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Family background is indicated by a combination of five measures:
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behind grade level in reading achievement, percent of the student
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indicators of teacher quality. Three refer to all of the teachers in
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in first year of teaching. Three refer to the individual pupil's
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teaching experience. (Author/JM)

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School Effects versus Family Background
Effects on Verbal Ability:

Testing Reliability of Coleman's Findings on Achievement

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Tallahassee, Florida

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of teaching. Three refer to the individual pupil's English teacher:
race, highest degree, and number of years of teaching experience.
Region and metropolitan residence are sort variables. A brief study of
difference by religion is included.

The results concur with Coleman's findings. Family background is
most important for whites. Student body characteristics are most
important for blacks.

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CHAPTER I

INTRODUCTION

Nature of the problem

One of the major obstacles to promotion of societal integration
and control is the divisive force of racial inequality. Although
American history represents a series of successes in assimilating
minority groups, the continuing segregation of blacks presents problems
to that minority group and to the larger society. Numerous research
efforts over past decades reflect continuing recognition of this problem.
Mass public education has been a traditional vehicle for assimilation of
minority groups. Hence, it has become a focus of attempts to improve
the situation of the black minority. Since education is the principal
avenue for entry into our highly technical occupational structure,
equality of educational opportunity is one of the preconditions for
equality of economic opportunity. However, the present situation is
that blacks as a group do not derive as much benefit from the educational
system as whites (Blau and Duncan, 1967; Folger and Nam, 1967). For
example, blacks generally have been found to score lower than whites on
both tests of achievement and ability (Osborne, 1960; Milner, 1951;
Clark, 1965; Anderson, 1962; Bloom, 1964; Hunt, 1961; Silverman, 1965;
Dreger and Miller, 1960.

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Given the general value and goal of providing equal opportunity in an egalitarian society, there has been increasing concern with identifying sources of inequality. In particular, the question is whether or not lower achievement of blacks is the result of inequality of educational opportunity within the educational system? Is it the result of blacks attending schools of poorer quality than those attended by whites and therefore the result of unequal access to educational opportunity? If this is indeed the case, then at least a partial solution to the lower achievement of blacks would be an improvement in the quality of schools they attended.

The present study is concerned with selected aspects of the problem of educational equality. The general problem masks many separate issues which remain to be resolved. For example, it is not enough to determine that blacks have unequal access to educational opportunity as a result of their schools having less of this or that input. Equality of educational opportunity must ultimately be defined in terms of output; that is, equal educational achievement. Hence, inputs, whether they be dollars, physical facilities, teachers, or even characteristics of other students, are relevant to the question of equality of educational opportunity only insofar as they affect student output defined in terms of some measure of student educational achievement. Only if those schools which blacks attend are inferior in those qualities which are important for educational achievement is it possible to attribute their lower achievement to the schools.

Consequently, prior to determining whether the schools which blacks attend are disadvantaged with respect to this or that input, factors important for achievement need to be determined. If those factors which significantly affect educational achievement are school related, it may then be possible to initiate policies which will help narrow the discrepancy between the achievement of blacks and that of whites. There are two possibilities, however, which would preclude the implementation of such school policies. One is that the schools attended by blacks may not differ significantly from those attended by whites, and the second is that those factors which most affect achievement may not be school related. Either of these proving true would make it necessary to go outside the school for changes which might help improve the achievement of blacks.

The Coleman Report

In 1966 a report was published entitled <u>Equality of Educational Opportunity</u> (hereafter referred to as "the Coleman Report," after its senior author, or simply "the Report"). Born of Section 402 of the Civil Rights Act of 1964, the authors of the Report had been directed to undertake a survey of the "lack of availability of equal educational opportunities for individuals by reason of race, color, religion, or national origin in public educational institutions at all levels in the United States. ." (Coleman, 1966, p. iii). Recognizing that equality or inequality of opportunity must ultimately be defined in terms of some measure of student educational achievement, one of the tasks undertaken in the Report was an analysis of the effects of several types of school inputs

upon this factor (Chapter 3). Among the inputs considered were those
having to do with the physical facilities, academic curriculum, per-
pupil expenditure, teachers, and characteristics of student bodies of
schools. Each of these was related to achievement as measured primarily
by scores on standardized ability tests. First, however, the effects
of student's family background upon achievement were removed. The
authors of the Report argue that given the situation of minority group
families in the larger society, this was a necessary step in order to
avoid the possibility that school factors are spurious (Coleman, 1966;
218). The unexpected results of this analysis have perturbed many and
made this section (Chapter 3) of the Report extremely controversial
(Albert and Sheldon, 1966; Nichols, 1966; Crain, 1967; Marascuilo, 1967;
Sewell, 1967; Bowles and Levin, 1968a; Bowles and Levin, 1968b; Cain and
Watts, 1968; Smith, 1968; Jencks, 1966; Levin, 1968; Mood, 1968; Cain
and Watts, 1970). As would be expected, the family background of a
student was found to be highly related to achievement throughout the
years of school. The physical facilities, academic curriculum of the
school, and per-pupil expenditures, on the other hand, were found to
explain only a very small amount of the school-to-school variation in
achievement. Characteristics of a pupil's teachers fared slightly better,
but still explained only a small amount of the variation. While the con-
tribution was smaller than that of student's family background, the
social composition of the student body explained more of the variation
in student achievement than any of the other school or teacher charact-
eristics (Coleman, 1966: 325). The analysis, which was done separately

for blacks and whites (and four other minority groups as well), did
find the characteristics of teachers and student body to be more
important for blacks than for whites. This led the authors of the
Report to conclude that blacks were more "sensitive" to their school
environment than were whites (Coleman, 1966: 304 and 317). Never-
theless, the general conclusions and implications reached by the
authors of the Coleman Report were:

> That schools bring little influence to bear on a
> child's achievement that is independent of his
> background and general social context; and that
> this very lack of an independent effect means
> that the inequalities imposed on children by their
> home, neighborhood, and peer environment are carried
> along to become the inequalities with which they con-
> front adult life at the end of school. For equality
> of educational opportunity through the schools must
> imply a strong effect of schools that is independent
> of the child's immediate social environment, and
> that strong independent effect is not present in
> American schools (Coleman, 1966: 325).

The damping effect of these findings upon those who enthusiastically
propose modifications of the school environment must seem obvious.
At one extreme the conclusion of the Report suggests that the school
environment is of minor significance for student achievement given its
current structure. Even the characteristics of the student body which
explained more of the variation than any of the other school related
variables were substantially less important than a student's family
background. In terms of policy making, these findings might be inter-
preted to mean that there is little reason to improve those conditions
of schools predominantly attended by blacks which have been assumed to
cause the disadvantage. On the contrary, the Report's findings could

be interpreted to mean that the achievement of blacks is more likely amenable to improvement by allocating new money for the improvement of the disadvantaged social conditions from which the majority of blacks come instead of funnelling it into further improvement of schools.

Given the incongruity of these findings with what is commonly presupposed as true; i.e., that the school is either the sole or the major vehicle for imposing equality, and the implications of these findings for the development and implementation of policies designed to improve the achievement of blacks and all disadvantaged minorities, it is easy to understand the furor and criticism which have been generated by the Report's Chapter 3. This is particularly true in light of the many methodological limitations of this chapter on which, given the close relationship of methods to results, most of the criticism has understandably centered.

Several things thus encourage the further study of those factors related to educational achievement. First, the determination of such factors is crucial for developing and implementing policies designed to improve the achievement of disadvantaged minorities. Second, the findings of the Coleman Report, the most massive nationwide study to ever attempt to ascertain the relevance of school factors for student achievement, are inconsistent with commonly held assumptions. And third, these unexpected results of the Coleman Report are contained within a methodological framework whose adequacy is seriously doubted.

The present research task is that of examining the relationships between a measure of student's educational achievement and student's family background vis-a-vis two types of school related factors. While a complete replication of the Coleman Report is not possible, this study is intended to contribute in a small way to the resolution of the controversy which surrounds the findings and conclusions of Chapter 3 of that study. The variables used in this study are similar to those used in the Coleman Report and the data employed also were collected in 1965. That is, are school characteristics less important than family background in explaining the variation in student's achievement as the Coleman Report contends? The interest in relating the above factors to achievement lies primarily in the potential implications for improving the achievement of disadvantaged minority groups; particularly that of blacks.

This research will include analyses of the relationships of student's family background and two types of school inputs to student educational achievement. The latter factor is to be measured by student scores on standardized reading tests. Student's family background is to be represented by a number of characteristics such as parent's education, occupation, and income. The two types of school inputs to be considered are those having to do with the characteristics of a student's teachers (such as the percent of a school's teachers having masters degrees) and those having to do with characteristics of a school's student body (such

as the percent of a school's student body having fathers employed in white-collar occupations). It should be remembered that of the school inputs, the Coleman study found these two types to be most important in the determination of achievement (Coleman, 1966: 325).

A second task which is inextricably involved with the primary task of this study is that of avoiding, where possible, the types of methodological problems which hindsight has raised about the analytical procedures employed by Coleman in the Report. For example, much effort has been given in this study to the problems of non-response and school mobility. These are two of the several problems which will be discussed in the chapter on methodology.

All of the analyses in this study will be carried out separately for blacks and whites since equality of education by race is the major concern noted in the opening remark, of this study and since the Coleman study gives at least some reason to believe that school factors are more important for the achievement of blacks than whites. Within these racial groups, separate analyses will also be carried out for subgroups created by cross-classification according to residence by region (North--South) and size of place (metropolitan--nonmetropolitan). Multiple regression analysis will be utilized to assess the contributions of family and school factors to achievement. The statistical procedures will be set forth in detail in the chapter on methodology.

In line with the separate analyses, the focus is to be within as opposed to between racial groups, although the latter type of comparisons will also be made. Reiterating, the importance of the results are seen primarily in terms of their implications for policies designed to help improve the underachievement of blacks and other disadvantaged minorities. Obviously, however, the results will have similar implications for under-achieving disadvantaged whites. It is hoped that this study will help resolve the controversy surrounding the findings of Chapter 3 of the Coleman Report.

Summary

This is a study of the relationship of both student's family background and of indicators of inputs into his school with his educational achievement. Prompted by the national concern with racial equality, and given the importance of education for success in our highly technical occupational structure, the fact that blacks have been consistently found to achieve at lower levels than whites makes it desirable to know what factors are related to achievement. Hopefully, knowing these factors will make possible the implementation of policies which will help to eliminate the lower achievement of blacks (as well as other minority groups) and facilitate their full participation in American society. At the same time, knowledge of these factors may help to explain the underachievement of disadvantaged whites.

This study is secondarily an attempt to help resolve the contro-versy surrounding the findings of Chapter 3 of the Equality of Educational

Opportunity Report that relative to a student's family background,
differences in school inputs explain little of the variation in student
achievement. This question of relative importance is particularly
crucial if the desire is to put limited resources to their most efficient.
use. Much effort is made in this study to avoid the types of methodo-
logical inadequacies which call the findings of the Coleman Report into
question. Comparisons of findings with the Report are facilitated by
the use of data independently collected at the same time (1966).

Only one aspect of student educational achievement is considered:
standardized reading achievement scores. Various characteristics of
student's background are considered including those of parent's education,
occupation, and income. Two types of school inputs are utilized--char-
acteristics of a school's teachers, such as the percent of teachers having
masters degrees; and characteristics of a school's students, such as the
percent of the student body having fathers in white collar occupations.

Multiple regression analysis will be used to assess the relative
contribution of family and school factors to achievement. The analysis
will be carried out separately for whites and blacks. Analyses will also
be accomplished within these two racial groups according to residence by
region and type of place.

Plan of dissertation

The second chapter will present the theory of the study, review
the previous relevant research, and specify the hypotheses to be tested.
The third chapter will describe the methodology. Chapter four will pre-
sent the results of the analysis. Chapter five will present the

conclusions, implications, and limitations of the study. Suggestions for further research will also be made in the final chapter. Brief appendices cover variation in reading achievement by religion and an attempt to assess extent of multicolinarity.

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CHAPTER II

THEORY, PREVIOUS RESEARCH ON THE PROBLEM AND
THE HYPOTHESES TO BE TESTED

This chapter is divided into six sections. The first section
presents the theory of the study in terms of which an interpretation
of the results might be made. The second section discusses the dependent
variable of the study which is student scores on standardized reading
test. The third section considers the relationship of student's family
background to educational achievement and presents the first hypothesis.
The fourth section considers the relationship of student body charact-
eristics to educational achievement and sets forth the second hypothesis
while the fifth section does the same for teacher characteristics and
the third hypothesis. Finally, the last part is concerned with the
relative effects of the above three factors in explaining subject's
educational achievement. Here a fourth hypothesis is offered.

The effects of social milieu on student educational achievement: theory

Let us assume, for the sake of simplicity, that the effects of
innate intelligence are controlled or held constant (Eckland, 1967).
Under this hypothetical condition, the level of educational ability which
a youth achieves is the end result of a complex process involving various

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agents of socialization whose aims may be more or less congruent. Among these agents are an adolescent's parents, siblings, peers and teachers.

Within this framework, an adolescent's eventual educational ability is first an outcome of his informal interactions with his parents and siblings within the home, and second a product of his interactions with his peers and with teachers. While much of the latter is likely to be formal in nature, occuring primarily within the confines of the class-room, most of the former is likely to be informal, occuring both within and outside the context of the school - although not necessarily with the same set of persons. The point to be made is that even with genetic endowment assumed to be a constant, much variation in the levels of ability achieved by youth is still to be expected as a result of variation in the exposure and commitment to various agents of socialization. Some of these experiences contribute to school success, but others militate against it. (Riley and Flowerman, 1951; Rosen and D'Andrade, 1959; Coleman, 1960; Deutsch, 1963; Crandall, 1964; Hobart, 1963).

The evidence seems ample that the preschool experiences of a child contribute to his later success or failure in school (Getzels and Jackson, 1961; Turner, 1962; Deutsch, 1963; Berkowitz, 1964; Crandall, 1964; Rosen, Crockett, and Nunn, 1969: 45-48). His verbal facility, his ability to concentrate and direct his energies, his value of education, his motivation and "need" to achieve, his reaction to adult authority, and various other skills and characteristics are all determined, at least initially, by the home experience.

At the same time, however, these qualities are also later reinforced, modified, or possibly even changed through experiences with socializing agents outside the home. First among these are an adolescent's peers. Their values and goals as they relate to school will undoubtedly affect the adolescent's own educational values and goals, and thus his degree of motivation to achieve in the classroom. Given the more or less segregation of neighborhoods along socioeconomic and racial lines, an adolescent's peer interactions within his immediate home sphere should primarily be with other adolescents quite similar to himself (Rhodes, Reiss, and Duncan, 1965). They will have experienced home environments much like his and should generally serve to reinforce the characteristics and predispositions of the youth which have emerged out of his home experience from an educational standpoint. While the probability of his interacting with peers whose values and goals differ from his own is much greater outside his own neighborhood, the fact that individuals tend to seek out other individuals who are similar to themselves (Rhodes, Reiss, and Duncan, 1965) still makes it more probable that most of a youth's interactions will be with adolescents who hold educational values and goals similar to his own. In the lower grade levels, the existence of the "neighborhood" school makes it highly probable that a large proportion of a youth's school peers are products of backgrounds similar to his own. If these assertions are true, it would be difficult at the lower grade levels to separate the effects of home background from the effects of neighborhood and school.

However, as the adolescent approaches the secondary school levels, the level with which this study is concerned, the student bodies will become increasingly diverse as students are brought in from various feeder schools over a wide area. Where an adolescent is enrolled in a school made up primarily of students with backgrounds different from his own, it is highly likely that his forced daily interaction with them, even if only within the classroom, will eventually serve to facilitate or inhibit, dependent upon the positive or negative effects of the milieu, the level of ability he achieves (Reiss and Rhodes, 1959; Wilson, 1959; Cutright, 1960; Michael, 1961; Cleveland, 1961; Coleman, 1961; Turner, 1964; Coleman, et. al., 1966; Boyle, 1966; Robbins, Jones, and Murphy, 1966; McDill, Meyers, and Rigsby, 1967; and Rhodes, 1968).

Like the effects of his background and his peers, the characteristics of an adolescent's teachers should have an affect on his level of educational achievement. The training and proficiency of his teachers will be important for the further development of whatever skills he brings to school with him and for the reinforcement, modification, or change in his valuation of educational achievement and his motivation to do well in school. In reference to the latter, it has been noted that since it is usually true that children try to meet the level of expectation set for them by adults, the level of achievement expected by a teacher often becomes the level which the child will strive to reach (Hobart, 1963; Clark, 1965). Thus, the teacher who assumes that her pupils are not capable of learning will often discover that she has a class of "students

who are unable to learn" (Jencks, 1972: 100-101). Given this definition, she gears her instructions and expectations of acceptable performance to a low level. Less is demanded of the student and the student does less. If this is the case, it is a prime example of the self-fulfilling prophecy (Merton, 1957). However, teachers should have the least effect of the socializing agents noted above. This is a function, it is argued, of both the small amount of time in which the students and teachers interact relative to the other agents and of the fact that in most instances these interactions tend to remain on the formal level where the rapport is more likely to be superficial in nature.

It has been the assertion here that an adolescent's experiences in his home, with his peers, and with his teachers have an additive effect on the level of ability he achieves. If all of these factors operate in a manner conducive for (or against) achieving a high level of ability, then the expectations are that the youth will (or will not) achieve at that level - (other things, such as intelligence, held constant). If, as is more likely the case, these socializing agents are partially at odds with one another, then the question of interest becomes which one of the agents is the more important and consequently exerts the greatest influence in determining the ability level achieved by a child. As already noted, the influence of teachers should be the least important of the three agents discussed. If this is so, the question remains as to whether family background or peers are more influential in the determination of the level of achievement realized by a child.

