on the Metropolitan Achievement Test (MAT), Elementary Form, will equal or exceed the national norms for the test.

Hypothesis 5

Pupils who participate in the experimental ungraded primary will show more desirable classroom behavior (specifically, cooperative, docile, conforming behavior in teacher-directed settings and independent-productive, assertive, socially integrative behavior in

non-teacher-directed settings) than control children who have not experienced the experimental behavior modification and ungraded instructional programs.

D. Intervention Strategies in EIP

A small scale, experimental school system was created enrolling from 200 to 300 children from four target areas (A, B, C, D) in Durham City and County. The four areas may be characterized as follows:

Area A - An inner-city, low-income Black community undergoing severe dislocations brought about by urban renewal and the building of an interstate type highway through the community.

Area B - An inner-city, bi-cultural low-income residential community also affected by urban renewal plans. Formerly an all white community, Area B was about 20 to 30 percent Black when project personnel surveyed the area in 1965.

Area C - An all Black suburban, semi-rural community with a history of local pride and stability. Although equally poor in economic terms, the families living there experienced fewer of the disruptions and dislocations of community life characteristic of the inner-city target areas.

Area D - A textile mill neighborhood with contrasting pockets of poverty, encompassing both low-income Black and white communities. Adjacent to the University, it also housed student families and became the location of the project laboratory school.

In each of these target areas a door to door survey was made to obtain the names of all residents. From these survey lists names of children were drawn randomly to form initial classroom groups, aged two through six. Subsequently, existing classroom groups in the public schools in the four target areas were randomly chosen and enrolled in the EIP program. Randomly selected groups were obtained by selecting additional subjects from the survey lists. Matched control groups were selected from intact classroom groups in poverty neighborhoods similar to the four target areas.

Support services in EIP included a social service component, a psychological consultation group from Duke University, a health service component, a public information office, a research and evaluation division, an instructional materials center and an in-service instructional training component.

The experimental instructional programs varied from school to school as each teaching team developed its own way of individualizing instruction. The teacher training program emphasized behavior modification as a means of social control and the use of inductive discovery techniques in the development of academic concepts. Teachers and children were observed daily and behavioral goals were set using the Coping Analysis Schedule for Educational Settings (CASES) (Spaulding, 1970).

The methods of classroom instruction promoted in the project included the following:

1. Discovery pedagogy in structured subject-matter fields (e.g. mathematics and reading);
2. Direct, expository teaching in motor skill development and in subject-matter fields structured arbitrarily or by custom (e.g. handwriting, the alphabet);
3. Programmed learning when materials were found consistent with items 1 and 2 above;
4. Individualized, ungraded, non-competitive instruction;
5. Use of CASES instructional and behavioral control treatments as indicated in the CASES manual of treatments according to individual pupil coping style;
6. Avoidance of aversive punishment as a means of social control;
7. Problem-oriented instruction consistent with each child's level of intellectual development, skill, knowledge, and social maturity.
8. Academic goals based on Piaget's developmental theory (making use of concrete experience as a foundation for concept development, with the child's logic respected, and the attachment of labels made following concept development through concrete experience);

9. Restriction of rote process to non-logical structures of high utility (such as memorization of alphabetical order);

10. Encouragement of talking in association with concrete experience in social settings to extend, sharpen, and validate preconcepts; and

11. Extensive use of dramatic play techniques using concrete materials as a source of social skills, knowledge, and academic motivation.

The programs developed in Target Areas A, B, and C were modeled after instructional systems pilot tested in the laboratory school (Target Area D). From the beginning all classes were ungraded and individualized, and all teachers employed programmed instructional materials. Dramatic play techniques, however, were restricted largely to the laboratory school. Discovery pedagogy was used in all classes to some extent, but it constituted a major instructional factor only in Target Area C.

Non-punitive control techniques (using principles of behavior modification) were fairly well established throughout the four schools by the third year, after two years of emotional stress among teachers while learning the reinforcement-based control strategies. (Data on classroom teacher behavior are available for the last three years of the Project and will be analyzed in future follow-up studies.)

II. QUESTIONS TO BE INVESTIGATED

A. Results Reported Previously

The results of statistical tests of the hypotheses mentioned and analyses of the longitudinal data obtained during the five-year program of intervention were presented in the Final Report to the Ford Foundation (Spaulding, 1971a, b, c) and in a paper given at the 1972 AERA meetings in Chicago (Spaulding, 1972). These findings can be summarized as follows:

1. Socialization

Statistically significant results were obtained for Hypotheses 1 and 2. Changes in social behavior were found to be a function of specific setting variables but not entry age. Among relevant setting variables, teacher behavior was found the most salient. Socially reinforcing and limit setting behaviors (on the part of teachers and other adults present) were found to shape pupil social behavior independently of age of entry to EIP treatment programs. During enrollment in EIP, children became more independently productive and socially integrative in non-teacher-directed classroom settings, without concurrent decrements in conforming and cooperative behavior in teacher-directed situations. EIP subjects were found significantly more independently productive and socially integrative than the control children in non-teacher-directed settings. Non-significant differences between EIP and control subjects were found in teacher-directed settings.

2. Intellectual Development

Children with no preschool experience were found to decline rapidly in tested I.Q. during or shortly after their second year of life. This decline amounted to a total of approximately 10 points by the third year and 15 points by the fourth year.

EIP experimental programs were found to reverse, significantly, the decline in tested I.Q. Experimental subjects gained, on the

average, a total of 5 or 6 points during their participation in EIP programs. Statistically significant gains made early in the experimental programs were not washed out after two or three years of EIP school experience.

Control children were observed to have significantly lower and constant I.Q. scores after entry to public school.

The younger a child entered an EIP sequence of educational programs the higher he was likely to score on the Stanford-Binet at exit. This result was due, apparently, to the fact that the younger children's I.Q.'s had, at entry, declined less (in comparison with the I.Q.'s of children of older entry ages) rather than to differences in program efficiency at various chronological ages. Length of EIP treatment was not found related to gains in tested I.Q. Similar gains in I.Q. were observed in children regardless of the length of enrollment (beyond one year). Losses were not found to follow gains made early in the experimental program. Significantly superior intellectual performance persisted among children enrolled 20 months or more in the experimental programs, in comparison with both randomly selected and matched controls.

The distribution of I.Q. scores found for the total sample of experimental subjects at exit approached a normal probability curve, with a mean of approximately 5 points less than the test norm of 100. A bimodal distribution observed at entry was no longer evident in the exit I.Q. distribution. Significance tests of goodness of fit, however, were not included in previous reports.

3. Academic Performance

The initial groups of EIP children completing the first year of the ungraded primary were found to perform significantly less well on the Metropolitan Achievement Test than control children.

This result had been anticipated since the control children were being prepared for the conventional achievement tests by direct teaching of the words to be sampled by the tests. The children in the experimental classrooms were developing learning-to-learn skills and self-control in a relatively open school environment.

By the end of the second year of the ungraded EIP primary the experimental subjects achieved higher mean scores on all sub-tests of the MAT. The differences, however, were statistically non-significant when adjusted for differences in entry I.Q. Non-significant differences were found, also, for the third year comparisons.

Although losses in position, relative to the MAT norms, were shown by EIP primary school graduates during their fourth grade public school experience, they were found to have higher mean scores on every sub-test of the MAT than their controls (again the differences, however, were not statistically significant, when adjusted for entry I.Q.). Control children showed losses in relative standing (vis a vis the MAT norms) every year after the first grade.

Grades given to EIP graduates by their public school teachers and their controls were not analyzed in time to be included in previous reports.

Age of entry to EIP did not appear to be a factor in academic achievement; however, most of the children entering EIP at 2, 3, and 4 years of age had not reached the second or third year of the elementary school when the project was terminated. Readiness data on the graduates of the Infant Project (aged 4 and 5 at the end of the grant period in 1970) suggested that they were likely to perform in a superior fashion at entry to public school.

B. Questions Unanswered in Previous Analyses

The analyses presented in the Final Report and the 1972 AERA paper were based on questions specifically stated in the original proposal to

the Ford Foundation and the hypotheses written into subsequent design and strategy statements. Data for all experimental subjects were examined in the Final Report regardless of the manner of selection. Some were randomly selected and others were not. A number of additional questions and issues raised by the findings reported previously deserved further investigation. Among these were the following:

1. Why was the EIP experimental curriculum effective in three target areas (A, C, D) but not in the fourth (B)? What was different about the children selected in Target Area B (an area with both low-income white and Black families) that might account for their failure to respond equally well to the instructional program? Variables in family background and child personality needed to be investigated to discover within group or between group variation which could account for the differences found in achievement.

2. The hypotheses which predicted that the experimental treatment programs would result in improved social behavior in the schools were strongly supported in the statistical analyses completed earlier. In addition, preliminary data obtained within one school suggested that improvement in social skills was directly related (positively) with learning to read (a correlation of .86 between experimentally-produced independent, productive, socially integrative behavior and MAT reading achievement for girls, for example). If these preliminary findings were replicated using the total sample it would be the first time that experimentally produced classroom coping behavior styles of disadvantaged pupils were found correlated, significantly, with academic performance.

3. The Durham EIP intervention program was designed with the assumption that children who were selected randomly from census lists would represent a random sample of the total population of children in each of the four target areas. This assumption led to the further assumption that an effective early childhood inter-

vention program could reasonably be expected to result in a normal distribution of Stanford-Binet I.Q. scores if environmental (rather than genetic) factors were primarily responsible for the characteristically low I.Q. scores found in poverty neighborhoods.

The I.Q. distributions presented in the Final Report included all children who participated in the EIP instructional programs (whether or not randomly selected) and approached a normal curve with a mean five points below 100. The question remained whether the observed distributions of randomly selected subjects were significantly different from a chance distribution. Tests of goodness of fit were needed to answer this question.

Should the Stanford-Binet I.Q. distribution for Black children (at exit) be found well within the limits of chance, it would fail to support the Jensen (1968, 1969) hypothesis of genetic difference in basic learning ability. Findings of no difference after intervention would give strong support for an environmental explanation of commonly found Black/white differences in tested I.Q.

C. Significance of the Questions Raised

The questions raised in the previous section are important since they bear directly on current social problems of national interest.

The questions regarding the experimental curricula and socialization processes used in the Durham project are important because they relate to current design issues in Follow Through, Head Start, and other early childhood intervention programs. The discovery of firm linkages between the experimental classroom treatment variables and subsequent academic and social achievement is of great importance to classroom teachers and others responsible for improving the quality of early education for children from low-income families.

The findings so far strongly suggest that an intervention program based on social learning principles, discovery pedagogy, and techniques of teacher and child behavior modification can overcome many of the negative effects of environmental impoverishment.

Experimental techniques used in socializing children in the EIP Project are replicable in any classroom and the finding of significant correlations between experimentally produced classroom behavior styles and school achievement would be of direct usefulness in preservice and inservice teacher training programs. The classroom behavior patterns of Project pupils were modified by EIP teachers through the application of specific treatments designed for six types of pupils (as defined by their overt coping styles). Significant results linking styles of classroom social behavior and academic achievement (as measured in this instance by the MAT) would strongly support the validity of the experimental socialization procedures.

The finding of significant correlates of academic achievement among the many family and demographic variables available in the EIP data bank is likely to provide new leads for experimental interventions and give support to particular EIP program variations developed by teaching-teams in one or another of the four target area schools. The literature on the probable effects of poverty on child development (for example, Mercer, 1971) makes frequent reference to family and community factors which are hypothesized to influence intellectual performance and academic achievement. A post hoc exploratory regression analysis is likely to provide support for some of these hypotheses and lead to modifications of others.

III. PROCEDURES USED IN THE SIX FOLLOW-UP STUDIES

Six studies were designed to test specific research hypotheses based on questions and issues raised in previous investigations. The specific hypotheses and procedures employed are summarized here to provide an overview of the complete set.

A. Study One

Hypothesis: Pupils who complete the third year of the EIP ungraded primary will earn higher grades in public schools than matched control pupils (page 163, EIP Final Report).

Procedure: Two sets of analyses were made. In one comparison matched pairs were selected from a pool of 67 EIP graduates and 42 control subjects. Differences in grades received were tested with a Wilcoxon matched-pairs signed-ranks test. A second set of comparisons employed one-way analysis of variance and *t* tests of differences between means.

B. Study Two

Hypothesis: The effects of EIP educational programs will be to improve the intellectual performance of Project pupils to the point where the distributions of their Stanford-Binet I.Q. scores approximate the test norm (that is, a mean of 100 and a standard deviation of 16) (Page 163, EIP Final Report).

Procedure: Separate tests of goodness of fit were completed for experimental and control subjects by sex, race, and type of selection (randomly from census lists or randomly from intact classes within matched pairs of schools).

C. Study Three

Hypothesis: The effect of the EIP classroom social behavior modification treatments will be to increase the frequency of desirable classroom behavior of students.

Procedure: An hypothesized "ideal" behavior pattern was identified using CASES categories in combination. Using the definition of "ideal" classroom behavior, scores were computed for each EIP subject using CASES data obtained in teacher-directed and non-teacher-directed settings during the spring term of each year of enrollment. Changes in the two sets of "ideal" behavior scores (over the several terms of enrollment) were tested by a repeated measures analysis of variance.

D. Study Four

Hypothesis: "Ideal" classroom behavior as defined in Study Three will be found correlated with school achievement. Specifically, the more closely a pupil resembles the behavioral "ideal" the higher will be his achievement as measured by the Metropolitan Achievement Test (MAT).

Procedure: A two factor analysis of covariance, with length of enrollment employed as a covariate, was repeated four times using the measures of "ideal" behavior computed in Study Three. Using a 3 X 3 block design, the main effects of I.Q. and "ideal" behavior scores and the effects of the interaction of I.Q. with behavior scores were tested.

E. Study Five

Hypothesis: Many independent variables reflecting differences in family structure, economic condition, neighborhood characteristics, housing, and family functioning will be found correlated with academic achievement within EIP.

Procedure: A series of four step-wise multiple regression analyses were completed with subtests of the MAT as dependent variables. Variance associated with dimensions of family structure, economic conditions, neighborhood characteristics, housing, and family functioning was examined. Relationships of sex, race, I.Q. at entry and exit, school of attendance, and number of teachers each pupil had in the course of instruction in EIP were also investigated.

F. Study Six

Hypothesis: Classroom social behavior patterns of EIP subjects will vary significantly as a function of school and teaching team differences within EIP and a child's relative year of enrollment.

Procedure: A 3 X 4 block, fixed factor analysis of variance design was used to test for main and interaction effects. Scores representing various definitions of "ideal" classroom behavior computed in Study Three were used as dependent variables.

IV. SOURCES OF DATA

Data reported in this series of follow-up studies were gathered in four areas.

A. Social Behavior

Changes in social behavior were measured using the Coping Analysis Schedule for Educational Settings (CASES). All experimental subjects and selected control groups were observed each fall and spring in each classroom setting over a period of ten days. A sample of the CASES instrument is given in Appendix A.

B. Intellectual Performance

Intelligence test scores were obtained each fall and spring each program year using the Stanford-Binet Intelligence Scale (Form L-M, 1960 Revision). In addition, selective use was made of the Wechsler Intelligence Scale for Children (WISC). When Stanford-Binet data were not available for a given subject an estimated S-B I.Q. was computed using WISC Verbal and Performance I.Q. scores and regression analysis.

C. Academic Achievement

All children in the ungraded primary classes and most EIP graduates in public schools were administered the Metropolitan Achievement Test (MAT) in the spring of each Project year. The MAT was also administered to EIP control groups for comparison purposes. Standard scores were used in all tests in the current series of studies.

Grades given by public school teachers to EIP graduates and their controls were collected during the academic year 1969-70. End of year averages were computed as input data in Study One.

D. Demographic Variables

An EIP Family Research Schedule was used to gather information regarding family structure, economic conditions, neighborhood characteristics, housing, and family functioning. The items on the schedule were completed

by trained social workers after several informal visits to each child's home. A copy of the schedule is attached as Appendix B.

V. RESULTS

A. Study One

Hypothesis: Pupils who complete the third year of the EIP ungraded primary will earn higher letter grades in public schools than matched control pupils.

Procedure and Results. Before the Project ended in 1970 several groups of children had completed the sequence of classes that had been planned for them. Two groups, one from the laboratory school (Target Area D) and one from Target Area C, completed the third year of the EIP ungraded primary in the spring of 1969. A total of 41 third-year graduates entered the fourth grade in the public schools in the fall, 1969.

During the months of May and June, 1970, school records were searched to locate as many as possible of the 41 graduates and their controls. Due to a desegregation plan involving busing, the EIP graduates and their controls were dispersed throughout the two school districts. A total of 39 EIP graduates and 22 control subjects were located and their report cards were examined to obtain average letter grades for the year.

During the same search 28 graduates of EIP Kindergartens and 20 of their controls were located. Their first grade report cards were also examined and yearly letter grade averages were computed.

Eight of the controls originally selected in 1965 for the 1969 graduates of the EIP third year primary were found enrolled in public school third grades. Two were found to be finishing the fifth grade. Twelve of the 22 control subjects were found enrolled in the fourth grade. Table 1 gives the grade placements of all EIP graduates and controls for whom letter grades were obtained.

Table 1

Distribution of Grade Placement of EIP Graduates and Public School Control Subjects

Group	1st	2nd	3rd	4th	5th	All Grades
EIP Graduates						
Randomly Selected	21			30		51
Matched	7			9		16
Total	28			39		67
Public School Subjects						
Randomly Selected	17	2	5	3	2	29
Matched			4	9		13
Total	17	2	9	12	2	42

Because of the variations in grade placement found among the controls, as a result of district policies of retention, promotion, and acceleration, two approaches were used to test the significance of differences observed between the EIP third year primary graduates and their controls. First, a series of Student's t tests were computed for samples of unequal size and variance.

In this analysis average letter grades for EIP graduates in public school fourth grades were found higher than letter grade averages for controls in every academic area. In language and spelling the differences were significant at the .02 level of confidence (using a one-tailed test). EIP graduates in the fourth grade received lower grades in conduct, but the difference was not found statistically significant. Letter grades in conduct were available for only 6 control subjects for this test.

Lower grades in conduct were anticipated since the EIP program permitted movement and talking in class and encouraged both when they were believed to facilitate a particular curricular task. Reports from the public schools during the fall had alerted the EIP staff to the dismay felt by some public school teachers when they experienced talkative and physically active EIP graduates in their classrooms.

The means, standard deviations, and t test data for the EIP fourth graders and their controls are given in Table 2.

Another finding of interest was the larger variance in letter grades found for the EIP graduates. Public school practices of retention and acceleration had, perhaps, resulted in more homogeneous groups of children.

Several problems of interpretation were raised in the previous analysis. The lack of random assignment to the groups being compared and the likelihood that the distribution of letter grades sampled was not normal suggests that the significance tests reported in Table 2 cannot be trusted. The effects of retention and promotion on the grading practices of teachers are also unknown. The letter grades assigned are unlikely to be values representing equal intervals on a single dimension.

As a consequence of these considerations a Wilcoxon matched-pairs signed-rank test was completed using matched pairs of subjects selected from the total samples of EIP graduates and their controls.

Matched pairs of EIP graduates and control subjects were identified using sex, race, chronological age in months, and grade level status as criteria.

Grade level status was coded as follows:

1 if subject had been retained (CA>age for grade)
2 if subject on grade level (CA=age for grade)
3 if subject had been accelerated (CA<age for grade)

Table 2

ANOVA: Differences Between Grades of EIP Graduates and Public School Control Subjects At End of Fourth Grade

	Experimentals (EIP)			Controls[a]					
Subjects	N	Mean	S.D.	N	Mean	S.D.	t	df	p
Reading	39	2.85	1.11	22	3.27	.83	1.5677	59	<.06
Language	38	2.95	1.14	22	3.55	.91	2.1032	58	<.02
Spelling	39	2.38	1.35	22	3.14	1.21	2.1675	59	<.02
Writing	38	2.74	0.98	22	2.91	.97	0.6591	58	ns
Math	39	3.03	1.27	22	3.45	.96	1.3777	59	<.09
Science	37	3.00	1.11	15	3.33	.72	1.0748	50	ns
Social Studies	38	3.32	1.12	12	3.58	.51	0.7986	48	ns
Conduct	23	2.26	0.75	6	2.00	.89	0.7294	27	ns

Note: Grades coded as follows: A = 1, B = 2, C = 3, D = 4, and F = 5. Lower values represent higher grades.

[a] Of the 22 control subjects identified before or at entry to first grade, 2 had been accelerated and 9 retained one year.

Age expectancies for normal grade placement were defined according to legal age requirements for entry to the public schools:

77 - 88 mo. for first grade placement
89 -100 mo. for second grade placement
101-112 mo. for third grade placement
113-124 mo. for fourth grade placement
125-136 mo. for fifth grade placement
137-148 mo. for sixth grade placement

If a pair had the same grade level status code, their teacher assigned letter grades for the year were used in the analysis. If a pair had different grade level status codes, the following steps were taken:

1. If one of the pair had been retained (1) a grade of F (5) was assigned to the retained subject.

2. If one of the pair had been accelerated (3) a grade of A (1) was assigned to the accelerated member.

Since the matched pairs included subjects from grades one, two and three where fewer subject areas were graded by teachers, comparisons were possible in only three areas: reading, writing, and mathematics. Results of the Wilcoxon matched-pairs signed-ranks tests indicated that the EIP graduates received non-significantly higher letter grades in these three subjects. The relevant statistics are presented in Table 3.

The previous one-way analysis of variance had produced a probability coefficient of .09 for the difference found between the means for mathematics. The Wilcoxon analysis produced a probability level of .06. These two tests are in close agreement. The difference between the letter grade means in writing was found non-significant in the first analysis and the Wilcoxon test supported that finding (p=.12) as well.

In the t test made for reading in the first analysis a probability value of .06 was found. The value obtained in the Wilcoxon test was .08. The two sets of statistics are in close agreement and the probable validity

Table 3

Summary of Wilcoxon Matched-pairs Signed-ranks Tests
of Differences in Grades Received in Three School Subjects

Statistic	School Subjects		
	Reading	Writing	Mathematics
No. of pairs	31	31	27
Wilcoxon N	21	22	18
Wilcoxon T	74.5	90	61
Difference in Favor of (i.e. larger sum)	EIP pairs	EIP pairs	EIP pairs
Z value	1.43	1.19	1.55
p (one-tailed test)	.08	.12	.06
Significance	ns	ns	ns

of the first analysis is enhanced by the similarity of findings in the more conservative Wilcoxon procedure.

Supported by the concurrence of the Wilcoxon test, a second one-way analysis of variance for unequal sample sizes and unequal variances was run using all the data available. In this series, t tests of differences between letter grade means were made in all eight areas. The pattern of differences found was similar to that observed in the first one-way analysis of variance. Statistically significant differences were found for reading, language, spelling, and mathematics. Letter grade means were found higher for EIP graduates, again, in every academic subject and lower in conduct. The input data for science and social studies were identical with the first analysis, since letter grades in these areas were not given below the fourth grade. Table 4 presents the results of the second one-way analysis of variance.

Table 4

ANOVA: Differences Between Grades of All EIP Graduates and Public School Control Subjects

Subjects	Experimentals (EIP) N	Mean	S.D.	Controls N	Mean	S.D.	t	df	p
Reading	67	2.96	1.11	41	3.46	.92	2.400	106	<.01
Language	38	2.95	1.14	24	3.58	.93	2.2958	60	<.01
Spelling	39	2.38	1.35	25	3.16	1.14	2.3760	62	<.01
Writing	66	2.73	.97	41	3.00	.97	1.4118	105	<.08
Mathematics	65	3.05	1.23	37	3.54	.87	2.1554	100	<.02
Science	37	3.00	1.11	15	3.33	.72	1.0748	50	ns
Social Studies	38	3.32	1.12	12	3.58	.51	.7986	48	ns
Conduct	33	2.39	.83	8	2.25	1.04	.4208	39	ns

Note: Grades were coded as follows: A = 1, B = 2, C = 3, D = 4, and F = 5. Lower values represent higher grades.

[a] All experimental and control subjects for whom data were available were included in this analysis. The total includes 28 EIP graduates in first grade and 19 of their original controls (17 in first grade and 2 in second grade). Thirty-nine EIP graduates enrolled in the fourth grade are included and 23 of their original controls (9 in third grade, 12 in fourth, and 2 in fifth grade).

This series of tests gives sufficient support to accept the research hypothesis that the EIP graduates earned higher letter grades in four subject areas in the public schools in comparison to the grades received by control pupils. The level of confidence in this decision regarding reading, language, spelling, and mathematics is in the neighborhood of 90 to 95 percent. Little support was found for the hypothesis in the areas of writing, science, social studies and conduct.

B. Study Two

Hypothesis: The effects of EIP educational programs will be to improve the intellectual performance of Project Pupils to the point where the distribution of their Stanford-Binet I.Q. scores approximates the test norm (that is, a mean of 100 and a standard deviation of 16).

Procedure and Results. The distributions of S-B I.Q. scores at entry to EIP and at exit were fitted to a normal curve distribution. In fitting the normal curve, expected frequencies were set up with a mean of 100 and a standard deviation of 16, in the manner described by McNemar (1955, pp. 236-240). Intervals of three I.Q. points were used in computing the expected frequencies. Since only sample size was used as a constant in fitting each of the observed distributions, the number of degrees of freeom used in the Chi Square tests was N-1, where N equaled the number of intervals.

As a general rule when the observed frequencies in the intervals at the two ends of the distributions fell below 3, intervals were combined as necessary to increase the observed frequencies to number 3 or more.

Separate distributions were fitted for males, females, whites, Blacks, as well as all subjects, according to the following breaks:

Random experimentals
Random and matched experimentals combined
Random controls
Matched controls
Random and matched controls combined

Each of the tests of goodness of fit are presented in Appendix B. The essential data are summarized in Tables 5 and 6.

The results of the tests of goodness of fit for randomly selected subjects favor the acceptance of the research hypothesis in the case of females. The observed distribution for randomly selected females at entry was found significantly different from the test norm (at the .025 level of significance). At exit the distribution for the same 63 females was found well within the limits of chance variation from the normal curve (p=.20).