While the evidence seems to indicate that the greatest influence on the adolescent in his younger years is the home, the poor influence outside the home necessarily assumes more importance as the child matures and his life space expands. There is evidence that as youths advance through the school system the peer influences increase and the parental influences decrease (McDill and Coleman, 1965). Nevertheless, it seems reasonable to argue that parental influence continues to be powerful even during the teenage years under consideration in this study; both directly through day-to-day interaction in the family, and indirectly through the family's impact on early socialization and its continuing impact on the child's response set towards school and teachers which has undoubtedly been developed throughout the adolescent's educational career. Obviously, peer effects also operate in this situation. Unfortunately, however, the peer effects measured in this study are only those indicated by characteristics of the entire student body. As an aggregate composed of all students with whom a youth goes to school, only a small proportion of those are peers who are close friends. Hence, his interaction with them (and thus their influence) should be less than that of his family. Consequently, in considering in this study the relative influence of family background vis-a-vis student body on level of academic achievement, the former should prove more important.

In sum, it has been suggested that family, school peers, and teachers make unequal contributions to the student's attainment of educational skills. A more specific statement of the expected contributions

of these three factors is discussed below and supported by relevant
literature. More specifically, the remainder of this chapter is
divided into five sections. The first section deals with the measure
of academic achievement selected as the dependent variable. The second
section deals with family background characteristics. These include
measures of socioeconomic status. Here the first hypothesis is offered.
In the third section, the characteristics of the subject's school peers
are considered as indicated by the aggregate characteristics of the
pupils in the school he attends (particularly the academic quality and
socioeconomic composition of the school). The second hypothesis is
set forth here. The fourth section considers the characteristics of the
subject's teachers. This includes both aggregate measures of the
characteristics of the teachers in the school the student attends, and
measures of the characteristics of his English teacher. A third hypothesis
follows this discussion. Finally, the last section is concerned with the
relative importance of these three groups of factors in explaining the
subject's educational achievement. Here, a fourth hypothesis is stated.

Educational achievement

As a measure of achievement, the Coleman Report relied almost
entirely on a student's score on a verbal ability test which had been
administered during the data collection process. A criticism has been
that a better estimation of the effects of school might have been obtained
if the kinds of achievement on which schools have traditionally focused
had been used. For example, a study by Shaycoft (1967) found substantial

differential effects among schools (even after differences in socio-
economic levels of parents had been accounted for) in terms of student's
scores on achievement tests which concentrated on knowledge specific to
school subjects (e.g. literature, mathematics, social studies, accounting,
etc.).

This study will use a student's score on standardized reading
achievement tests as its dependent variable and measure of achievement.
While this indicator is more restricted than the general measure of
ability used in Coleman's study, it is central to the educational process.
For example, one has to read instructions and items on tests or one must
be able to read texts. At the same time, however, it is also less
restrictive than measures of achievement based on knowledge of specific
subject matters. But, its necessarily close relationship with achievement
in specific subjects, e.g. English, history, civics, mathematics, etc.,
should make reading achievement of particular and continuing interest.
For these reasons, this variable is felt to be an acceptable indicator
of other forms of achievement.

Family background effects on achievement

While the theoretical discussion of the familial influences has
been in terms of socialization experiences, this study uses measures of
socioeconomic status as indirect indicators of such socialization experi-
ences. The specific variables used are: family income; occupation of
head of household; mother's educational attainment; father's educational

attainment; and mother's value of education. While each of family back-
ground, student body characteristics and teacher characteristics are
represented by several different variables, the interest in this study
is not on the separate effects of these. Rather, the interest is on the
effects of all of these variables taken together and assumed collectively
to represent three entities defined as "family background", "student body
context", and "teacher context". Consequently, all of the discussion and
the hypotheses have been designed to reflect this concern. The utiliza-
tion of these measures is in keeping with a general strategy of using
measures of a type similar to those found in the Coleman Report whenever
it is possible.

The substitution of socioeconomic variables for actual measures
of socialization experiences is not without support in the literature.
At the psychological level, a number of studies have shown both that
middle and upper socioeconomic status parents are more likely to engage
in those socialization practices correlated with emergence of high need
achievement and that this "need to achieve" is found far more often in
the children of such parents than of lower socioeconomic status parents
(McClelland, 1958; Rosen, 1956 and 1951; McKinley, 1959; Komarovsky,
1962; Pearler and Kohn, 1963). Similarly several studies have also found
that higher-status parents generally show more positive values towards
educational achievement and/or attainment; as a result, youths from these
families tend to place greater emphasis on academic achievement than lower
class youths (Inkeles, 1960; Kohn, 1963; Hillman, 1969). Significant

relationships have also been shown to exist between both parent's educational aspirations and youth's educational aspirations (Bordua, 1960; Bell, 1963; Cohen, 1965; McDill and Coleman, 1965; Rehberg and Westby, 1967; Rhodes, 1968; Sewell and Shah, 1968a and 1968b; Kandel and Lesser, 1969; Sandis, 1970) and between social class and educational aspirations (Kahl, 1953; Strodtbeck, 1958; Bordua, 1960; Ellis and Lane, 1963; Cohen, 1965; Pavalko, 1966; Rehberg and Westby, 1967; Sewell, 1967; Sewell and Shah, 1968a and 1968b; Kandel and Lesser, 1969; Pavalko and Walizer, 1969). Although tautological to some extent, it has also been pointed out by several authors that even if the lower socioeconomic status family would like to see its offspring achieve a higher status, it cannot provide the model of attitudes and behavior which underlies a perception of the world as open and schooling as a means of moving out and up into higher status (Hobart, 1963; Goldberg, 1963). These lower socioeconomic level parents and minority parents cannot see past the confines of their own life situation (laboring job, etc.) to any degree which helps their child advance. In the lower socioeconomic groups, little is available for development of those characteristics necessary for achievement.

It has been pointed out that the lower class child has a number of characteristics which place him at a disadvantage relative to the middle class child (Reissman, 1962; Hobart, 1963). Among these are a lack of an educational tradition in the home, insufficient language and reading skills, inadequate motivation to pursue a long-range educational

career, a poor estimate of self, antagonism towards the school and
teachers, and a lack of a middle-class vocabulary on which success in
school is based. On the basis of these observations and the earlier
theoretical argument, the following hypothesis is offered:

Hypothesis I - Socioeconomic status of a student's family is
positively correlated with student's level of
educational achievement as measured by scores
on standardized reading achievement tests.
That is, the higher the status (as reflected
by increasing education, closeness to a white
collar occupation, and a valuation of educa-
tion as the best way to get ahead) the higher
the expected reading score.

This hypothesis is also supported by studies which have consistently found
a positive relationship between a child's socioeconomic background and his
scores on tests of achievement or intelligence (Warner, Meeker, and Eells,
1949; Kneuf and Stroud, 1950; McClelland, 1958; Lennon and Schultz, 1959;
Anderson, 1962; Bloom, 1964; Deutsch and Brown, 1964; Coleman, 1965;
Gordon, 1965; Gray and Klaus, 1965; Karp and Sigel, 1965; Silverman, 1965;
Bereiter and Engelmann, 1966).

Student context effects on achievement

The "student context" of an adolescent's school reflects an aggre-
gate assessment of the individual characteristics of the studies in the
school. Four context variables are used in this study; one (the percent

of the student body with white collar fathers) is a direct indicator of
the socioeconomic status of the student body, while the other three
(the percent of the student body not below the norm for their grade in
reading, the percent of the student body enrolled in a college prepara-
tory curriculum, and the average student body I.Q.) are all direct
indicators of the academic quality of the student body. The assumption
is that "student body context" represents an atmosphere, in much the
same way as the youth's family, which is more or less conducive to a
high level of academic achievement.

Studies which have examined school context have found both
aspirations and achievement to be significantly and positively correlated
with characteristics of the student body (Wilson, 1959 and 1967; Cutright,
1960; Michael, 1961; Cleveland, 1961; Ramsoy, 1962; Coleman, 1961; Turner,
1964; Coleman, et. al. 1966; Boyle, 1966; Robbins, Jones, and Murphy, 1966;
Reiss and Rhodes, 1968). However, findings such as these (including the
Coleman Report) have been subject to the criticism that they are neither
longitudinal nor corrected for initial achievement and aspirations upon
entering school in the primary grades (Nichols, 1966; Bowles and Levin,
1968; Pettigrew, 1968). Such limitations create the possibility that
the findings of these studies are merely products of self-selection.
That is, lower class children in predominantly middle-class schools
achieve more and aspire higher, not because of school climate, but because
as a group they either are brighter and more ambitious to begin with than
lower status children as a whole, and/or that their ambitious parents moved

to a neighborhood which affords better opportunities for their children.
Wilson (1967) in a study connected with the U. S. Commission on Civil
Rights Report, analyzed the socioeconomic climate variable on a prob-
ability sample of junior and senior high school children in the California
Bay area. He had the advantage, not found in any of the other studies,
of longitudinal data beginning with initial scores upon entering school.
His findings, however, differ little from the results of the studies
already mentioned. In his words, "allowing for individual differences
in personal background, neighborhood context, and mental maturity at the
time of school entry; variations in elementary schools context made a
substantial and significant difference in academic success at higher
levels (Wilson, 1967, p. 203)". In light of these findings and with the
previous theoretical discussion in mind, the following hypothesis is
offered:

Hypothesis II - The "student context" of schools is positively
correlated with student's level of educational
achievement as measured by scores on standardized
reading achievement tests. That is, the higher
the socioeconomic status of the school (as
reflected by the higher percentage of students
with white collar fathers) and the more academ-
ically oriented the student body (as reflected
by the higher percentage of students not below
the norm for their grade in reading, the higher

percentage of students enrolled in a college
preparatory curriculum, and the higher average
I.Q. of the student body) the higher the
expected reading score.

The effects of teacher characteristics on achievement

As was true with background and aggregate peer effect,
teacher effects are to be measured through the use of a number of
objective indicators of teacher characteristics; all of which are
expected to be individually and collectively relevant for the educational
achievement of an adolescent. Six variables are used; three of these
(percent of a school's teachers who are male, percent of a school's
teachers not in their first year of teaching, and percent of a school's
teachers with a master's degree) are aggregate measures of the charact-
eristics of a student's teachers, while three are characteristics of one
individual teacher--the subject's present English teacher (her race, her
years as a teacher, and her highest degree). Being male, having experi-
ence, and having a master's degree are all assumed to be associated with
better qualified teachers. Similarly, given the poorer quality of educa-
tion obtained by a greater percentage of black than white teachers having
a white teacher is assumed to reflect having a better qualified teacher.

A number of studies offer support for expecting to find a signi-
ficant relationship between the characteristics of teachers and pupil
achievement. First, of course, is the Coleman Report (1966). It found
that the family educational background of the teacher, the teacher's own
level of education, the teacher's verbal ability, and the teacher's years

of experience were all positively related to achievement (Coleman, et. al., 1965. pp.316-318). Using selected portions of the data collected for the Coleman Report, Bowles and Levin (1968a and 1968b) and Guthrie (1969) each found the characteristics of teachers to be significantly related to the achievement of pupils. A number of additional studies have also shown both teacher's years of experience and teacher's academic preparation to be positively related to achievement of pupils (Goodman, 1959; Thomas, 1962; Burkhead, 1967; Central Advisory for Education, 1968; Hanushek, 1968; Katzman, 1968). Given the theoretical argument and previous findings, the following third hypothesis is offered:

Hypothesis III - Teacher characteristics are positively correlated

with student's level of educational achievement

as measured by scores on standardized reading

achievement tests. That is, the higher the

percentage of a school's teachers who are

male, the higher the percentage who are

experienced, and the higher the percentage

with master's degrees, the higher the expected

reading score. Similarly, having an English

teacher who is white, who is experienced, and

who has a master's degree is expected to be

associated with a higher reading score.

The relative importance of student's family background, student body context, and teacher characteristics in explaining educational achievement

If one has the purpose of increasing the level of achievement, and resources for doing so are limited, it is important to know which factors are important in its determination. In the absence of the methodology and data to show causation on the other hand, one must be content to show which of these factors is the most highly related to achievement.

In the third chapter of the Coleman Report, the concern was primarily with whether characteristics of the schools were significantly related to educational achievement. The general conclusion of the Report was that these factors explain only a small amount of the variation in achievement; although some school characteristics, particularly those of student body and teachers, were relatively more important for blacks than for whites. Family background characteristics, however, were found to explain a far larger proportion of the variation in achievement. There are three implications of these results. The first is that modifications of the school environment are likely to produce only minor improvement in the educational achievement of either blacks or whites; even if the schools of the former are disadvantaged. The second is that in spite of the small benefits to be derived from improving the school environment the fact that these factors are somewhat more important for blacks than whites means that any changes that are made should serve to reduce to at least some degree the difference in the achievement levels of the two groups. However, the third implication, and the one which has probably most bothered those who have so staunchly advocated pouring more resources into the schools (given

the existence of only limited resources) is the fact that family back-
ground factors were found to explain far more of the variation in the
achievement of both blacks and whites than any of the school factors.
This inevitably forces the conclusion that the greatest improvement in
the achievement of minority group members and the most efficient use of
limited resources would come through the improvement of the "home"
environment of these educationally disadvantaged persons. That is,
given limited resources, there is more benefit to be derived from
allocating these resources to locations which are outside rather than
inside the school. In this light it is easy to understand the concern
for the relative importance of the factors being analyzed in this study.

Prior to the Coleman Report, there has been little consideration
of the question of relative importance of teacher characteristics as
they relate to achievement. A few studies, however, have attempted to
assess the importance of peer and student context effects relative to
those of background in determining educational aspirations. With the
exception of a study by Kandel and Lesser (1969), those who have looked
at peer and background effects have concluded that peer effect is the
more important of the two for educational aspiration (Simpson, 1962;
Herriott, 1963; McDill and Coleman, 1965). In comparing the relative
effects of family background and student context, the findings have been
more ambiguous. Wilson (1959) and Michael (1961) concluded that the
school's student context was more important than background in determining
a youth's educational aspirations while Turner (1964) and Ramsoy (1962)

found the latter to be more important. The relative importance of teacher characteristics in comparison with background and student context has never been studied outside the Coleman Report.

In spite of the scarcity of information in the area, the Coleman Report's conclusion that, "schools bring little influence to bear on a child's achievement that is independent of his background and general social context (p. 325)," has been vehemently disputed, particularly on the grounds of methodological inadequacies. Arguing that an adequate assessment of the effects of schools factors on achievement is possible only if the assumption can be made that all students are initially of equal background and ability, the Report examined the relationship of student context and teacher characteristics only after having first let the "background" of the student explain as much of the variation in achievement as it could. As Table 1 indicates, the Report found that the background of the student accounted for approximately fifteen percent of the variation in the achievement of blacks and for approximately 23 percent of the variation in the achievement of whites. The authors note, however, that these factors tap only a few aspects of the child's background and would perhaps best be considered a lower limit.

With the effects of family background statistically controlled, the relationships of student body characteristics and teacher characteristics were then examined. Insofar as student body context is concerned, the Coleman study concluded that "attributes of other students account

TABLE 1

PERCENT OF VARIANCE IN VERBAL ACHIEVEMENT ACCOUNTED FOR
AT GRADES 12, 9, AND 6 BY EIGHT BACKGROUND FACTORS

Race and Region	Grade 12	Grade 9	Grade 6
Negro, Total	15.14	14.99	14.62
White, Total	23.03	23.28	17.64
Negro, South	15.79	15.69	15.44
Negro, North	10.96	11.41	10.25
White, South	20.13	23.12	19.91
White, North	24.56	22.78	15.57

Source: James S. Coleman, et. al. Equality of Educational Opportunity,
Washington, D. C.: U. S. Government Printing Office, 1966, Table 3.221.3,
p. 300. The eight background factors are: urbanism of background (for
grade 6 is migration), parent's education, structural integrity of the
home, smallness of family, items in home, reading material in the home,
parent's interest, and parent's educational desires.

for far more variation in the achievement of minority group children than

do any attributes of staff (Coleman, et. al., 1966, p. 302). According

to the authors of the Report, the much smaller relationship between

student body characteristics and achievement for whites would seem to

indicate less sensitivity to the variations in the school environments;

a possible function of coming from a background which probably encourages

achievement (Coleman, et. al., 1966, p. 304). The justification for

the above conclusion appears to come from the results found in Table 2

where one variable was used as an indicator of the different types of

school factors. In terms of unique explanatory power, or that proportion

of the explained variance attributable to a variable alone, student body

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TABLE 2

PERCENT OF VARIANCE IN VERBAL ACHIEVEMENT UNIQUELY ACCOUNTED ·FOR BY ONE
VARIABLE REPRESENTING EACH OF: SCHOOL FACILITIES (A); CURRICULUM (B);
TEACHERS QUALITY (C); TEACHERS' ATTITUDES (D); AND STUDENT BODY QUALITY
(E) AT GRADES 12, 9, AND 6

Race and Region	Joint ABCDE	Common	Unique				
			A	B	C	D	E
Grade 12							
Negro, Total	12.43	5.58	0.02	1.01	0.02	0.03	6.77
White, Total	2.52	0.50	0.01	0.00	0.00	0.00	2.01
Negro, South	11.06	2.80	0.00	0.00	0.01	0.18	8.07
Negro, North	7.59	3.58	0.13	0.04	0.00	0.17	3.67
White, South	3.02	0.25	0.02	0.00	0.00	0.24	2.34
White, North	1.58	0.25	0.02	0.00	0.00	0.00	1.31
Grade 9							
Negro, Total	8.21	3.99	0.01	0.00	0.08	0.08	4.05
White, Total	1.88	-0.06	0.02	0.08	0.06	0.09	1.69
Negro, South	8.84	3.40	0.00	0.00	0.07	0.02	5.35
Negro, North	3.37	1.38	0.07	0.01	0.01	0.24	1.66
White, South	2.05	0.15	0.03	0.03	0.01	0.05	1.78
White, North	1.23	0.01	0.01	0.12	0.08	0.01	1.10
Grade 6							
Negro, Total	9.38	2.85	0.00	0.03	0.00	0.01	6.49
White, Total	4.37	-0.06	0.03	0.00	0.05	0.09	4.26
Negro, South	9.48	3.22	0.05	0.03	0.06	0.04	6.12
Negro, North	4.81	0.87	0.00	0.05	0.19	0.01	3.69
White, South	2.13	-0.02	0.03	0.00	0.00	0.01	2.11
White, North	4.56	0.02	0.15	0.00	0.08	0.00	4.31

Source: James S. Coleman, et. al., Equality of Educational Opportunity,
Washington, D. C.: U. S. Government Printing Office, 1966, Table 3.23.1,
p. 303.

quality explains a much greater percentage of the variance in achievement

than do any of the other variables; and this is true for both blacks and

whites.* However, this is still substantially less than the amount of

variation in achievement accounted for by student's family background;

particularly in the case of whites.

Analyzing the relationship of teacher characteristics to student

achievement led Coleman to conclude that, "altogether, variation in school

average of teacher's characteristics accounted for higher proportions of

variation in student achievement than did all other aspects of the school

combined, excluding student body characteristics" (Coleman, 1966, p. 325).

In Table 3, it can again be seen that the apparent effect of average

teacher characteristics for the student is directly related to what the

TABLE 3

PERCENT OF VARIANCE IN VERBAL ACHIEVEMENT ACCOUNTED FOR BY SEVEN SELECTED
TEACHER VARIABLES AT GRADES 12, 9, AND 6 WITH BACKGROUND FACTORS CONTROLLED

Race and Region	Grade 12	Grade 9	Grade 6
Negro., Total	9.53	6.77	3.52
White, Total	1.82	1.03	1.23
Negro, South	9.97	7.72	5.29
Negro, North	4.35	1.58	2.19
White, South	2.07	2.49	1.12
White, North	1.89	1.02	1.67

The background variables are the first six noted in Table 1

Source: James S. Coleman, et. al., Equality of Educational Opportunity,
Washington, D. C.: U. S. Government Printing Office, 1966, Table 3.25.1,
p. 317.

Report has referred to as the "sensitivity" of the groups to the school

environment. That is, the characteristics of the teachers are far more

important for blacks, according to this analysis, than they are for

whites. However, for both blacks and whites, family background is still

the more important factor. The Coleman Report notes, however, that these

results suggest that good teachers matter more for children from minority

groups who have deficient educational backgrounds or for that matter for

any children who suffer greater educational disadvantage in their back-

ground (Coleman, et. al., 1966, p. 317). Consequently, upgrading teacher

quality, they say, will have the most effect in underprivileged areas.

On the basis of the findings of the Coleman Report and on the basis of

earlier theoretical arguments, the following hypothesis is offered:

Hypothesis IV - Of the three factors of family background, student

context, and teacher characteristics, family

background will explain more of the variation

in the educational achievement of an adolescent,

as measured by scores on standardized reading

achievement tests, and teacher characteristics

will explain the least amount of the variation.

Thus, of the three variable groups, family

background is the most important (in terms of

its explanatory power) and teacher characteristics

the least important for achievement.

This dissertation is concerned with testing the above hypotheses.

These tests involve controlling for type of curriculum in which a student

is enrolled and place of residence, the rationale for which are given in the next chapter. At the same time, this study is also concerned with certain methodological problems as already noted. These problems, along with certain methodological considerations, will be discussed in the next chapter.

CHAPTER III

METHOD

Introduction

This chapter will be concerned with describing the methodology
of the study. The first section will describe the source of the data
while the second section will consider the representativeness of the
sample and possible effects of considerable nonresponse rates for
selected items, particularly in the case of the dependent variable.
In the third section, a description will be given of how the variables
were measured. The last section will describe the type of analysis
employed in this study. As was noted earlier, the validity of the
conclusions found in Chapter 3 of the Coleman Report have been questioned
primarily on the basis of perceived methodological problems; for which
the study has been highly criticized. To avoid similar criticism, much
effort has been taken in carrying out the primary objective of this
dissertation to use additional data or otherwise compensate for method-
ological inadequacies which have been noted by critics of the Coleman
Report. A detailed description of the criticism and the procedure taken
by this study to avoid similar criticism are set forth in various sections
of this chapter. However, the data for the present study also present
problems not encountered in the Coleman study and means of dealing with
them are presented.

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Source of data

This study will involve a further analysis of data originally
obtained at the national level by the United States Bureau of the
Census in October of 1965 as part of that year's Current Population
Survey of School Enrollment. Information about the student, his
family, and his school was obtained in a three phase survey. The
first phase obtained data on the age, race, sex, educational enrollment
(including name of school attended), and attainment status of school-
age subjects as part of the regular CPS household interview; which
also provided information about the education of the student's mother,
occupation of head of household, and family income. The second phase
of the study involved the use of questionnaires which were left at
the household by the CPS interviewer after the interview; one question-
naire to be filled in by all mothers of children in the 14 to 19 year
old age group and one questionnaire for each child in that age group.
Among the items included in the mother's questionnaire were her value
of education and the educational attainment of the child's father.
The sample size for enrolled subjects in this age group is 6993. The
third phase consisted of sending two questionnaires to the principals
of the schools attended by children in the sample. One questionnaire
was concerned with characteristics of the pupil himself, including
his reading achievement score and the type of curriculum in which he
was enrolled. The other questionnaire was designed to elicit informa-
tion about the social background, mean I.Q. score, racial composition,
and other characteristics of the student body, as well as a few selected

characteristics of the school's teachers and the student's English teacher. The data obtained from these three phases were then merged and entered on a computer tape.

Representativeness of the sample

The Current Population Survey (CPS) through which these data were originally obtained, is a sample survey conducted monthly by the Bureau of the Census to obtain estimates of unemployment and other characteristics of the population as a whole. The sample is an area probability sample which, at the time of the 1965 survey, selected some 3357 areas comprising 701 counties and independent cities in each of the 50 states and the District of Columbia. About 40,000 housing units were visited each month and about 5,000 of these were found to be vacant or otherwise not to be enumerated. About 1,500 of the remaining 35,000 occupied units were visited but interviews were not obtained because the occupants were not at home, refusals, etc. A complex rotation design is employed to improve the survey statistics. Each monthly sample has eight equal portions, only one of which is brand new. The assignments of each portion are in the sample for four months, then out eight months, then in again for four months.

The total error encountered in sampling surveys can be categorized into sampling and nonsampling error. Sampling error is concerned with whether or not the selection procedure resulted in having a sample which is representative of the total population. Even if there were no other source of bias, it is possible, using a random mechanical method

of selection and a complete sampling frame, to draw a typical sample by chance. The probability of this occuring can be computed. An extended discussion regarding the degree of sampling error in the CPS is available (U. S. Bureau of the Census, 1963, 50-70, 90-91). Another source of sampling error is using an incomplete frame or list. The CPS intentionally excludes military and institutional populations and doubtlessly excludes other and much smaller populations by reasons of sampling design. Nonsampling errors include the cumulative effect of errors in the field and errors in the coding and processing of interview or questionnaire forms. Still other nonsampling errors include those of measurement; i.e., do the questions used in the survey elicit the desired information from respondents, etc. The details of measurement are covered later in this chapter.

The coverage of the CPS has been described at length (U. S. Bureau of the Census, 1963). One should keep in mind, however, that the CPS is designed to make estimates of accurate monthly changes in the U. S. employment rates. The accurate estimate of the population enrolled in school is a secondary task rather than the primary goal of the survey. In addition, the data used in this report represents a subject of all persons in the October, 1965 Current Population Survey of School Enrollment (1967). The data for that report include all persons who were described by "any responsible adult" in the household during the regular CPS interview as being enrolled in school. This study excludes 33 cases of 14 to 19 year old persons who were identified as being

enrolled in regular school on the CPS-1 household interview form, but who were later identified as not enrolled in school according to the leave-behind form (CPS-552) for nonenrollees themselves and/or the principal of the school in which the respondent was last enrolled (CPS-555). That is, if the person was identified as being enrolled in school by the original respondent (any responsible adult in the household) and the person himself indicated that he was not enrolled in school, or if the principal of the last school in which he was enrolled indicated that he was not enrolled, then this case was excluded from the analysis. Twelve cases were also excluded because it was impossible to locate the CPS form and match it to the leave-behind forms and the principal's forms. One case was lost during the tape cleaning process when double punches, etc. were eliminated from the data tape.

The response rates to the original CPS household interview (first phase) and to the household "leave-behind" questionnaires (second phase) were both very good with approximately 96 percent and 87 percent of the sample responding. However, in the third phase, almost 30 percent of the school principals failed to return one or both of their questionnaires. An added problem for this study is that of the 70 percent who did respond, 30 percent failed to indicate a reading achievement score for the student. Consequently, reading achievement scores, the dependent variable in this study, are available for only about half of the subjects (70 percent of the principals responding). Unfortunately, this non-response was not random; e.g. the central cities of the Chicago and Fort

Worth SMSAs were among the school systems which did not cooperate.
It should be noted, however, that even where the school system did
not cooperate the whole city was still not lost for some principals
did respond. Coleman depended on superintendents for cooperation,
rather than principals, as was the case here, and thus lost whole
cities. At the same time, the response rates were not particularly
good for rural schools in the South, and there is an underrepresenta-
tion of certain populations. For example, surveys of this type which
depend upon area probability samples have some difficulty in obtaining
information from highly mobile populations, such as young, unmarried
males in the 17 to 20 year old age group.

Any consideration of the general representativeness of a
particular survey, however, must ultimately rest upo.; comparisons of
the results of that survey with some standard. In an ex-post-facto
study utilizing the same data on 14 to 19 year olds as this study,
Rhodes (1968, 37-46) made a number of such comparisons employing as
his criterion the school enrollment figures of the 1960 decennial
census (U. S. Bureau of the Census, 1964a). Comparisons of distri-
butions were made on the following variables: age; sex; region;
residence; age by region; age by residence; age, race, and sex of
subject, education of father or of mother if father absent (or guardian
if both absent), and family income. The results of these comparisons
indicate that the sample is, on the whole, a representative one (Rhodes,
1968: 45). There is still the question of possible bias introduced by

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the high non-response rate of the principals. One of the major criticisms of the Coleman Report was that principal and pupil questionnaires were available for analysis in only 59 percent of the cases. A number of critics (Marascuilo, 1967; Sewell, 1967; Bowles and Levin, 1968) maintain that the nonrandomness of the non-response (e.g. data was lost on three of the five largest U. S. cities) introduces the possibility of serious biases in the estimation and inference procedures. Unfortunately for the Coleman Report, errors were made in the administration and mailing of the questionnaire forms which made it impossible to prepare an accurate list of non-respondents for followup (Coleman, et. al, 1966: 565). Utilizing both a randomly selected subsample of 66 secondary schools, for each of which there was not a principal's questionnaire, and information about these schools obtained from the state departments of education, an effort was still made by the authors of the Report to discover the extent to which non-response was a source of bias in the survey (Coleman, et. al., 1966, p. 565). Their conclusion, found on the one page in the Report which is devoted to a discussion of nonresponse (p. 565), was that the exclusion of these schools introduced very little bias. The response of critics to this conclusion is well summed up by Sewell who notes that, "the brief discussion in the methodological appendix, which indicates that no great bias was introduced by the exclusions of the schools that refused to cooperate, is not particularly convincing" (1967: 478).

The data from schools in this study, while suffering from a high non-response rate, are still more complete than data for schools

in the Coleman study, and more data are available on missing cases.
Not only is the response rate higher, but this study lost school data
for most of only one of the five largest cities in the United States
while the Coleman Report did so for three of the five. At the same
time, however, the data on student bodies of schools in the present
study are restricted in that within-school variances are unknown
(except as pooled residuals in the analysis of variance routines).
Since the smaller Current Population Survey sample includes only a
few children from any given school (12 was the maximum), this study
had to obtain information about the student body by asking the principal
questions like, "What percent of the student body is behind grade level
in reading achievement?" or, "What is the mean I.Q. score for the student
body?" Very limited pretests indicated that principals should have
accurate estimates of some student body characteristics such as percent
Negro and mean I.Q. scores. Further, the availability of data from the
first two phases of the study will permit a more accurate estimate of
the effects of the high non-response rate of principals than was possible
in the Coleman Report.

Comparisons of those persons for whom no school data was avail-
able were made with persons for whom there was school data. This was
done separately for blacks and whites along five different background
measures: family income; head of household's occupation; mother's
education; father's education; and mother's educational values. The
results of these comparisons are found in Table 4 and 5.

TABLE 4

A COMPARISON ALONG FIVE BACKGROUND VARIABLES OF MEAN VALUES, USING A
TWO INDEPENDENT SAMPLES T TEST AND A SIGNIFICANCE LEVEL OF .01 (TWO-
TAILED), OF THOSE WHITE STUDENTS FOR WHOM SCHOOL DATA IS AVAILABLE
(ANSWER) WITH THOSE WHITE STUDENTS FOR WHOM NO SCHOOL DATA
IS AVAILABLE (NO ANSWER)

| | | Answer | | No Answer | | | |
	N	(Means)	N	(Means)	Difference	T-Score	Significant?
Income	4244	81.22	1487	79.99	1.23	0.71	No
Occupation	4530	3.14	1577	3.16	−0.02	0.40	No
Mother's Education	4457	4.48	1532	4.49	−0.01	0.07	No
Father's Education	4334	4.53	1501	4.51	0.02	0.38	No
Mother's Values	4357	0.66	1499	0.65	0.01	0.84	No

Significant differences between the two groups on specific variables were.

determined by using a two-independent samples t-test of the differences

between the group means (Blalock, 1960, pp. 170-176). Due to the large

sample sizes which tend to make minor differences statistically signifi-

cant, a significance level of .01 was selected for discussion purposes.

For both whites and blacks, there is no difference between the "answer"

and "no answer" groups which is statistically significant along the five

background measures. Although obviously not as good as conducting a

follow-up of the non-responsive principals, given the usually close

association between the socioeconomic backgrounds of youths and the

TABLE 5

A COMPARISON ALONG FIVE BACKGROUND VARIABLES OF MEAN VALUES, USING A
TWO INDEPENDENT SAMPLES T TEST AND A SIGNIFICANCE LEVEL OF .01 (TWO-
TAILED), OF THOSE BLACK STUDENTS FOR WHOM SCHOOL DATA IS AVAILABLE
(ANSWER) WITH THOSE BLACK STUDENTS FOR WHOM NO SCHOOL DATA
IS AVAILABLE (NO ANSWER)

	Answer		No Answer		Difference	T-Score	Significant?
	N	(Means)	N	(Means)			
Income	439	38.99	330	34.97	4.02	1.76	No
Occupation	459	2.54	340	2.52	0.02	0.17	No
Mother's Education	449	3.54	315	3.32	0.22	1.83	No
Father's Education	391	3.53	307	3.25	0.28	2.17	No
Mother's Values	434	0.64	320	0.67	−0.03	0.76	No

demographic characteristics of the schools they attend, the lack of dif-
ferences in the background characteristics of those students for whom
there were and were not school data available gives support to an assumption
that the non-response of the principals should not bias the results of the
analyses.

Perhaps the most interesting aspect of these two tables are the
obvious differences in the backgrounds from which the black and white
students come. The parents of the black sample of students are less
educated, less likely to be employed in a "white collar" occupation, and
have far less income than the parents of the white student sample.

Before continuing, it is best to consider at this time a second
methodological criticism which has been lodged against the Coleman Report.
This is the criticism that the study does not take student migration into
account and thus implicitly assumes that the characteristics of the school
in which the student is currently enrolled is typical of tne quality of
all schools to which he has been exposed during his educational experience
(Jencks, 1966; Nichols, 1966; and Bowles and Levin, 1968a). While the
obvious and most legitimate manner in which to assess the validity of
this assumption would be through a comparison of the different schools
which a student has attended, data for such a test are not available for
this study. However, an indirect assessment of the validity of this
assumption can be made. Comparisons will be made, within the black and
white subgroups, between those persons who have either never changed
schools or have changed only once (non-movers) and those persons who have
changed schools twice or more times (movers). The inclusion in the non-
movers of those persons who have changed schools once is in recognition
of the fact that graduation into high school often involves the changing
of school. Given that such a change is usually local in nature, the
characteristics of the secondary school into which the studen moves should
differ little from the middle school or junior high school from which he
has come. If the movers resemble the non-movers both in terms of their
background characteristics and in terms of the characteristics of the
schools in which they are presently enrolled, it seems unreasonable to
assume that the type of school in which the "mover" is currently enrolled
is very similar to the type of school in which he has always been enrolled.

If the "movers" and "non-movers" differ on either background or school characteristics, however, such an assumption would not be valid. If this proves to be the case, then this study will restrict itself to those students who have changed schools no more than once. The comparisons of the "movers" and "non-movers" was done using a two independent samples t-test again of the differences between the groups means, and a significance level of .01. As can be seen below in Tables 6 and 7, for both whites and blacks, none of the t scores are equal to or larger than the 2.58 needed for statistical significance. Given that the differences between those persons who have changed schools two or more times and those persons who have changed schools at most only one time, it was decided that the assumption that the schools in which the "movers" are currently enrolled are probably very similar in demographic composition to the type of schools in which they have always been enrolled was reasonable. Consequently, the analysis will combine movers and nonmovers.