The distributions for randomly selected whites were found within the limits of chance at entry and at exit. The I.Q. scores of randomly selected Black children who entered EIP were distributed in a manner to be expected on the basis of chance alone less than once out of a thousand times, but at exit the same children had an I.Q. score distribution that could be expected twenty-five times out of a thousand. In contrast to these changes in the EIP sample, the I.Q. score distributions of the randomly selected control children (Black, white, male and female) were all significantly different from the test norm. The Chi Squares obtained for matched control children were larger at exit than at entry (in each case where sample size and the degrees of freedom were the same or nearly the same). The larger Chi Squares found for all control subjects combined, in contrast to all EIP subjects combined (in those cases where sample sizes and degrees of freedom were approximately the same), provides additional support to the hypothesis that the EIP educational programs were having the effect of reversing the declines in tested I.Q. displayed by the control groups. The smaller Chi Square values found for the tests of the distributions of experimentals at exit (in those comparisons where the degrees of freedom are very nearly the same) suggest that enrollment in the EIP program resulted in an increased goodness of fit. Acceptance of the hypothesis that the EIP graduates are children of normal intelligence within the limits of chance variation on the Stanford-Binet Intelligence Test is strongly supported for whites and females and the evidence for males and Blacks encourages support in those cases as well.

Table 5

Summary of Tests of Goodness of Fit for Pre- and Posttest I.Q Distributions for Experimental Subjects by Sex and Race

Group	N	First I. Q. df	χ^2	p	Last I. Q. df	χ^2	p
Random Experimentals[a]							
All	124	13	40.67	<.001	14	33.79	<.005
Males	61	12	25.94	<.025	6	17.76	<.01
Females	63	10	22.24	<.025	8	12.07	ns
Whites	33	6	11.89	ns	10	17.56	ns
Blacks	91	12	40.21	<.001	12	23.85	<.025
Random & Matched Experimentals Combined							
All	254	17	99.37	<.001	18	57.74	<.001
Males	121	14	73.85	<.001	15	44.48	<.001
Females	132	14	45.59	<.001	15	24.99	<.05
Whites	61	8	31.20	<.001	12	31.40	<.005
Blacks	193 -	16	76.89	<.001	17	40.61	<.005

[a] The random experimentals sex/race breakdowns were as follows:

Black males = 41 Black females = 50
White males = 20 White females = 13

Table 6

Summary of Tests of Goodness of Fit for Pre- and Posttest I.Q. Distributions of Control Subjects by Sex and Race

Group	N	First IQ df	First IQ χ^2	First IQ p	Last IQ df	Last IQ χ^2	Last IQ p
Random Controls[a]							
All	66				7	42.90	<.001
Males	37				6	33.16	<.001
Females	29				14	24.28	<.05
Whites	3						
Blacks	63				7	46.16	<.001
Matched Controls							
All	148	15	97.25	<.001	12	116.65	<.001
Males	70	10	51.47	<.001	11	59.01	<.001
Females	78	11	47.02	<.001	11	63.44	<.001
Whites	35	7	16.06	<.025	9	26.57	<.005
Blacks	113	13	96.35	<.001	11	108.25	<.001
Random & Matched Controls Combined							
All	253				17	171.58	<.001
Males	126				13	106.47	<.001
Females	127				13	78.00	<.001
Whites	65				13	35.67	<.001
Blacks	188				15	157.73	<.001

[a] Randomly selected controls were administered a Stanford-Binet I.Q. test only at the end of the Project (i.e. in May, 1970). These randomly selected controls were assumed to be matched to the experimental subjects at the time of the selection of the experimental subjects at entry to the program, since both groups were drawn randomly from the same roster of names. The roster of names was obtained by taking a complete census of all persons living in the four target areas at the beginning of the Project (July, 1965).

The research hypothesis (in this case the null hypothesis) is accepted for females, both Black and white, and for whites generally. The significance levels for males and Blacks generally argue for rejection of the null hypothesis, but the evidence uniformly shows change in the predicted direction. The possibility of making a Type II error (accepting the null hypothesis as true when it is not) seems much less serious here than making a Type I error (rejecting the null hypothesis of no difference when there is no real difference). Considering the reverse pattern of change among the controls and the size of the Chi Squares obtained with both groups, accepting the research hypothesis appears to be the most tenable position to take.

C. Study Three

Hypothesis: The effect of the EIP classroom social behavior modification treatments will be to increase the frequency of desirable classroom behavior of students.

Procedure. Desirable classroom behavior was defined in terms of the categories of the Coping Analysis Schedule for Educational Settings (CASES). A copy of the short form of CASES is included in Appendix A.

Two definitions of desirable behavior based on psychological concepts were investigated in preparation for this study and for Studies Four and Six. Six behavior styles are defined in the CASES manual (Spaulding, 1970). These are derived from the literature on personality development and are identified by letters and descriptive terms as follows:

Style A: Dominative, active, annoying, bothering, controlling
Style B: Resistant, passive aggressive, delaying, cautious
Style C: Dependent, passive, withdrawn, fearful, watchful
Style D: Talkative, peer dependent, social, gregarious
Style E: Obedient, submissive, compliant, conforming, cooperative
Style F: Assertive, thoughtful, socially integrative, productive

The first definition investigated was based on the ability of the student to match his behavior to the demands of the setting. Desirable behavior was conceived as Style E behavior in teacher-directed settings

(when conformity to the instructor's wishes was assumed to be desirable) and Style F behavior in non-teacher-directed settings (when thoughtful, socially integrative, and productive behavior was considered most appropriate).

In previous reports (Spaulding, 1971a, 1972) the first definition was examined in tests made of changes found in Style E behavior in teacher-directed settings and Style F behavior in non-teacher-directed settings. Desirable classroom behavior, as defined, was found to increase, significantly, from entry to EIP to the last term of enrollment. Significant gains in Style E behavior in teacher-directed settings were also found for the control subjects in public schools and the difference in Style E behavior in teacher-directed settings between experimentals and controls was statistically non-significant.

The control subjects, however, were found significantly less assertive, thoughtful, productive, and socially integrative (Style F) in non-teacher-directed settings. Thus, Style F behavior scores in non-teacher-directed settings effectively distinguished the two groups at the end of the Project.

For the current analysis an ordinal, weighted coefficient was devised to provide one score representing an hypothesized "ideal" pattern of classroom behavior in any setting. This weighted score was labeled an "Overall CASES Coefficient." It was computed from the six CASES Style Coefficients by weighting the proportion of observed behavior in Styles A, B, and C (collectively) by a factor of 1, the proportion in Style D by a factor of 2, the proportion in E by a factor of 3, and the proportion in Style F by a factor of 4 (see Appendix A for a sample calculation work sheet). Thus, the Overall CASES Coefficient gave greatest weight to Style F behavior and lesser weights to Style E behavior and the amounts of behavior found in the other four Styles. In Study Four the validity of this newly devised Overall CASES Coefficient was investigated, vis-a-vis the predictive value of the Style F measure alone. In this study

the changes found in Overall CASES Coefficients in two settings, during various terms of enrollment in EIP, were investigated.

To test the effects of variation in length of enrollment in EIP on the Overall CASES Coefficient, a repeated measures analysis of variance was run eight times, four times using CASES data obtained in teacher-directed settings and four times using data obtained in non-teacher-directed settings.

Results. Significant gains in Overall CASES Coefficients were found in both settings when data for all treatment lengths were pooled. However, when various treatment lengths were examined by setting, a significant loss was found in one group - the 4-year treatment group in teacher-directed settings. In both the 3- and 4-year treatment groups, losses in the Overall CASES means were observed in mid-treatment. Declining values in the 3- and 4-year treatment groups in teacher-directed settings were not overcome by the time the period of enrollment was terminated.

Tables 7 and 8 present summaries of the two sets of repeated measures analyses of variance. Table 9 summarizes the means found each spring term for each treatment group and the tests of significance of the gains and losses observed.

The losses followed by gains in Overall CASES Coefficients are interpreted to be the result of the complexity of the experimental procedures followed. The CASES manual presents six treatments to be used by teachers according to the behavioral style displayed by the individual pupil. This is an aptitude by treatment interaction (ATI) design (Cronbach and Gleser, 1965) and it required two to three years to train the Project teachers to apply the appropriate treatments. First the teachers had to learn to recognize the behavioral style exhibited by a particular child in a particular setting, then they had to learn to apply a recommended treatment. It wasn't until the last two years of the five-year Project

Table 7

Summary of Repeated Measures ANOVA: Effects of Length of EIP Treatments on CASES Overall Behavior in Teacher-Directed Settings

Sources of Variance	Sum of Squares	df	Mean Square	F	p
Two-year Treatment:					
Mean	1,744.353	1	1,744.353		
T (Treatment)	.461	1	.461	.00	ns
C (Child)	47.042	133	.354		
TC	47.198	133	.355		
Three-year Treatment:					
Mean	1,602.282	1	1,602.282		
T (Treatment)	1.074	2	.537	1.63	ns
C (Child)	33.460	80	.418		
TC	52.636	160	.329		
Four-year Treatment:					
Mean	1,026.669	1	1,026.669		
T (Treatment)	5.203	3	1.734	6.08	<.001
C (Child)	14.149	36	.393		
TC	30.806	108	.285		
All treatments combined:[a]					
Mean	2,515.759	1	2,515.759		
T (Treatment)	2.721	1	2.721	10.01	<.001
C (Child)	65.781	179	.367		
TC	48.673	179	.272		

Note: A program of random permutations was used to eliminate subjects from the larger cells in the ANOVA to produce cells with data for the same subjects in each cell.

[a] The combined group included data for 46 subjects who had been excluded in the two-, three-, and four-year treatment analyses by the program of random permutations.

Table 8

Summary of Repeated Measures ANOVA: Effects of Length of EIP Treatments on CASES Overall Behavior in Non-Teacher-Directed Settings

Sources of Variance	Sum of Squares	df	Mean Square	F	p
Two-year Treatment:					
Mean	2,231.393	1	2,231.393		
T (Treatment)	1.584	1	1.584	4.71	<.05
C (Child)	45.202	146	.310		
TC	49.105	146	.336		
Three-year Treatment:					
Mean	1,934.515	1	1,934.515		
T (Treatment)	.428	2	.214	.66	ns
C (Child)	36.516	82	.445		
TC	53.460	164	.326		
Four-year Treatment:					
Mean	1,353.095	1	1,353.095		
T (Treatment)	4.297	3	1.432	4.62	<.01
C (Child)	16.823	40	.421		
TC	37.202	120	.310		
All Treatments Combined:[a]					
Mean	3,103.500	1	3,103.500		
T (Treatment)	12.107	1	12.107	41.95	<.001
C (Child)	69.363	185	.375		
TC	53.393	185	.289		

Note: A program of random permutations was used to eliminate subjects from the larger cells in the ANOVA to produce cells with data for the same subjects in each cell.

[a] The combined group included data for 39 subjects who had been excluded in the two-, three-, and four-year treatment analyses by the program of random permutations.

Table 9

Summary of Means and Tests of Significance of Changes
in CASES Overall Behavior in Two Settings by Length of Treatment

Statistic	2-Year Treatment Group		3-Year Treatment Group		4-Year Treatment Group		All Treatment Group	
	T.D.	Non-T.D.	T.D.	Non-T.D.	T.D.	Non-T.D.	T.D.	Non-T.D.
Group Size[a]	134	147	162	166	111	123	180	186
Mean at end of 1st year	2.55	2.68	2.66	2.80	2.85	2.82	2.56	2.71
Mean at end of 2nd year	2.55	2.83	2.50	2.73	2.59	2.86		
Mean at end of 3rd year			2.55	2.83	2.35	2.68		
Mean at end of 4th year					2.74	3.13		
Mean at end of last year							2.73	3.07
Direction (overall)	no change	gain	loss	gain	loss	gain	gain	gain
F Value	.00	4.71	1.63	.66	6.08	4.62	10.01	41.95
Probability Level	ns	<.05	ns	ns	<.001	<.01	<.001	<.001

[a] Group size was affected by the number of subjects in each group for whom data were available each year. A program of random permutations was used to eliminate subjects from the larger cells in the ANOVA to produce cells with data for the same subjects in each cell.

that a majority of the Project teachers had developed the necessary skills to apply the six treatments appropriately (in Study Six the effects of such variations among teaching teams were examined). While Project teachers were gaining skills the pupils in the Project's classes were often confused about what to do in a given setting (confused about the reinforcers operating) and their classroom behavior was variable and undisciplined. As the teachers became more consistent and their instructional behavior more closely resembled the suggested treatments for each pupil's behavioral style, improvements in student behavior were found.

A second factor apparently operated to cause the differences found between the teacher-directed and non-teacher-directed settings. The behavior called for on the part of the students in teacher-directed settings was apparently more complex. The Overall CASES Coefficient gives greater weight to Style F behavior, in contrast to Style E behavior, and it can be assumed to be much easier to become docile and submissive than to behave in an intellectually active, socially integrative, thoughtful and productive fashion.

The groups enrolled for one and two years only, entering toward the close of the Project, were apparently the ones who learned most rapidly to exhibit Style F behavior as well as Style E behavior in teacher-directed settings. Thus, when all groups were pooled in the current analysis, significant gains were found in teacher-directed settings.

Since the close of EIP in 1970, improved methods of teacher training have been devised to shorten the time needed by teachers to master the six treatment schedules. In a future series of studies the effectiveness of current in-service teacher training methods and the validity of the Overall CASES Coefficient will be investigated. Modifications of the Overall CASES Coefficient, designed to improve its psychological validity as well as the shape of the distribution of scores obtained in a sample of normal subjects, are currently being investigated. Revisions of the

Overall Coefficient are expected to have greater value in predicting classroom learning.

The research hypothesis in Study Three is accepted as supported by the statistical tests applied. The EIP classroom social behavior modification treatments were found, in general, to increase the frequency of "desirable" classroom behavior, as defined. In Study Six the differential effects of the EIP programs in the four Target Area schools were studied to discover which teaching teams were most effective in learning and applying the experimental treatments (as measured by increases in the Overall CASES Coefficients). In Study Four the validity of the Overall CASES Coefficient as a predictor of school achievement was examined. Each of these studies has investigated a link in a chain of relationships between teacher training, classroom processes, and student achievement.

D. Study Four

Hypothesis: "Ideal" classroom behavior (as defined in Study Three) will be found correlated with school achievement. Specifically, the more closely a pupil resembles the behavioral "ideal" the higher will be his achievement as measured by the Metropolitan Achievement Test (MAT).

Procedure. In the proposal for this research it had been hypothesized that "Style A, B, C, and D CASES Coefficients will be found negatively related to Stanford-Binet I.Q. scores and to MAT scores." Investigation of the distributions of each of the six CASES Style Coefficients indicated that only the distributions for Style E and F Coefficients approached normality. High frequencies of zero coefficients were found in the Style A, B, C, and D distributions. As a consequence a combined score was devised to reflect the six Style Coefficients.

As described briefly in Study Three, the six behavioral Styles were ranked according to presumed psychological value in school settings and weighted by factors as follows:

First (highest presumed value):		Style F (weighted 4)
Second:		Style E (weighted 3)
Third:		Style D (weighted 2)
Fourth:	(tied as equally	Styles A, B, and C
Fifth:	inappropriate in	(weighted 1, collectively)
Sixth:	school settings)	

Using the weights indicated, an ordinal scale score called an "Overall CASES Coefficient" was calculated by multiplying the proportion of behavior represented by each subject's coefficient in each CASES Style by the appropriate factor. The manner of calculation is shown by the sample worksheet included in Appendix A.

Mean Overall CASES Coefficients were computed for all EIP subjects using CASES data gathered each program year in April and May, in teacher-directed and non-teacher-directed settings. Histograms were produced to provide a check on the nature of the distributions of mean scores. Visual inspection indicated the distributions were approximately normal.

In testing the hypothesis, the significance of the relationships found using the mean Overall CASES Coefficients were compared with the significance of results found using mean CASES Style F Coefficients. Both types of coefficients were considered to be measures of "ideal" classroom behavior, but the mean Overall CASES Coefficient was expected to be the more powerful statistic since it included information about the total behavioral repertoire of the pupils.

As mentioned in the proposal, it was anticipated that the various CASES Coefficients would correlate with I.Q. Pupils who were brighter would, it was felt, learn the experimental reinforcement contingencies more rapidly. The MAT scores would, of course, be found strongly related to I.Q., as well. Because of these considerations a two factor, fixed effect analysis of variance model was used.

A 3 X 3 block design was used with cell parameters based on the means and standard deviations of the two factors, I.Q. at entry to EIP

and a selected measure of "ideal" behavior. The Overall CASES Coefficient and Style F Coefficients calculated for Study Three were averaged for each subject, by setting, over all years of enrollment. The I.Q. of each pupil at entry to EIP was chosen as the best estimate of initial mental ability. Statistics for the two independent factors used in each of the four analyses of variance are given in Table 10.

Table 10

Means and Standard Deviations for Independent Variables Used in a Two Factor, 3 x 3 Block Design ANOVA, Repeated Four Times

Factor	N	Mean	S.D.
First Factor:			
Stanford-Binet I.Q. at Entry	181	90.98	15.52
Second Factor:			
Mean Overall CASES Style Coefficients			
1st -in Teacher-Directed Settings	181	2.57	.37
2nd -in Non-Teacher-Directed Settings	179	2.84	.36
Mean CASES Style F Coefficients			
3rd -in Teacher-Directed Settings	181	.51	.18
4th -in Non-Teacher-Directed Settings	179	.90	.21

In each analysis the dependent variables were four subtests of the MAT: Word Knowledge, Word Discrimination, Reading, and Arithmetic.

Since the data for all EIP subjects were pooled for these analyses, the number of months each pupil was enrolled in EIP was entered in the ANOVA as a covariate to control for possible length of treatment effects.

Figures 1 through 4 display the four ANOVA designs with cell, row, column, and total frequencies. The I.Q. and CASES block break-points

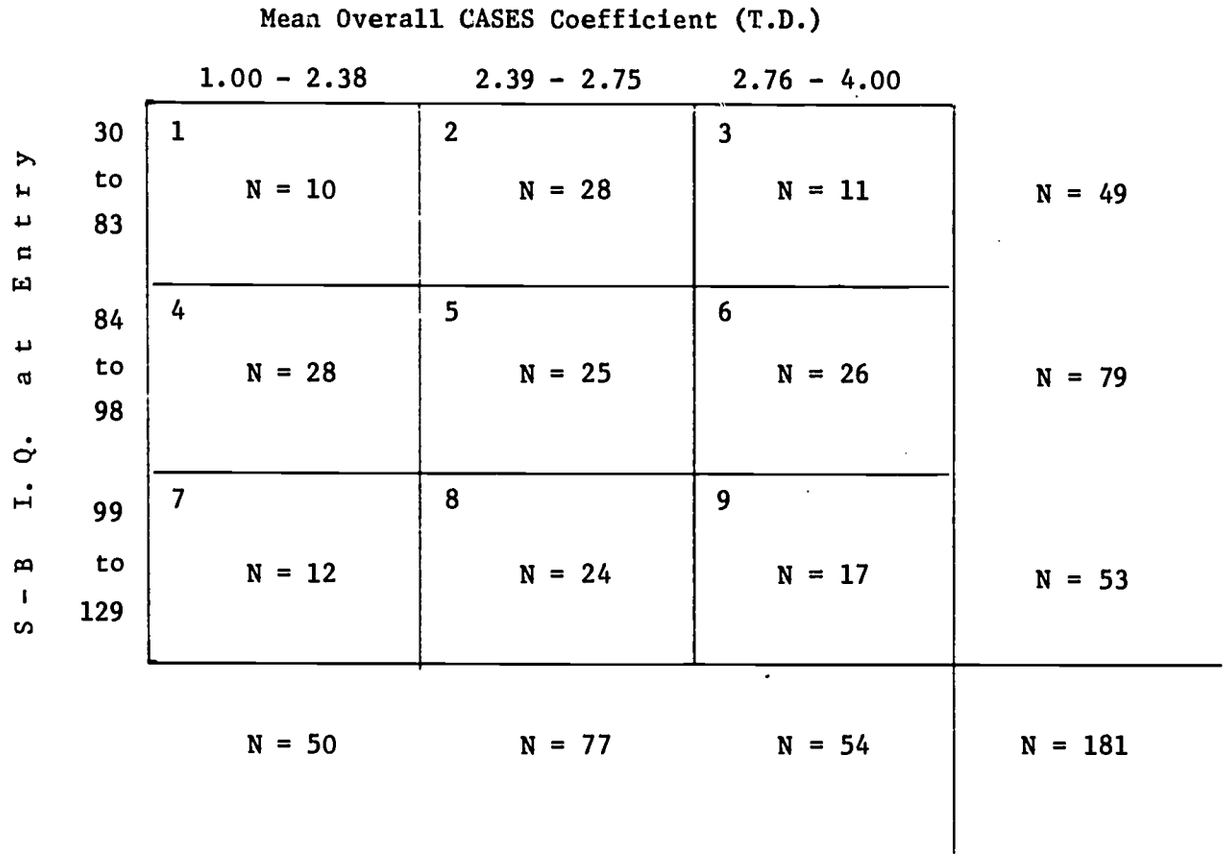

Figure 1 ANOVA Design with Cell Frequencies for Analysis of Effects of Socialization in Teacher-Directed (T.D.) Settings Using the Overall CASES Coefficient as a Measure of Socialization.

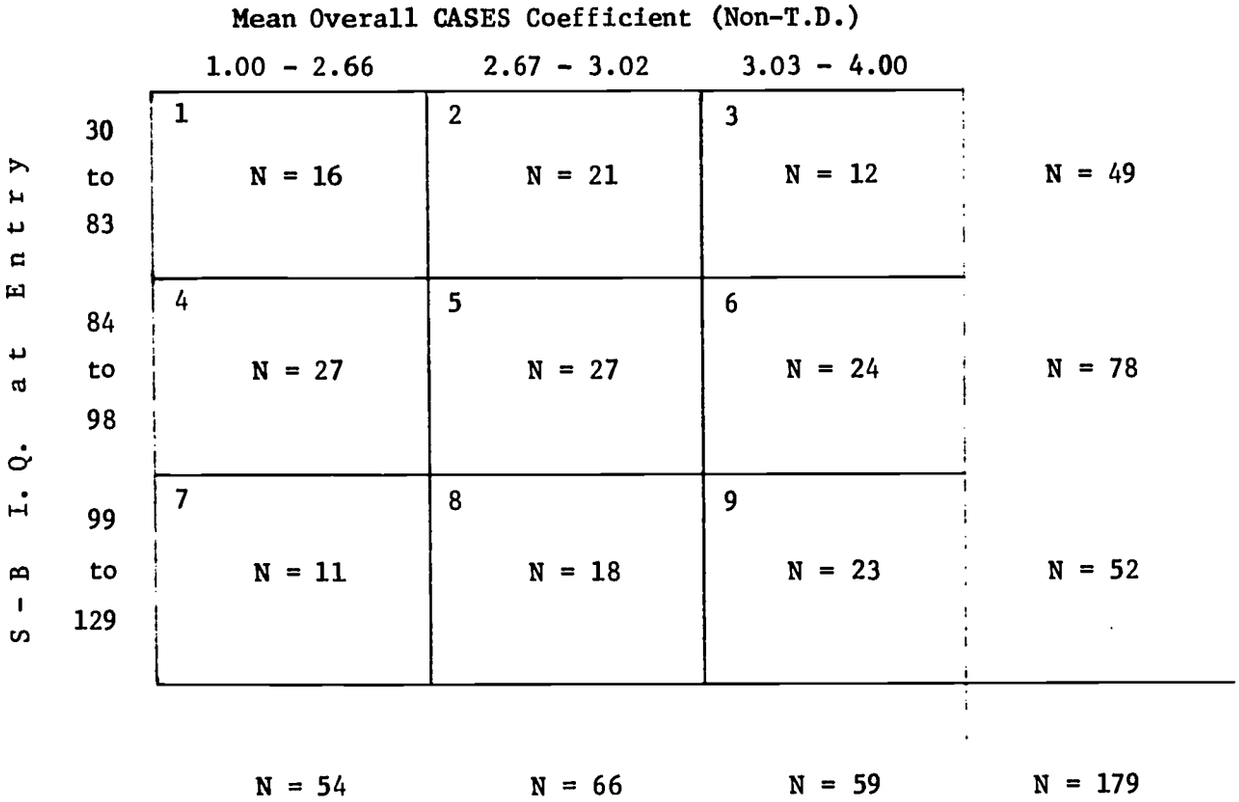

Figure 2 ANOVA Design with Cell Frequencies for Analysis of Effects of Socialization in Non-Teacher Directed (Non-T.D.) Settings Using the Overall CASES Coefficient as a Measure of Socialization.

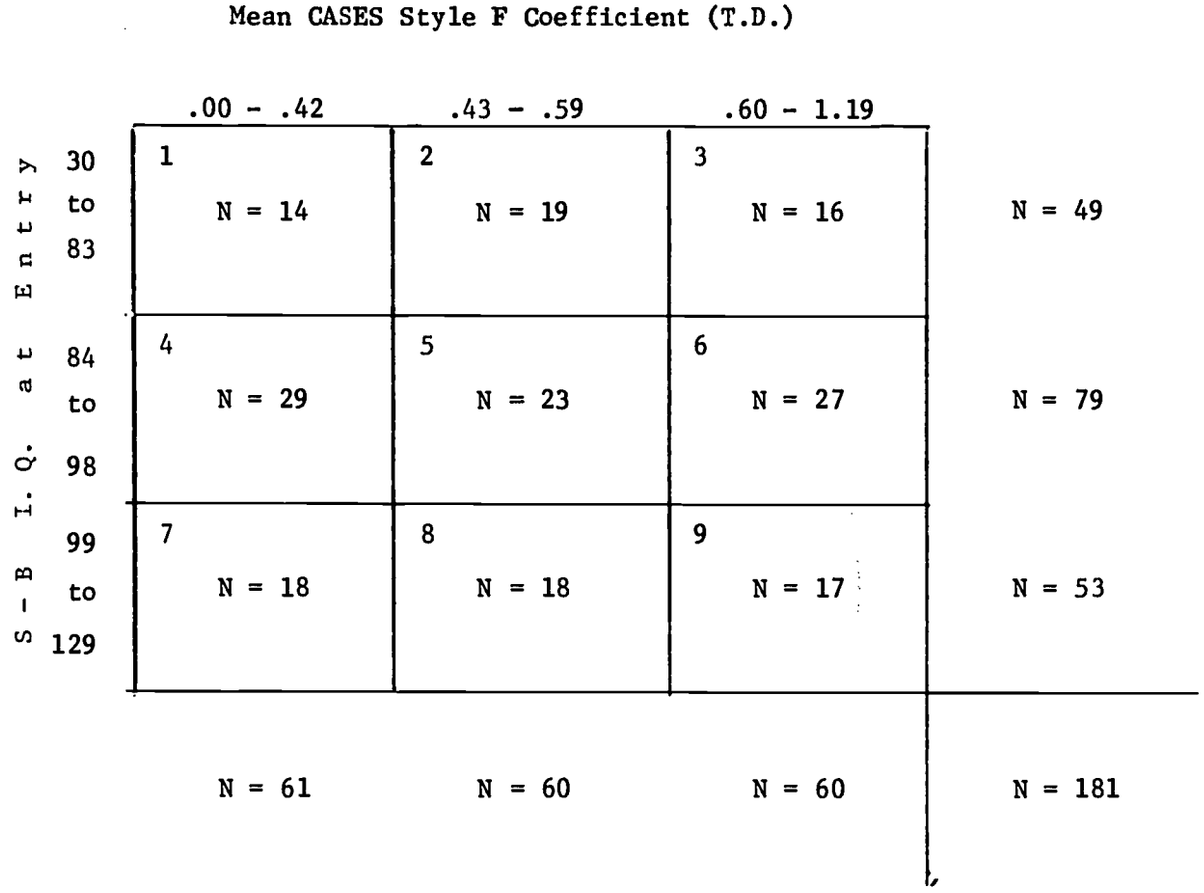

Figure 3 ANOVA Design with Cell Frequencies for Analysis of Effects of Socialization in Teacher-Directed (T.D.) Settings Using the CASES Style F Coefficient as a Measure of Socialization.