TABLE 6

A COMPARISON AMONG ALL VARIABLES OF MEAN VALUES, USING A TWO INDEPENDENT SAMPLES T TEST AND A SIGNIFICANCE LEVEL OF .01 (TWO-TAILED), OF THOSE WHITE STUDENTS WHO HAVE NEVER CHANGED SCHOOLS OR WHO HAVE CHANGED ONLY ONCE (NON-MOVERS) WITH THOSE WHITE STUDENTS WHO HAVE CHANGED SCHOOLS TWO OR MORE TIMES (MOVERS)

Variable	Non-Movers N	Non-Movers (Means)	Movers N	Movers (Means)	Difference	T-Score	Significant?
Background							
Income	1910	85.22	1793	80.66	4.36	2.26	No
Occupation	2028	3.21	1873	3.16	0.05	1.67	No
Mother's Education	1994	4.51	1864	4.47	0.04	0.80	No
Father's Education	1944	4.66	1812	4.58	0.08	1.33	No
Mother's Value	1743	0.67	1841	0.64	0.03	1.50	No
Student Body							
% in College Prep.	1339	50.06	1277	48.72	1.34	1.22	No
% Behind in Reading	1373	18.93	1283	19.52	-0.59	0.95	No
% White Collar	1334	42.82	1232	41.17	1.65	1.57	No
Mean Student I.Q.	1276	104.50	1191	103.45	1.05	2.39	No
Teachers							
Percent Male	1476	51.28	1359	51.76	-0.48	0.58	No
Percent First Year	1452	8.67	1350	8.68	-0.01	0.02	No
Percent With Masters	1402	36.85	1308	35.73	1.12	1.18	No
Eng. T. Race	2046	0.99	1928	0.99	0.00	0.00	No
Eng. T. Years	1283	10.73	1183	10.67	0.06	0.13	No
Eng. T. Degree	1317	2.42	1213	2.38	0.04	1.33	No
Curriculum	1417	3.20	1325	3.12	0.08	2.00	No

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TABLE 7

A COMPARISON AMONG ALL VARIABLES OF MEAN VALUES, USING A TWO INDEPENDENT SAMPLES T TEST AND A
SIGNIFICANCE LEVEL OF .01 (TWO-TAILED), OF THOSE BLACK STUDENTS WHO HAVE NEVER CHANGED
SCHOOLS OR WHO HAVE CHANGED ONLY ONCE (NON-MOVERS) WITH THOSE BLACK STUDENTS
WHO HAVE CHANGED SCHOOLS TWO OR MORE TIMES (MOVERS)

Variable	Non-Movers		Movers		Difference	T-Score	Significant?
	N	(Means)	N	(Means)			
Background							
Income	277	39.45	250	41.67	-2.22	0.75	No
Occupation	287	2.58	252	2.55	0.03	0.33	No
Mother's Education	278	3.41	243	3.70	-0.29	2.00	No
Father's Education	249	3.49	220	3.54	-0.05	0.31	No
Mother's Value	273	0.63	245	0.65	-0.02	0.40	No
Student Body							
% in College Prep.	163	34.10	143	35.22	-1.12	0.34	No
% Behind in Reading	164	43.16	145	40.87	2.29	0.76	No
Percent White Collar	155	19.83	138	23.01	-3.18	1.30	No
Mean Student I.Q.	154	93.62	136	95.25	-1.63	1.27	No
Teachers							
Percent Male	178	40.80	154	44.10	-4.02	1.75	No
Percent First Year	175	8.90	151	9.23	-1.33	0.87	No
Percent with Masters	167	32.48	147	33.29	-2.81	0.94	No
Eng. T. Race	288	0.78	257	0.74	0.04	1.00	No
Eng. T. Years	189	10.51	115	11.00	-0.49	0.32	No
Eng. T. Degree	143	2.30	118	2.30	0.00	0.00	No
Curriculum	157	2.83	126	2.29	0.04	0.36	No

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The Measurement of the Variables

The dependent variable: reading achievement

This study will use as its measure of achievement and as its
dependent variable, a student's score on standardized reading achieve-
ment tests. The reading scores were obtained from the principal of
the school in which the subject was enrolled by means of a mail
questionnaire (Form CPS-555). Principals were first asked: "Has this
pupil ever taken a group reading test (including reading subtest of an
achievement battery)?" If it was indicated that the pupil had taken a
test, the principal was then asked: "What is the full name of the most
recent of such reading tests?" Nine additional questions were asked in
order to determine the edition, data, level, form, time of administration,
grade level of the pupil, percentile score and/or stanine score. Infor-
mation was then obtained from the publishers of the various tests and a
system devised for assigning all the test scores to stanine scores
(Herriott and Hodgkins, 1969), which were then used by the Bureau of the
Census for coding. Stanine scores represent transformations of normalized
standard scores into a scale with scores running from one to nine (Anastasi,
1968, p. 56). The merging of scores from different reading tests has
been discussed and defended by Herriott and Kohen in an unpublished
memorandum.

One potential difficulty with the use of reading achievement is
the same one of non-response which plagued the school information in

general. Reading achievement scores are available for only approximately
49 percent of the sample. There is concern as to whether this nonresponse
is nonrandom and consequently a source of potential bias. Utilizing the
procedure previously followed, the black and white subgroups were divided
into those persons for whom a reading achievement score was available and
those persons for whom there was not a reading achievement score. Using
both background and school characteristics, a two-independent samples
t test was again employed. With a sample size this large, a T score of
2.58 must be obtained for a difference to be significant at the .01 level.
As can be seen below in Tables 8 and 9, there are only a few instances
in which the respondents on reading score differ significantly from the
non-respondents.

In the case of whites there is a statistically significant dif-
ference between the respondents and non-respondents on three variables:
the percent of the school's teachers with master's degrees; the percent
of the students with white-collar fathers; and the average school I.Q.
In comparisons between respondents and non-respondents on each of the
three variables, the non-respondents have lower reading scores. However,
despite the statistically significant difference, it is only in the case
of average school I.Q. that the differences amount to any practical
importance. Here it is very evident that the schools which have
an answer on reading scores have student bodies with mean I.Q.s sub-
stantially above the student bodies in the schools for which no answer
on reading score is available.

TABLE 8

A COMPARISON AMONG ALL VARIABLES OF MEAN VALUES, USING A TWO INDEPENDENT SAMPLES T TEST AND A SIGNIFICANCE LEVEL OF .01 (TWO-TAILED), OF THOSE WHITE STUDENTS FOR WHOM READING ACHIEVEMENT SCORE IS AVAILABLE (READING) WITH THOSE WHITE STUDENTS FOR WHOM NO READING ACHIEVEMENT SCORE IS AVAILABLE (NO READING)

Variable	Reading		No Reading		Difference	T-Score	Significant
	N	(Means)	N	(Means)			
Background							
Income	2709	82.93	3022	79.08	3.84	2.51	No
Occupation	2896	3.16	3211	3.13	0.03	1.38	No
Mother's Education	2855	4.51	3134	4.46	0.05	1.18	No
Father's Education	2780	4.53	3055	4.51	0.02	0.40	No
Mother's Value	2795	0.67	3061	0.65	0.02	0.26	No
Student Body							
% in College Prep.	2680	48.89	1478	47.66	1.23	1.31	No
% Behind in Reading	2693	15.73	1452	15.30	0.43	0.79	No
Percent White Collar	2607	40.65	1485	36.27	4.38	5.17	Yes
Mean Student I.Q.	2551	103.79	1327	82.95	15.84	43.03	Yes
Teachers							
Percent Male	2831	51.45	1572	50.21	1.24	1.69	No
Percent First Year	2796	9.09	1547	8.48	0.51	1.40	No
Percent with Masters	2714	36.64	1500	32.98	3.66	4.63	Yes
Eng. T. Race	2928	0.99	3258	1.00	-0.01	0.01	No
Eng. T. Years	2661	10.68	1256	11.30	-0.62	1.57	No
Eng. T. Degree	2721	2.38	1296	2.39	-0.01	0.34	No
Curriculum	2897	3.22	1410	3.20	0.02	0.71	No

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TABLE 9

A COMPARISON AMONG ALL VARIABLES OF MEAN VALUES, USING A TWO INDEPENDENT SAMPLES T TEST AND A SIGNIFICANCE LEVEL OF .01 (TWO-TAILED), OF THOSE BLACK STUDENTS FOR WHOM READING ACHIEVEMENT SCORE IS AVAILABLE (READING) WITH THOSE BLACK STUDENTS FOR WHOM NO READING ACHIEVEMENT SCORE IS AVAILABLE (NO READING)

Variable	Reading N	Reading (Means)	No Reading N	No Reading (Means)	Difference	T-Score	Significant
Background							
Income	239	41.88	530	35.19	6.69	2.66	Yes
Occupation	245	2.53	554	2.54	-0.01	0.12	No
Mother's Education	239	3.59	525	3.38	0.21	1.61	No
Father's Education	211	3.70	487	3.28	0.42	2.80	Yes
Mother's Value	234	0.70	520	0.63	0.00	1.75	No
Student Body							
% in College Prep.	224	33.57	185	34.54	-0.97	0.34	No
% Behind in Reading	224	42.73	199	43.78	-1.05	0.41	No
Percent White Collar	218	20.24	184	17.82	2.42	1.19	No
Mean Student I.Q.	205	93.13	179	93.01	0.12	0.10	No
Teachers							
Percent Male	240	42.68	210	39.62	3.06	1.59	No
Percent First Year	230	8.12	202	10.35	-2.23	1.63	No
Percent with Masters	232	34.64	192	28.68	5.96	2.34	No
Eng. T. Race	251	0.55	556	0.85	-0.30	7.50	Yes
Eng. T. Years	218	11.15	138	12.57	-1.42	1.15	No
Eng. T. Degree	223	2.37	142	2.21	0.16	2.67	Yes
Curriculum	249	2.88	147	2.86	0.02	0.22	No

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In the case of blacks, four of the seventeen variables show a
statistically significant difference; income, father's education, English
teacher's race, and English teacher's degree. In none of the four
instances, however, do the differences appear to be large enough to be
of practical significance. Both the "answer" and "no answer" groups
fall within the same $3,000 to $3,999 income category; both have fathers
with an approximately eighth grade education; and both have teachers with
just slightly more than a bachelors degree. In the case of English
teacher's race, the "no answer" group was only somewhat more likely to
have a white teacher than was the "answer" group.

A general conclusion for both whites and blacks is that despite
the high non-response rate on reading achievement this non-response
appears to be relatively random and should introduce very little bias
into the results.

Curriculum

A third criticism of the Coleman Report was that the curriculum of the student should have been controlled. Bowles and Levin (1968 a and b) contend that selection of standardized verbal ability test scores as the criterion of educational achievement operates to over-state the effects of family background and understate the effects of school. The argument is that this criterion gives an advantage to students enrolled in college preparatory courses since this category of student takes courses which concentrate on development of these kinds of skills and the college preparatory courses are overloaded with advantaged students. Disadvantaged students and blacks, on the other hand, are more likely to be enrolled in vocational type curricula (Folger and Nam, 1967; Rhodes, 1968). Since these courses may require more in the way of school facilities (machinery, welding equipment, modern typewriter, etc.), school effects (particularly as indicated by presence or absence of specially trained teachers and special equipment) might be more important. While data are not available to adequately test this notion, this study will make use of information on subject's curriculum as a constant statistical control. Information on the type of curriculum in which a student is enrolled was available from the principal's form (CPS-555). Each of the principals was asked the following question: "In which type of curriculum is (or was) this pupil enrolled?" Four different curricula are available, weighted from the least to the most academically oriented.

01 - agricultural and vocational

02 - commercial

03 - general - Those students not assigned a

curriculum were placed in the

"general" category

04 - college prepartory

The background variables

A fourth criticism of the Coleman Report is that its family background characteristics are too limited. The charge seems somewhat unfair, since responses to 26 different items were included in the composite background measure (Coleman, et. al, 1965: p. 298). However, the Coleman Report may have faced certain restrictions on the kinds of data that are obtainable from school-age children. For example, children may not have sufficient knowledge about family income, parent's educational. attainment, or father's occupation to accurately report this information in a questionnaire. Critics are particularly uneasy with use of parent's educational attainment as the primary indicator of socioeconomic status. In the case of blacks they say that occupational and income levels should have been used as additional indicators (Bowles and Levin, 1968). The quality of such data in the present study may be superior to that in the Coleman study because family background information was obtained by interview and through a questionnaire from an adult member of the student's family. On the other hand, fewer background items are available. Five family background measures: family income; head of household's occupation; mother's education; mother's values as to how to get ahead; and father's education are included in the analysis. Each is briefly described below.

Occupation

Only a gross classification of occupation of household head was provided on the U. S. Bureau of the Census work tape. (One person is designated as "head" in each household; it is usually the persons regarded as head by members of the group and married women are not classified as head if living with their husband; U.S.B.C., U.S. Summary, 1964, p. LVI). The categories of occupation given on the work tape were: "unemployed and not in the labor force," "farm," "manual or service," and "white collar." (The labor force includes unemployed persons who are looking for work but excludes housewives, those who are not seeking work and persons who cannot work because of physical and mental disability.) White collar occupations include those in the major census occupational groupings of professional, technical and kindred workers, managers, officials and proprietors (excluding farm managers), sales workers, and clerical and kindred workers. (U.S.B.C., U. S. Summary, 1964, p. LXVII). Manual and service workers includes all the other nonfarm occupations. Occupation of head of household was obtained as part of the regular CPS household interview so the nonresponse was very low (1.4 percent). About one-third of the subjects come from households in which the head has a white-collar occupation; 46 percent are from households where the head has a manual or service occupation. Ten percent of the subjects come from homes in which the head is unemployed or not in the labor force, and six percent are from households in which the head has a farm occupation. For the purposes of this study, the occupations are scored from one to four with the "white collar" category having the largest value and "unemployed" has the lowest value.

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Mother's education

Mother's education was obtained as part of the regular CPS interview in the household. The item asks: "What is the highest grade (or year) of regular school _____ has ever attended?" "Did _____ finish this grade (year)?" Responses were coded into nine categories: no school or only kindergarten; first through the fourth grade; fifth through the seventh grade; eighth grade; ninth through the eleventh grade; twelvth grade; college, one to three years; college, four years; and college, graduate school. Non-response on this item was only 3.6 percent.

Mother's values

Mother's value of a college education as a success means was obtained by a single item on the "leave-behind" questionnaire (Form CPS-553). The item is, "According to your OPINION, which one of these is THE BEST way for young people to get ahead in life? All of these may help but check only the one which you think is best." The six available responses were recorded into a dichotomy of those mothers who thought a college education was the best way to get ahead and those mothers who checked another means. Sixty-one percent of the subjects had mothers who indicated that obtaining a college education was the best way for young people to get ahead. The remaining cases were mothers who indicated some other best way plus five percent who did not respond.

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Family income

Family income is the algebraic sum of money income received from wages or salary, or from self employment, or other sources (such as interest, pensions, rent, alimony, unemployment benefits, etc.) by all persons over age 14 in the family. It should be noted that there are slight differences between definitions of income used by the CPS and the decennial census because the CPS interview uses more questions to get details about income. Since income is also obtained as part of the regular CPS interview, the non-response rate is 7.7 percent. Income was coded into eleven categories: less than $1,000; 1,000 to 1,999; 2,000 to 2,999; 3,000 to 3,999; 4,000 to 4,999; 5,000 to 5,999; 6,000 to 7,499; 7,500 to 9,999; 10,000 to 14,999; 15,000 to 24,999; and 25,000 or more.

Father's education

The extent of a child's father's education was obtained from the mother's "leave-behind" questionnaire (Form CPS-553). The item asked for each child: "What is the HIGHEST grade or year of school completed by the father of this child?" The response categories were: never attended school; less than eighth grade; completed eighth grade; went to high school but didn't finish; finish high school; went to college but didn't finish; graduated from college; post-graduate college work. The nonresponse on this item was approximately 6.6 percent. Responses were coded into these eight categories.

The student body variables

Four student body characteristics will be used in this study. All four are based on estimates of these characteristics by principals obtained from Form CPS-554. Three of these variables (mean school I.Q., percent of student body in a college preparatory curriculum, and percent of the student body behind in reading) serve as direct indicators of the academic status of the student body, while the fourth variable (percent of the student body who have a father (or guardian) who is a white collar worker) is a direct indicator of the socioeconomic status of the student body. With the obvious exception of mean school I.Q., which requests a specific figure, these variables are described in percentages. Having been obtained through the principal of the school in which the student is enrolled, all of these variables exhibit a high nonresponse rate (since 30 percent of the forms were not returned).

The teacher variables

Characteristics of the teachers to which a student has been exposed are measured along six variables. Three of these (percent of a school's teachers who have a master's degree; percent of the school's teachers who are male; and percent of a school's teachers who are in their first year of teaching) represent characteristics of a school's teachers as a group, while three (race of pupil's English teacher; highest degree of pupil's English teacher; and his English teacher's years as a teacher) represent characteristics of the pupil's English teacher. While the English teacher should be particularly relevant

for the student's reading ability, it was also selected because English is the only subject taken by all secondary school pupils at all levels. As in the case of the student variables, information on the characteristics of the teachers was also obtained from the principal (Form CPS-554 and Form CPS-555). Consequently, the teacher variables also have the high non-response rate noted for the student body variables. The three aggregate teacher variables are all measured in percentages. English teacher's race is coded as a dichotomous variable according to whether the teacher is white or black. English teacher's years as a teacher is a discrete variable coded from "less than a year (00)" to 50 years. Finally, English teacher's highest degree is coded in five categories: less than a B.A., B.A., M.A., M.A. plus 30 hours; and Ph.D.

The control variables

As was noted in the introduction to this study, the analysis will be carried out separately for whites and blacks. Within these racial groups, separate analyses will also be carried out for subgroups created by cross-classification of region (North-South) and type of place (metropolitan-non-metropolitan). In addition, separate analyses will be accomplished by racial group according to grade in which the pupil is enrolled. The racial, residential, and grade variables are each briefly described below.

Race

Race is measured according to the U. S. Bureau of the Census practice of having the members of the household classify themselves as

being Negro or in some other category of race or color (U. S. Census

of Population: 1960, Volume I, Characteristics of the Population:

XLI-XLII). The analyses in this study simply distinguish between

Negroes and non-Negroes. The latter category is referred to as

"whites" since less than one percent of the sample are American Indians,

Chinese, Japanese, or some other color group. The CPS sample used here

contains a slightly higher proportion of blacks than the 1960 population

of enrollees; 12.3 percent versus 11 percent (U.S.B.C., School Enrollment,

1963). Race was obtained by the CPS interviewer. There was complete

response to this variable.

Region and size of place

The Coleman study found that the educational achievement of students

varied according to their place of residence as did the relationship of

background and school variables to achievement. In keeping with the

Coleman Report, cases were divided according to whether they lived in

the South or North (everywhere but the South) and according to the size

of place in which they lived. In the latter instance, three locations

were originally available: residence in the central city of an SMSA

(Standard Metropolitan Statistical Area); in the SMSA but not in the

central city (i.e. in the ring); and not in an SMSA. Again, following

the lead of the Coleman Report, the first two categories (i.e. central

city and ring) were combined to form what is called "metropolitan,"

while "not in an SMSA" was redesignated as "nonmetropolitan." Finally,

analyses were also carried out according to region and size of place
combined (e.g. North-metropolitan, South-nonmetropolitan, etc.). Region
and size of place are known for everyone.

Form of Analysis

Bivariate analysis

The first part of the analysis will be concerned with relation-
ships between each of the three groups of independent variables (i.e.
background, student body, and teacher characteristics) and the dependent
variable, reading achievement. In addition, the relationship between
the control variable, "type of curriculum in which student is enrolled,"
and reading achievement is also considered. Each of the three groups of
independent variables is composed of several variables which, taken
together, are perceived as measuring either different background, student
body, or teacher environments. A factor analysis indicated that the
variables for each group do indeed hang together.

All of the variables in this study are treated as if at an
interval level of measurement or dichotomous. The statistic used to
indicate the strength of each of the independent-dependent variable
relationships is the squared multiple correlation coefficient, R^2
(Blalock, 1960, pp. 346-351). R^2 may be interpreted as showing the
amount of variation in the dependent variable that is explained by the
linear regression of the dependent variable on a number of independent
variables. Each of the independent-dependent variable relationships is
tested for significance using the F-test.

Missing data or non-response on specific variables

A further criticism of the Coleman Report has emerged from its
high non-response rate on particular questionnaire items and its subse-
quent treatment of these "no-answers" and "don't knows." Bowles and

Levin (1968) say there is definite evidence that the missing items were
not randomly distributed. Their analysis shows that the achievement
scores of non-respondents on particular items were significantly below
the means of the respondents, with few exceptions. There was also a
large non-response on parent's education; one of the few indicators of
socioeconomic status of the student's family. In addition, Bowles and
Levin contend that the Report's method of assigning the item nonresponses
to the arithmetic means of the responses is "an ingenious treatment which
has probably created severe measurement errors in the data" (p. 6-7).
The nonresponse on specific items in this study, it will be remembered,
was low for the variables obtained by the CPS interviewer and from the
"leave-behind" questionnaire. The nonresponses on particular student
body and teacher variables, however, were all in the vicinity of 35
percent. Most of this non-response is due to nonresponse by about 30
percent of the principals. Very little of it is due to the principals
leaving blank a particular item. And, as shown earlier, the principal
non-response generally appears to be relatively random.

Initially, much thought was given in this study to the possibility
of assigning values to the various independent variables. Three different
methods for assigning values to nonrespondents were employed and the results
were similar for each method. Finally, it was decided to just exclude non-
responses since a variable by variable comparison, similar to those pre-
viously discussed, indicated very little difference between the respondents
and nonrespondents on particular items. Each variable was divided into

respondents and nonrespondents and then comparisons were made along
the other variables in the study using a two independent samples t-test
of the differences between the groups means and a significance level of
.01. Consequently, it is felt that the item nonresponse should intro-
duce very little, if any, bias into the analysis. The possibility of
assigning values was still considered for the purpose of keeping the
sample size as large as possible. First, values were assigned to the
means or mode and, secondly, they were assigned randomly. A regression
technique for assigning values for missing data was considered also but
never actually accomplished. In each instance, those persons for whom
a reading score was unavailable were first eliminated. Within each of
the samples created above the correlations of all relevant pairs were
obtained. Similar correlations were obtained for a sample where every
person with even one nonresponse was eliminated, and for a sample
utilizing all possible pairs of observations where information was
available for each member of the pair. Comparisons of these four
samples revealed surprisingly little difference in the correlations
between variable pairs.

The final decision, however, was not to use a sample where values
for missing data were assigned. The apparent lack of bias in the item
non-response and the ever-present possibility of creating measurement
error in the data or artifactually high or low correlations prompted
this decision. Wanting to make the most efficient use of that data which
was available, however, the analysis of relationships was carried out
using all possible pairs of variables for cases in the sample where
information was available for each pair of items for each case.

Multivariate analysis

The second part of the analysis is concerned with ascertaining the relative contributions to explained variance in reading skill of each of the three groups of independent variables. The approach to be used is multiple regression analysis. Conceptually, the variation in a dependent variable can be separated into three parts; (1) that which can be attributed to the regressor variables individually (the unique explained variation), (2) that which can be attributed to the regressor variables as a group (the shared explained variation), and (3) the residual variation which is unexplained by the regression (the error). Together, the first two parts comprise the total variation explained by the regression. For each of the three groups of independent variables, its "unique effect" $\left[U_{(i)} \text{ (where i is the variable name)} \right]$ will be calculated. $U_{(i)}$, often referred to as the unique R^2 or marginal R^2 (Wisler, 1960), is the measure of the effect of adding a given variable to a regression equation after all the other variables have been entered. Mathematically, this can be represented as $U_{(i)} = R^2_{0(ijk)} - R^2_{0(jk)}$; where 0 indicates the dependent variable and i, j, k denote the independent variables. $R^2_{0(ijk)}$ and $R^2_{0(jk)}$ consequently indicate the square of the multiple correlation between the two.

The unique R^2 is also interpretable as the squared <u>part</u> correlation coefficient. That is, the unique effect of a variable $U_{(i)}$ can be seen as its effects on a given dependent variable after having controlled for the effects on $U_{(i)}$ of all the other variables in the equation (Wisler, 1960). Mathematically, this can be expressed as $U_{(i)} = r^2_{0(i \cdot jk)}$ where 0 and i, j, k again respectively represent the dependent and independent

variables. $r^2_{0(i \cdot jk)}$ then represents the square of correlation between the dependent variable 0 and the independent variable i after having first removed from i the effects of j and k.

The above measure can be directly extended to two or more variables, as was done in this study, in that $R^2_{0(ijk)} - R^2_{0(k)}$ is a measure of the effect of adding variables $x_{(i)}$ and $x_{(j)}$ to the regression already containing k. More specifically, for example, in a three variable regression composed of variables i, j, and k, the unique effect of variables i and j is the amount of variation in the dependent variable explained by i and j beyond the amount explained by k. Comparing the unique effects of the three groups of predictor variables in this study, and, thus, their effects when entered into the regression equation last (after type of curriculum and the two other variable groups), is one method for determining the relative importance of each of these variables (in terms of explanatory power) for educational achievement.

Each of these relationships is tested for significance using an F-test. The test here determines whether the additional reduction in unexplained sums of squares resulting from introducing a particular independent variable (or variables in this instance) into the regression problem is significant. For example, to determine if an independent variable $X_{(i)}$ gives information about an independent variable 0 which is not given by an independent variable $X_{(j)}$, the regression is first partitioned into two parts (Steel and Torrie, 1960: 287):

(1) The sum of squares explained by $X_{(i)}$ alone.

$$R^2{}_{0(i)} \Sigma_0{}^2 \qquad df = k \quad \text{(k equals the number of variables}$$

associated with i)

The above formula indicates that the sums of squares explained by $X_{(i)}$ is determined by multiplying the square of the multiple correlation $R^2{}_{0(i)}$ times the total sums of squares $\Sigma_0{}^2$.

(2) The additional reduction in unexplained sums of squares due to the addition of $X_{(j)}$ to the regression

$$R^2{}_{0(ij)} \Sigma_0{}^2 - R^2{}_{0(i)} \Sigma_0{}^2 \qquad df = k' \quad \text{(k' equals the number of}$$

variables associated with j)

The test of significance is then:

$$F = \frac{\text{additional reduction mean square}}{\text{residual mean square}} \qquad df = k' \text{ and } n-(k + k') - 1$$

(n equals the sample size)

The "additional reduction mean square" is obtained by dividing the answer obtained in (2) by the correct degrees of freedom. The "residual mean square" is $\Sigma_0{}^2 - R^2{}_{0(ij)} \Sigma_0{}^2$ divided by $n - (k + k') - 1$ degrees of freedom.

The problem of multicollinearity

One of the criticism further leveled by Bowles and Levin against the Coleman Report is that the use of multiple regression analysis to determine the amount of variance in achievement uniquely explained by the different variables has systematically inflated the importance of background variables and consistently underestimated the role of school

resources (1968, p. 15-16). This is a reference to a problem that has long been recognized in the econometrics literature under the label of "multicollinearity." 'or a full discussion of this problem see Blalock (1963), Gordon (1968), and Farrar and Glauber (1967). It arises when some or all of the explanatory (i.e. independent) variables in a relation are so highly correlated with one another that it becomes very difficult, if not impossible, to disintangle their separate influences and obtain a reasonably precise estimate of their relative effects. It should be noted that what constitutes a "high" correlation is at best only nebulously defined.

For those who are unfamiliar with this problem, an example may be helpful. Suppose one wishes to estimate the relationship between the level of achievement, 0, and two explanatory variables, X_1 and X_2, where X_1 denotes student's background characteristics and X_2 denotes characteristics of their schools. The method of the Coleman study is to first determine the amount of variance in 0 that can be explained statistically by X_1, and then to determine the amount of variation in 0 that can be explained by both X_1 and X_2. The increment in explained variance resulting from the addition of X_2 to the explanatory equation is the measure used in the report for the unique effect of that variable on 0. If, for example, X_1 explained 20 percent of the variance in 0 and X_1 and X_2 together explained 30 percent, then the difference of ten percent is considered the measure of the unique effect of X_2 on 0. If X_1 and X_2 are completely independent of one another then the use of addition to the proportion of variance explained as a measure of the unique

explanatory value of the two variables is not objectionable. However:

When the explanatory variables X_1 and X_2 are

highly correlated with each other, as are the background

characteristics of students and the characteristics of

the schools that they attend, the addition to the pro-

portion of variance in achievement that each will explain

is dependent on the order in which each is entered into

the regression equation. By being related to each other,

X_1 and X_2 share a certain amount of explanatory power

which is common to both of them. The shared portion of

variance in achievement which could be accounted for by

either X_1 or X_2 will always be attributed to that vari-

able which is entered into the regression first.

Accordingly, the explanatory value of the first variable

will be overstated and that of the second variable under-

stated (Bowles and Levin, 1968, pp. 14-15).

What Bowles and Levin are saying is that it is highly probable that a

relatively high correlation of family background characteristics with

school characteristics, compounded by the entering of background into

the regression equation first has led to an overestimation of the

explanatory power of the former and an underestimation of the explanatory

power of the latter. Bowles and Levin also note that this is a more

general problem than just the high correlation of background and school

variables; thus, a relatively large or small unique contribution for a

particular variable is a measure of both its effect on achievement and the degree to which it is independent of the other variables in the analysis (p. 16).

Like the Coleman Report, this study also uses the increment in explaining variance resulting from the addition of variables. There is evidence, however, that the multicollinearity among the variables in this study are less than was true for the Coleman study. According to Bowles and Levin (1968b, p. 395):

> Probably the best over-all test for the presence of multicollinearity is the magnitude of the determinant of the zero-order correlation matrix (1X ' X1). The condition under which the increase in the proportion of variance explained by a variable is invariant with regard to the order in which it is introduced is that 1X ' X1 be equal to unity; that is, when perfect orthoganality exists. Where 1X ' X1 is equal to zero, the problem of multicollinearity is so serious that the estimates of the regression coefficients are completely indeterminate.

When all of the school facilities, teacher characteristics, and student background characteristics used in the Coleman Report are included in the regression, Bowles and Levin report (1968b: 395) that the determinant of blacks in the twelvth grade, for example, is .0005 while for similarly situated whites it is .0032; an indication they say of severe multicollinearity in the Coleman Report data. In the present study, on the

other hand, when all 16 background, teacher, and student body char-
acteristics, as well as type of curriculum are entered in the regression
scheme, the determinants are still substantially larger than those found
in the Coleman Report being .0492 for blacks and .0852 for whites. This
is one indication of somewhat less multicollinearity in the data being
used in this study. See Appendix B for further discussion of multicol-
linearity.

The utilization of "unique" variance explained, in conjunction
with not entering background into the regression before looking at the
effects of other variable groups is the biggest improvement over the
Coleman Report and serves to reduce the problem of multicollinearity to
a minimum. By using the unique variance explained, the effects observed
are those resulting from entering each variable, including background,
into the regression last, i.e. after all the other variables in the study.
Consequently, the variance explained is only that which is attributable
solely to each variable. There is no problem with the "commonly" explained
variance for it is not attributed to any of the variables.

The precision of measurement

Another whole problem is the extent of precision with which the
variables are measured. For the sake of simplicity, it is assumed that
variables are equally well measured in the present study. However, it
is quite likely that they are not. It is hoped that employing groups
of measures (e.g. education and occupation, etc.) rather than relying on

any single indicator should serve to reduce but not eliminate this
problem. Unfortunately, there are no corroborative data to test this
assumption. Although the generally high quality of recurrent items
in the CPS data is well known (U.S.B.C., 1963), there is no standard
against which validity and reliability of principal's responses can
be measured. Other sources of data either depend upon report from
principals or upon other measures used by the investigator. Unfortu-
nately, no study has used both types of measures.

In the following chapter, the results of the analyses are
presented.

CHAPTER IV

THE ANALYSIS

This chapter is divided into four sections, three of which are followed by a short summary. The first section discusses the relationships between the dependent variable, reading achievement, and each of the three groups of independent variables: indicators of student's family background; indicators of student body composition; and indicators of characteristics of the student's teachers. The second section examines the relationship between the type of curriculum in which the student is enrolled and his reading achievement. The third section shows the extent to which the relationships between reading achievement and each of the three independent variable groups is independent of the effects of curriculum. Finally, the fourth section examines the unique contribution of each of the independent variable groups towards explaining the variation in reading achievement. This is calculated by removing from an independent variable group the joint effects with the remaining two groups of independent variables and curriculum. All of the analyses are carried out separately for whites and blacks. Further analyses are accomplished for subgroups described by race, region of residence, and metropolitan versus nonmetropolitan residence. Differential effects of the three types of independent variables on reading achievement of students within each of these race-residence subgroups will be set forth at each stage of the analysis.

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The relationship of family background, student-body, and teacher characteristics to reading achievement; by race, region of residence, and type of place of residence

The percent of explained variance in student's reading achievement scores was calculated for each collection of family background, student-body, and teacher characteristics. This was done separately for both blacks and whites. Residence is added as a control so that within the two racial groups these relationships are also shown by region only (North-South), type of place only (metropolitan-nonmetropolitan), and by both region and type of place (North-metropolitan, etc.). All of these relationships are shown in Table 10.

TABLE 10

THE PERCENT OF VARIATION IN READING ACHIEVEMENT SCORES (R^2) EXPLAINED BY FAMILY BACKGROUND, STUDENT BODY, AND TEACHER CHARACTERISTICS; BY RACE, REGION OF RESIDENCE, AND TYPE OF PLACE OF RESIDENCE

Characteristics and Region of Residence	Race and Type of Residence					
	All Cases[a]		Metropolitan		Nonmetropolitan	
	Whites	Blacks	Whites	Blacks	Whites	Blacks
All Characteristics	15.1[b]	17.5	14.9	17.4	14.1	24.0
North	14.3	15.9	14.3	12.9	15.4	–
South	15.1	15.2	18.5	23.9	13.8	11.1
Family Background	13.2	5.4	12.7	5.1	12.6	4.9
North	12.6	5.5[c]	12.4	5.2[e]	13.3	–
South	12.6	2.8[d]	14.6	5.3[d]	9.6	2.4[e]
Student Body	6.8	14.2	7.2	14.3	4.0	23.0
North	5.7	11.9	6.7	9.8	2.0	–
South	8.1	15.2	7.8	20.0	8.9	15.9
Teachers	1.6	6.5	1.5	5.3	2.0	10.6
North	1.0	3.9[e]	.9	2.8[e]	1.9	–
South	3.2	4.6[c]	4.9	11.2	2.6	6.1[c]

TABLE 10 Continued

[a]The sample sizes are:

	Blacks (251)	Whites (2928)
North	124	2264
South	127	664
Metropolitan	161	1945
Nonmetropolitan	90	983
North-metropolitan	112	1620
North-nonmetropolitan	12	644
South-metropolitan	49	325
South-nonmetropolitan	78	339

[b]Those values not lettered are significant at the .001 level. All of the values in this table are corrected for the degrees of of freedom using the following formula (Kendall and Stuart, 1967, p. 342).

$$\overline{R}^2 = R^2 - \left(\frac{k-3}{t-k}\right)(1-R^2)$$

k = number of regressors
t = number of observations

[c]Significant at the .01 level

[d]Significant at the .05 level

[e]Insignificant

It can be seen in Table 10 that with four exceptions each of the variable groups exhibit a positive and statistically significant relationship to reading achievement. This is true for blacks as well as whites. The relationships hold within each residential category.

Looking at the results for all cases, it is easily seen that family background characteristics explain the largest amount of the variation (13.2 percent) in the reading achievement of whites. Student body composition has less explanatory power (6.8 percent of the variation) than family background, but it contributes more to explained variation than characteristics of the subject's teachers. The latter has a negligible relation to subject's reading skill; only 1.6 percent of the variance is

explained by this group of variables. However, all three of these

relationships are statistically significant (F-test; p less than .001).

This pattern observed for whites is not reflected in the results

blacks. Student-body characteristics contribute most to explained vari-

ation in reading skill of blacks (14.2 percent). Next in importance is

the group of teacher characteristics which account for 6.5 percent of

the variation. Hence, student-body characteristics explain somewhat

more than twice the amount of variation explained by teacher's charact-

eristics in the case of blacks. Family background explains only 5.4

percent of the variation in black's reading achievement (the least amount

of the three variable groups). The observation that student-body and

and teacher characteristics are more important for blacks than family

background (while the reverse is true for whites) is in agreement with

the Coleman Report's conclusion that the achievement of blacks is more

"sensitive" than that of whites to the school environment.