Mean CASES Style F Coefficient (Non-T.D.)

S-B I.Q. at Entry	.00 - .79	.80 - 1.00	1.01 - 1.19	
30 to 83	1 N = 12	2 N = 22	3 N = 15	N = 49
84 to 98	4 N = 23	5 N = 29	6 N = 26	N = 78
99 to 129	7 N = 14	8 N = 20	9 N = 18	N = 52
	N = 49	N = 71	N = 59	N = 179

Figure 4 ANOVA Design with Cell Frequencies for Analysis of Effects of Socialization in Non-Teacher Directed (Non-T.D.) Settings Using the CASES Style F Coefficient as a Measure of Socialization.

are also shown. In each case, the break-points were one-half of one standard deviation above and below the mean.

Results. A packaged ANOVA program (Biomed 05V) was used since it offered the option of testing the significance of all variance elements.

The Overall CASES Coefficient was found a better predictor of MAT achievement than the CASES Style F Coefficient. The Overall CASES Coefficient was found significantly related, positively, as hypothesized, with MAT Word Knowledge, Word Discrimination, and Reading - but only when using CASES data gathered in teacher-directed settings. In contrast, the CASES Style F Coefficient was found significantly related, positively, as hypothesized, with MAT Word Knowledge and Word Discrimination, but only when using CASES data from non-teacher-directed settings.

Neither measure of "ideal" classroom behavior was found significantly related to MAT Arithmetic.

With the exception of MAT Arithmetic, these findings supported acceptance of the research hypothesis. Levels of significance of the F-values obtained for the main effects of the CASES factors in the four analyses are summarized in Table 11.

Length of enrollment in EIP was not found to contribute significantly to achievement. When the main effects of I.Q. and the CASES coefficients were adjusted for length of enrollment their statistical significance was not increased.

A significant interaction was found, however, between S-B I.Q. and CASES Overall Coefficients in teacher-directed settings (in association with MAT Word Knowledge). Low I.Q. subjects with high Overall CASES Coefficients were the lowest achievers on the MAT Word Knowledge subtest. A similar pattern, not reaching statistical significance, was found in

Table 11

Summary of Significance Levels of F-Values Found in the ANOVA and Covariance for the Main Effects of CASES Coefficients as Variates of Achievement in EIP

Type of CASES Coefficient	Metropolitan Achievement Test			
	Word Knowledge	Word Discrimination	Reading	Arithmetic
1. CASES Style F Coefficient in T.D. Settings	ns	ns	ns	ns
2. CASES Style F Coefficient in Non-T.D. Settings	<.025	<.05	ns	ns
3. Overall CASES Style Coefficient in T.D. Settings	<.025	<.01	<.01	ns
4. Overall CASES Style Coefficient in Non-T.D. Settings	ns	ns	ns	ns

the analysis of relationships of I.Q. and CASES Overall Coefficients with MAT Word Discrimination and Reading.

Results of all tests of variance contributions in the four analyses are given in Tables 12 to 15. The means for each cell in the two analyses of variance where significant effects of the CASES measures were found are displayed graphically in Figures 5 through 12.

Only the Overall CASES Coefficient showed an ordered relationship with achievement. In the cases of MAT Word Knowledge, Word Discrimination, and Reading, subjects with I.Q.'s above 84 were found higher in achievement in direct relationship to their mean Overall CASES Coefficients. A reversal of relationships found to occur between low and medium CASES Style F Coefficient groups and MAT Word Knowledge and Word Discrimination strongly supports the superior predictive validity of the Overall CASES Coefficient.

The research hypothesis is accepted on the basis of results found for subjects with S-B I.Q.'s of 84 or above in the areas of word knowledge, word discrimination, and reading. The research hypothesis is not accepted regarding achievement in arithmetic.

The interaction found between I.Q. and Overall CASES Coefficients indicates that among the lowest I.Q. group (30-83) the most highly socialized subjects were not achieving as well as the less well socialized subjects. A revised form of the Overall CASES Coefficient is now being developed in an effort to provide a behavioral measure that will relate with achievement in an ordered fashion at every I.Q. level. Results of tests of a revised Overall CASES Coefficient as an improved measure of "ideal" classroom behavior will be reported in the future.

Table 12

Summary of ANOVA and Covariance
Predictor: Overall CASES Style Coefficient in Teacher-Directed Settings

Sources of Variance[a]	df	Dependent Variables: Subtests of the Metropolitan Achievement Test (MAT) Word Knowledge F	p	Word Discrimination F	p	Reading F	p	Arithmetic F	p
A	2	4.19	<.025	5.16	<.01	5.28	<.01	.71	ns
A + (A x B)	6	3.04	<.01	3.00	<.01	2.69	<.025	1.70	ns
B	2	16.75	<.001	17.34	<.001	27.83	<.001	10.47	<.001
B + (A x B)	6	8.99	<.001	8.57	<.001	10.83	<.001	5.04	<.001
A - C	3	3.86	<.025	4.23	<.01	3.61	<.025	.47	ns
[A + (A x B)] - C	7	3.19	<.005	3.02	<.01	2.36	<.025	1.46	ns
B - C	3	11.43	<.001	11.69	<.001	18.72	<.001	7.07	<.001
[B + (A x B)] - C	7	7.90	<.001	7.47	<.001	9.32	<.001	4.34	<.001
C	1	2.21	ns	1.61	ns	.01	ns	.00	ns
A x B	4	2.60	<.05	2.07	ns	.87	ns	2.04	ns
(A x B) - C	5	2.62	<.025	2.05	ns	.70	ns	1.63	ns
A + B	4	10.71	<.001	11.10	<.001	17.32	<.001	5.80	<.001
(A + B) - C	5	8.88	<.001	9.07	<.001	13.86	<.001	4.69	<.001
[A + B + (A x B)] - C	9	7.27	<.001	6.96	<.001	8.97	<.001	3.73	<.001
Mean of MAT Subtest	1								
Residual (error)	171								
Total	181								

[a] Independent Variables:
A = Overall CASES Style Coefficient in Teacher-Directed Settings at exit from EIP
B = Stanford-Binet I.Q. measured at entry to EIP
Covariate:
C = Length of Enrollment in EIP (in months)

Table 13

Summary of ANOVA and Covariance
Predictor: Overall CASES Style Coefficient in Non-Teacher-Directed Settings

Sources of Variance[a]	df	Dependent Variables: Subtests of the Metropolitan Achievement Test (MAT) Word Knowledge F	p	Word Discrimination F	p	Reading F	p	Arithmetic F	p
A	2	.07	ns	.18	ns	2.30	ns	1.62	ns
A + (A x B)	6	.27	ns	.65	ns	1.38	ns	1.05	ns
B	2	19.49	<.001	19.53	<.001	25.47	<.001	8.80	<.001
B + (A x B)	6	7.03	<.001	7.45	<.001	10.52	<.001	4.18	<.001
A - C	3	.84	ns	.64	ns	1.54	ns	1.08	ns
[A + (A x B)] - C	7	.68	ns	.87	ns	1.20	ns	.90	ns
B - C	3	13.48	<.001	13.29	<.001	16.98	<.001	5.87	<.001
[B + (A x B)] - C	7	6.31	<.001	6.57	<.001	9.02	<.001	3.59	<.005
C	1	2.22	ns	1.43	ns	.06	ns	.01	ns
A x B	4	.39	ns	.94	ns	1.07	ns	1.05	ns
(A x B) - C	5	.90	ns	1.17	ns	.89	ns	.84	ns
A + B	4	10.08	<.001	9.87	<.001	15.94	<.001	6.18	<.001
(A + B) - C	5	8.35	<.001	8.07	<.001	12.77	<.001	4.95	<.001
[A + B + (A x B)] - C	9	5.08	<.001	5.16	<.001	8.22	<.001	3.33	<.005
Mean of MAT Subtest	1								
Residual (error)	169								
Total	179								

[a] Independent Variables:
A = Overall CASES Style Coefficient in Non-Teacher-Directed Settings at exit from EIP
B = Stanford-Binet I.Q. measured at entry to EIP
Covariate:
C = Length of Enrollment in EIP (in months)

Table 14

Summary of ANOVA and Covariance
Predictor: CASES Style F Coefficient in Teacher-Directed Settings

Sources of Variance[a]	df	Dependent Variables: Subtests of the Metropolitan Achievement Test (MAT) Word Knowledge F	p	Word Discrimination F	p	Reading F	p	Arithmetic F	p
A	2	.73	ns	.88	ns	1.34	ns	.47	ns
A + (A x B)	6	.99	ns	.94	ns	1.29	ns	.53	ns
B	2	20.71	<.001	20.01	<.001	30.17	<.001	10.72	<.001
B + (A x B)	6	7.73	<.001	7.32	<.001	11.03	<.001	4.16	<.001
A - C	3	1.66	ns	1.49	ns	.93	ns	.31	ns
[A + (A x B)] - C	7	1.39	ns	1.22	ns	1.15	ns	.46	ns
B - C	3	14.38	<.001	13.73	<.001	20.22	<.001	7.15	<.001
[B + (A x B)] - C	7	6.91	<.001	6.47	<.001	9.47	<.001	3.56	<.005
C	1	3.05	ns	2.31	ns	.00	ns	.04	ns
A x B	4	1.17	ns	.99	ns	1.01	ns	.66	ns
(A x B) - C	5	1.56	ns	1.26	ns	.81	ns	.55	ns
A + B	4	10.73	<.001	10.49	<.001	15.63	<.001	5.67	<.001
(A + B) - C	5	8.97	<.001	8.65	<.001	12.52	<.001	4.56	<.001
[A + B + (A x B)] - C	9	5.56	<.001	5.26	<.001	7.71	<.001	2.85	<.005
Mean of MAT Subtest	1								
Residual (error)	171								
Total	181								

[a] Independent Variables:
A = CASES Style F Coefficients in Teacher-Directed Settings at exit from EIP
B = Stanford-Binet I.Q. measured at entry to EIP
Covariate:
C = Length of Enrollment in EIP (in months)

Table 15

Summary of ANOVA and Covariance
Predictor: CASES Style F Coefficient in Non-Teacher-Directed Settings

Sources of Variance[a]		Dependent Variables: Subtests of the Metropolitan Achievement Test (MAT)							
		Word Knowledge		Word Discrimination		Reading		Arithmetic	
	df	F	p	F	p	F	p	F	p
A	2	4.07	<.025	3.54	<.05	1.18	ns	1.89	ns
A + (A x B)	6	1.39	ns	1.64	ns	.67	ns	.99	ns
B	2	20.31	<.001	19.81	<.001	30.28	<.001	12.78	<.001
B + (A x B)	6	7.05	<.01	7.21	<.001	10.81	<.001	4.47	<.001
A - C	3	3.80	<.025	3.16	<.05	.82	ns	1.26	ns
[A + (A x B)] - C	7	1.66	ns	1.73	ns	.59	ns	.85	ns
B - C	3	13.97	<.001	13.63	<.001	20.24	<.001	8.58	<.001
[B + (A x B)] - C	7	6.24	<.001	6.36	<.001	9.28	<.001	3.85	<.001
C	1	2.13	ns	2.22	ns	.01	ns	.02	ns
A x B	4	.08	ns	.58	ns	.46	ns	.65	ns
(A x B) - C	5	.53	ns	.90	ns	.37	ns	.52	ns
A + B	4	12.61	<.001	12.05	<.001	16.01	<.001	7.14	<.001
(A + B) - C	5	10.53	<.001	9.97	<.001	12.81	<.001	5.72	<.001
[A + B + (A x B)] - C	9	6.02	<.001	5.98	<.001	7.58	<.001	3.28	<.005
Mean of Subtest	1								
Residual (error)	169								
Total	179								

[a] Independent Variables:

A = CASES Style F Coefficient in Non-Teacher-Directed Settings at Exit from EIP
B = Stanford-Binet I.Q. measured at Entry to EIP

Covariate:

C = Length of Enrollment in EIP (in months)

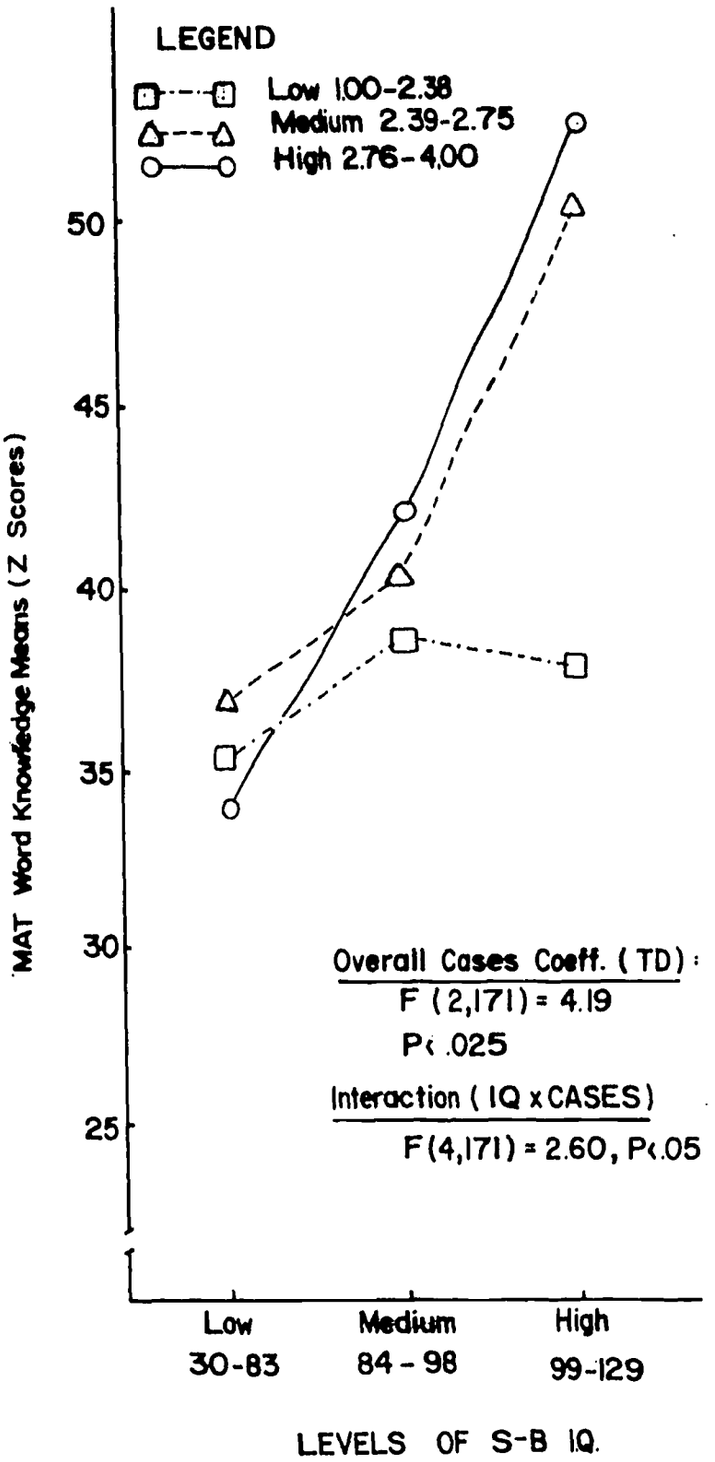

Figure 5 MAT Word Knowledge means for three levels of Overall CASES Coefficients in teacher-directed settings and three levels of S-B I.Q.

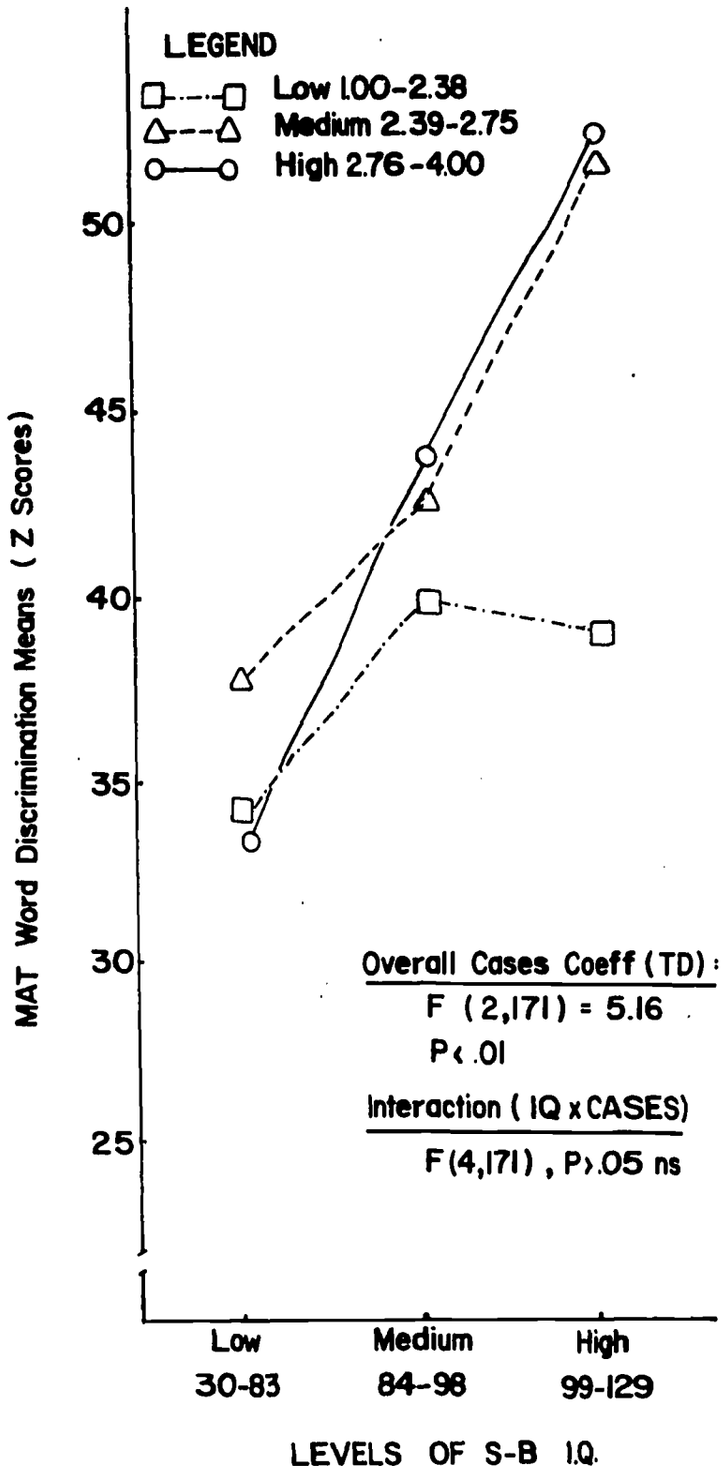

Figure 6 MAT Word Discrimination means for three levels of Overall CASES Coefficients in teacher-directed settings and three levels of S-B I.Q.

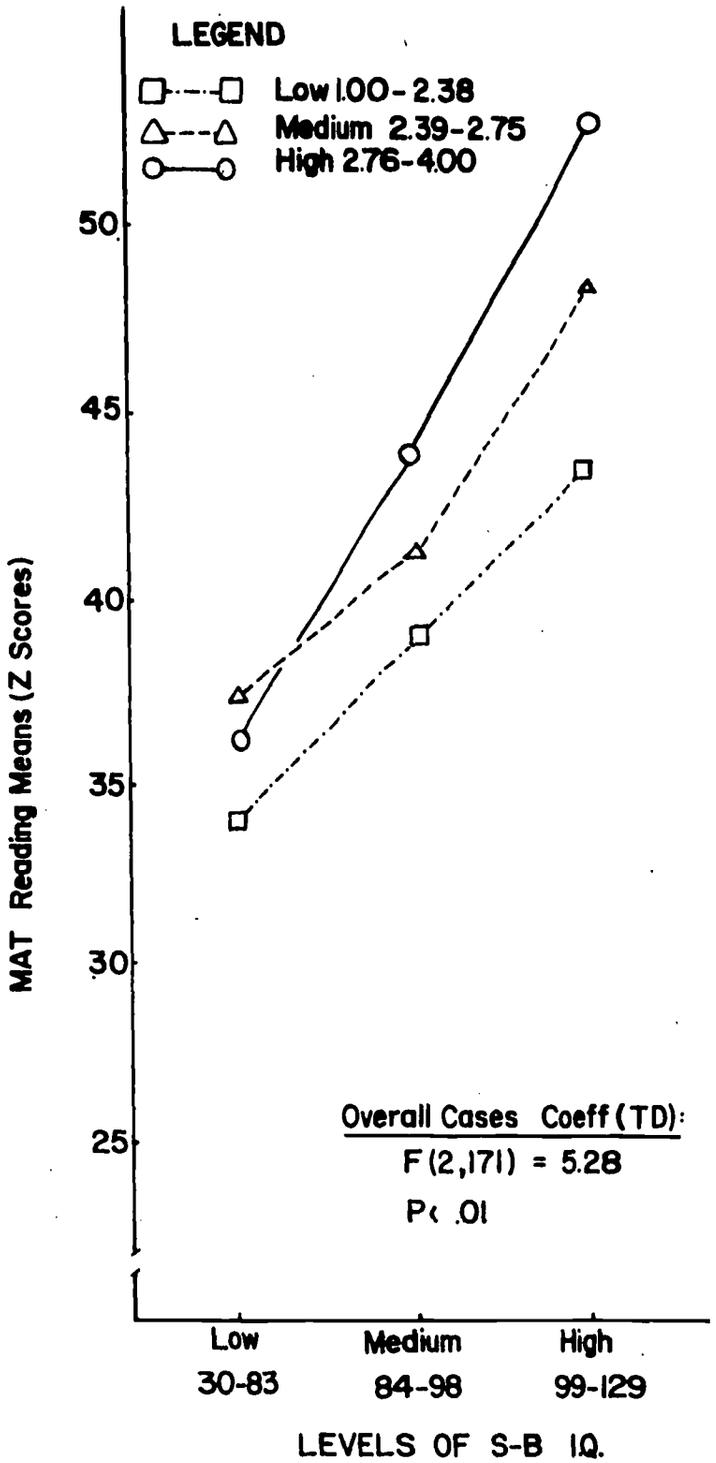

Figure 7 MAT Reading means for three levels of Overall CASES Coefficients in teacher-directed settings and three levels of S-B I.Q.

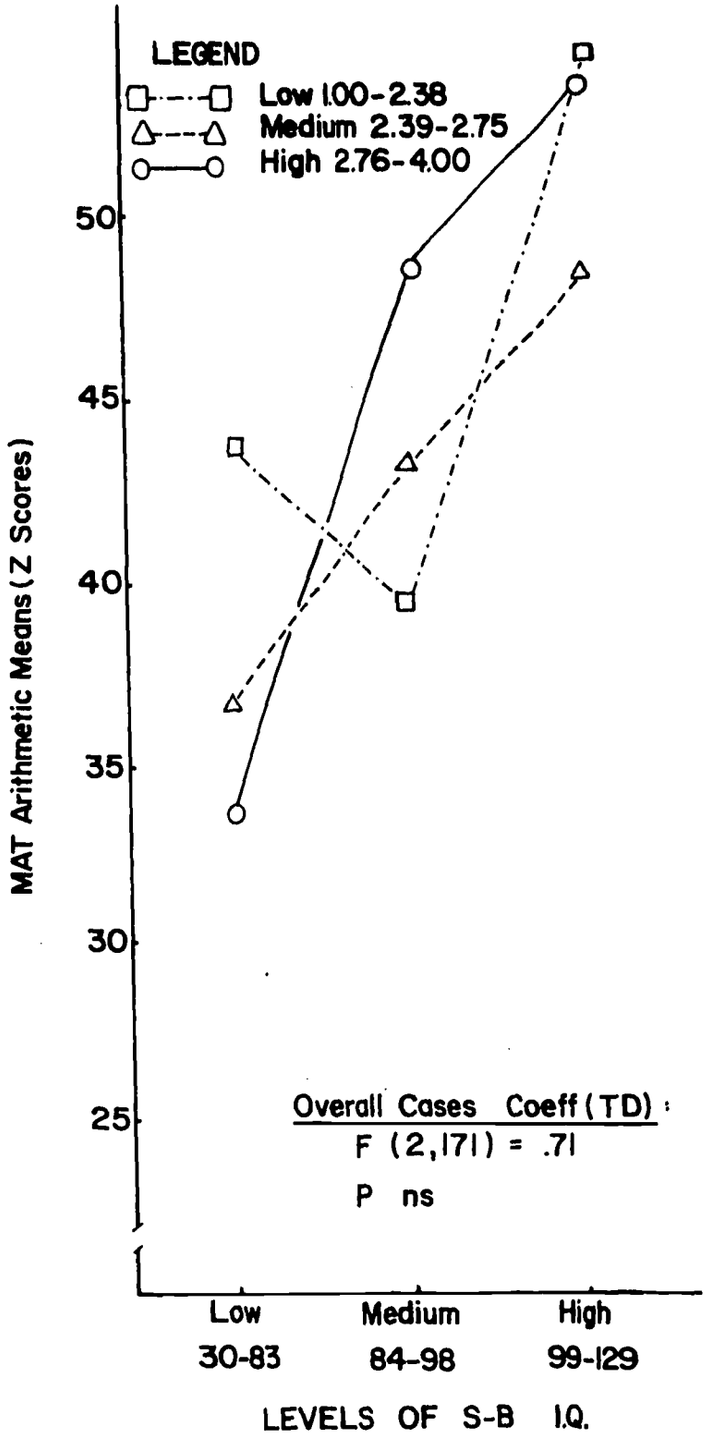

Figure 8 MAT Arithmetic means for three levels of Overall CASES Coefficients in teacher-directed settings and three levels of S-B I.Q.

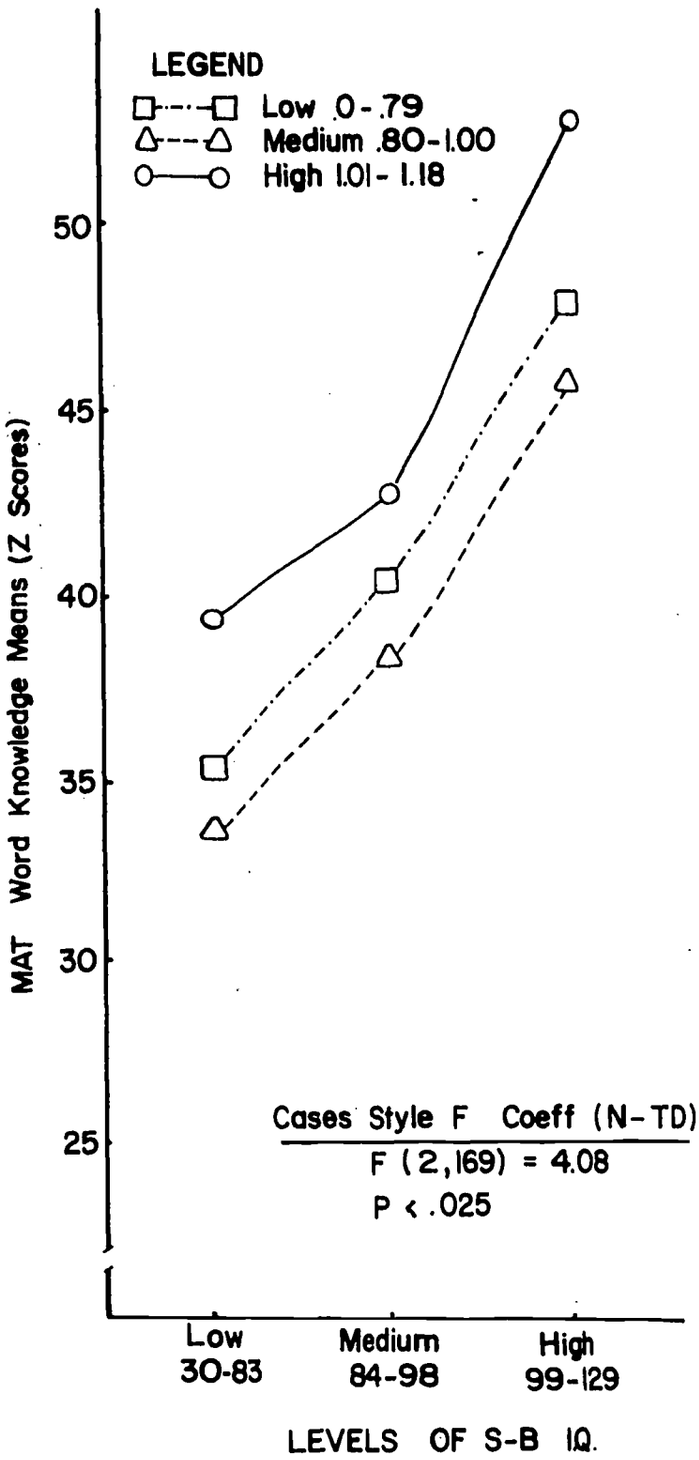

Figure 9 MAT Word Knowledge means for three levels of CASES Style F Coefficients in non-teacher-directed settings and three levels of S-B I.Q.

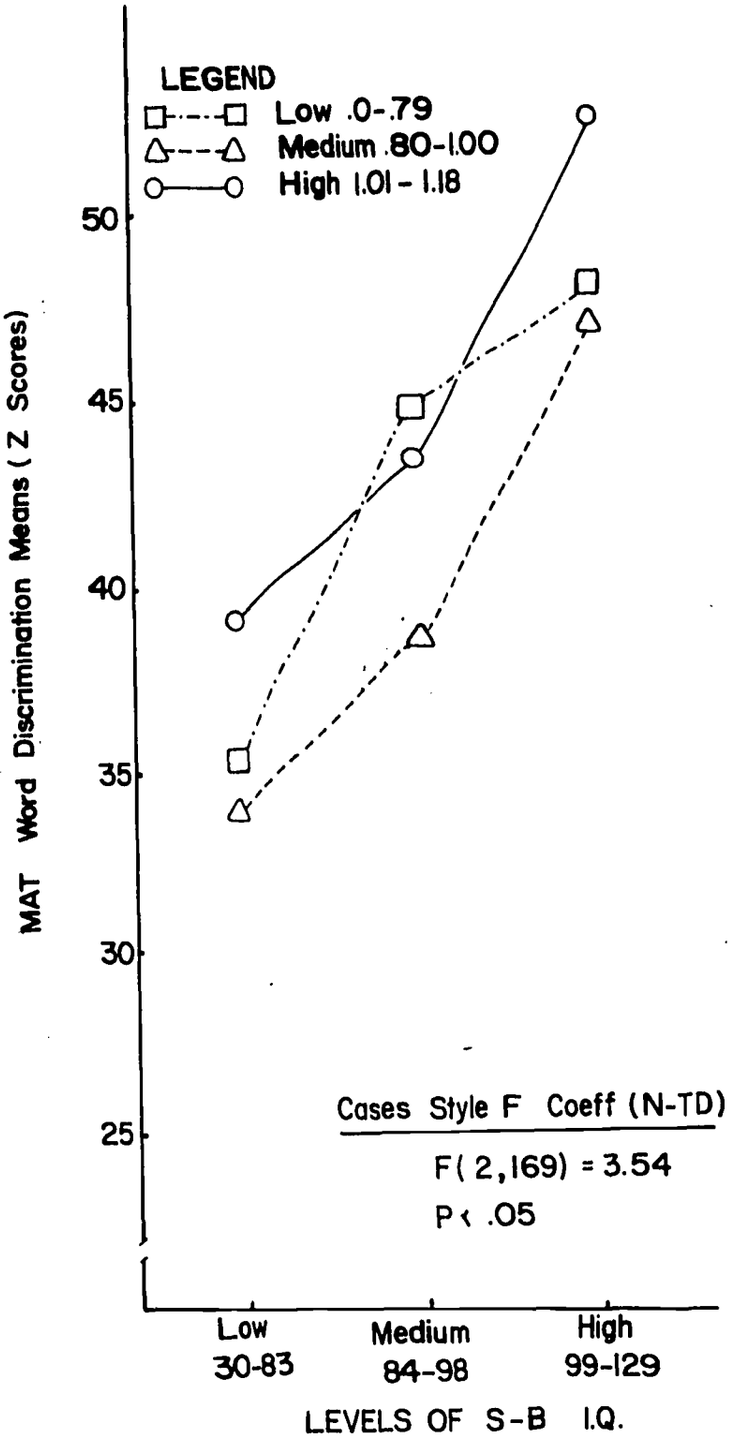

Figure 10 MAT Word Discrimination means for three levels of CASES Style F Coefficients in non-teacher-directed settings and three levels of S-B I.Q.

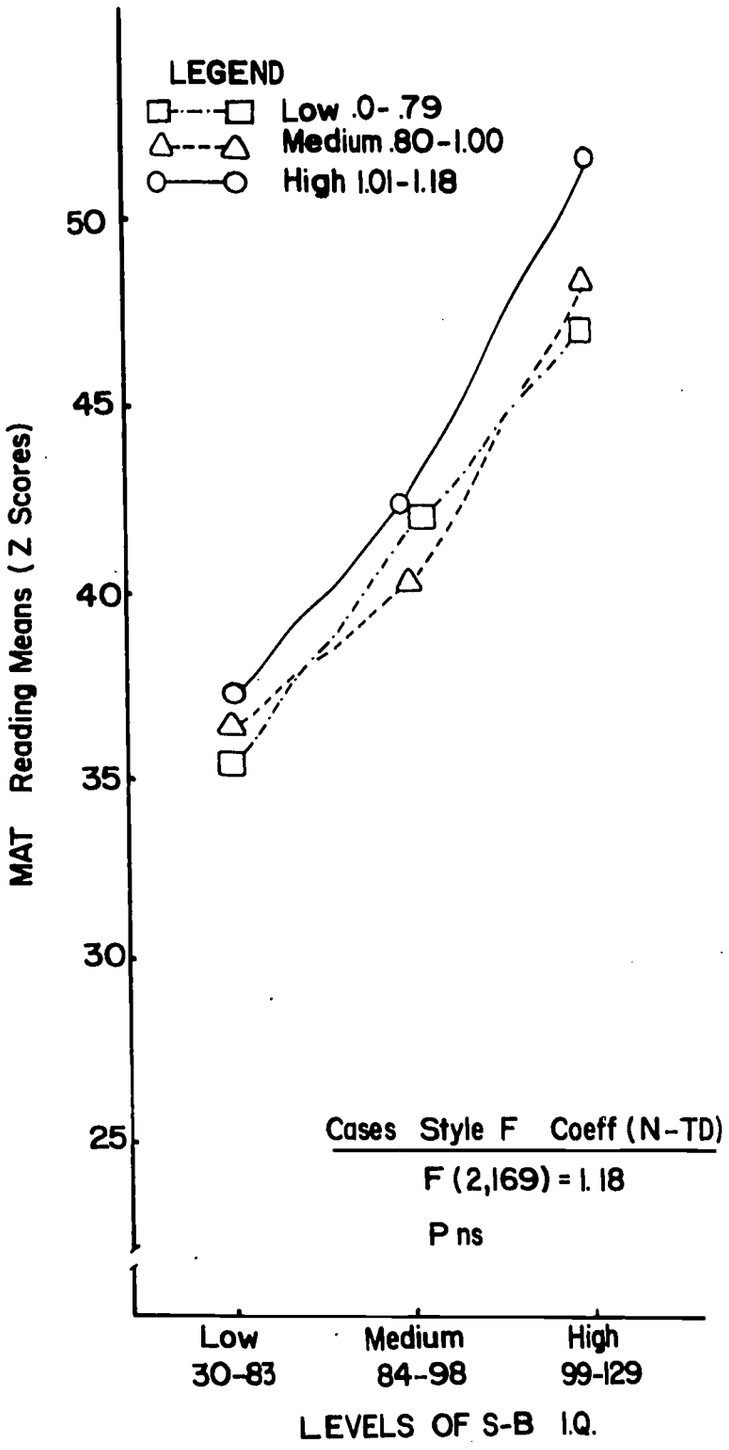

Figure 11 MAT Reading means for three levels of CASES Style F Coefficients in non-teacher-directed settings and three levels of S-B I.Q.

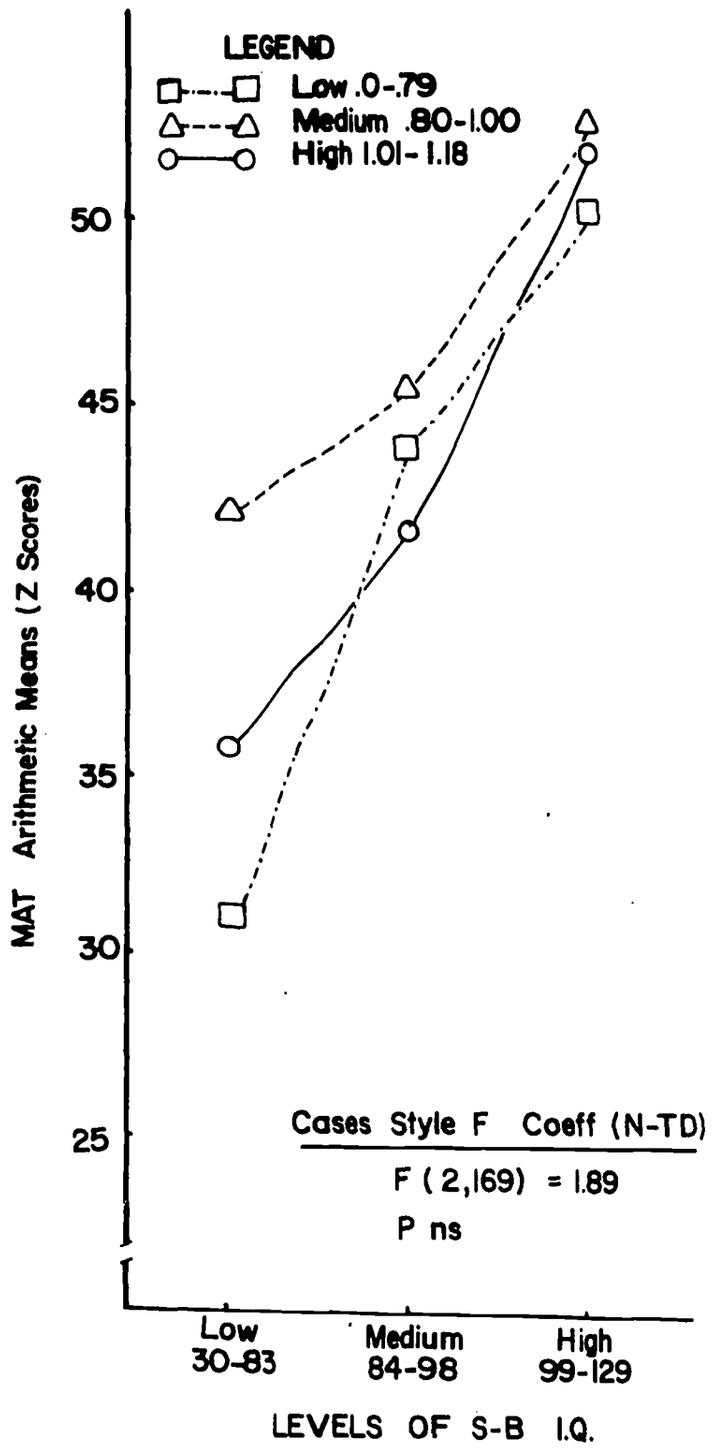

Figure 12 MAT Arithmetic means for three levels of CASES Style F Coefficients in non-teacher-directed settings and three levels of S-B I.Q.

E. Study Five

Hypothesis: Many independent variables reflecting differences in family structure, economic condition, neighborhood characteristics, housing, and family functioning will be found correlated with the academic achievement of randomly selected EIP children.

Procedure. A series of four step-wise multiple regression analyses was used to identify independent variables significantly related to standardized scores on four sub-tests of the Primary level of the MAT, Word Knowledge, Word Discrimination, Reading, and Arithmetic. All randomly-selected EIP subjects who had been tested with the MAT before exit were included in this analysis. Scores from the last administration of the MAT during enrollment in EIP were used.

Information on family structure, economic conditions of the family, neighborhood conditions and characteristics, housing, and family functioning was obtained by trained social workers during home visits extending over the years 1965-69. A copy of the research questionnaire used by the social workers and the coding procedures used in preparing the family and environmental data for machine processing are given in Appendix B.

In transforming the stored data for regression analysis, non-continuous independent variables were coded as dichotomous vectors. In some cases the breaks were based on logical grounds but in most cases they were made according to the frequency distributions found for random experimental subjects over all possible values of each variable. Continuous variables such as "family income in dollars" and "number of family members" were entered in the analysis without modification. When data for a given subject were missing, means for the sample as a whole were assigned.

The independent variables used in the four regression analyses are identified in Table 16. Data for ten variables (Numbers 21-30) were available for only a portion of the EIP random sample and these ten were dropped after a preliminary analysis with the smaller sample indicated the ten variables were not significant.

Table 16

Independent Variables Used in Regression Analysis

Variable Number	Variable Description
1	Year of Birth
2	Month of Birth
3	Number of Sisters
4	Number of Brothers
5	Number of Older Brothers
6	Ordinal Position (0 if 4th or more; 1 if 1st to 3rd)
7	Total Number of Persons in Household
8	Mother's Year of Birth
9	Father's Year of Birth
10	Mother's Educational Level (in years completed)
11	Father's Educational Level (in years completed)
12	Marital Status (0 if not married; 1 if married)
13	Amount of Family Income
14	Child's Legitimacy (0 if illegitimate; 1 if legitimate)
15	Home Ownership (0 if rented; 1 if owned)
16	Target Area
17	Rent (monthly rent in dollars)
18	Mother's Availability to Children (0 if employed or not regularly at home; 1 if fulltime homemaker)
19	Year and Term of Entry to EIP
20	Number of Teaching Personnel Child Has Had
21	Estimate of Family Social Functioning (1 if adequate; 0 if marginal or inadequate)
22	Family Relationships and Family Unity (1 if adequate; 0 if marginal or inadequate)
23	Individual Behavior and Adjustment (1 if adequate; 0 if marginal or inadequate)
24	Care and Training of Children (1 if adequate; 0 if marginaal or inadequate)
25	Social Activities (1 if adequate; 0 if marginal or inadequate)
26	Economic Practices (1 if adequate; 0 if marginal or inadequate)
27	Household Practices (1 if adequate; 0 if marginal or inadequate)
28	Health Conditions and Practices (1 if adequate; 0 if marginal or inadequate)
29	Relationships to School Social Service Worker (1 if adequate; 0 if marginal or inadequate)
30	Use of Community Resources (1 if adequate; 0 if marginal or inadequate)
31	MAT Word Knowledge
32	MAT Word Discrimination
33	MAT Reading
34	Subject's S-B I.Q. at Entrance into EIP
35	Subject's S-B I.Q. at Exit from EIP
36	Location of School Attended: Target Area 1
37	Location of School Attended: Target Area 2
38	Location of School Attended: Target Area 3
39	Location of School Attended: Target Area 4

Table 16 (continued)

Independent Variables Used in Regression Analysis

Variable Number	Variable Description
40	Race (0 if Black; 1 if white)
41	Sex (0 if female; 1 if male)
42	Mother's Warner Scale Occupational Status (0 if 1 to 5; 1 if 6 or 7)
43	Father's Warner Scale Occupational Status (0 if 1 to 5; 1 if 6 or 7)
44	Father's Job Stability (1 if stable; 0 if not stable)
45	Source of Family Income (1 if father and/or mother; 0 if relatives and/or welfare)
46	Percentage of Income Earned by Mother (0 if 0%; 1 if above 0%)
47	Percentage of Income Earned by Father (0 if 58% or less; 1 if 59% or more)
48	Type of Family Structure (1 if intact, nuclear or extended; 0 if not)
49	State of House (0 if poor or very poor; 1 if fair to very good)
50	State of Neighborhood (0 if poor or very poor; 1 if fair to very good)
51	MAT Arithmetic

Results. I.Q. scores at exit from EIP accounted for most of the variance in all four dependent variables. The amount explained ranged from a low of 17% in Reading to a high of 27% in Word Discrimination. I.Q. at entry to EIP added nothing to the variance already explained by Exit I.Q.

The next most significant independent variable was the sex of the subject. Females in EIP achieved higher scores in all four MAT sub-tests. The contribution of the sex variable was highest in Reading (12%) and lowest in Word Knowledge (4%). In Study Two, I.Q. scores for randomly-selected females in EIP were found normally distributed at exit. Correlations in this Study showed that sex and I.Q. were unrelated at entry to EIP (r=.04) but significantly correlated at exit (r=.178, p=.05). The EIP curriculum appeared to increase both the I.Q. and achievement scores of the girls. In the four step-wise regression analyses, sex was a significant variable even after variance associated with I.Q. at Exit had been extracted.

After variance associated with I.Q. at Exit and sex had been removed from the matrix, the next most salient variable was assignment to School A. The scores of subjects in School A (in Target Area A) were significantly higher in all four subtests of the MAT. The strongest association occurred in Arithmetic, where 8% of the variance was accounted for by the fact of enrollment in School A. The specific forms of the EIP curriculum applied in School A appear, from these findings, to have been the most effective.

In three analyses, predicting Word Knowledge, Word Discrimination, and Reading, the number of persons in the subject's household was found significantly negatively related. Approximately 10% of the variance in Word Knowledge and Word Discrimination was found associated with this index of family size. Higher scores on these three subtests were found among the children of smaller families.

Older children in EIP were found to perform better on the Word Knowledge, Reading, and Arithmetic subtests. Age was not found related to Word Discrimination. The strongest association was found in Arithmetic, where differences in age (in years and months) explained approximately 21% of the variance, rivaling the contribution of I.Q. at Exit from EIP.

Two other independent variables were found meaningfully related to two of the subtests. The Warner Scale score of the mother was found significantly related to Word Knowledge and Word Discrimination. Family income was found significant in predicting scores in Word Knowledge and Reading. Differences in family income also appeared to account for the lower scores in Reading found for children assigned to School B. These findings supported the view that variation in family income and occupational status are important even within the lowest two or three levels of socio-economic status, as found in the EIP disadvantaged group.

An important issue in the literature and the public mind regarding the teaching of disadvantaged children has been ethnic membership. Both Black and white children from poverty neighborhoods were enrolled in EIP.

The variable of race, however, was not found significant in any of the four regression analyses.

The research hypothesis is rejected except for three variables: Total Number of Persons in the Subject's Household, Mother's Warner Scale of Occupational Status, and Amount of Family Income. These three independent variables are not many, therefore the hypothesis is rejected. Other variables reflecting differences in family structure, neighborhood conditions, housing, and family functioning were not found significant in accounting for school achievement.

The more important factors were found to be personal or institutional, such as mental ability (I.Q.), age, sex, type of school program and instruction provided, and the number and quality of the teachers and instructional aides the child had had.

Tables 17 through 20 present the complete results of the four stepwise regression analyses. Table 21 summarizes the significant findings.

It may be useful to point out here that all three socio-economic characteristics found to contribute significantly to variance in achievement in this Study were among those found significant by Mercer (1971) in her studies of the process of labelling Black and Mexican-American children as mildly mentally retarded in Riverside, California.

Table 17

Step-wise Multiple Regression Analysis - Summary Table
Independent Variables: Sex, Race, I.Q., Target Area, No. of Teachers, and Twenty-three Family Variables
Target Variable: Metropolitan Achievement Test Word Knowledge at Exit from EIP

Step No.	Variable Description	Variable[a] Entered	Removed	R	R^2	Increase in R^2	F Value to Enter or Remove
1	Student's S-B I.Q. at Exit from EIP	35 +		.50	.25	.248	28.98
2	Total Number of Persons in Household	7 -		.59	.35	.105	14.16
3	Number of Teaching Personnel child has had	20 +		.68	.46	.112	17.95
4	Sex (0 if female; 1 if male)	41 -		.71	.51	.043	7.43
5	Mother's Warner Scale Occupational Status[b]	42 -		.74	.55	.041	7.57
6	Mother's Year of Birth	8 -		.75	.57	.019	3.63
7	Child's Legitimacy[c]	14 -		.77	.59	.019	3.66
8	Amount of Family Income (in dollars)	13 +		.78	.61	.024	5.06
9	Location of School Attended: Target Area 1	36 +		.79	.63	.017	3.54
10	Location of School Attended: Target Area 3	38 +		.80	.64	.016	3.49
11	Year of Birth	1 -		.81	.65	.010	2.23
12	Month of Birth	2 -		.82	.67	.014	3.10
13	Mother's Educational Level (in yrs. completed)	10 +		.82	.67	.008	1.87
14	Father's Warner Scale Occupational Status[b]	43 +		.82	.68	.004	0.93
15	Number of Brothers	4 -		.83	.68	.003	0.75
16	Percentage of Income Earned by Mother[d]	46 -		.83	.69	.004	0.94

[a] Direction of contribution indicated by plus or minus sign (at entry or removal)

[b] Warner Scale dichotomized: 0 if 1 to 5; 1 if 6 or 7

[c] Child's Legitimacy dichotomized: 0 if illegitimate; 1 if legitimate

[d] Percentage of Income Earned by Mother dichotomized: 0 if 0%; 1 if above 0%

Table 17 (continued)

Step-wise Multiple Regression Analysis - Summary Table
Independent Variables: Sex, Race, I.Q., Target Area, No. of Teachers, and Twenty-three Family Variables
Target Variable: Metropolitan Achievement Test Word Knowledge at Exit from EIP

Step No.	Variable Description	Variable Entered	Variable Removed	R	R^2	Increase in R^2	F Value to Enter or Remove
17	Year and Term of Entry to EIP	19 +		.83	.69	.003	0.73
18	Source of Family Income[e]	45 +		.83	.69	.003	0.64
19	Student's S-B I.Q. at Entrance into EIP	34 +		.83	.69	.003	0.75
20	Percentage of Income Earned by Father[f]	47 -		.84	.70	.004	0.91
21	Home Ownership (0 if rented; 1 if owned)	15 -		.84	.70	.002	0.55
22	State of House[g]	49 -		.84	.70	.002	0.39
23	Location of School Attended: Target Area 2	37 +		.84	.70	.001	0.23
24	Number of Sisters	3 -		.84	.71	.002	0.34
25	State of Neighborhood[h]	50 +		.84	.71	.001	0.29
26	Race (0 if Black; 1 if white)	40 -		.84	.71	.002	0.32

[e] Source of Family Income dichotomized: 1 if father or father and mother; 0 if relatives and/or welfare

[f] Percentage of Income Earned by Father dichotomized: 0 if 58% or less; 1 if 59% or more

[g] State of House dichotomized: 0 if poor or very poor; 1 if fair to very good

[h] State of Neighborhood dichotomized: 0 if poor or very poor; 1 if fair to very good

Table 18

Step-wise Multiple Regression Analysis - Summary Table
Independent Variables: Sex, Race, I.Q., Target Area, No. of Teachers, and Twenty-three Family Variables
Target Variable: Metropolitan Achievement Test Word Discrimination at Exit from EIP