In all the locational categories, family background characteris-

tics consistently account for approximately 12 to 14 percent of the varia-

tion in the reading achievement scores of whites. The one exception is in

the metropolitan South where this factor explains only 9.6 percent of the

variation. In terms of explanatory power, student-body characteristics

remain the second most important of the three variable groups for whites.

It explains 8.1 percent of the variation for those in the South and 5.7

percent for those in the North. The larger explanatory power of this

variable for Southerners holds true for both metropolitan (7.8 to 6.7

percent) and nonmetropolitan residence (8.9 to 2.0 percent). Teacher

characteristics are also more important for whites living in the South
rather than the North (3.2 as opposed to 1.0 percent) in terms of explained
variation. This again holds true whether the type of place in which the
person lives is metropolitan (4.9 to .9 percent) or nonmetropolitan (2.6
to 2.2 percent). It is also true that regardless of region or type of
place, this factor explains very little of the variation in the reading
achievement of whites.

Student-body characteristics account for more of the variation
in the reading achievement of blacks than either of the other two variable
groups regardless of location. It explains somewhat more of the variation
for blacks in the South (15.2 percent) than in the North (11.9 percent).
This is also true for metropolitan areas with this factor explaining
twice as much variation for blacks in the metropolitan South (20.0 percent)
as for blacks in the metropolitan North (9.8 percent). While a comparison
is not possible, the fact that student body characteristics explain more
than 23 percent of the variation in the reading achievement for all non-
metropolitan blacks and only 16 percent of variation in reading achievement
of blacks in the nonmetropolitan South leads one to suspect that had the
cases been available for the nonmetropolitan North, the amount of variation
explained could have been greater than 16 percent.

In both the North and South, teacher characteristics explain
about 4 to 5 percent of the variation in the reading achievement of
blacks. For those living in the North, however, the correlation is
statistically insignificant. This is true also in the metropolitan

North. In the metropolitan South, teacher characteristics explain a comparatively large 11.2 percent of the variation. In the nonmetropolitan South, this factor accounts for 6.1 percent of the variation.

With explanatory powers similar to teacher characteristics, family background explains more of the variation of those blacks living in the North (5.5 percent) than in the South (2.8 percent). Within the metropolitan areas of the North and South, however, the numerical difference (5.2 to 5.3 percent) is for all intents and purposes nonexistent. Statistically, this factor is not significant for blacks in the metropolitan North. This lack of statistical significance is also observed in the case of the nonmetropolitan South where family background explains only 2.4 percent of the variation in reading achievement.

While student-body characteristics clearly explain more of the variation in blacks' reading achievement than either teacher characteristics or characteristics of family, neither of the latter two is clearly more important than the other in terms of explanatory power. In the North, family background explains a slightly greater percentage (5.5 versus 3.9 percent), while in the South the reverse is true (4.6 versus 2.8 percent). In the metropolitan areas a similar situation exists. Teacher characteristics explain more of the variation in the reading achievement of blacks in the South (11.2 to 5.3 percent) while family background does so for blacks in the North (5.2 versus 2.8 percent). Both are statistically significant, however, in the latter instance. In the nonmetropolitan South, teacher characteristic explains 6.1 percent of the variation while family background explains a statistically

insignificant 2.4 percent. In general, therefore, teacher characteristics and family background characteristics appear to be about equally less important (in terms of explanatory power) for the reading achievement of blacks.

The combined effects of family background, student—body, and teacher characteristics on reading achievement; by race, region of residence, and type of place of residence

For whites, the total variation in reading achievement explained by the three variable groups taken together is about 15 percent. This remains true regardless of residence. The one exception to this is for whites living in the metropolitan South where the total variation explained is 18.5 percent.

Blacks present a more varied picture. Overall, the total variation explained by the three independent variable groups is 17.5 percent. There is little difference by region of residence in the amount of variation explained by the three variable groups together; with the percentages being 15.9 for the North and 15.2 for the South. For blacks living in the metropolitan South, however, the total explained variation (23.9 percent) is substantially larger than that for blacks in the metropolitan North (12.9 percent). These three variable groups account for 11.1 percent of the variation in reading achievement for blacks in the South in nonmetropolitan areas. Even though all the independent variables together only account for about one-sixth of the total variation in reading skill, this is consistent with the results of other similar studies (Coleman, 1966: 294, Robert M. Hauser, 1968: 172, Coleman, 1972: 159).

Summary

In sum, the results noted in Table 10 lend substantial support to the first three hypotheses that each of the factors of family background, student body, and teacher characteristics are significantly and positively correlated, as measured in this study, to reading skill. For whites, however, teacher characteristics appear to be of little practical significance. The strengths of the two-variable relationships were in the expected direction for whites. Family background explained more of the variation than any of the other variable groups; and this was true across all residential categories. Similarly, characteristics of the student body were more important than teacher characteristics in explaining reading achievement scores. Compared to background, however, these latter two factors explain substantially less of the variation for whites.

The case is somewhat different for blacks. Characteristics of the student body are the most important of the three variable groups in explaining reading achievement. Teacher and background factors are of about equal importance. However, there is some difference: teacher characteristics appear to explain more of the variation for those living in the South while family background does so for those living in the North.

While these are just the simple relationships, they do give some basis for expecting the fourth hypothesis (concerning unique effects) to be supported for whites but not for blacks. It seems highly probable that student-body characteristics will remain the most important factor for explaining the reading achievement of blacks even after account has been taken of explained variance shared with other variable groups. In

the case of blacks, it is possible that family background may even emerge

as the least important of the three variable groups. The findings that

blacks appear to be more "sensitive" than whites to the school environ-

ment is quite in agreement with the Coleman Report.

The relationship of type of curriculum in which a student is enrolled with reading achievement; by race, region of residence, and type of place of residence

One of the criticisms of the Coleman Report was that the effects

of curriculum in which the student was enrolled had not been controlled

(Bowles and Levin, 1968). The argument was that those students enrolled

in a college preparatory curriculum were better prepared and consequently

more likely to do well on the type of achievement test used. Since

standardized reading scores were used as a measure of achievement, and

since type of curriculum in which a student is enrolled was available in

the data, it was used in the analysis. First, however, analysis of rela-

tionships of a student's curriculum with his reading scores were carried

out for blacks and for whites. The results of this analysis are shown

in Table 11.

Each of the two-variable relationships between type of curriculum

and reading achievement found in Table 11 was statistically significant

at the .001 level and positive. Those enrolled in either agricultural

or vocational type of curricula were least likely to do well on standard-

ized reading test and those enrolled in a college preparatory curriculum

were most likely to do well. In terms of the amount of variation explained,

type of curriculum was substantially more important for whites than blacks.

TABLE 11

THE PERCENT OF VARIATION IN READING ACHIEVEMENT SCORES (R^2) EXPLAINED
BY TYPE OF CURRICULUM IN WHICH A STUDENT IS ENROLLED; BY RACE, REGION
OF RESIDENCE, AND TYPE OF PLACE OF RESIDENCE

Residence	Curriculum Only[b]		Curriculum + 3 Variable Groups	
	Whites	Blacks	Whites	Blacks
All Cases[a]	13.4[c]	4.9	21.6	23.9
Region				
North	13.8	8.6	21.5	28.9
South	10.8	7.7	20.2	22.7
Type of Place				
Metropolitan	15.7	5.8	23.4	26.3
Nonmetropolitan	7.9	4.3	7.7	33.8
Region and Type of Place				
North metropolitan	15.9	7.4	23.5	25.7
North nonmetropolitan	8.5	-	19.4	-
South metropolitan	14.4	9.2	25.2	34.5
South nonmetropolitan	7.0	6.4	18.0	26.8

[a]The sample sizes may be found in Table 10.

[b]Curriculum values have not been corrected for degrees of freedom.

[c]All of the values in this table are significant at the .001 level.

For whites as a group, this variable accounts for approximately
13.4 percent of the variation. Within regions, this variable explains
13.8 percent of the variation for those living in the North and 10.9 per-
cent for those living in the South. Similarly, curriculum explains more
of the variation for those living in the metropolitan areas of both
regions.

For blacks as a group, curriculum accounts for 4.9 percent of the variation in reading achievement. This factor differs only slightly by region explaining 8.6 percent for blacks in the North and 7.7 percent for blacks in the South. Curriculum explains slightly more of the variation in reading scores of metropolitan blacks than that of nonmetropolitan blacks (5.8 versus 4.3 percent). By region and type of place, this factor explains more of the variation for blacks in the metropolitan South (9.2 percent) than in the nonmetropolitan South (6.4 percent). For blacks in the metropolitan North, curriculum type explains 7.4 percent.

The inclusion of curriculum with the three independent variable groups adds substantially to the percent of explained variation in reading skill. If the top three rows of Table 10 are compared with the values found in the two right-hand columns of Table 11, it is apparent that curriculum type adds about six percent in the case of whites and blacks to the explained variation.

Curriculum adds more to total variation explained in the case of whites living in the North, particularly those living in the metropolitan North. In the case of blacks, the effects of adding curriculum to the explanatory system are more apparent for Northern blacks and those living in nonmetropolitan areas of the South. It is in this subgroup that the other three groups of explanatory variables add least to explained variation in reading.

Given the significant relationships found to exist between the type of curriculum in which a student is enrolled and reading achievement

scores, the relationships of each of the three variable groups were

analyzed a second time after removing the effects of curriculum type on

each of the independent variable groups.

The relationship of family background, student-body, and teacher characteristics to reading achievement with the type of curriculum in which a student is enrolled controlled; by race, region of residence, and type of place of residence

Curriculum is controlled by entering it into the regression model

first and then observing how much each of the other three variable groups

add to its explanatory power. The effects of controlling for type of cur-

riculum on the relationships of each of the three variable groups to reading

achievement are shown in Tables 12 and 13.

The general effect of controlling for type of curriculum is to

halve the combined explanatory powers of the three variable groups in the

case of whites. Control for curriculum has little effect in the case of

blacks. In general, however, the patterns of relationships do not change.

There are positive and significant relationships between each of the three

variable groups and reading achievement.

As can be seen in Table 12, controlling for type of curriculum in

which a student is enrolled does reduce the amount of variance accounted

for by each of the variable groups. Relative to one another, though, there

appears to be little change in the ability of each of the independent vari-

able groups to explain variation in reading achievement. For whites, as

was true without any controls, family background still explains more of

the variation in reading with curriculum effects removed than either of

TABLE 12

THE PERCENT OF VARIATION IN READING ACHIEVEMENT SCORES (R^2) EXPLAINED BY FAMILY BACKGROUND, STUDENT BODY, AND TEACHER CHARACTERISTICS WITH THE EFFECTS OF TYPE OF CURRICULUM REMOVED; BY RACE, REGION OF RESIDENCE, AND TYPE OF PLACE OF RESIDENCE

Characteristics and Region of Residence	Race and Type of Place of Residence					
	All Cases[a]		Metropolitan		Nonmetropolitan	
	Whites	Blacks	Whites	Blacks	Whites	Blacks
All Characteristics	7.9[b]	17.6	7.3	17.0	9.3	26.1
North	7.5	17.6	7.2	13.4	10.0	—
South	8.5	12.5	9.0	19.7	9.5	12.9
Family Background	7.0	4.3	6.2	3.2[c]	8.0	4.2[c]
North	6.4	3.1[e]	6.3	2.8[e]	8.1	—
South	6.8	2.1[d]	7.2	3.0[e]	6.1	2.4[e]
Student Body	3.2	13.3	3.0	14.8	2.5	23.6
North	2.5	12.5	2.8	11.2	1.1	—
South	4.3	11.7	3.1	13.6	6.5	15.6
Teachers	.6	8.2	.5	6.3	1.9	11.8
North	.3[c]	3.5[e]	.3[e]	2.3[e]	1.8	—
South	2.1	4.2	2.8	12.3	2.5	5.2[e]

[a]For the sample size refer to Table 10.

[b]The variables not lettered are significant at the .001 level. All of the values in this table have been corrected for the degrees of freedom using the formula found in Table 10.

[c]Significant at the .01 level.

[d]Significant at the .05 level.

[e]Insignificant.

the other two variable groups. Overall, this factor now accounts for 7.0 percent of the variation or 6.2 percent less than it did when curriculum was not controlled. As Table 10 indicates, family background explains about the same amount of variation regardless of whether one lives in the

TABLE 13

THE EFFECT OF CONTROLLING ON TYPE OF CURRICULUM IN WHICH STUDENT IS
ENROLLED: TABLE 10 MINUS TABLE 12

Characteristics and Region of Residence	Race and Type of Place of Residence					
	All Cases		Metropolitan		Nonmetropolitan	
	Whites	Blacks	Whites	Blacks	Whites	Blacks
All Characteristics	7.2	+0.1	7.6	0.4	4.8	+2.1
North	6.8	+1.7	7.1	+0.5	5.4	—
South	6.6	2.7	9.5	4.2	4.3	+0.8
Family Background	6.2	1.1	6.5	1.9	4.6	3.7
North	6.2	2.4	6.1	2.4	5.2	—
South	5.8	0.7	7.4	2.3	3.5	0.0
Student Body	3.6	0.9	4.2	+0.5	1.5	+0.6
North	3.2	+0.6	3.9	+1.4	0.9	—
South	3.8	+3.5	4.7	6.4	2.4	0.3
Teachers	1.0	+1.7	1.0	+1.0	0.1	+1.2
North	0.7	0.4	0.6	0.5	0.1	—
South	1.1	0.4	2.1	+1.1	0.1	0.9

North or South. With curriculum effects removed, the variance accounted

for by this factor is 6.4 percent in the North and 6.8 percent in the

South. This represents a 6.2 and 5.8 percent reduction in explained

variation as a result of controlling for the effects of curriculum (see

Table 13). Similarly, the variation explained by background remains

slightly larger for whites in the metropolitan South (7.2 percent) as

compared with whites in the metropolitan North (6.3 percent). It is

also greater for whites in the nonmetropolitan North as compared with

the nonmetropolitan South (8.1 versus 6.1 percent). These involve

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reductions of 7.4 and 3.5 percent in the metropolitan and nonmetropolitan South and 6.1 and 5.2 percent reductions in the metropolitan and nonmetropolitan North.

For whites, student-body characteristics continue to explain less of the variation in reading achievement than family background but more than teacher characteristics. This is true regardless of residence. For whites as a whole, student body now explains 3.2 percent of the variation as opposed to 6.8 percent when curriculum type was not controlled. Within regions, this factor remains more important (in terms of explanatory power) for whites in the South (4.3 percent) than in the North (2.5 percent). Without curriculum controlled, the respective values had been 8.1 and 5.7 percent. In metropolitan areas, however, there is little difference in the explanatory power of this variable whether one lives in the North (2.8 percent) or the South (3.1 percent). The same held true without curriculum controlled with the values being 6.7 and 7.8 percent. As without controls, though, student-body composition explains substantially more of the variation of whites in the nonmetropolitan South (6.5 percent) than in the nonmetropolitan North (1.1 percent). Removing the effects of curriculum from the independent variables has reduced their explanatory power by 3.9 and .9 percent in the metropolitan and nonmetropolitan North and by 4.7 and 2.4 percent in the metropolitan and nonmetropolitan South. Variance explained by student-body characteristics is no longer significant in the case of the nonmetropolitan North.

Teacher characteristics for whites account for even less of the variation in reading achievement with curriculum effects removed than they did when they were not. For whites in general, this factor now explains only .6 percent of the variation; down 1 percent from the strength of the relationship without controls. While statistically significant, it has little practical significance. As when curriculum was not controlled, this factor explains a slightly larger percentage of the variation in the reading achievement of Southern whites, regardless of metropolitan or nonmetropolitan residence. Specifically, it accounts for 2.1 percent of the variation for whites in the South and .3 percent for whites in the North. In the absence of a control for curriculum, these values had been 3.2 and 1.0 percent. In the metropolitan areas, the values are now 2.8 percent for whites in the South (4.9 percent without curriculum controlled) and .3 percent for whites in the North (.9 percent without curriculum controlled). In the nonmetropolitan areas, teacher characteristics explain 2.5 percent for those in the South and 1.8 percent for whites in the North; only a slight decrease from the 2.6 and 1.9 percent explained when curriculum type was not controlled. To sum up these results for whites, teacher characteristics remain relatively unimportant but the pattern remains the same across subgroups differentiated according to residence.

For blacks, controlling for the type of curriculum in which a student is enrolled does not change the fact that student body characteristics explain more of the variation in reading achievement than either of

the other two variable groups. As a matter of fact, there is some evidence of interaction; removing the effects of curriculum increases the effects of this factor in some residential subgroups. For blacks overall, student body characteristics now explain 13.3 percent of the variation or only slightly less than the 14.2 percent it explained when curriculum was not controlled. There is little difference in the explanatory power of this factor regardless of whether a black lives in the North (12.5 percent) or in the South (11.7 percent). When curriculum was not controlled, however, this factor had explained slightly more variation for blacks living in the South (15.2 to 11.9 percent). Removing the effects of curriculum, while reducing the explanatory power of student body characteristics in the South, slightly increased it for those in the North. Within the metropolitan areas, this factor is still more important (in terms of explained variation) for blacks in the South (13.6 percent) despite the increase from 9.8 percent to 11.2 percent of the variation accounted for by student body composition for blacks in the metropolitan North. For blacks in the nonmetropolitan South, this factor still accounts for 15.6 percent of the variation; only slightly less than 15.9 percent explained when curriculum was not controlled.