Step No.	Variable Description	Variable[a] Entered	Variable[a] Removed	R	R^2	Increase in R^2	F Value to Enter or Remove
1	Student's S-B I.Q. at Exit from EIP	35 +		.52	.27	.267	31.98
2	Total Number of Persons in Household	7 -		.59	.35	.085	11.35
3	Number of Teaching Personnel child has had	20 +		.64	.41	.055	8.00
4	Mother's Warner Scale Occupational Status[b]	42 -		.68	.47	.056	9.47
5	Sex (0 if female; 1 if male)	41 -		.72	.52	.050	8.58
6	Location of School Attended: Target Area 1	36 +		.74	.54	.025	4.59
7	Number of Sisters	3 +		.75	.56	.016	2.97
8	Location of School Attended: Target Area 2	37 -		.76	.57	.015	2.87
9	Mother's Educational Level (in yrs. completed)	10 +		.76	.58	.008	1.56
10	Type of Family Structure[c]	48 +		.77	.59	.006	1.15
11	Percentage of Income Earned by Father[d]	47 -		.77	.60	.013	2.57
12	Location of School Attended: Target Area 3	38 +		.78	.60	.005	0.98
13	Race (0 if Black; 1 if white)	40 +		.78	.61	.006	1.18
14	Father's Warner Scale Occupational Status[b]	43 +		.78	.62	.005	0.95
15	Year of Birth	1 -		.79	.62	.003	0.58
16	Amount of Family Income	13 +		.79	.62	.003	0.61
17	Father's Year of Birth	9 +		.79	.63	.005	0.90

[a] Direction of contribution indicated by plus or minus sign (at entry or removal)

[b] Warner Scale dichotomized: 0 if 1 to 5; 1 if 6 or 7

[c] Type of Family Structure dichotomized: 1 if intact, nuclear or extended; 0 if not

[d] Percentage of Income Earned by Father dichotomized: 0 if 58% or less; 1 if 59% or more

Table 18 (continued)

Step-wise Multiple Regression Analysis - Summary Table
Independent Variables: Sex, Race, I.Q., Target Area, No. of Teachers, and Twenty-three Family Variables
Target Variable: Metropolitan Achievement Test Word Discrimination at Exit from EIP

Step No.	Variable Description	Variable Entered	Variable Removed	R	R^2	Increase in R^2	F Value to Enter or Remove
18	Location of School Attended: Target Area 2		37 -	.79	.63	-.001	0.20
19	Marital Status (1 if married; 0 if not married)	12 +		.79	.63	.002	0.32
20	Type of Family Structure[e]		48 -	.79	.63	-.001	0.08
21	Father's Job Stability (1 if stable; 0 if not)	44 +		.79	.63	.001	0.24

[e] Type of Family Structure dichotomized: 1 if intact, nuclear or extended; 0 if not

Table 19

Step-wise Multiple Regression Analysis - Summary Table
Independent Variables: Sex, Race, I.Q., Target Area, No. of Teachers, and Twenty-three Family Variables
Target Variable: Metropolitan Achievement Test Reading at Exit from EIP

Step No.	Variable Description	Variable[a] Entered	Removed	R	R^2	Increase in R^2	F Value to Enter or Remove
1	Student's S-B I.Q. at Exit from EIP	35 +		.42	.17	.174	18.58
2	Sex (0 if female; 1 if male)	41 -		.55	.30	.123	15.23
3	Location of School Attended: Target Area 2	37 -		.61	.37	.068	9.34
4	Year of Birth	1 -		.64	.41	.039	5.65
5	Percentage of Income Earned by Father[b]	47 -		.66	.44	.036	5.45
6	Amount of Family Income	13 +		.68	.46	.021	3.29
7	Location of School Attended: Target Area 1	36 +		.69	.48	.018	2.86
8	Percentage of Income Earned by Mother[c]	46 -		.70	.50	.015	2.37
9	Home Ownership (0 if rented; 1 if owned)	15 -		.71	.51	.010	1.56
10	Race (0 if Black; 1 if white)	40 -		.72	.51	.009	1.39
11	Total Number of Persons in Household	7 -		.73	.53	.016	2.58
12	Ordinal Position[d]	6 -		.74	.54	.015	2.54
13	Number of Sisters	3 +		.74	.55	.009	1.56
14	Father's Educational Level (in yrs. completed)	11 -		.75	.56	.008	1.28
15	Mother's Educational Level (in yrs. completed)	10 +		.76	.57	.011	1.95
16	Year and Term of Entry to EIP	19 +		.76	.58	.008	1.50
17	Number of Teaching Personnel child has had	20 +		.77	.60	.014	2.48

[a] Direction of contribution indicated by plus or minus sign (at entry or removal)

[b] Percentage of Income Earned by Father dichotomized: 0 if 58% or less; 1 if 59% or more

[c] Percentage of Income Earned by Mother dichotomized: 0 if 0%; 1 if above 0%

[d] Ordinal Position dichotomized: 0 if 4th or more; 1 if 1st to 3rd

Table 19 (continued)

Step-wise Multiple Regression Analysis - Summary Table
Independent Variables: Sex, Race, I.Q., Target Area, No. of Teachers, and Twenty-three Family Variables
Target Variable: Metropolitan Achievement Test Reading at Exit from EIP

Step No.	Variable Description	Variable Entered	Variable Removed	R	R^2	Increase in R^2	F Value to Enter or Remove
18	Father's Job Stability (1 if stable; 0 if not)	44 -		.78	.60	.007	1.31
19	Father's Warner Scale Occupational Status[e]	43 -		.78	.61	.006	1.01
20	Mother's Warner Scale Occuaptional Status[e]	42 -		.78	.61	.005	0.91
21	Source of Family Income[f]	45 +		.79	.62	.008	1.21
22	Month of Birth	2 +		.79	.62	.005	0.81
23	Mother's Availability to Children[g]	18 +		.79	.63	.004	0.73
24	Home Ownership (0 if rented; 1 if owned)		15 -	.79	.63	-.001	0.15
25	Student's S-B I.Q. at Entrance into EIP	34 +		.80	.63	.005	0.86
26	Number of Brothers	4 +		.80	.64	.004	0.68
27	Marital Status (0 if not married; 1 if married)	12 +		.80	.64	.004	0.71
28	Mother's Year of Birth	8 -		.80	.64	.001	0.22

e Warner Scale dichotomized: 0 if 1 to 5; 1 if 6 or 7

f Source of Family Income dichotomized: 1 if father or father and mother; 0 if relatives and/or welfare

g Mother's Availability to Children dichotomized: 0 if employed or not regularly at home; 1 if fulltime homemaker

Table 20

Step-wise Multiple Regression Analysis - Summary Table
Independent Variables: Sex, Race, I.Q., Target Area, No. of Teachers, and Twenty-three Family Variables
Target Variable: Metropolitan Achievement Test Arithmetic at Exit from EIP

Step No.	Variable Description	Variable[a] Entered	Removed	R	R^2	Increase in R^2	F Value to Enter or Remove
1	Student's S-B I.Q. at Exit from EIP	35 +		.47	.22	.217	24.31
2	Year of Birth	1 -		.63	.40	.186	27.05
3	Location of School Attended: Target Area 1	36 +		.70	.49	.084	14.01
4	Sex (0 if female, 1 if male)	41 -		.74	.54	.058	10.77
5	Month of Birth	2 -		.76	.57	.029	5.72
6	Location of School Attended: Target Area 3	38 +		.78	.60	.031	6.58
7	Number of Teaching Personnel Child has had	20 +		.79	.62	.016	3.42
8	Number of Brothers	4 -		.80	.64	.015	3.43
9	State of House[b]	49 -		.81	.65	.012	2.83
10	Father's Warner Scale Occupational Status[c]	43 +		.81	.66	.010	2.32
11	Rent (Monthly rent in dollars)	17 -		.82	.67	.007	1.64
12	Source of Family Income[d]	45 +		.82	.67	.008	1.96
13	Number of Older Brothers	5 +		.83	.68	.007	1.72
14	Mother's Educational Level (in yrs. completed)	10 -		.83	.69	.005	1.18
15	Father's Educational Level (in yrs. completed)	11 +		.84	.70	.017	4.33
16	Home Ownership (0 if rented, 1 if owned)	15 -		.84	.71	.005	1.29
17	Student's S-B I.Q. at Entrance into EIP	34 +		.84	.71	.005	1.14

[a] Direction of contribution indicated by plus or minus sign (at entry or removal)

[b] State of house dichotomized: 0 if poor or very poor; 1 if fair to very good

[c] Warner Scale dichotomized: 0 if 1 to 5; 1 if 6 or 7

[d] Source of Family Income dichotomized: 1 if father or father and mother; 0 if relatives and/or welfare

Table 20 (continued)

Step-wise Multiple Regression Analysis - Summary Table
Independent Variables: Sex, Race, I.Q., Target Area, No. of Teachers, and Twenty-three Family Variables
Target Variable: Metropolitan Achievement Test Arithmetic at Exit from EIP

Step No.	Variable Description	Entered	Removed	R	R^2	Increase in R^2	F Value to Enter or Remove
18	Child's Legitimacy[e]	14 -		.85	.72	.007	1.88
19	State of Neighborhood[f]	50 -		.85	.72	.002	0.48
20	Race (0 if Black; 1 if white)	40 +		.85	.72	.002	0.41
21	Mother's Year of Birth	8 -		.85	.73	.002	0.47
22	Mother's Availability to Children[g]	18 -		.85	.73	.002	0.38
23	Percentage of Income Earned by Mother[h]	46 -		.85	.73	.003	0.69
24	Father's Job Stability (1 if stable; 0 if not)	44 -		.86	.73	.002	0.40
25	Mother's Warner Scale Occupational Status[i]	42 -		.86	.73	.001	0.28
26	Percentage of Income Earned by Father[j]	47 -		.86	.73	.001	0.34
27	Father's Year of Birth	9 +		.86	.74	.001	0.21
28	Location of School Attended: Target Area 4	39 +		.86	.74	.001	0.23

[e] Child's Legitimacy dichotomized: 0 if illegitimate; 1 if legitimate

[f] State of Neighborhood dichotomized: 0 if poor or very poor; 1 if fair to very good

[g] Mother's Availability to her children dichotomized: 0 if employed or regularly not at home; 1 if fulltime homemaker

[h] Percentage of Income Earned by Mother dichotomized: 0 if 0%; 1 if above 0%

[i] Warner Scale dichotomized: 0 if 1 to 5; 1 if 6 or 7

[j] Percentage of Income Earned by Father dichotomized: 0 if 5% or less; 1 if 5% or more

Table 21

Summary of Independent Variables Found Significant
in Four Step-wise Multiple Regression Analyses

		Word Knowledge				Word Discrimination			
Independent Variable		Step	Dir.	Inc. in R^2	F	Step	Dir.	Inc. in R^2	F
Significant in all four equations:									
35	I.Q. at Exit from EIP	1	+	.248	29.0	1	+	.267	32.0
41	Sex	4	-	.043	7.4	5	-	.050	8.6
36	Enrollment in School 1	9	+	.017	3.5	6	+	.025	4.6
20	No. of Teaching Personnel	3	+	.112	18.0	3	+	.055	8.0
Significant in three equations:									
7	No. of Persons in Household	2	-	.105	14.2	2	-	.085	11.4
1	Year of Birth	11	-	.010	2.2				
Significant in two equations:									
42	Mother's Warner Scale Score	5	-	.041	7.6	4	-	.056	9.5
13	Amount of Family Income	8	+	.024	5.1				
38	Enrollment in School 3	10	+	.016	3.5				
2	Month of Birth	12	-	.014	3.1				
37	Enrollment in School 2					8[a]	-	.015	2.9
47	% of Income Father Earned					11	-	.013	2.6
Significant in one equation only:									
8	Mother's Year of Birth	6	-	.019	3.6				
14	Legitimacy	7	-	.019	3.7				
3	No. of Sisters					7	+	.016	3.0
46	% of Income Mother Earned								
6	Ordinal Position								
4	No. of Brothers								
49	State of House								
43	Father's Warner Scale Score								
11	Father's Educational Level								

[a] Removed in Step 18

Table 21 (continued)

Summary of Independent Variables Found Significant
in Four Step-wise Multiple Regression Analyses

		Reading				Arithmetic			
Independent Variable		Step	Dir.	Inc. in R^2	F	Step	Dir.	Inc. in R^2	F
Significant in all four equations:									
35	I.Q. at Exit from EIP	1	+	.174	18.6	1	+	.217	24.3
41	Sex	2	-	.123	15.2	4	-	.058	10.8
36	Enrollment in School 1	7	+	.018	2.9	3	+	.084	14.0
20	No. of Teaching Personnel	17	+	.014	2.5	7	+	.016	3.4
Significant in three equations:									
7	No. of Persons in Household	11	-	.016	2.6				
1	Year of Birth	4	-	.039	5.7	2	-	.186	27.1
Significant in two equations:									
42	Mother's Warner Scale Score								
13	Amount of Family Income	6	+	.021	3.3				
38	Enrollment in School 3					6	+	.031	6.6
2	Month of Birth					5	-	.029	5.7
37	Enrollment in School 2	3	-	.068	9.34				
47	% of Income Father Earned	5	-	.036	5.5				
Significant in one equation only:									
8	Mother's Year of Birth								
14	Legitimacy								
3	No. of Sisters								
46	% of Income Mother Earned	8	-	.015	2.4				
6	Ordinal Position	12	-	.015	2.5				
4	No. of Brothers					8	-	.015	3.4
49	State of House					9	-	.012	2.8
43	Father's Warner Scale Score					10	+	.010	2.3
11	Father's Educational Level					15	+	.017	4.3

F. Study Six

In this study the effects of variations in curriculum and instruction in the classroom behavior of pupils were investigated. In each target area school, EIP teaching teams developed their own particular styles and patterns of classroom management and academic instruction following the lead of innovations developed by teachers in the laboratory school. Between school differences were expected to develop and differences in pupil behavior as measured by CASES were expected to occur, also.

In Study Three the changes in the classroom social behavior of pupils in the Project as a whole were examined. In that investigation significant gains in desirable behavior were found when all children and all lengths of enrollment were included in the analysis. It was evident in that study that most of the gains were made in the last two years of the five-year project.

In Study Four the validity of two definitions of "ideal" behavior was investigated. Means for each definition (Style F Coefficients and Overall CASES Coefficients) over all years of enrollment were used in an analysis of variance design to determine the main effects of each measure of "ideal" behavior on academic achievement. The Overall CASES Coefficient was found more useful as a predictor of variance in the subtests of the Metropolitan Achievement Tests.

Study Six was needed to identify the particular teaching teams and curricular programs within EIP which were most effective in producing gains in desirable behavior. It was believed that the EIP program would be found more effective during the last two years when the teachers were better trained in the classroom behavior modification treatments.

Hypothesis: Classroom social behavior patterns of EIP subjects will vary significantly as a function of school and teaching team differences within EIP and a child's relative year of enrollment.

Procedure. Since teaching teams varied from year to year within the schools in the four target areas it was decided to examine the main and interaction effects of target area identification as a fixed factor. The effects of specific teaching teams were to be inferred indirectly by examination of interaction effects of the child's relative year in EIP and his school attendance area (target area).

The input data for Study Six were the CASES Style F Coefficients and Overall CASES Coefficients computed in Study Three. A two block, fixed factor, repeated measures analysis of variance design was used to test for main and interaction effects of target area and relative year of enrollment. The four columns in the design represented data gathered in each of the four target area schools. The rows represented the child's relative year of enrollment in EIP (either over two years or over three years).

The repeated measures ANOVA was run eight times to accomodate the following sets of data:

1. CASES Style F Coefficients in Teacher-directed Settings
   a. over three years of enrollment
   b. over two years of enrollment

2. CASES Style F Coefficients in Non-teacher-directed Settings
   a. over three years of enrollment
   b. over two years of enrollment

3. Overall CASES Coefficients in Teacher-directed Settings
   a. over three years of enrollment
   b. over two years of enrollment

4. Overall CASES Coefficients in Non-teacher-directed Settings
   a. over three years of enrollment
   b. over two years of enrollment

Cell sizes were equalized by a random permutations program in each of the eight runs. By this procedure the child effect was held constant, in each ANOVA, over the years of enrollment.

Results. Interaction effects were found in all eight analyses, cancelling out the main effects of target area and length of treatment in 5 out of 8 cases. The interactions were statistically significant in 7 out of 8 of the analyses.

The results of the eight ANOVA are summarized in Tables 22 through 25. The various interactions between target areas and relative years of enrollment are readily apparent in Figures 13 through 16.

Several patterns of change can be seen in these figures. Among them are the following:

1. In School D, gains in both measures of desirable classroom behavior, CASES Style F Coefficients and Overall CASES Coefficients, were apparent in data gathered in both classroom settings for both treatment groups. Behavior of the children was least desirable in 6 out of 8 of the comparisons at the end of the first year of treatment, but above the median in half of the comparisons at the end of treatment.

2. In School A, a reversal of treatment effect was found in the two-year-groups. During the early years of EIP (represented by the three-year-treatment groups) the children in School A showed less and less desirable classroom behavior. In the years near the end of EIP (represented by the two-year-treatment groups in Study Six) the treatments applied in School A increased the desirable behavior of the children in both teacher-directed and non-teacher-directed settings. These findings were traceable to a major staffing change in the last two years in School A.

3. Treatments in School B resulted in decreases in desirable behavior with the exception of Style F behavior in non-teacher-directed settings. These decreases occurred in both length of treatment groups, indicating that little improvement in treatment effectiveness as measured by the Overall CASES Coefficient was achieved in School B even in the last two years of the Project. It was in School B that pupils were found to have exceptionally poor reading achievement during the last two years of EIP.

4. The behavior of the children in School C was found generally desirable in both treatment groups in both settings over all years. Slight decreases were found in the Overall CASES Coefficients in the two-year-treatment groups (representing the effects of the programs and classroom treatments applied in the last two years of the Project in School C). These losses in School C are interpreted to have been the result of the development of a school-wide ungraded primary and the involvement of five new teachers during the fourth and fifth years of EIP in School C.

Table 22

ANOVA: Summary of Main and Interaction Effects
of Length of EIP Treatment on CASES Style F
Behavior in Teacher-Directed Settings by Target Area

Sources of Variance	Sum of Squares	df	Mean Square	F	p
Two-year Treatment:					
Mean	207,908.60	1	207,908.60		
T (Time)[a]	246.15	1	246.15	.58	ns
L (Location)[b]	475.12	3	158.37	.42	ns
C(L)[c]	18,097.18	48	377.03		
T x L	1,801.77	3	600.59	1.43	ns
TC(L)	20,220.76	48	421.27		
Three-year Treatment:					
Mean	307,100.60	1	307,100.60		
T (Time)	1,449.26	2	724.63	1.34	ns
L (Location)	463.14	3	154.38	.29	ns
C(L)	23,154.05	44	526.23		
T x L	7,051.22	6	1,175.20	2.18	.06
TC(L)	47,533.49	88	540.15		

[a] Time = Length of enrollment in EIP in years

[b] Location = Target Area of residence at time of enrollment in EIP

[c] C(L) = Variance for children nested within cells

Table 23

ANOVA: Summary of Main and Interaction Effects of Length of EIP Treatment on CASES Style F Behavior in Non-Teacher-Directed Settings by Target Area

Sources of Variance	Sum of Squares	df	Mean Square	F	p
Two-year Treatment:					
Mean	1,282,003.00	1	1,282,003.00		
T (Time)[a]	4,060.88	1	4,060.88	13.87	<.001
L (Location)[b]	5,051.14	3	1,683.72	6.08	<.001
C(L)[c]	25,473.52	92	276.89		
T x L	2,755.26	3	918.42	3.14	<.05
TC(L)	26,931.78	92	292.74		
Three-year Treatment:					
Mean	1,395,909.00	1	1,395,909.00		
T (Time)	1,590.09	2	795.04	2.48	ns
L (Location)	7,177.93	3	2,392.65	10.97	<.001
C(L)	13,963.10	64	218.17		
T x L	14,972.32	6	2,495.39	7.78	<.001
TC(L)	41,061.39	128	320.79		

[a] Time = Length of enrollment in EIP in years

[b] Location = Target Area of residence at time of enrollment in EIP

[c] C(L) = Variance for children nested within cells

Table 24

ANOVA: Summary of Main and Interaction Effects of Length of EIP Treatment on CASES Overall Behavior in Teacher-Directed Settings by Target Area

Source of Variance	Sum of Squares	df	Mean Square	F	p
Two-year Treatment:					
Mean	667.865	1	667.865		
T (Time)[a]	.219	1	.219	.70	ns
L (Location)[b]	1.411	3	.470	1.56	ns
C(L)[c]	14.512	48	.302		
T x L	2.667	3	.889	2.83	<.05
TC(L)	15.063	48	.314		
Three-year Treatment:					
Mean	915.184	1	915.184		
T (Time)[a]	1.566	2	1.566	2.67	ns
L (Location)	4.239	3	4.239	3.28	<.05
C(L)	18.942	44	18.942		
T x L	4.724	6	4.724	2.68	<.05
TC(L)	25.854	88	25.854		

[a] Time = Length of enrollment in EIP in years

[b] Location = Target Area of residence at time of enrollment in EIP

[c] C(L) = Variance for children nested within cells

Table 25

ANOVA: Summary of Main and Interaction Effects
of Length of EIP Treatment on CASES Overall
Behavior in Non-Teacher-Directed Settings by Target Area

Sources of Variance	Sum of Squares	df	Mean Square	F	p
Two-year Treatment:					
Mean	1,498.559	1	1,498.559		
T (Time)[a]	.721	1	.721	2.05	ns
L (Location)[b]	1.386	3	.462	1.66	ns
C(L)[c]	25.596	92	.278		
T x L	2.862	3	.954	2.71	.06
TC(L)	32.344	92	.351		
Three-year Treatment:					
Mean	1,576.688	1	1,576.688		
T (Time)	.095	2	.048	.15	ns
L (Location)	3.121	3	1.040	2.40	ns
C(L)	27.739	64	.433		
T x L	6.052	6	1.009	3.12	<.01
TC(L)	41.378	128	.323		

[a] Time = Length of enrollment in EIP in years

[b] Location = Target Area of residence at time of enrollment in EIP

[c] C(L) = Variance for children nested within cells

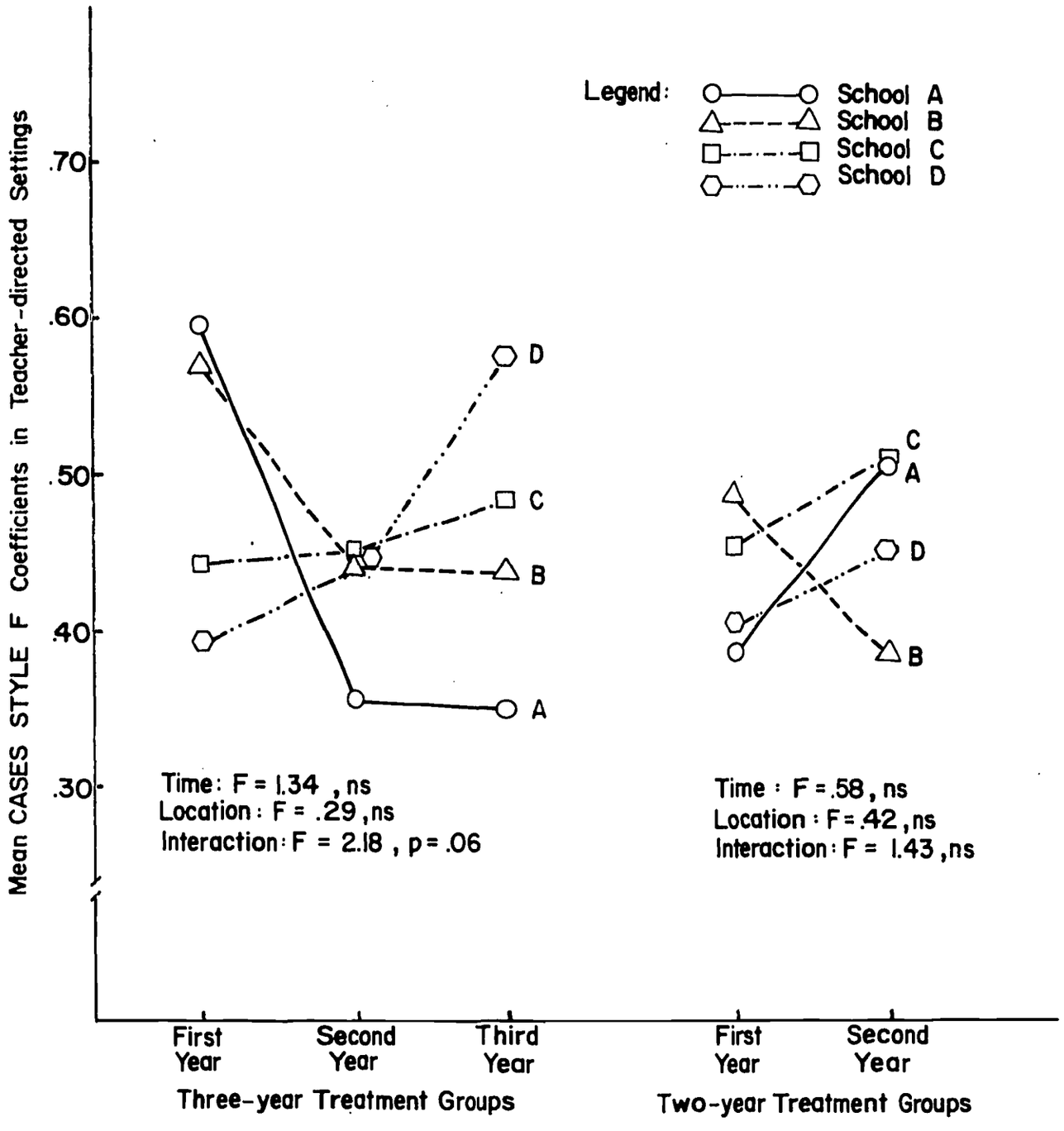

Figure 13 Mean CASES Style F Coefficients in Teacher-Directed Settings for Two-year and Three-year Treatment Groups by Four Target Areas

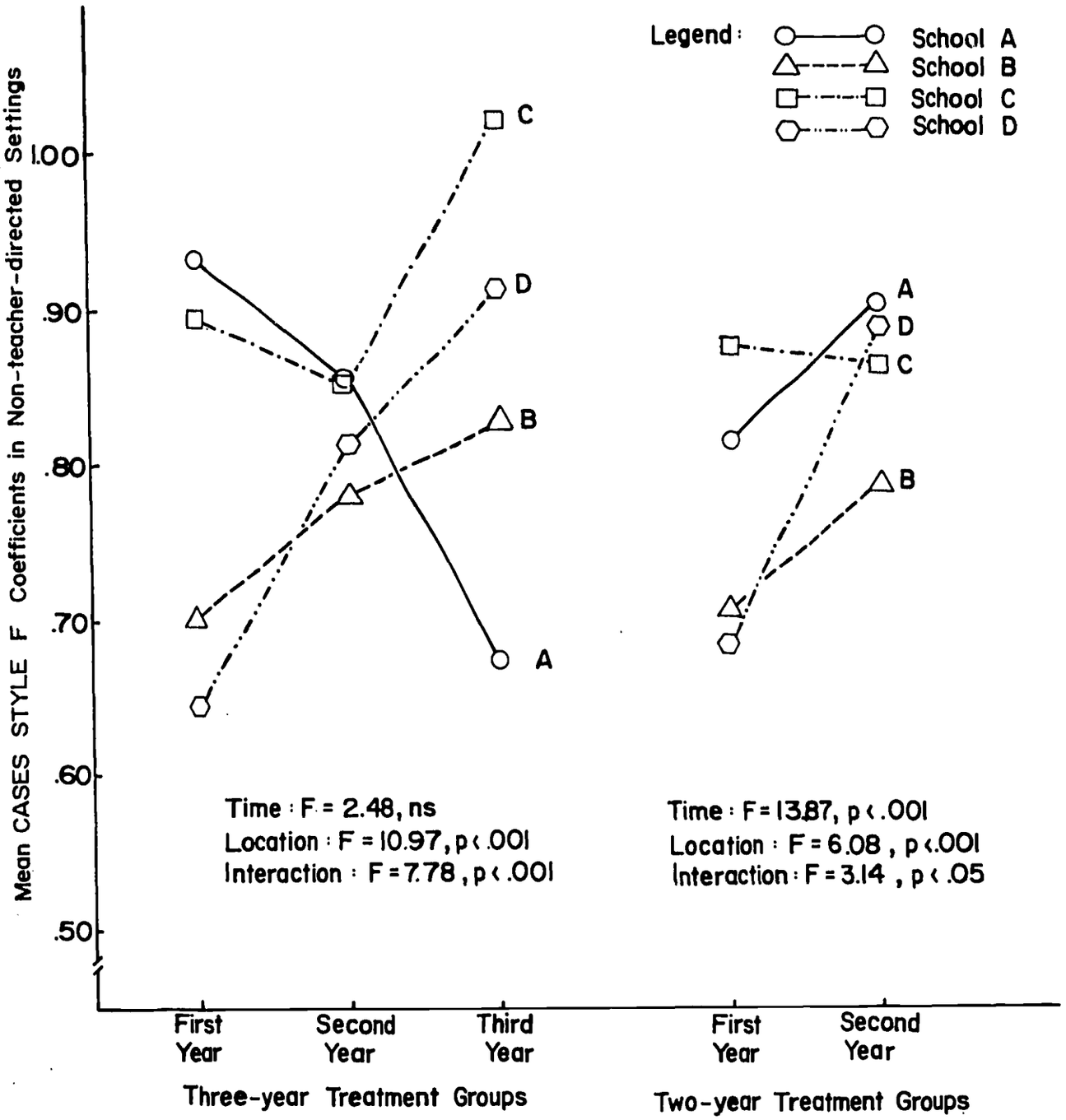

Figure 14 Mean CASES Style F Coefficients in Non-Teacher-Directed Settings for Two-year and Three-year Treatment Groups by Four Target Areas

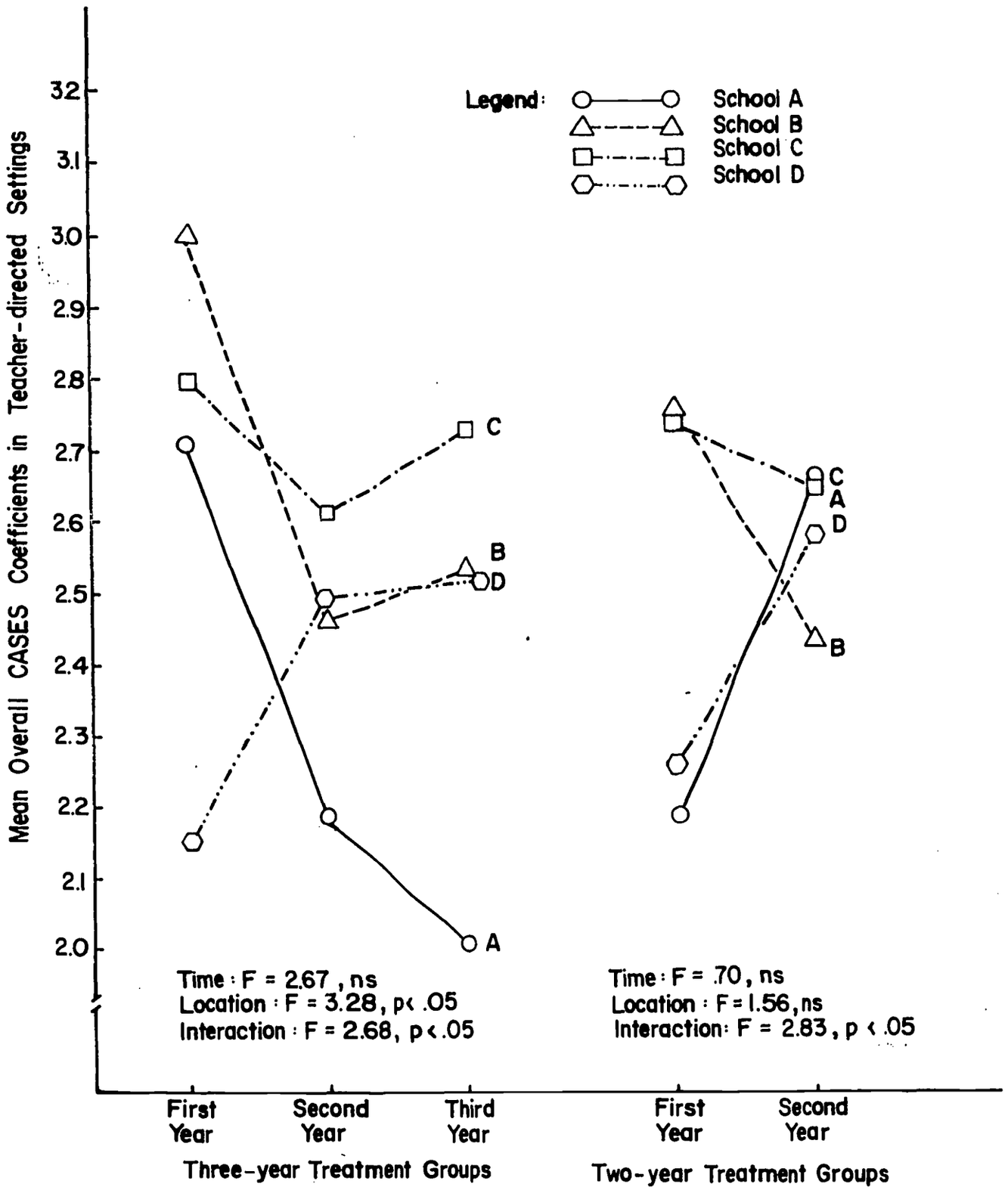

Figure 15 Mean Overall CASES Coefficients in Teacher-Directed Settings for Two-year and Three-year Treatment Groups by Four Target Areas

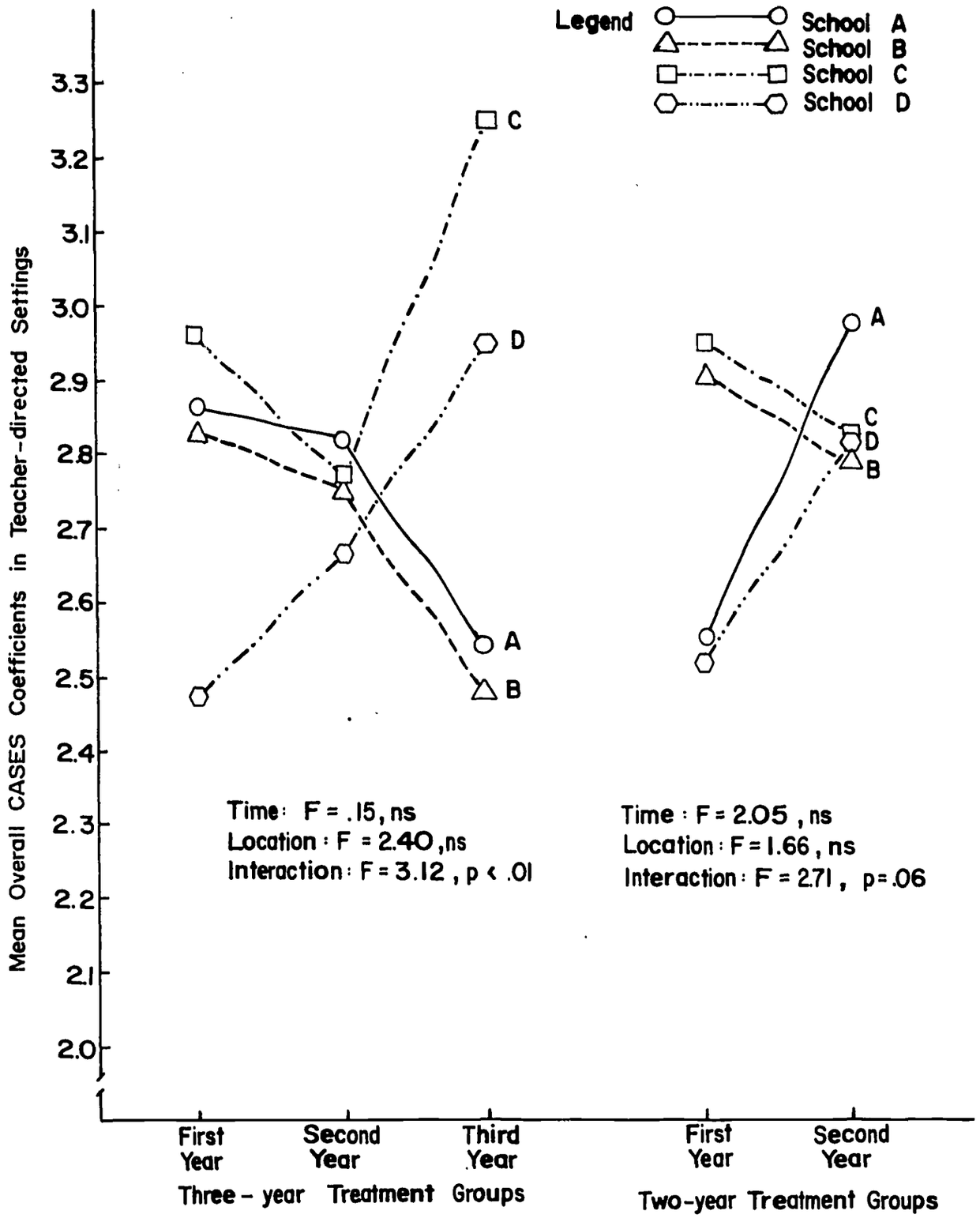

Figure 16 Mean Overall CASES Coefficients in Non-Teacher-Directed Settings for Two-year and Three-year Treatment Groups by Four Target Areas

In summary, the findings in Study Six support the effectiveness of the behavior modification treatments in increasing the desirable behavior of disadvantaged children in classroom settings. The data most relevant to this conclusion are those obtained in School D where the classroom treatments and teacher training methods were originally developed and most closely monitored.

The research hypothesis is accepted. Classroom social behavior, as measured by CASES, was found to vary significantly as a function of length of treatment and target area. The greater effect was found for the interaction of these two factors, rather than the main effects of either one alone.

VI. SUMMARY AND CONCLUSIONS

The six studies presented in this report added important new information to the findings published earlier on the Durham Education Improvement Program (Spaulding, 1971a, b, c; 1972). Significant findings in all six of the current investigations strongly supported the effectiveness of the innovative classroom behavior modification treatments and the academic curricula in the last two years of the Durham EIP. The construct validity of the CASES instrument was thoroughly upheld. The Overall CASES Coefficient was shown to be a significant predictor of academic achievement, independently of a conventional measure of scholastic aptitude (i.e. the Stanford-Binet Intelligence Scale).

A. Summary of Findings

1. EIP graduates in public schools earned significantly higher letter grades in four school subjects: reading, language, spelling, and mathematics.

2. Randomly-selected girls and all randomly-selected white children were found at exit from EIP to have Stanford-Binet I.Q. score distributions that were non-significantly different from a normal curve with a mean of 100 and a standard deviation of 16.

3. Significant gains in desirable classroom behavior in teacher-directed and non-teacher-directed settings were found for EIP pupils in all length of treatment groups combined.

4. The Overall CASES Coefficients based on behavioral data gathered in teacher-directed settings were found to contribute significantly to scores in MAT Word Knowledge, Word Discrimination, and Reading. The Overall CASES Coefficient was found a valid predictor of academic achievement in the EIP sample of disadvantaged children.

5. Three family variables were found significantly related to academic achievement in EIP: size of family, occupational status of the mother, and family income. Race was not found significant, but sex, age, I.Q., number of different persons teaching each pupil, and school assignment within EIP were found significant.

6. Significant interactions were found between school attended within EIP and gains in desirable classroom behavior. Desirable behavior (as measured by CASES Style F and Overall CASES

Coefficients) increased in all treatment groups and settings in School D (the laboratory school). Decreases were found in the early years of the Project in School A and in all years in School B (except for Style F behavior in non-teacher-directed settings). The behavior of EIP pupils in School C was found highly desirable and relatively stable over all years.

B. Discussion

The Overall CASES Coefficient computed from data gathered in teacher-directed settings appears to be the best behavioral predictor of academic achievement, among the four CASES Coefficients investigated in these studies. Apparently, the ability of teachers to shape classroom behavior in teacher-directed settings in the manner represented by the ranking and weighting used in computing the Overall CASES Coefficient is a significant dimension of teaching effectiveness. This hypothesis will need to be tested in future school samples in various populations to make the assumption of general applicability acceptable.

Various weights and modifications of the ranking of the six CASES Style Coefficients need to be tested in such future studies to improve the predictive and construct validity of the Overall CASES Coefficient itself. Currently, an investigation is being made of the value of using a psychological cut-off point in weighting the six CASES Style Coefficients to improve the validity of the Overall CASES Coefficient. For example, CASES Style A represents aggression but the psychological impact of aggression varies with the amount of aggression expressed. Low amounts of Style A behavior will be discounted in the modifications of the Overall CASES Coefficients now being investigated.

The results of Study Two, in which the I.Q. scores of randomly-selected girls and all randomly-selected white children were found normally distributed at exit from EIP, support the environmental hypothesis. The trends found for boys and Blacks, generally, also upheld the environmental position, although significance levels supported rejection of the null hypothesis. The danger of the making a Type I error was considered the greater risk in this case. The lack of significant effects of ethnic

group membership in Study Five strengthened the view that the Black/white differences found were reasonably attributable to environmental and socio-economic factors rather than to genetic processes.

The significantly higher letter grades found for EIP graduates in four school subjects complemented the findings regarding the normality of I.Q. distributions for girls and whites at exit from the Program. The effectiveness of the EIP experimental curriculum was supported externally by these independent judgments of public school teachers.

The lower reading performance of EIP subjects in Target Area B, reported previously, apparently occurred as a result of two factors: a) the pupils in School B came from more seriously deprived families (with significantly lower family income), and b) the teachers in School B were less effective in strengthening the type of classroom behavior that was found related to gains in academic achievement (i.e. behavior represented by high Overall CASES Coefficients in teacher-directed settings).

The factor of family size, found significant in Study Five, was one of the six sociocultural characteristics which Mercer (1971) had found significant in studies of intelligence test scores of Mexican-Americans in Riverside, California. Mercer also found education and occupational status of the head of household to be a significant predictor of high I.Q. scores in Black families in Riverside. Two socio-economic factors similar to Mercer's were found significant in regressions on Arithmetic and Word Knowledge, respectively.

C. Concluding Statement

The Durham Educational Improvement Program was designed in 1964 and funded in 1965, before Head Start became a national program. The Durham EIP was one of several early childhood, innovative programs of the last half of the 1960's that stimulated experimentation and development in Kindergartens, pre-schools, and ungraded primaries in many states. In

this series of studies the major curricular innovations of EIP were shown to be sound and effective. Continued development in other schools and communities of the ideas expressed and the methods field-tested in the Durham EIP will benefit children from families at all levels of socio-economic status. It was a child-centered project, with a solid base of theory supporting the curricular innovations, and a well funded and competent research division. The substantial and valid results presented in this report testify to the value of carefully devised and documented interventions and field-based research in education.

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Appendix A

A Coping Analysis Schedule
for Educational Settings (CASES)*

(Brief Form for Quick Reference)**

1. Aggressive Behavior:
Direct attack: grabbing, pushing, hitting, pulling, kicking, name-calling; destroying property: smashing, tearing, breaking.

2. Negative (Inappropriate) Attention-Getting Behavior:
Annoying, bothering, whining, loud talking (unnecessarily), attention getting aversive noise-making, belittling, criticizing.

3. Manipulating, Controlling, and Directing Others:
Manipulating, bossing, commanding, directing, enforcing rules, conniving, wheedling, controlling.

4. Resisting:
Resisting, delaying; passive aggressive behavior; pretending to conform, conforming to the letter but not the spirit; defensive checking.

5. Self-Directed Activity:
Productive working; reading, writing, constructing with interest; self-directed dramatic play (with high involvement).

6. Paying Close Attention; Thinking, Pondering:
Listening attentively, watching carefully; concentrating on a story being told, a film being watched, a record played; thinking, pondering, reflecting.

7. Integrative Sharing and Helping:
Contributing ideas, interests, materials, helping; responding by showing feelings (laughing, smiling, etc.) in audience situations; initiating conversation.

8. Integrative Social Interaction:
Mutual give and take, cooperative behavior, integrative social behavior; studying or working together where participants are on a par.

9. Integrative Seeking and Receiving Support, Assistance and Information:
Bidding or asking teachers or significant peers for help, support, sympathy, affection, etc., being helped; receiving assistance.

** Revised August 12, 1968.

10. Following Directions Passively and Submissively:
Doing assigned work without enthusiasm or great interest; submitting to requests; answering directed questions; waiting for instructions as directed.

11. Observing Passively:
Visual wandering with short fixations; watching others work; checking on noises or movements; checking on activities of adults or peers.

12. Responding to Internal Stimuli:
Daydreaming; sleeping; rocking or fidgeting; (not in transaction with external stimuli).

13. Physical Withdrawal or Passive Avoidance:
Moving away; hiding: avoiding transactions by movement away or around; physical wandering avoiding involvement in activities.

Note: Categories 3, 5, 6, 7, 8, and 9 are further coded as a or b in structured settings to indicate appropriate or inappropriate timing or location of activity (based on the teacher's expectations for the setting). Example: 5a would be recorded when a child was painting during art period (when painting was one of the expected activities). Painting during "story time" or in an academic setting would normally be coded 5b. The code b represents behaving in a certain coping category at the "wrong" time or place. What is "right" or "wrong" is based on the values and goals of the teacher or authority responsible in a given situation.

A child might be sharing with another child in an integrative manner (7) some bit of information the teacher regarded as highly inappropriate. It would be coded as 7b since it was an integrative act of sharing occurring at the "wrong" time in the "wrong" place, from the point of view of the teacher.

CASES Computation Work Sheet

School_____ Teacher_____ Observer_____ Date_____

Subject (Child's code name)_____ Setting_____

CASES f							
1		**STYLE A**	1		**STYLE B**	4	
2			2			5b	
3a			3b			6b	
3b			Total A	(2)		Total B	(4)
4			(2) ÷ (1) =	(3)		(4) ÷ (1) =	(5)
5a			(3) ÷ .03 =	(A)		(5) ÷ .10 =	(B)
5b		**STYLE C**	9b		**STYLE D**	7b	
6a			11			8b	
6b			12			9b	
7a			13			Total D	(8)
7b			Total C	(6)		(8) ÷ (1) =	(9)
8a			(6) ÷ (1) =	(7)		(9) ÷ .15 =	(D)
8b			(7) ÷ .15 =	(C)	**STYLE F**	3a	
9a		**STYLE E**	5a			5a	
9b			7a			6a	
10			9a			7a	
11			10			8a	
12			Total E	(10)		Total F	(12)
13			(10) ÷ (1) =	(11)		(12) ÷ (1) =	(13)
Σf	(1)		(11) ÷ .80 =	(E)		(13) ÷ .85 =	(F)

Overall CASES Coefficient

Step 1

Style A Coefficient _____ (A)
" " B " " _____ (B)
" " C " " _____ (C)
Sub-Total (A+B+C) (14)

Style D Coefficient _____ (D)
" " E " " _____ (E)
" " F " " _____ (F)
Total (A+B+C+D+E+F) _____ (15)

Step 2

(14) ÷ (15) =

÷ (15) =
÷ (15) =
÷ (15) =

Step 3

x 1 =

x 2 =
x 3 =
x 4 =

Total

Step 4

_____

_____
_____
_____

Total

Appendix B

Fact Sheet for Interviewers

Education Improvement Program and Head Start

We are trying to find out about the children in this area who are five years old and younger. Classes operated by Operation Breakthrough's Head Start Program are available during the summer for children old enough to enter school next year. Classes operated by the Education Improvement Program are available in the fall for 2-year-olds and 5-year-olds.

(Give interpretation according to the interests of the informant and ages of the children. Try to fill the survey sheet whether there is an interest in the program or not.)

The Education Improvement Program has classes during the regular school year. The purpose is to teach children things they can learn at an early age that will help them later in school. The children from Edgemont will be transported either to Southside or Pearson Schools in the afternoons (1:00 to 4:30). Only a certain number can be enrolled and parents will be notified if the child is accepted.

Summer Head Start is an eight-week program from June 20th - August 12th, and held in the mornings from 8:30 - 12:30 at Scarborough Nursery, St. Mark's Nursery, and St. Luke's Kindergarten. Transportation will be provided if needed and arrangements made usually for transportation to the nearest center. A morning snack and mid-day meal will be provided. (See application for more details.)

EIP Survey

Area_____

Date_____

Interviewer_____

1. Child's Name_____Age____Sex____Birthdate_____
2. Address_____Phone_____Race_____
3. Mother's Name_____Father in home_____

   separated_____divorced_____widowed_____other_____
4. Siblings:

	Name	Sex	Birthdate	School
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				

5. Who else lives in household?_____

   _____
6. Father's Name_____Where does he work?_____

   _____What does he do?_____
7. Who cares for child?_____
8. Is mother working?_____What type of work?_____

   _____What type of work has she done?_____
9. Level of Education: Mother_____Father_____
10. Are you interested in your child participating in the Program?_____
11. Worker: Please comment briefly (on back of sheet) on impressions regarding environment, appearance of home, or anything outstanding about this contact.

(Revised January 1968)

Social Worker_____

Informant_____

EIP Family Research Schedule

1. Name_____Date_____
2. Sex____Race____Religion____Birthdate____Verified on_____
3. with_____(Birth Certificate or Hospital Record)_____
4. Address (Year):_____
5. Address (Year):_____
6. Emergency contact:_____
7. Relation to child_____Address_____
8. Nearest telephone_____

Family Constellation:

9. Person(s) responsible for EIP child:_____Relation_____
10. Mother_____Age_____Place of Birth_____
11. Last grade completed____Age of completion____Present occupation_____
12. Occupational rating (Warner Scale)____Length of time on job_____
13. Job stability rating_____
14. Marital Status: Married____No. of previous marriages____Separated_____
15. Divorced____Widowed____Never Married____Unknown_____
16. Father_____Age____Place of Birth_____
17. Last grade completed____Age of completion____Present occupation_____
18. Occupational rating (Warner Scale)____Length of time on job_____
19. Job stability rating_____
20. Marital Status: Married____No. of previous marriages____Separated_____
21. Divorced____Widowed____Never Married____Unknown_____
22. Children (in and out of the home, oldest first):

	Name	Sex	Age	Occupation or School	Birthdate
1)					
2)					
3)					
4)					
5)					
6)					
7)					
8)					

23. Give the names of children behind in grade level:

1) _____ Years behind _____

2) _____ Years behind _____

3) _____ Years behind _____

24. Others in household:

Name	Relation	Age	Sex	Occupation or School and Grade
1)				
2)				
3)				
4)				

Family Income:

	Monthly	Father	Mother	Other	Welfare	Total
25.						
26.						
27.						

28. Social Work estimate of how family manages on income: _____

_____

_____

29. Attitude expressed about income: _____

_____

_____

Housing:

30. Neighborhood: Very good____Good____Fair____Poor____Very Poor____

31. Family Housing Conditions: Very good____Good____Fair____Poor____Very Poor____

32. Housekeeping: Very good____Good____Fair____Poor____Very Poor____

33. Buying Home____Renting____Cost per month____

34. Living with relatives at no cost____Number of Rooms____

35. Type of Housing: Single____Apartment____Public Housing____Other____

36. Year____Type____

37. Year____Type____

38. Year____Type____

39. Home Furnishings: Good____Fair____Poor____

40. Is there an outdoor place for play: At home?____In the neighborhood?____

41. Note presence of the following equipment or materials in the home: Telephone

42. ____T.V.____Radio____Car____Kind of heating unit____Cooking unit____

43. Washing machine ____Iron____Children's books____Toys____Adult books____

44. Magazines____Newspapers____Phonograph____Other____

Description of Family Organization:

45. Intact____Extended____One parent____Common-law marriage____One parent with one or more relatives____Unknown____

46. Rate family communication patterns with non-authoritarian individuals and institutions: Excellent____Good____Fair____Poor____Unknown____

47. Rate family communication:
Excellent____Good____Fair____Poor____Unknown____

48. Rate intra-familial communication patterns:
Excellent____Good____Fair____Poor____Unknown____

Indicate your impressions of how the family is managed:

49. a. Father major decision maker____

50. b. Mother major decision maker____

51. c. Relative major decision maker____

d. Shared responsibility by father and mother____

e. Unknown____

52. Agencies and institutions involved with the family? Yes___No___

53. Date_____Agency_____Worker_____

54. Date_____Agency_____Worker_____

55. Date_____Agency_____Worker_____

56. Date_____Agency_____Worker_____

58. Check major social contacts for the family: (Describe)

59. Kinship groups, specify and describe_____

_____

60. Neighbors and friends_____

61. Church attendance_____

62. Sunday School for children_____

63. Church activities_____

64. PTA or school activities_____

65. List group memberships:_____

66. Travel:_____

67. Others:_____

68. Are there indications of personal and/or social problems in the family such as:

69. Behavioral or psychiatric symptoms_____

70. Peer relationship problems_____

71. Prison record_____

72. Severe marital conflict_____

73. Continuous loss of employment_____

74. Marked lack of household organization_____

75. Illiteracy_____

76. Other_____ 77._____

78. Describe briefly specific problem(s) of family members that have been identified.

_____

_____

_____

_____

_____

The Development of the Education Improvement Program child:

79. Mother's pregnancy: Planned__Unplanned__Normal__Complications_____

80. Describe anything mother feels was special about pregnancy and/or birth_____

_____

_____

81. Child's place of birth_____Birth weight___lbs.___oz.

82. Did mother have assistance during her convalescence with care of infant?____

83. Who assisted?_____

84. Note any statements regarding the beginning mother-child relationship_____

_____

_____

85. Father's attitude and relationship_____

_____

86. Other family members_____

_____

87. Who cared for the child in years prior to enrolling in the EIP Program?_____

_____

88. Describe handling and care of child_____

89. Breast fed__Bottle fed__Crying in early infancy__Age taken out of parent's

90. bedroom_____. Does he now have a room of his own?__If he shares, with whom?