Teacher characteristics exhibit only minor differences in their explanatory power for blacks with curriculum controlled as opposed to when it was not controlled. Again, in some instances, removing the effects of curriculum has served to raise the explanatory power of this factor. One of these instances is for blacks as a group. With curriculum controlled,

teacher characteristics now account for 8.2 percent of the variation in reading achievement as opposed to 6.5 percent when curriculum effects were ignored. The differences between North and South are still small, being 3.5 and 4.2 percent (compared to 4.6 and 3.9 percent before controlling for curriculum), although this factor is now statistically insignificant in the North. Within the metropolitan areas, however, there is still a substantial difference in the explanatory power of teacher characteristics for those living in the metropolitan South rather than the metropolitan North. In the former instance, this factor now explains 12.3 percent of the variation. This is somewhat larger than the 11.2 percent explained when curriculum was not controlled. In the metropolitan North, however, this factor accounts for only 2.8 percent of the variation when the effects of curriculum are not removed and only 2.3 percent when they are (which is statistically insignificant). For blacks living in the nonmetropolitan South, controlling for curriculum reduces the explanatory power of teacher characteristics from a statistically significant 6.1 percent to a statistically insignificant 5.2 percent.

With curriculum controlled, family background accounts for 4.3 percent of the variation in the reading achievement of blacks. This is in comparison with the 5.4 percent it explained where the effects of curriculum type were ignored. As before, this factor remains slightly more important for blacks in the North (3.1 percent) as opposed to blacks in the South (2.1 percent). In the former instance, this factor is statistically insignificant. When the effects of curriculum had been ignored, the equivalent values were 5.5 percent and 2.8 percent. In the metro-

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politan areas, family background is statistically insignificant for
reading achievement whether the black live in the North (2.8 percent)
or in the South (3.0 percent). With no controls, while the relationships
with the dependent variable had been statistically significant, the
explanatory power of background was about the same for blacks in the
metropolitan North and South (5.3 and 5.2 percent). With curriculum
controlled, this factor explains an insignificant (statistically speaking)
2.4 percent of the variation; the same percentage as when the effects of
curriculum were ignored.

When the effects of the type of curriculum in which a student was
enrolled were not controlled, there were some doubts as to whether family
background or teacher characteristics were more important for blacks in
terms of explaining the variation in reading achievement. With the effects
of curriculum controlled, however, teacher characteristics are quite
obviously the more important. For blacks as a group, teacher characteris-
tics now explain 8.2 percent of the variation while family background
explains 4.3 percent. In the North, there is little difference but here
both factors are statistically insignificant. In the South, teacher
characteristics explain 4.2 percent of the variation while family back-
ground explains only 2.1 percent. In both the metropolitan North and
South family background is statistically insignificantly related to reading
achievement. The same is true for teacher characteristics for blacks in
the metropolitan North. However, there is interaction in the metropolitan
South: this factor accounts for more of the variation (12.3 percent).

While teacher characteristics explain more of the variation than

family background for blacks in the nonmetropolitan South (5.2 versus

2.4 percent), both of these figures are statistically insignificant.

The combined effects of family background, student-body, and teacher
characteristics on reading achievement with type of curriculum in which
student enrolled controlled; by race, region of residence, and type of
place of residence

Controlling for the effects of curriculum substantially reduces

the total explained variation of the three independent variable groups

taken together for whites (see Table 12). Overall, these three variable

groups now account for 7.9 percent of the variation in the reading

achievement of whites as compared to 15.1 percent explained when curriculum

effects were ignored. Similar type reductions are observed in the North

and South where the total explained variation is now 7.5 and 8.5 percent

as compared to the 14.3 and 15.1 percent when curriculum was not controlled.

In the metropolitan North, these variables now account for 7.2 percent of

the variation while in the metropolitan South the percentage accounted for

is 9.0. Previously, they had been 14.3 percent and 18.5 percent respectively.

In the nonmetropolitan North and South, all of the variables taken together

account for 10.0 percent and 9.5 percent of the variation with type of cur-

riculum controlled. This is down from 15.4 and 13.8 percent when curricu-

lum effects were not taken into account.

For blacks, there is little difference in the explanatory power of

all the variables taken together; with or without curriculum controlled.

Again, controlling for curriculum reveals an interaction effect: there is

actually a slight increase in total explained variation in some instances.

For blacks as a group, the total explained variation without curriculum controlled had been 17.5 percent. With curriculum effects removed, the equivalent value is 17.6 percent. In the North and South, all of the variables together now explain 17.6 and 12.5 percent of the variation. When curriculum was not controlled, they had explained 15.9 and 15.2 percent. In the metropolitan North, the total explained variation for blacks is now 13.4 percent as compared to 12.9 percent without curriculum controlled. In the metropolitan South, the equivalent values are 19.7 percent without effects of curriculum removed and 23.9 percent with them controlled. For blacks in the nonmetropolitan South, controlling for curriculum produces a slight increase in the total explained variation from 11.1 percent to 12.9 percent.

Summary

In summary, the results noted in Table 12 with the effects of curriculum removed tended to reaffirm what was found earlier when type of curriculum in which a student was enrolled was not controlled. That is, while controlling for curriculum tended generally, but not always, to reduce the explanatory powers of each of the variable groups, their relative ability to explain variation in reading achievement tended to remain the same as when curriculum effects were not removed.

For whites, family background effects are weakened but they still explain more of the variation in reading achievement than either of the

other two variable groups. This is true for both regions and metro-
politan-nonmetropolitan residence. Also, as in the absence of a control
for curriculum, student body characteristics explain more of the variance
than teacher characteristics in all residential categories. Interestingly
enough, of the three variable groups, controlling for curriculum tends to
reduce the explanatory power of family background substantially more than
that of the other two variable groups. One possible explanation, which
will be discussed further in the concluding chapter, is that (for whites
at least) controlling for curriculum is also a control for "I.Q." or
"ability" which tends to be related to background.

As in the absence of a control for curriculum, student body charact-
eristics still tend to explain more of the variation in reading achievement
of blacks than that explained by the other two variable groups. This is
true in all residential categories. Whereas teacher characteristics and
family background were found to be of about equal importance in terms of
explaining variation in reading achievement when curriculum was not con-
trolled, removing its effects showed teacher characteristics to be more
important in most instances. At the same time, the relationship of both
of these variables to reading achievement was found to be statistically
insignificant several times. The fact that student body and teacher
characteristics continue to explain more of the variance than family
background is continued support for the assertion that blacks tend to be
more "sensitive" than whites to the school environment. However, an
alternative explanation, and one which will be discussed further in the

concluding chapter, is that family background explains as little of
the variation in the achievement of blacks as it does due to a lack of
variation in this variable. That is, the generally poor background of
blacks prohibits this factor from explaining much of the variance,
although it could be important if the distribution of blacks on back-
ground characteristics were the same as the distribution of whites.

While the analyses carried out thus far give some indication
of the relative importance of the different variable groups, a better
indicator is the "unique" explanatory power of the independent variable
groups. In this instance, this refers to the amount of variation in
reading achievement accounted for by each of the three variable groups
when it is entered into the regression equation after all the other
variables, i.e. after the two variable groups and type of curriculum.
The results of such an analysis are shown in the following section.

The amount of variation in reading achievement uniquely explained by family background, student body, and teacher characteristics

In general, the first three hypotheses predicting a significantly
positive relationship between each of the three variable groups and reading
achievement still appears to hold true. For blacks, however, this may
not be entirely true in the case of family background. That is, while
the relationships are positive, many of them are statistically insigni-
ficant. (See Tables 14 and 15)

TABLE 14

THE PERCENT OF VARIATION IN READING ACHIEVEMENT SCORES (R^2) UNIQUELY[a]
EXPLAINED BY FAMILY BACKGROUND, STUDENT BODY, AND TEACHER
CHARACTERISTICS; BY RACE, REGION OF RESIDENCE, AND TYPE
OF PLACE OF RESIDENCE[b, c, d]

Characteristics	Race and Residence by Type of Place of Residence					
	All Cases[b]		Metropolitan		Nonmetropolitan	
	Whites	Blacks	Whites	Blacks	Whites	Blacks
Family Background	4.7[c]	1.5[d]	4.2	1.6[f]	6.0	.7[f]
North	5.0	2.4[e]	4.5	2.3[f]	7.5	-
South	3.7	.5[e]	4.6	4.4[e]	2.8	.4[f]
Student Body	1.0	7.0	1.0	9.9	.6	12.1
North	1.0	10.2	.0	9.2	.7	-
South	1.0[d]	7.6	.7[f]	5.8[d]	3.1	10.9
Teachers	.1[e]	3.7	.3[e]	3.0[d]	.7[d]	3.0[e]
North	.3[f]	3.7[e]	.2[f]	3.0[e]	1.7	-
South	.7[e]	1.6[f]	1.7[d]	2.9[f]	.7[f]	2.2[f]

[a]In determining the unique effects, the effects of the other two independent variable groups and type of curriculum have first been controlled.

[b]For the sample size refer to Table 10.

[c]The variables not lettered are significant at the .001 level. All of the values in this table have been corrected for the degrees of freedom using the formula found in Table 10.

[d]Significant at the .01 level.

[e]Significant at the .05 level.

[f]Insignificant.

TABLE 15

THE EFFECT OF CONTROLLING ON THE TWO OTHER INDEPENDENT VARIABLES IN
ADDITION TO CONTROLLING ON TYPE OF CURRICULUM IN WHICH STUDENT IS
ENROLLED: TABLE 12 MINUS TABLE 14

Characteristics and Region of Residence	Race and Type of Place of Residence					
	All Cases		Metropolitan		Nonmetropolitan	
	Whites	Blacks	Whites	Blacks	Whites	Blacks
Family Background	2.3	2.8	2.0	1.6	2.0	3.5
North	1.4	.7	1.8	.5	.6	-
South	3.1	1.6	2.6	+1.4	3.3	2.0
Student Body	2.2	6.3	2.0	4.9	1.9	11.5
North	1.5	2.3	2.8	2.0	.4	-
South	3.3	4.1	2.4	7.8	3.4	4.7
Teachers	.5	4.5	.2	3.3	1.2	8.8
North	.0	+ .2	.1	+ .7	.1	-
South	1.4	2.6	1.1	10.4	1.8	3.0

For whites, the fourth hypothesis predicting family background
to explain more of the variation in reading achievement than either of the
other two variable groups is sustained at the unique level of explanation.
This is true regardless of residential location. Overall, this factor
now explains 4.7 percent of the variation or 2.3 percent less than it
did when just curriculum was controlled. With all other variables con-
trolled, family background now explains slightly more variation for whites
in the North (5.0 percent) than for whites in the South (3.7 percent).
When just curriculum was controlled, there was essentially little dif-
ference between the regions with the percentage of variation accounted

for being 6.4 percent for the North and 6.8 percent for the South. Within the metropolitan areas, however, there is not any difference in the unique explanatory powers of family background by region. In the metropolitan North, this factor explains 4.5 percent of the variation while in the metropolitan South it accounts for 4.6 percent. This is little different from the percentages explained when just curriculum alone was controlled; the values then were 6.3 percent for the metropolitan North an 7.2 percent for the metropolitan South. At the unique level, the biggest difference is in the explanatory power of family background in the nonmetropolitan areas. In the nonmetropolitan South, this factor accounts for only 2.8 percent of the variation while in the nonmetropolitan North it explains 7.5 percent. When just curriculum had been controlled, the equivalent values had been 8.1 and 6.1 percent.

With type of curriculum and the other two variable groups removed, both student body and teacher characteristics explain no more than one percent of the variation in reading achievement of whites; with three exceptions. In the nonmetropolitan South, student body characteristics account for 3.1 percent of the variation, which is .3 of a percent more than that explained by family background in this area. Similarly, for whites living in the metropolitan South or nonmetropolitan North, teacher characteristics explain 1.7 percent of the variation. It can be seen that, although most of these relationships are statistically significant, practically speaking they explain almost none of the variation in the reading achievement of whites. Consequently, while the fourth hypothesis

also predicted that student body characteristics would explain more of
the variation than teacher characteristics, it appears that there is
actually little difference between the explanatory powers of the two;
both are small.

Contrary to the fourth hypothesis, student body characteristics
continue to account for more of the variation in the reading achievement
of blacks than either of the other two variable groups at the unique level
of explanation. This is true for all residential locations. Overall,
the factor makes a unique contribution of 7.0 percent (6.3 percent less
than when just curriculum was controlled). With all the effects of
other variables removed, student body characteristics explain more of
the variation in the reading achievement of blacks in the North (10.2
percent) than in the South (7.6 percent). When just curriculum effects
were removed, there was little difference between the regions; 12.7
percent of the variation was explained for blacks in the North and 11.7
percent for blacks in the South. Within the metropolitan areas, student
body characteristics remain more important, in terms of explained variation,
for blacks in the metropolitan North (9.2 percent) as opposed to the metro-
politan South (5.8 percent). When just curriculum had been controlled the
reverse was true; this factor had then explained more for blacks living
in the metropolitan South (13.6 versus 11.2 percent). In the nonmetropoli-
tan South, student body characteristics contribute uniquely 10.9 percent
to the explanation of variation in the dependent variable; down 4.7 percent
from the amount explained when just the effects of curriculum were removed.

As was true when curriculum alone was controlled, and again contrary to Hypothesis IV, teacher characteristics still uniquely explain more of the variation in the reading achievement of blacks than does family background. Overall, this factor accounts for 3.7 percent of the variation; which is substantially less than 8.2 percent explained when curriculum alone was controlled. Within regions, teacher characteristics uniquely explain 3.7 percent of the variation for blacks in the North but only 1.6 percent for blacks in the South. With just curriculum effects removed from the independent variable there had been little difference between the regions, although the percentages had been slightly higher for blacks in the South than in the North (4.6 versus 3.9 percent). In metropolitan areas, the variance uniquely explained by teachers is about three percent for both North and South, although in the latter instance this value is statistically insignificant. When curriculum alone had been controlled, an insignificant 2.3 percent of the variation had been explained by teacher characteristics for blacks in the metropolitan North. In the metropolitan South with just curriculum controlled, however, the factor had explained a large 12.3 percent of the variation; a marked contrast to the insignificant 2.9 percent it explains as a result of also controlling for student body and background charact- eristics. In the nonmetropolitan South, the unique contribution to explanation of variation by teacher characteristics is an insignificant 2.2 percent. With curriculum alone controlled, it had been an insignifi- cant 5.2 percent.

With only one exception, teacher characteristics uniquely explain more of the variation in reading achievement than family background for blacks, although the differences are not sufficiently large to have much practical significance. For blacks overall, family background uniquely explains 1.5 percent of the variation or 2.8 percent less than it did when just curriculum by itself was controlled. In both the North, South, metropolitan North, and nonmetropolitan South, family background explains an insignificant proportion of the variation in reading achievement. The percentages are 2.4, .5, 2.3, 4.4 and .4 percent respectively. The one exception is in the metropolitan South where the variable group accounts for 4.4 percent of the variation; this is also the exception where family background explains more than teacher characteristics.

Summary

The analysis of the unique explanatory power of each of the variable groups produced little change in the pattern of relationships that had been observed before. However, the unique contributions of all variable groups are small. For whites, the fourth hypothesis is supported in the sense that family background does explain substantially more of the variation in achievement than either of the other factors regardless of residential location. There is little difference in the amount of variation explained by either student body or teacher characteristics because neither explained much of the variation. The hypothesis had predicted student body characteristics would explain

more of the variation in reading achievement than teacher characteristics but this was not true in the metropolitan South.

For blacks, hypothesis four is not supported. In all residential locations, student body characteristics uniquely explains the largest percentage of the variation in reading achievement, while family background explains the least. In addition, the majority of the correlations between family background and reading achievement were statistically insignificant. The unique contribution of teacher characteristics is not significant except in the metropolitan North.

Whether the above results indicate a greater sensitivity on the part of blacks to their school environment or a lack of variation in family background will be discussed in the following chapter which offers a general interpretation of the results. Here also will be considered the implications of other results, limitations of the study, and suggestions for further research.

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The problem in this study is that of assessing the potential
relative contribution of family background, student body, and teacher
characteristics towards the realization of equality of educational
opportunity. Prompted by the national concern with racial equality,
and given the importance of educational success for success in our
highly technical occupational structure, the fact that blacks do not
derive as much benefit from the educational system as whites makes it
imperative to know what factors are related to success in school. Knowing
these will hopefully make possible the implementation of policies which
will eventually eliminate the lower achievement of blacks and facilitate
their full participation in American society. At the same time, such
knowledge could also be applied in the effort to improve the achievement
of underachieving whites.

Proxies for equality in educational output are skills crucial
to either continuing education or entering the occupational structure
at a more favorable position. Reading skill is a skill which is crucial
in the educational process and one measure of the school's success is
preparing individuals to achieve either further education or occupational
goals. Consequently, in this study, the problem has been simplified to
that of assessing the relative influence of family background, student

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body, and teacher characteristics on a student's ability to read. The analysis is carried out separately for blacks and whites. In addition, attention is also given within these two racial groups to variation by region and size of place.

The substantive problem of this study is the same one as that faced in the third chapter of the report, Equality of Educational Opportunity. (Coleman, et al., 1966) The results of that study have come under heavy criticism; centering primarily on the study's methodological shortcomings. In carrying out the primary task of this study, much effort is given to avoiding and/or overcoming some of the questionable procedures employed in the Coleman Report. The resolution of the methodological problems, if possible, is important for interpretation and implementation of findings produced by the Report.

Theory

Although there is no known way to assess the effects of genetic differences in intelligence on the potential for achievement and hence no control for them, it is apparent from previous research that environmental conditions affect ability and motivation to acquire educational skills. Preschool socialization occurs largely within the family situation. Direct data on family influences show that discipline, desire for achievement, ability to adapt to the classroom situation, etc., are more or less encouraged by the behavior and attitudes of parents and siblings. Considerable evidence also exists that degree of support for

eventual educational achievement varies with the socioeconomic level of family. Consequently, the expectation of this study is that socio-economic level of family will have a close and positive correlation with educational achievement for both blacks and whites.

As socialization processes continue during primary and secondary grades, the student is exposed to attitudes and behaviors of peers which can be expected to have either a positive or negative effect on how well he achieves in school. School climates vary in the degree to which they support or inhibit motivation to achieve and expectations or standards for educational achievement, including the acquisition of specific skills such as reading achievement. Consequently, variables measuring the composition of the student body, such as the percent of students with high socioeconomic status families or average I.Q. of student body, are expected to have a positive correlation to reading achievement.