91. _____Was child allowed to move freely as an infant?__Kept in play pen?_____.

92. Was talked to___Sung to___Read to___Early toys___Games played_____

93. Walked at_____Began talking: Words_____Sentences_____

94. Toilet training initiated at age_____Complete method used_____

95. Dry at night_____

96. Parents' description of child's personality (Mood, temperament, how parent feels child handles his feelings)_____

_____

_____

97. Would you describe him as having an average amount of dependence?_____

98. Too dependent_____Independent_____Too independent_____

99. How does he handle separations from mother or surrogates?_____

_____

100. Describe sibling relationships_____

_____

101. Describe peer relationships_____

_____

102. Activities: What does he like to do?_____

_____

103. What does he like for you to do with him?_____

_____

104. Does he have chores assigned to him?_____Does he like books?_____

105. Is he read to?_____Does child have a schedule for daily activities_____

106. Describe_____

_____

107. Child's Health

Did this child receive well-baby care?_____Where?_____How long?_____

108. When was he last seen by a doctor?_____Has he ever received a dental examination?_____When was the last one?_____

109. History of Health Problems:

Year	Disease or Symptoms	Treatment
____	_____	_____
____	_____	_____
____	_____	_____
____	_____	_____

110. Has EIP child had immunizations for smallpox_____typhoid_____red measles_____ polio_____tetanus_____diptheria_____Where?_____When?_____

111. Family Health (If all members considered in good health, please indicate)

Name	Condition	Medical Care

112. List social work interventions with family members:

Name_____ Date_____

Intervention

Outcome

Name_____ Date_____

Intervention

Outcome

Name_____ Date_____

Intervention

Outcome

Name_____ Date_____

Intervention

Outcome

Table C-1

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected Children at Entry to EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	113.5 - 116.5 +	5	.19934	24.72	15.73				
	110.5 - 113.5	4	.05658	7.02	1.30				
	107.5 - 110.5	4	.06372	7.90	1.93				
	104.5 - 107.5	8	.06972	8.65	0.05				
	101.5 - 104.5	11	.07323	9.08	0.41				
	98.5 - 101.5	9	.07488	9.29	0.01				
	95.5 - 98.5	14	.07323	9.08	2.67				
	92.5 - 95.5	9	.06972	8.65	0.01				
	89.5 - 92.5	8	.06372	7.90	0.00				
	86.5 - 89.5	10	.05658	7.02	1.27				
	83.5 - 86.5	13	.04807	5.96	8.31				
	80.5 - 83.5	11	.03985	4.94	7.43				
	77.5 - 80.5	6	.03155	3.91	1.11				
	74.5 - 77.5	2	.02440	3.03	0.35				
	71.5 - 74.5	4	.01801	2.23	1.40				
	68.5 - 71.5	3	.01298	1.61	1.20				
	65.5 - 68.5	0	.00893	1.11	1.11	12	.07986	9.90	0.44
	62.5 - 65.5	0	.00601	0.75	0.75				
	59.5 - 62.5	0	.00386	0.48	0.48				
	56.5 - 59.5	3	.00567	0.70	7.50				
Total		124[a]	1.00005	124.01	53.00		1.00005		40.67*

* $p<.001$ (df = 13)

[a] Nine subjects had a posttest only and the same scores were included in the pretest distribution

Table C-2

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected Children at Exit from EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	116.5 - 119.5 +	6	.15127	18.76	8.68				
	113.5 - 116.5	3	.04807	5.96	1.47	11	.25592	31.73	13.53
	110.5 - 113.5	2	.05658	7.02	3.59				
	107.5 - 110.5	5	.06372	7.90	1.07				
	104.5 - 107.5	13	.06972	8.65	2.19				
	101.5 - 104.5	9	.07323	9.08	0.00				
	98.5 - 101.5	9	.07488	9.29	0.01				
	95.5 - 98.5	15	.07323	9.08	3.86				
	92.5 - 95.5	13	.06972	8.65	2.19				
	89.5 - 92.5	9	.06372	7.90	0.15				
	86.5 - 89.5	4	.05658	7.02	1.30				
	83.5 - 86.5	9	.04807	5.96	1.55				
	80.5 - 83.5	9	.03985	4.94	3.33				
	77.5 - 80.5	8	.03155	3.91	4.27				
	74.5 - 77.5	3	.02440	3.03	0.00				
	71.5 - 74.5	3	.01801	2.23	0.26				
	68.5 - 71.5	1	.01298	1.61	0.23	4	.03745	4.64	0.08
	65.5 - 68.5	3	.02447	3.03	0.00				
Total		124 [a]	1.00005	124.01	34.15		1.00005		33.79*

* $p < .005$ (df = 14)

[a] Nine subjects had a posttest only

Table C-3

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Male Children at Entry to EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	113.5 - 116.5 +	3	.19934	12.16	6.90	5	.25592	15.61	7.21
	110.5 - 113.5	2	.05658	3.45	0.61				
	107.5 - 110.5	3	.06372	3.89	0.20				
	104.5 - 107.5	3	.06972	4.25	0.37				
	101.5 - 104.5	5	.07323	4.47	0.06				
	98.5 - 101.5	3	.07488	4.57	0.54				
	95.5 - 98.5	6	.07323	4.47	0.53				
	92.5 - 95.5	4	.06972	4.25	0.02				
	89.5 - 92.5	3	.06372	3.89	0.20				
	86.5 - 89.5	4	.05658	3.45	0.09				
	83.5 - 86.5	7	.04807	2.93	5.64				
	80.5 - 83.5	6	.03985	2.43	5.24				
	77.5 - 80.5	5	.03155	1.92	4.91				
	74.5 - 77.5	1	.02440	1.49	0.16				
	71.5 - 74.5	3	.01801	1.10	3.29	7	.07986	4.87	0.93
	68.5 - 71.5	3	.03745	2.28	0.22				
Total		61[a]	1.00005	61.00	28.99		1.00005		25.94*

* $p < .025$ (df = 12)

[a] Five subjects had a posttest only and the same scores were included in the pretest distribution

Table C-4

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Male Children at Exit from EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	113.5 - 116.5 +	4	.19934	12.16	5.48				
	110.5 - 113.5	1	.05658	3.45	1.74	7	.31964	19.50	8.01
	107.5 - 110.5	2	.06372	3.89	0.92				
	104.5 - 107.5	7	.06972	4.25	1.77				
	101.5 - 104.5	4	.07323	4.47	0.05				
	98.5 - 101.5	5	.07488	4.57	0.04				
	95.5 - 98.5	10	.07323	4.47	6.85				
	92.5 - 95.5	6	.06972	4.25	0.72				
	89.5 - 92.5	2	.06372	3.89	0.92				
	86.5 - 89.5	2	.05658	3.45	0.61				
	83.5 - 86.5	7	.04807	2.93	5.64	22	.31963	19.50	0.32
	80.5 - 83.5	5	.03985	2.43	2.72				
	77.5 - 80.5	6	.11141	6.80	0.09				
Total		61[a]	1.00005	61.00	27.55		1.00005		17.76*

* $p < .01$ (df = 6)

[a] Five subjects had a posttest only

Table C-5

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Female Children at Entry to EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	110.5 - 113.5 +	4	.25592	16.12	9.12	5	.31964	20.14	11.38
	107.5 - 110.5	1	.06372	4.01	2.26				
	104.5 - 107.5	5	.06972	4.39	0.08				
	101.5 - 104.5	6	.07323	4.61	0.42				
	98.5 - 101.5	6	.07488	4.72	0.35				
	95.5 - 98.5	8	.07323	4.61	2.49				
	92.5 - 95.5	5	.06972	4.39	0.08				
	89.5 - 92.5	5	.06372	4.01	0.24				
	86.5 - 89.5	6	.05658	3.56	1.66				
	83.5 - 86.5	6	.04807	3.03	2.92				
	80.5 - 83.5	5	.03985	2.51	2.47				
	77.5 - 80.5	1	.03155	1.99	0.49				
	74.5 - 77.5	1	.02440	1.54	0.19	6	.11141	7.02	0.15
	71.5 - 74.5	1	.01801	1.13	0.02				
	68.5 - 71.5	3	.03745	2.36	0.17				
Total		63[a]	1.00005	63.00	22.96		1.00005		22.24*

* $p<.025$ (df = 10)

[a] Four subjects had a posttest only and the same scores were included in the pretest distribution

Table C-6

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Female Children at Exit from EIP

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Post-test	116.5 - 119.5 +	4	.15127	9.53	3.21				
	113.5 - 116.5	1	.04807	3.03	1.36	6	.25592	16.12	6.35
	110.5 - 113.5	1	.05658	3.56	1.85				
	107.5 - 110.5	3	.06372	4.01	0.26				
	104.5 - 107.5	6	.06972	4.39	0.59				
	101.5 - 104.5	5	.07323	4.61	0.03				
	98.5 - 101.5	4	.07488	4.72	0.11				
	95.5 - 98.5	5	.07323	4.61	0.03				
	92.5 - 95.5	7	.06972	4.39	1.55				
	89.5 - 92.5	7	.06372	4.01	2.22				
	86.5 - 89.5	2	.05658	3.56	0.69				
	83.5 - 86.5	2	.04807	3.03	0.35				
	80.5 - 83.5	4	.03985	2.51	0.88				
	77.5 - 80.5	4	.03155	1.99	2.04	20	.25592	16.12	0.93
	74.5 - 77.5	3	.02440	1.54	1.39				
	71.5 - 74.5	5	.05546	3.49	0.65				
Total		63[a]	1.00005	63.00	17.20		1.00005		12.07*

* $p < 0.25$ (df = 8)

[a] Four subjects had a posttest only

Table C-7

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected White Children at Entry to EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	113.5 - 116.5 +	3	.19934	6.58	1.95				
	110.5 - 113.5	1	.05658	1.87	0.40				
	107.5 - 110.5	1	.06372	2.10	0.58	9	.53747	17.74	4.30
	104.5 - 107.5	1	.06972	2.30	0.74				
	101.5 - 104.5	2	.07323	2.42	0.07				
	98.5 - 101.5	1	.07488	2.47	0.88				
	95.5 - 98.5	3	.07323	2.42	0.14				
	92.5 - 95.5	5	.06972	2.30	3.17				
	89.5 - 92.5	3	.06372	2.10	0.38				
	86.5 - 89.5	4	.05658	1.87	2.44				
	83.5 - 86.5	3	.04807	1.59	1.26				
	80.5 - 83.5	1	.03985	1.32	0.08	6	.15126	4.99	0.20
	77.5 - 80.5	5	.11141	3.68	0.48				
Total		33[a]	1.00005	33.00	12.55		1.00005		11.89*

* $p < .10$ (df = 6)

[a] Four subjects had a posttest only and the same scores were included in the pretest distribution

Table C-8

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected White Children at Exit from EIP

	IQ	O	Proportion	E	χ^2
Post-test	107.5 - 110.5 +	4	.31964	10.55	4.06
	104.5 - 107.5	3	.06972	2.30	0.21
	101.5 - 104.5	2	.07323	2.42	0.07
	98.5 - 101.5	3	.07488	2.47	0.11
	95.5 - 98.5	4	.07323	2.42	1.04
	92.5 - 95.5	2	.06972	2.30	0.04
	89.5 - 92.5	2	.06372	2.10	0.01
	86.5 - 89.5	1	.05658	1.87	0.40
	83.5 - 86.5	3	.04807	1.59	1.26
	80.5 - 83.5	5	.03985	1.32	10.33
	77.5 - 80.5	4	.11141	3.68	0.03
Total		33[a]	1.00005	33.00	17.56*

*p <.10 (df = 10)

[a] Four subjects had a posttest only

Table C-9

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Black Children at Entry to EIP

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Pre-test	110.5 - 113.5 +	5	.25592	23.29	14.36				
	107.5 - 110.5	3	.06372	5.80	1.35				
	104.5 - 107.5	7	.06972	6.34	0.07				
	101.5 - 104.5	9	.07323	6.66	0.82				
	98.5 - 101.5	8	.07488	6.81	0.21				
	95.5 - 98.5	11	.07323	6.66	2.82				
	92.5 - 95.5	4	.06972	6.34	0.87				
	89.5 - 92.5	5	.06372	5.80	0.11				
	86.5 - 89.5	6	.05658	5.15	0.14				
	83.5 - 86.5	10	.04807	4.37	7.23				
	80.5 - 83.5	10	.03985	3.63	11.20				
	77.5 - 80.5	3	.03155	2.87	0.01				
	74.5 - 77.5	2	.02440	2.22	0.02				
	71.5 - 74.5	4	.01801	1.64	3.40	10	.07986	7.28	1.02
	68.5 - 71.5	4	.03745	3.41	0.10				
Total		91[a]	1.00005	91.00	42.71		1.00005		40.21*

* $p < .001$ (df = 12)

[a] Five subjects had a posttest only and the same scores were included in the pretest distribution

Table C-10

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Black Children at Exit from EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	116.5 - 119.5 +	6	.15127	13.77	4.38				
	113.5 - 116.5	2	.04807	4.37	1.29	9	.25592	23.29	8.76
	110.5 - 113.5	1	.05658	5.15	3.34				
	107.5 - 110.5	3	.06372	5.80	1.35				
	104.5 - 107.5	10	.06972	6.34	2.11				
	101.5 - 104.5	7	.07323	6.66	0.02				
	98.5 - 101.5	6	.07488	6.81	0.10				
	95.5 - 98.5	11	.07323	6.66	2.82				
	92.5 - 95.5	11	.06972	6.34	3.42				
	89.5 - 92.5	7	.06372	5.80	0.25				
	86.5 - 89.5	3	.05658	5.15	0.90				
	83.5 - 86.5	6	.04807	4.37	0.60				
	80.5 - 83.5	4	.03985	3.63	0.04				
	77.5 - 80.5	6	.03155	2.87	3.41				
	74.5 - 77.5	2	.02440	2.22	0.02				
	71.5 - 74.5	3	.01801	1.64	1.13	8	.07986	7.27	0.07
	68.5 - 71.5	3	.03745	3.41	0.05				
Total		91[a]	1.00005	91.00	25.22		1.00005		23.85*

* $p < .025$ (df = 12)

[a] Five subjects had a posttest only

Table C-11

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomlv Selected and Matched Children at Entry to EIP

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Pre-test	125.5 - 128.5 +	3	.05547	14.09	8.73				
	122.5 - 125.5	0	.02440	6.20	6.20	7	.15127	38.42	25.70
	119.5 - 122.5	2	.03155	8.01	4.51				
	116.5 - 119.5	2	.03985	10.12	6.52				
	113.5 - 116.5	5	.04807	12.21	4.26				
	110.5 - 113.5	7	.05658	14.37	3.78				
	107.5 - 110.5	7	.06372	16.18	5.21				
	104.5 - 107.5	17	.06972	17.71	0.03				
	101.5 - 104.5	19	.07323	18.60	0.01				
	98.5 - 101.5	12	.07488	19.02	2.59				
	95.5 - 98.5	23	.07323	18.60	1.04				
	92.5 - 95.5	19	.06972	17.71	0.09				
	89.5 - 92.5	23	.06372	16.18	2.87				
	86.5 - 89.5	22	.05658	14.37	4.05				
	83.5 - 86.5	27	.04807	12.21	17.92				
	80.5 - 83.5	25	.03985	10.12	21.87				
	77.5 - 80.5	16	.03155	8.01	7.96				
	74.5 - 77.5	8	.02440	6.20	0.52				
	71.5 - 74.5	4	.01801	4.57	0.07				
	68.5 - 71.5	4	.01298	3.30	0.15				
	65.5 - 68.5	1	.00893	2.27	0.71				
	62.5 - 65.5	1	.00601	1.53	0.18				
	59.5 - 62.5	0	.00386	0.98	0.98	9	.02447	6.22	1.25
	56.5 - 59.5	1	.00241	0.61	0.25				
	53.5 - 56.5	6	.00326	0.83	32.30				
Total		254	1.00005	254.01	132.80		1.00005		99.37*

* $p<.001$ (df = 17)

Table C-12

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched Children at Exit from EIP

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Post-test	125.5 - 128.5 +	4	.05547	14.09	7.22				
	122.5 - 125.5	2	.02440	6.20	2.84	7	.11142	28.30	16.03
	119.5 - 122.5	1	.03155	8.01	6.14				
	116.5 - 119.5	7	.03985	10.12	0.96				
	113.5 - 116.5	5	.04807	12.21	4.26				
	110.5 - 113.5	9	.05658	14.37	2.01				
	107.5 - 110.5	12	.06372	16.18	1.08				
	104.5 - 107.5	21	.06972	17.71	0.61				
	101.5 - 104.5	17	.07323	18.60	0.14				
	98.5 - 101.5	15	.07488	19.02	0.85				
	95.5 - 98.5	25	.07323	18.60	2.20				
	92.5 - 95.5	24	.06972	17.71	2.23				
	89.5 - 92.5	18	.06372	16.18	0.20				
	86.5 - 89.5	17	.05658	14.37	0.48				
	83.5 - 86.5	17	.04807	12.21	1.88				
	80.5 - 83.5	19	.03985	10.12	7.79				
	77.5 - 80.5	18	.03155	8.01	12.44				
	74.5 - 77.5	10	.02440	6.20	2.33				
	71.5 - 74.5	6	.01801	4.57	0.44				
	68.5 - 71.5	4	.01298	3.30	0.15				
	65.5 - 68.5	3	.02447	6.22	1.66				
Total		254	1.00005	254.01	57.94		1.00005		57.74*

* $p<.001$ (df = 18)

Table C-13

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, Male Children at Entry to EIP

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Pre-test	116.5 - 119.5 +	3	.15127	18.30	12.80				
	113.5 - 116.5	3	.04807	5.82	1.36	8	.25592	30.97	17.03
	110.5 - 113.5	2	.05658	6.85	3.43				
	107.5 - 110.5	4	.06372	7.71	1.79				
	104.5 - 107.5	8	.06972	8.44	0.02				
	101.5 - 104.5	9	.07323	8.86	0.00				
	98.5 - 101.5	4	.07488	9.06	2.83				
	95.5 - 98.5	9	.07323	8.86	0.00				
	92.5 - 95.5	8	.06972	8.44	0.02				
	89.5 - 92.5	9	.06372	7.71	0.22				
	86.5 - 89.5	9	.05658	6.85	0.68				
	83.5 - 86.5	14	.04807	5.82	11.51				
	80.5 - 83.5	15	.03985	4.82	21.48				
	77.5 - 80.5	12	.03155	3.82	17.54				
	74.5 - 77.5	4	.02440	2.95	0.37				
	71.5 - 74.5	3	.01801	2.18	0.31				
	68.5 - 71.5	1	.01298	1.57	0.21				
	65.5 - 68.5	1	.00893	1.08	0.01	5	.03745	4.53	0.05
	62.5 - 65.5	3	.01554	1.88	0.67				
Total		121	1.00005	121.01	75.24		1.00005		73.85*

* $p < .001$ (df = 14)

Table C-14

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, Male Children at Exit from EIP

	IQ	O	Proportion	E	χ^2
Post-test	116.5 - 119.5 +	3	.15127	18.30	12.80
	113.5 - 116.5	3	.04807	5.82	1.36
	110.5 - 113.5	3	.05658	6.85	2.16
	107.5 - 110.5	4	.06372	7.71	1.79
	104.5 - 107.5	12	.06972	8.44	1.51
	101.5 - 104.5	9	.07323	8.86	0.00
	98.5 - 101.5	6	.07488	9.06	1.03
	95.5 - 98.5	12	.07323	8.86	1.11
	92.5 - 95.5	13	.06972	8.44	2.47
	89.5 - 92.5	7	.06372	7.71	0.07
	86.5 - 89.5	11	.05658	6.85	2.52
	83.5 - 86.5	12	.04807	5.82	6.57
	80.5 - 83.5	9	.03985	4.82	3.62
	77.5 - 80.5	9	.03155	3.82	7.04
	74.5 - 77.5	3	.02440	2.95	0.00
	71.5 - 74.5	5	.05546	6.71	0.44
Total		121	1.00005	121.01	44.48

* $p < .001$ (df = 15)

Table C-15

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomlv Selected and Matched, Female Children at Entry to EIP

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Pre-test	125.5 - 128.5 +	3	.05547	7.32	2.55				
	122.5 - 125.5	0	.02440	3.22	3.22				
	119.5 - 122.5	1	.03155	4.16	2.40	6	.19934	26.31	15.68
	116.5 - 119.5	0	.03985	5.26	5.26				
	113.5 - 116.5	2	.04807	6.35	2.98				
	110.5 - 113.5	5	.05658	7.47	0.82				
	107.5 - 110.5	3	.06372	8.41	3.48				
	104.5 - 107.5	9	.06972	9.20	0.00				
	101.5 - 104.5	9	.07323	9.67	0.05				
	98.5 - 101.5	8	.07488	9.88	0.36				
	95.5 - 98.5	14	.07323	9.67	1.94				
	92.5 - 95.5	11	.06972	9.20	0.35				
	89.5 - 92.5	14	.06372	8.41	3.71				
	86.5 - 89.5	13	.05658	7.47	4.10				
	83.5 - 86.5	13	.04807	6.35	6.98				
	80.5 - 83.5	10	.03985	5.26	4.27				
	77.5 - 80.5	4	.03155	4.16	0.01				
	74.5 - 77.5	4	.02440	3.22	0.19				
	71.5 - 74.5	1	.01801	2.38	0.80				
	68.5 - 71.5	3	.01298	1.71	0.97				
	65.5 - 68.5	0	.00893	1.18	1.18				
	62.5 - 65.5	0	.00601	0.79	0.79	9	.05220	6.89	00.65
	59.5 - 62.5	0	.00386	0.51	0.51				
	56.5 - 59.5	1	.00241	0.32	1.46				
	53.5 - 56.5	4	.00326	0.43	29.61				
Total		132	1.00005	132.01	77.99		1.00005		45.59*

*p< .001 (df = 14)

Table C-16

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, Female Children at Exit from EIP

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Post-test	125.5 - 128.5 +	3	.05547	7.32	2.55				
	122.5 - 125.5	2	.02440	3.22	0.46				
	119.5 - 122.5	1	.03155	4.16	2.40	13	.19934	26.31	6.74
	116.5 - 119.5	5	.03985	5.26	0.01				
	113.5 - 116.5	2	.04807	6.35	2.98				
	110.5 - 113.5	6	.05658	7.47	0.29				
	107.5 - 110.5	7	.06372	8.41	0.24				
	104.5 - 107.5	9	.06972	9.20	0.00				
	101.5 - 104.5	8	.07323	9.67	0.29				
	98.5 - 101.5	9	.07488	9.88	0.08				
	95.5 - 98.5	13	.07323	9.67	1.15				
	92.5 - 95.5	11	.06972	9.20	0.35				
	89.5 - 92.5	11	.06372	8.41	0.80				
	86.5 - 89.5	6	.05658	7.47	0.29				
	83.5 - 86.5	5	.04807	6.35	0.29				
	80.5 - 83.5	10	.03985	5.26	4.27				
	77.5 - 80.5	9	.03155	4.16	5.61				
	74.5 - 77.5	7	.02440	3.22	4.43				
	71.5 - 74.5	3	.01801	2.38	0.16				
	68.5 - 71.5	5	.03745	4.94	0.00				
Total		132	1.00005	132.01	26.66		1.00005		24.99*

* $p < .05$ (df = 15)

Table C-17

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, White Children at Entry to EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	113.5 - 116.5 +	5	.19934	12.16	4.22				
	110.5 - 113.5	2	.05658	3.45	0.61				
	107.5 - 110.5	3	.06372	3.89	0.20	15	.53747	32.79	9.65
	104.5 - 107.5	1	.06972	4.25	2.49				
	101.5 - 104.5	3	.07323	4.47	0.48				
	98.5 - 101.5	1	.07488	4.57	2.79				
	95.5 - 98.5	5	.07323	4.47	0.06				
	92.5 - 95.5	5	.06972	4.25	0.13				
	89.5 - 92.5	7	.06372	3.89	2.49				
	86.5 - 89.5	6	.05658	3.45	1.88				
	83.5 - 86.5	7	.04807	2.93	5.64				
	80.5 - 83.5	5	.03985	2.43	2.72				
	77.5 - 80.5	6	.03155	1.92	8.63				
	74.5 - 77.5	2	.02440	1.49	0.18				
	71.5 - 74.5	0	.01801	1.10	1.10	5	.07986	4.87	0.00
	68.5 - 71.5	3	.03745	2.28	0.22				
Total		61	1.00005	61.00	33.84		1.00005		31.20*

* $p < .001$ (df = 8)

Table C-18

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomlv Selected and Matched, White Children at Exit from EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	110.5 - 113.5 +	4	.25592	15.61	8.64				
	107.5 - 110.5	4	.06372	3.89	0.00				
	104.7 - 107.5	4	.06972	4.25	0.02				
	101.5 - 104.5	4	.07323	4.47	0.05				
	98.5 - 101.5	4	.07488	4.57	0.07				
	95.5 - 98.5	5	.07323	4.47	0.06				
	92.5 - 95.5	5	.06972	4.25	0.13				
	89.5 - 92.5	4	.06372	3.89	0.00				
	86.5 - 89.5	6	.05658	3.45	1.88				
	83.5 - 86.5	4	.04807	2.93	0.39				
	80.5 - 83.5	9	.03985	2.43	17.75				
	77.5 - 80.5	4	.03155	1.92	2.24				
	74.5 - 77.5	1	.02440	1.49	0.16	4	.07986	4.87	0.16
	71.5 - 74.5	3	.05546	3.38	0.04				
Total		61	1.00005	61.00	31.44		1.00005		31.40*

* p< .005 (df = 12)

Table C-19

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, Black Children at Entry to EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	119.5 - 122.5 +	3	.11142	21.50	15.92				
	116.5 - 119.5	2	.03985	7.69	4.21	7	.19934	38.47	25.75
	113.5 - 116.5	2	.04807	9.28	5.71				
	110.5 - 113.5	5	.05658	10.92	3.21				
	107.5 - 110.5	4	.06372	12.30	5.60				
	104.5 - 107.5	16	.06972	13.46	0.48				
	101.5 - 104.5	16	.07323	14.13	0.25				
	98.5 - 101.5	11	.07488	14.45	0.82				
	95.5 - 98.5	18	.07323	14.13	1.06				
	92.5 - 95.5	14	.06972	13.46	0.02				
	89.5 - 92.5	16	.06372	12.30	1.11				
	86.5 - 89.5	16	.05658	10.92	2.36				
	83.5 - 86.5	20	.04807	9.28	12.39				
	80.5 - 83.5	20	.03985	7.69	19.70				
	77.5 - 80.5	10	.03155	6.09	2.51				
	74.5 - 77.5	6	.02440	4.71	0.35				
	71.5 - 74.5	4	.01801	3.48	0.08				
	68.5 - 71.5	3	.01298	2.51	0.10				
	65.5 - 68.5	1	.00893	1.72	0.30				
	62.5 - 65.5	1	.00601	1.16	0.02				
	59.5 - 62.5	0	.00386	0.74	0.74	7	.02447	4.72	1.10
	56.5 - 59.5	1	.00241	0.47	0.62				
	53.5 - 56.5	4	.00326	0.63	18.06				
Total		193	1.00005	193.01	95.64		1.00005		76.89*

* $p < .001$ (df = 16)

Table C-20

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, Black Children at Exit from EIP

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	125.5 - 128.5 +	3	.05547	10.71	5.55				
	122.5 - 125.5	2	.02440	4.71	1.56	6	.11142	21.50	11.18
	119.5 - 122.5	1	.03155	6.09	4.25				
	116.5 - 119.5	7	.03985	7.69	0.06				
	113.5 - 116.5	4	.04807	9.28	3.00				
	110.5 - 113.5	7	.05658	10.92	1.41				
	107.5 - 110.5	8	.06372	12.30	1.50				
	104.5 - 107.5	17	.06972	13.46	0.93				
	101.5 - 104.5	13	.07323	14.13	0.09				
	98.5 - 101.5	11	.07488	14.45	0.82				
	95.5 - 98.5	20	.07323	14.13	2.44				
	92.5 - 95.5	19	.06972	13.46	2.28				
	89.5 - 92.5	14	.06372	12.30	0.24				
	86.5 - 89.5	11	.05658	10.92	0.00				
	83.5 - 86.5	13	.04807	9.28	1.49				
	80.5 - 83.5	10	.03985	7.69	0.69				
	77.5 - 80.5	14	.03155	6.09	10.28				
	74.5 - 77.5	9	.02440	4.71	3.91				
	71.5 - 74.5	4	.01801	3.48	0.08				
	68.5 - 71.5	6	.03745	7.23	0.21				
Total		193	1.00005	193.01	40.80		1.00005		40.61*

* $p < .005$ (df = 17)

Table C-21

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	116.5 - 119.5 +	3	.15127	9.98	4.89				
	113.5 - 116.5	1	.04807	3.17	1.49				
	110.5 - 103.5	1	.05658	3.73	2.00				
	107.5 - 110.5	0	.06372	4.21	4.21	11	.53747	35.47	16.89
	104.5 - 107.5	3	.06972	4.60	0.56				
	101.5 - 104.5	1	.07323	4.83	3.04				
	98.5 - 101.5	2	.07488	4.94	1.75				
	95.5 - 98.5	6	.07323	4.83	0.28				
	92.5 - 95.5	7	.06972	4.60	1.25				
	89.5 - 92.5	8	.06372	4.21	3.42				
	86.5 - 89.5	10	.05658	3.73	10.51				
	83.5 - 86.5	4	.04807	3.17	0.22				
	80.5 - 83.5	6	.03985	2.63	4.32				
	77.5 - 80.5	2	.03155	2.08	0.00				
	74.5 - 77.5	5	.02440	1.61	7.13				
	71.5 - 74.5	2	.01801	1.19	0.55	14	.11141	7.35	6.01
	68.5 - 71.5	2	.01298	0.86	1.53				
	65.5 - 68.5	3	.02447	1.62	1.19				
Total		66	1.00005	66.00	48.34		1.00005		42.90*

* $p < .005$ (df = 7)

Table C-22

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Male Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	104.5 - 107.5 +	4	.38936	14.41	7.52				
	101.5 - 104.5	0	.07323	2.71	2.71	6	.61070	22.60	12.19
	98.5 - 101.5	0	.07488	2.77	2.77				
	95.5 - 98.5	2	.07323	2.71	0.19				
	92.5 - 95.5	6	.06972	2.58	4.54				
	89.5 - 92.5	4	.06372	2.36	1.14				
	86.5 - 89.5	6	.05658	2.09	7.29				
	83.5 - 86.5	4	.04807	1.78	2.77				
	80.5 - 83.5	3	.03985	1.47	1.58				
	77.5 - 80.5	1	.03155	1.17	0.02				
	74.5 - 77.5	3	.02440	0.90	4.87	8	.11141	4.12	3.65
	71.5 - 74.5	4	.05546	2.05	1.85				
Total		37	1.00005	37.00	37.25		1.00005		33.16*

*p < .001 (df = 6)

Table C-23

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Female Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2
Post-test	110.5 - 113.5 +	3	.25592	7.42	2.63
	107.5 - 110.5	0	.06372	1.85	1.85
	104.5 - 107.5	1	.06972	2.02	0.52
	101.5 - 104.5	1	.07323	2.12	0.59
	98.5 - 101.5	2	.07488	2.17	0.01
	95.5 - 98.5	4	.07323	2.12	1.66
	92.5 - 95.5	1	.06972	2.02	0.52
	89.5 - 92.5	4	.06372	1.85	2.51
	86.5 - 89.5	4	.05658	1.64	3.39
	83.5 - 86.5	0	.04807	1.39	1.39
	80.5 - 83.5	3	.03985	1.16	2.94
	77.5 - 80.5	1	.03155	0.91	0.01
	74.5 - 77.5	2	.02440	0.71	2.36
	71.5 - 74.5	0	.01801	0.52	0.52
	68.5 - 71.5	3	.03745	1.09	3.37
Total		29	1.00005	29.00	24.28*

*p < .05 (df = 14)

Table C-24

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected, Black Control Subjects at End of Project

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Post-test	113.5 - 116.5 +	3	.19934	12.56	7.28				
	110.5 - 113.5	1	.05658	3.56	1.85				
	107.5 - 110.5	0	.06372	4.01	4.01				
	104.5 - 107.5	2	.06972	4.39	1.30	9	.53747	33.86	18.25
	101.5 - 104.5	1	.07323	4.61	2.83				
	98.5 - 101.5	2	.07488	4.72	1.57				
	95.5 - 98.5	6	.07323	4.61	0.42				
	92.5 - 95.5	7	.06972	4.39	1.55				
	89.5 - 92.5	7	.06372	4.01	2.22				
	86.5 - 89.5	10	.05658	3.56	11.62				
	83.5 - 86.5	4	.04807	3.03	0.31				
	80.5 - 83.5	6	.03985	2.51	4.85				
	77.5 - 80.5	2	.03155	1.99	0.00				
	74.5 - 77.5	5	.02440	1.54	7.80				
	71.5 - 74.5	2	.01801	1.13	0.66	14	.11141	7.02	6.94
	68.5 - 71.5	2	.01298	0.82	1.71				
	65.5 - 68.5	3	.02447	1.54	1.38				
Total		63	1.00005	63.00	51.35		1.00005		46.16*

*p < .001 (df = 7)

Table C-25

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched Control Subjects at Beginning of Project

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Pre-test	113.5 - 116.5 +	3	.19934	29.50	23.81	3	.25592	37.88	32.11
	110.5 - 113.5	0	.05658	8.37	8.37				
	107.5 - 110.5	3	.06372	9.43	4.38				
	104.5 - 107.5	7	.06972	10.32	1.07				
	101.5 - 104.5	6	.07323	10.84	2.16				
	98.5 - 101.5	8	.07488	11.08	0.86				
	95.5 - 98.5	15	.07323	10.84	1.60				
	92.5 - 95.5	14	.06972	10.32	1.31				
	89.5 - 92.5	16	.06372	9.43	4.58				
	86.5 - 89.5	16	.05658	8.37	6.95				
	83.5 - 86.5	17	.04807	7.11	13.74				
	80.5 - 83.5	11	.03985	5.90	4.41				
	77.5 - 80.5	6	.03155	4.67	0.38				
	74.5 - 77.5	12	.02440	3.61	19.49				
	71.5 - 74.5	5	.01801	2.67	2.04				
	68.5 - 71.5	3	.01298	1.92	0.61				
	65.5 - 68.5	1	.00893	1.32	0.08				
	62.5 - 65.5	2	.00601	0.89	1.39	6	.02447	3.62	1.56
	59.5 - 62.5	3	.00953	1.41	1.79				
Total		148	1.00005	148.01	99.01		1.00005		97.25*

*p < .001 (df = 15)

Table C-26

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	107.5 - 110.5 +	7	.31964	47.31	34.34				
	104.5 - 107.5	6	.06972	10.32	1.81				
	101.5 - 104.5	8	.07323	10.84	0.74				
	98.5 - 101.5	10	.07488	11.08	0.11				
	95.5 - 98.5	3	.07323	10.84	5.67				
	92.5 - 95.5	19	.06972	10.32	7.30				
	89.5 - 92.5	20	.06372	9.43	11.85				
	86.5 - 89.5	14	.05658	8.37	3.78				
	83.5 - 86.5	17	.04807	7.11	13.74				
	80.5 - 83.5	11	.03985	5.90	4.41				
	77.5 - 80.5	16	.03155	4.67	27.49				
	74.5 - 77.5	8	.02440	3.61	5.33				
	71.5 - 74.5	1	.01801	2.67	1.04				
	68.5 - 71.5	1	.01298	1.92	0.44				
	65.5 - 68.5	3	.00893	1.32	2.13	9	.05546	8.21	0.08
	62.5 - 65.5	0	.00601	0.89	0.89				
	59.5 - 62.5	4	.00953	1.41	4.75				
Total		148	1.00005	148.01	125.83		1.00005		116.65*

*p < .001 (df = 12)

Table C-27

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched, Male Control Subjects at Beginning of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	107.5 - 110.5 +	4	.31964	22.37	15.09				
	104.5 - 107.5	1	.06972	4.88	3.09	7	.46259	32.38	19.89
	101.5 - 104.5	2	.07323	5.13	1.91				
	98.5 - 101.5	3	.07488	5.24	0.96				
	95.5 - 98.5	8	.07323	5.13	1.61				
	92.5 - 95.5	8	.06972	4.88	1.99				
	89.5 - 92.5	8	.06372	4.46	2.81				
	86.5 - 89.5	8	.05658	3.96	4.12				
	83.5 - 86.5	9	.04807	3.36	9.44				
	80.5 - 83.5	6	.03985	2.79	3.70				
	77.5 - 80.5	3	.03155	2.21	0.28				
	74.5 - 77.5	5	.02440	1.71	6.35				
	71.5 - 74.5	5	.05546	3.88	0.32				
Total		70	1.00005	70.00	51.66		1.00005		51.47*

*p < .001 (df = 10)

Table C-28

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched, Male Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2
Post-test	107.5 - 110.5 +	3	.31964	22.37	16.78
	104.5 - 107.5	3	.06972	4.88	0.72
	101.5 - 104.5	3	.07323	5.13	0.88
	98.5 - 101.5	3	.07488	5.24	0.96
	95.5 - 98.5	2	.07323	5.13	1.91
	92.5 - 95.5	11	.06972	4.88	7.67
	89.5 - 92.5	12	.06372	4.46	12.74
	86.5 - 89.5	6	.05658	3.96	1.05
	83.5 - 86.5	6	.04807	3.36	2.06
	80.5 - 83.5	5	.03985	2.79	1.75
	77.5 - 80.5	7	.03155	2.21	10.40
	74.5 - 77.5	9	.07986	5.59	2.08
Total		70	1.00005	70.00	59.01*

*p < .001 (df = 11)

Table C-29

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched, Female Control Subjects at Beginning of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	104.5 - 107.5 +	8	.38936	30.37	16.48				
	101.5 - 104.5	4	.07323	5.71	0.51				
	98.5 - 101.5	5	.07488	5.84	0.12				
	95.5 - 98.5	7	.07323	5.71	0.29				
	92.5 - 95.5	6	.06972	5.44	0.06				
	89.5 - 92.5	8	.06372	4.97	1.85				
	86.5 - 89.5	8	.05658	4.41	2.92				
	83.5 - 86.5	8	.04807	3.75	4.82				
	80.5 - 83.5	5	.03985	3.11	1.15				
	77.5 - 80.5	3	.03155	2.46	0.12				
	74.5 - 77.5	7	.02440	1.90	13.65				
	71.5 - 74.5	2	.01801	1.40	0.25				
	68.5 - 71.5	1	.01298	1.01	0.00				
	65.5 - 68.5	1	.00893	0.70	0.13	9	.05546	4.33	5.05
	62.5 - 65.5	2	.00601	0.47	5.00				
	59.5 - 62.5	3	.00953	0.74	6.85				
Total		78	1.00005	78.00	54.20		1.00005		47.02*

* $p < .001$ (df = 11)

Table C-30

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched, Female Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	107.5 - 110.5 +	4	.31964	24.93	17.57				
	104.5 - 107.5	3	.06972	5.44	1.09				
	101.5 - 104.5	5	.07323	5.71	0.09				
	98.5 - 101.5	7	.07488	5.84	0.23				
	95.5 - 98.5	1	.07323	5.71	3.89				
	92.5 - 95.5	8	.06972	5.44	1.21				
	89.5 - 92.5	8	.06372	4.97	1.85				
	86.5 - 89.5	8	.05658	4.41	2.92				
	83.5 - 86.5	11	.04807	3.75	14.02				
	80.5 - 83.5	6	.03985	3.11	2.69				
	77.5 - 80.5	9	.03155	2.46	17.38				
	74.5 - 77.5	1	.02440	1.90	0.43				
	71.5 - 74.5	1	.01801	1.40	0.12	8	.07986	6.23	0.50
	68.5 - 71.5	1	.01298	1.01	0.00				
	65.5 - 68.5	5	.02447	1.91	5.01				
Total		78	1.00005	78.00	68.48		1.00005		63.44*

*p < .001 (df = 11)

Table C-31

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched, White Control Subjects at Beginning of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	113.5 - 116.5 +	3	.19934	6.98	2.27				
	110.5 - 113.5	0	.05658	1.98	1.98				
	107.5 - 110.5	1	.06372	2.23	0.68	8	.46259	16.19	4.14
	104.5 - 107.5	4	.06972	2.44	1.00				
	101.5 - 104.5	0	.07323	2.56	2.56				
	98.5 - 101.5	4	.07488	2.62	0.73				
	95.5 - 98.5	5	.07323	2.56	2.32				
	92.5 - 95.5	2	.06972	2.44	0.08				
	89.5 - 92.5	4	.06372	2.23	1.40				
	86.5 - 89.5	3	.05658	1.98	0.53				
	83.5 - 86.5	5	.04807	1.68	6.54				
	80.5 - 83.5	1	.03985	1.39	0.11				
	77.5 - 80.5	0	.03155	1.10	1.10	4	.15126	5.29	0.32
	74.5 - 77.5	3	.07986	2.80	0.02				
Total		35	1.00005	35.00	21.31		1.00005		16.06*

* $p < .025$ (df = 7)

Table C-32

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched, White Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	107.5 - 110.5 +	5	.31964	11.19	3.42				
	104.5 - 107.5	3	.06972	2.44	0.13				
	101.5 - 104.5	3	.07323	2.56	0.07				
	98.5 - 101.5	2	.07488	2.62	0.15				
	95.5 - 98.5	0	.07323	2.56	2.56				
	92.5 - 95.5	5	.06972	2.44	2.69				
	89.5 - 92.5	7	.06372	2.23	10.20				
	86.5 - 89.5	1	.05658	1.98	0.49				
	83.5 - 86.5	5	.04807	1.68	6.54				
	80.5 - 83.5	0	.03985	1.39	1.39				
	77.5 - 80.5	4	.11141	3.90	0.00	4	.15126	5.29	0.32
Total		35	1.00005	35.00	27.65		1.00005		26.57*

*p < .005 (df = 9)

Table C-33

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched, Black Control Subjects at Beginning of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Pre-test	104.5 - 107.5 +	5	.38936	44.00	34.57				
	101.5 - 104.5	6	.07323	8.27	0.63				
	98.5 - 101.5	4	.07488	8.46	2.35				
	95.5 - 98.5	10	.07323	8.27	0.36				
	92.5 - 95.5	12	.06972	7.88	2.16				
	89.5 - 92.5	12	.06372	7.20	3.20				
	86.5 - 89.5	13	.05658	6.39	6.83				
	83.5 - 86.5	12	.04807	5.43	7.94				
	80.5 - 83.5	10	.03985	4.50	6.71				
	77.5 - 80.5	6	.03155	3.57	1.66				
	74.5 - 77.5	11	.02440	2.76	24.64				
	71.5 - 74.5	4	.01801	2.04	1.90				
	68.5 - 71.5	3	.01298	1.47	1.60				
	65.5 - 68.5	1	.00893	1.01	0.00	5	.02447	2.77	1.80
	62.5 - 65.5	4	.01554	1.76	2.87				
Total		113	1.00005	113.01	97.41		1.00005		96.35*

*p < .001 (df = 13)

Table C-34

Test of Goodness of Fit of Distribution of I.Q.
Scores of Matched, Black Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	104.5 - 107.5 +	5	.38936	44.00	34.57				
	101.5 - 104.5	5	.07323	8.27	1.30				
	98.5 - 101.5	8	.07488	8.46	0.03				
	95.5 - 98.5	3	.07323	8.27	3.36				
	92.5 - 95.5	14	.06972	7.88	4.76				
	89.5 - 92.5	13	.06372	7.20	4.67				
	86.5 - 89.5	13	.05658	6.39	6.83				
	83.5 - 86.5	12	.04807	5.43	7.94				
	80.5 - 83.5	11	.03985	4.50	9.37				
	77.5 - 80.5	13	.03155	3.57	24.97				
	74.5 - 77.5	8	.02440	2.76	9.97				
	71.5 - 74.5	1	.01801	2.04	0.53				
	68.5 - 71.5	1	.01298	1.47	0.15				
	65.5 - 68.5	3	.00893	1.01	3.93	8	.05546	6.27	0.48
	62.5 - 65.5	0	.00601	0.68	0.68				
	59.5 - 62.5	3	.00953	1.08	3.43				
Total		113	1.00005	113.01	116.47		1.00005		108.25*

*p < .001 (df = 11)

Table C-35

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	116.5 - 119.5 +	5	.15127	38.27	28.92	7	.19934	50.43	37.41
	113.5 - 116.5	2	.04807	12.16	8.49				
	110.5 - 113.5	3	.05658	14.31	8.94				
	107.5 - 110.5	6	.06372	16.12	6.35				
	104.5 - 107.5	11	.06972	17.64	2.50				
	101.5 - 104.5	10	.07323	18.53	3.92				
	98.5 - 101.5	13	.07488	18.94	1.87				
	95.5 - 98.5	12	.07323	18.53	2.30				
	92.5 - 95.5	26	.06972	17.64	3.96				
	89.5 - 92.5	33	.06372	16.12	17.67				
	86.5 - 89.5	27	.05658	14.31	11.24				
	83.5 - 86.5	25	.04807	12.16	13.55				
	80.5 - 83.5	20	.03985	10.08	9.76				
	77.5 - 80.5	22	.03155	7.98	24.62				
	74.5 - 77.5	17	.02440	6.17	18.99				
	71.5 - 74.5	3	.01801	4.56	0.53				
	68.5 - 71.5	6	.01298	3.28	2.25				
	65.5 - 68.5	5	.00893	2.26	3.32				
	62.5 - 65.5	2	.00601	1.52	0.15	7	.01554	3.93	2.40
	59.5 - 62.5	5	.00953	2.41	2.78				
Total		253	1.00005	253.01	172.13		1.00005		171.58*

* $p < .001$ (df = 17)

Table C-36

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, Male Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	116.5 - 119.5 +	3	.15127	19.06	13.53				
	113.5 - 116.5	1	.04807	6.06	4.22	5	.25592	32.25	23.02
	110.5 - 113.5	1	.05658	7.13	5.27				
	107.5 - 110.5	3	.06372	8.03	3.15				
	104.5 - 107.5	6	.06972	8.78	0.88				
	101.5 - 104.5	3	.07323	9.23	4.20				
	98.5 - 101.5	4	.07488	9.43	3.13				
	95.5 - 98.5	6	.07323	9.23	1.13				
	92.5 - 95.5	17	.06972	8.78	7.68				
	89.5 - 92.5	18	.06372	8.03	12.38				
	86.5 - 89.5	13	.05658	7.13	4.83				
	83.5 - 86.5	12	.04807	6.06	5.83				
	80.5 - 83.5	8	.03985	5.02	1.77				
	77.5 - 80.5	11	.03155	3.98	12.41				
	74.5 - 77.5	12	.02440	3.07	25.91				
	71.5 - 74.5	2	.01801	2.27	0.03				
	68.5 - 71.5	2	.01298	1.64	0.08				
	65.5 - 68.5	1	.00893	1.13	0.01	8	.05546	6.99	0.15
	62.5 - 65.5	0	.00601	0.76	0.76				
	59.5 - 62.5	3	.00953	1.20	2.70				
Total		126	1.00005	126.01	109.92		1.00005		106.47*

*p < .001 (df = 13)

Table C-37

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, Female Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	113.5 - 116.5 +	3	.19934	25.32	19.67	5	.25592	32.50	23.27
	110.5 - 113.5	2	.05658	7.19	3.74				
	107.5 - 110.5	3	.06372	8.09	3.20				
	104.5 - 107.5	5	.06972	8.85	1.68				
	101.5 - 104.5	7	.07323	9.30	0.57				
	98.5 - 101.5	9	.07488	9.51	0.03				
	95.5 - 98.5	6	.07323	9.30	1.17				
	92.5 - 95.5	9	.06972	8.85	0.00				
	89.5 - 92.5	15	.06372	8.09	5.90				
	86.5 - 89.5	14	.05658	7.19	6.46				
	83.5 - 86.5	13	.04807	6.10	7.79				
	80.5 - 83.5	12	.03985	5.06	9.51				
	77.5 - 80.5	11	.03155	4.01	12.21				
	74.5 - 77.5	5	.02440	3.10	1.17				
	71.5 - 74.5	1	.01801	2.29	0.72				
	68.5 - 71.5	4	.01298	1.65	3.35	13	.05546	7.04	5.04
	65.5 - 68.5	4	.00893	1.13	7.24				
	62.5 - 65.5	4	.01554	1.97	2.08				
Total		127	1.00005	127.01	86.50		1.00005		78.00*

*p < .001 (df = 13)

Table C-38

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, White Control Subjects at End of Project

	IQ	O	Proportion	E	χ^2	O	Proportion	E	χ^2
Post-test	113.5 - 116.5 +	3	.19934	12.96	7.65	4	.25592	16.63	9.60
	110.5 - 113.5	1	.05658	3.68	1.95				
	107.5 - 110.5	5	.06372	4.14	0.18				
	104.5 - 107.5	6	.06972	4.53	0.48				
	101.5 - 104.5	3	.07323	4.76	0.65				
	98.5 - 101.5	3	.07488	4.87	0.72				
	95.5 - 98.5	3	.07323	4.76	0.65				
	92.5 - 95.5	5	.06972	4.53	0.05				
	89.5 - 92.5	10	.06372	4.14	8.29				
	86.5 - 89.5	2	.05658	3.68	0.77				
	83.5 - 86.5	7	.04807	3.12	4.81				
	80.5 - 83.5	3	.03985	2.59	0.06				
	77.5 - 80.5	6	.03155	2.05	7.61				
	74.5 - 77.5	3	.02440	1.59	1.26				
	71.5 - 74.5	0	.01801	1.17	1.17				
	68.5 - 71.5	2	.01298	0.84	1.58	5	.05546	3.60	0.54
	65.5 - 68.5	0	.00893	0.58	0.58				
	62.5 - 65.5	3	.01554	1.01	3.92				
Total		65	1.00005	65.00	42.37		1.00005		35.67*

*p < .001 (df = 13)

Table C-39

Test of Goodness of Fit of Distribution of I.Q.
Scores of Randomly Selected and Matched, Black Control Subjects at End of Project

	IQ	0	Proportion	E	χ^2	0	Proportion	E	χ^2
Post-test	116.5 - 119.5 +	3	.15127	28.44	22.76				
	113.5 - 116.5	1	.04807	9.04	7.15	7	.31964	60.09	46.91
	110.5 - 113.5	2	.05658	10.64	7.01				
	107.5 - 110.5	1	.06372	11.98	10.06				
	104.5 - 107.5	5	.06972	13.11	5.01				
	101.5 - 104.5	7	.07323	13.77	3.33				
	98.5 - 101.5	10	.07488	14.08	1.18				
	95.5 - 98.5	9	.07323	13.77	1.65				
	92.5 - 95.5	21	.06972	13.11	4.75				
	89.5 - 92.5	23	.06372	11.98	10.14				
	86.5 - 89.5	25	.05658	10.64	19.39				
	83.5 - 86.5	18	.04807	9.04	8.89				
	80.5 - 83.5	17	.03985	7.49	12.07				
	77.5 - 80.5	16	.03155	5.93	17.09				
	74.5 - 77.5	14	.02440	4.59	19.31				
	71.5 - 74.5	3	.01801	3.39	0.04				
	68.5 - 71.5	4	.01298	2.44	1.00				
	65.5 - 68.5	5	.00893	1.68	6.57				
	62.5 - 65.5	1	.00601	1.13	0.01	4	.01554	2.92	0.40
	59.5 - 62.5	3	.00953	1.79	0.81				
Total		188	1.00005	188.01	158.24		1.00005		157.73*

*p < .001 (df = 15)