A related but somewhat distinct set of influences center around the quality of school facilities. Among these, the excellence of the teachers should be particularly important. Therefore, a third hypothesis predicts a positive correlation between characteristics of quality of student's teachers and student's reading achievement is expected.

On the assumption that family background, student body, and teacher characteristics are all positively related to reading achievement, the question remains as to which makes the greatest contribution in explaining the variation in reading skill. The answer has important policy implications, e.g. where would the input of resources be most likely to produce improvement

in achievement. On the basis of the more frequent, intensive interaction of the pupil with his family as compared with less intensive interaction with teachers, this study expects to find that in terms of explaining variation in reading achievement, family background will be the most important and teacher characteristics the least important of the three variable groups. Peer influences should be intermediate to those of parents and teachers.

Method

This study involves a further analysis of data collected originally at the national level by the United States Bureau of the Census in October of 1965 as part of that year's Current Population Survey of School Enrollment. Information was gathered about a student, his family, and his school. While the generally high quality of the CPS data is well known, the representativeness of the present survey was confirmed by an earlier study, utilizing the same data, which made a number of comparisons with the school enrollment figures of the 1960 decennial census. The sample in the present study consists of 6,993 fourteen-to-nineteen year olds enrolled in school at the secondary level.

One of the major criticisms of the Coleman Report centered on its high nonresponse rate and its inability, due to resistence by school administrators, to adequately assess the effects of this nonresponse. In the present study, while the data gathered by the CPS interviewer in the home and from two questionnaires left in the home had high response rates of 96 and 87 percent respectively, information gathered from the principals about

the schools in which students were enrolled had a poor response rate of about 70 percent. Comparisons along a number of variables (using t-tests of the difference between group means of two-independent samples) between those persons for whom school data was available and those persons for whom it was not indicates, however, that the nonresponse of the principals is relatively random and should consequently not bias the results. There was a high nonresponse rate for the dependent variable. Hence, similar comparisons were made between those persons for whom reading achievement, was available and those persons for whom it was not available. Again, the conclusion is that the nonresponse was relatively random and should introduce little bias.

The Coleman Report was also criticized for not taking migration into account; thus, implicitly assuming that characteristics of the school in which a child is currently enrolled are typical of all schools to which he has been exposed during his educational career. An indirect assessment of the validity of this assumption was made by comparing those students who had changed schools more than once with those students who had not. The results showed no significant difference. Consequently, the above assumption was viewed as reasonable and no distinction was made in the study between movers and non-movers.

Coleman was also criticized for not controlling on the type of curriculum in which a student is enrolled. The argument is that achievement tests of the type used by Coleman give an advantage to the student enrolled in a college preparatory curriculum since that curriculum

emphasizes verbal skills. Since disadvantaged students, such as blacks, are less likely to be enrolled in this curriculum they will do poorly on the test. Given the general importance of reading ability for both vocational and academic success this criticism is somewhat irrelevant for this study. Nevertheless, the analysis will be carried out with and without curriculum controlled to see if it accounts for differential contributions of other characteristics.

A further criticism of the Report emerged from its procedure for handling the high nonresponse rate on particular items, i.e. of assigning them the arithmetic means of the cases having data. A variable by variable comparison in this study indicated no significant difference between the respondents and nonrespondents on specific items. Consequently, nonresponse on particular items was not viewed as a significant source of potential bias and no value assignments were made. In order to make the most efficient use of the data, the analysis in this study was carried out on all possible pairs of data where information was available for each member of the pair.

Five measures of family background were used: family income, head of household's occupation; mother's education; father's education; and mother's value of education as a success means. The quality of the background data should be superior to that of the Coleman Report since it was obtained from an adult member of the family and not from the students themselves. Four student body characteristics were used: mean school I.Q.; percent of student body enrolled in a college preparatory curriculum; the percent of the student body not below the norm for their grade in reading; and

the percent of the student body who have a father who is a white collar

worker. Six teacher variables were utilized: percent of teachers with

master's degrees; percent of teachers who are male; percent of teachers

in their first year of teaching; English teacher's race, years as teacher,

and highest degree. Three control variables were used in addition to

curriculum: race (black-white); region of residence (North-South); and

size of place (metropolitan-nonmetropolitan).

Because interest centers on the contributions by each of the three

groups of variables describing background, student body, and teacher

characteristics, the effects of separate variables on reading achievement

is not considered in the interest of simplicity of presentation by means

of data reduction. Consequently, these groups are discussed as if they

were single indicators in describing relationships with reading achieve-

ment. The statistic used is the squared multiple correlation coefficient

(R^2).

A second major portion of the analysis was concerned with ascer-

taining the unique contributions of each of the three independent variable

groups to the explanation of the variation in reading achievement scores.

In this study, the unique explanatory power of a variable is the percentage

of variation in reading achievement it explains after having controlled for

the effects on the independent variable of curriculum and the other two

independent variable groups.

The use of "unique" explained variation overcomes to a great extent

the problem of multicollinearity for which the Coleman Report was severly

criticized. The critics claim that the explanatory variables of the Report

are highly correlated meaning that there is a great deal of explained variation which could arbitrarily be attributed to any of the variables according to the order in which it is entered into the regression scheme. Thus, they say, by always entering family background into the regression first and attributing to it all of the commonly explained variance, the Report inflated the importance of family background at the expense of school factors. By using unique explanatory power, the effects observed are always those of entering each variable group into the regression last. There is no problem with "shared explained variance" for it is not attributed to any of the independent variables.

A different problem is the extent of the precision with which the variables are measured. For the sake of simplicity, it is assumed that the variables in the present study are all measured equally well. This is a common, though seldom justified assumption. However, it is quite likely that they are not. The employment of several measures in groups may serve to reduce this problem to some extent, but there is no way to eliminate it. Further treatment of the implications of this problem is given under the discussion of limitations of the study.

Discussion and interpretation

(1) That family background exerts the strongest effect (and the strongest unique effect) on the reading skill of whites, this supports the contention of Coleman that what the individual student brings to the school situation sets limits on what modification of school environment can accomplish to improve achievement.

(2) The relatively low effect of family background (especially the negligible unique effects) on the reading achievement of blacks should not be interpreted to mean that family background does not make a difference in black achievement. Rather it reflects the relatively <u>homogeneously low</u> socioeconomic status of blacks coupled with <u>homogeneously high</u> valuation of education as a success means. An extreme but simple statement of the situation is that one cannot predict a variable (reading skill) with a constant (low socioeconomic status).

(3) The failure of student body characteristics to exert much of a unique influence on reading skill of whites is curious. However, this can be partially explained by correlation of student body with background characteristics, but more information is needed. Observing effects of the curriculum control may provide a clue for interpretation. In the case of whites, controlling for curriculum alone produces the greatest drop in explanatory power of family background. Again, one suspects that this is partially a function of greater heterogeneity of whites; greater heterogeneity does not insure a stronger relationship but extreme homogeneity precludes the existence of a relationship. Thus, invariability of family background and curriculum for blacks produces little effect when curriculum is controlled. For whites, a greater relationship of both school composition and family background with curriculum and curriculum with reading may account for the greater reduction observed for whites, i.e. favorable family background probably partially determines both selection of a school with achievement producing characteristics and also choice of a college

preparatory curriculum which is the type most closely associated with higher reading achievement. That is, whites have greater resources and thus have the option to select a college preparatory curriculum and to attend schools with high socioeconomic status and high achieving student bodies. That is, both student body characteristics and curriculum overlap in the sense that they both reflect the greater advantage of whites.

(4) The absence of association between reading skill of whites and teacher characteristics (particularly the negligible unique contribution of the latter to the former) is no doubt surprising to those advocates of teaching effectiveness. The findings should not be interpreted to mean that skilled and motivated teachers will not have an impact on levels of reading attained by their indiidual pupils. Rather, it means that overall, teachers as a group will not have differential effects on pupils. Whether this is due to the present structure of the educational enterprise, the relatively homogeneous capabilities and levels of motivation among the vast majority of teachers is unknown. However, the indicators of teacher quality which are available in this study obviously fail to tap the most important aspects of teachers' ability to upgrade efforts of individual pupils.

(5) The relatively strong effect of student body composition on blacks reading achievement is important from a policy standpoint. Since the unique effect is substantial, it suggests that this factor can be manipulated without important side effects on curriculum choice or without radical changes in teacher quality. That is, given the

relatively low impact of teacher quality and student body composition on whites, further integration will not have negative consequences for whites and will have positive consequences for blacks.

(6) It is interesting that an interaction effect is observed with regard to control of curriculum on the relationship between reading achievement of blacks and teacher characteristics. Since teacher characteristics are more closely associated with reading skill when curriculum is held constant, it suggests that reorganization of curriculum choice procedures could put blacks in situations which would optimize the effect of teacher quality. That is, blacks are less likely to be in a college preparatory curriculum (compare Tables 6 and 7), but if this differential could be removed, they might benefit from such actions. However, a note of caution should be inserted. Curriculum differentials may reflect differences in measured I.Q. which is in turn correlated with reading test scores (Hanushek and Kain, 1972). To the extent that this is so, it follows that other steps must be taken to raise measured general ability of blacks if teacher effects are to be maximized. The extent to which curriculum choice reflects either I.Q. scores or other factors such as high occupational aspirations on the one hand, or apathy in the face of systematic discrimination against blacks in the occupational structure (or other factors) is unknown and cannot be tested with the data at hand.

(7) The greater relationship of all three types of variables (total R^2) on reading skill of both whites and blacks in the metropolitan areas, particularly those in the metropolitan South, suggest that characteristics selected for study in this research might help to explain the

regional differences observed in this and other studies. That is, if
the metropolitan areas are "more modern" (in the sense of having better
educated parents, more educationally advanced student bodies, and more
qualified teachers) and this is reflected in the efficiency of families
and school systems in maximizing achievements of pupils in those areas,
then further modernization of less modern areas, such as the nonmetro-
politan South, may promote higher school achievement in the latter
(Herriott and Hodgkins, 1970).

Limitations

As in any research, this study has a number of limitations which
should be recognized.

(1) Limitations of "reading achievement"

(a) First is the fact that the dependent variable, reading skill,
is only one of the many skills important for the educational process. As
Armer (1970) notes in a discussion of the Coleman Report's use of verbal
ability; even assuming that such a test adequately measures academic
achievement, there are many other kinds of possible outputs, e.g. better
student adjustment, higher motivation, good career choices, and the like.
The point is that even though the school does or does not have an important
impact on one measure of output does not necessarily mean that it is not
having an important impact in other respects--including their unequal
impact for blacks and whites.

(b) A second limitation of the reading scores used here is that
they represent a number of different tests that have been forced into an
equivalence. To the extent that the equivalence is not a good fit, the
variable is not measured as accurately as it could be.

(c) A third limitation is that the reading tests which were used were not administered under uniform conditions. The tests were "the most recent" test of which the principal had knowledge. Consequently, it is highly likely that these tests may have been administered in different grades, different regions, different urban or rural places, and under different internal school conditions. It is highly probable that the different conditions under which the tests were administered affect the outcomes of the test to some degree.

(d) A fourth limitation on the reading scores found in this study is a function of unknown biases in the missing test scores. All that could be reported in the study is that there is no bias according to the information available. But there are most likely other biases, e.g. test scores are more likely to be absent for truants, delinquents, the chronically ill, etc.

(e) A fifth limitation is one pointed out by Hanushek and Kain who note that innate ability is least likely to be correlated with school and teacher characteristics and most likely to be correlated with background. Assuming this is true, then the extent to which "reading ability" is a proxy for "innate ability" is a possible source of bias.

(2) Limitations of family background

(a) As in the case of the dependent variable, there are other aspects of family background which are unknown; e.g. sibling attitudes toward educational achievement, facilities for studying in the home, family tradition regarding work, achievement, etc., quality of educational materials in the home, and marital status of parents.

(b) Further measures of SES would also be useful, e.g. stability
of income, and social prestige of the family.

(c) Finally, two of the SES variables used are not measured as
well as they could have been. This is particularly true of the occupation
of the head of household which has only four gross categories. In addition,
some measure of the quality of the family's education would have been useful.

(3) Limitations of student body characteristics

(a) A major limitation is the availability only of aggregate
measures of student body characteristics. It would have been much better
had measures of individual students been available, particularly those
of the subject's immediate peer group.

(b) A second limitation is the lack of information on the intel-
lectual climate of the school, particularly its achievement orientation.

(c) A third limitation is the lack of within-school variances
on both the dependent and independent variables. There was no way of
analyzing how variations within the school affect the achievement of
students (Hauser, 1968).

(d) A fourth limitation is the dependence on the principal's
estimates. The assumption had to be made in the study that these estimates
are accurate. Not only may this assumption not be true, but it may even
be that some principals are knowingly presenting inaccurate information.

(e) A fifth limitation is that aggregate measures of schools
(whether of student body or teacher characteristics) are likely to have
a somewhat restrictive field of variation, thus limiting the amount of

variance in the dependent variable that they can explain. This is particularly true given that these aggregates are all based on the estimates of the principals.

(f) A sixth limitation is the high nonresponse of the principals. The conclusion that this nonresponse was not a problem in terms of bias could only be drawn on the basis of available information; which most likely did not give a complete picture. This limitation also applies to teacher characteristics.

(g) A seventh limitation is that, given the dependence solely on principal's estimates, characteristics of the student body are not measured as well as those of family background. This limitation also applies to teacher characteristics.

(4) Limitations of teacher characteristics

(a) The main limitation was in the availability of only a few variables. Additional measures were needed, e.g. those of teacher quality, skills, motivation, and racial attitudes, etc.

(b) A second limitation was that half of the teacher variables pertain to all teachers in the school and depend upon estimates by the principals with all of the attendant validity problems noted above. More measures of teacher quality for teachers to which the individual pupil has been exposed are needed.

(c) A third limitation was that what measures of individual teachers there were, were available only for the subject's English teacher. The

characteristics of other teachers who might conceivably affect reading scores (e.g. history teachers, typing teachers, etc.) are needed.

(5) Limitations of curriculum

(a) A major limitation with this variable was the availability of only a gross classification of curriculum.

(b) A second limitation was that there was no allowance for subjects who were within the age group of the sample but not in a school with a curriculum choice; e.g. pupils either in a junior high with a ninth grade or still in the eighth grade (14 year olds in this case are age-grade retarded). Consequently, presence of either type of pupils as a significant proportion of the sample distort the true effects of curriculum choice.

(c) A third limitation is that there may be things other than curriculum which determine the selection of certain courses. What constitutes a college curriculum may vary from school to school. Some measure of the specific courses to which a student has been exposed might prove to be a better predictor of reading achievement.

(6) Limitations of type of place of residence

(a) This variable is described only in gross terms. There are no data which enable one to separate out residence in "ghettos" of inner cities or remote rural areas (such as depressed areas of Appalachia).

(7) Limitations of the analysis

(a) A major limitation of the analysis was the sample size, particularly for blacks, and especially within the certain categories

created by cross-classification, e.g. region of residence by type of place of residence. The size of the sample undoubtedly had an effect in these finer categories on the stability of the estimates.

(b) A second limitation was the utilization of only correlational analysis. Critics of the Coleman Report (Hanushek and Kain, 1972; Cain and Watts, 1970) have felt that a better measure of impact are the regression coefficients. As Coleman (1972) has recently pointed out, however, regression coefficients can also be misleading, e.g. the slope may be large but the correlation small. What is needed, of course, is both; and in that sense this is a limitation of the analysis. Coleman (1972) has also pointed out though that the unique explanatory power of a variable (which this study used) is comparable to the square of the standardized regression coefficient. If the variables in an analysis are completely orthogonal, then the sum of the squares of the standardized regression coefficients are equal to the R^2. In this case, it is highly likely that the variable with the largest unique explanatory power is also the variable most likely to produce the greatest change in the dependent variable for every unit change in itself. If this is true, then this limitation of the analysis may not be as much of a limitation as first inspection might suggest.

(c) A third and final limitation of the analysis is in the availability of only cross-sectional data which limits one's ability to measure impact. What is needed, of course, is a longitudinal study which can obtain continuing measures of students, schools, teachers, and families over time. This is particularly relevant in the case of students who change schools quite often. In this study all that could be said was

that the movers (those who had changed schools two or more times)
differed little from the nonmovers (those who had changed schools no
more than once). Nothing can be said, however, on why they are alike.
It may be that the "mover" is similar to the "nonmover" (who are
undoubtedly distributed over the range of good and bad schools) because
they have been to both good and bad schools whose effects have tended
to cancel one another out. If such is the case then the effects of
school are obviously not going to be cumulative as they ideally should
be (in the case of good schools at least) (see discussions by Jencks,
Armor, and Smith in Mosteller and Moynihan, 1972).

Suggestions for further research

If additional research is to be carried out in the area of
educational achievement, and particularly as it relates to black and
white subgroups, an effort should be made to overcome the limitations
to this study. Blacks must have a larger sampling fraction than whites.
Of particular importance would be the utilization of a longitudinal
analysis. Such an analysis would permit a continuing measurement of
impact of changes in the environment (whether they be in the family,
the school, the student body, or the teachers) on the educational
achievement of students. In addition, better measures should be developed
for the factors just noted; particularly those which tap attitudes and
other individual qualities of a more psychological nature. Such a study
should also concern itself with the selection of outputs other than
reading achievement. As was noted earlier, there are many types of

skills which are important to the educational process and reading

achievement is only one. It may even be that school and background

factors have different effects dependent upon the skill being considered.

Future studies need to take into account the relationship between

the skills that represent outputs of educational systems and the demand

for such skills in the American occupational structure. This is part

of the total opportunity picture and studies similar to the present one

need to be designed so that they can be articulated with other studies

of transitions from secondary education to higher education or to various

positions in the labor force.

A basic problem which plagues all studies of educational processes

centers around inability to measure inate ability of individual students.

Hanushek and Kain (1972: 123) note the importance of including genetic

input in the conceptual model for assessing heredity--environment inter-

action. They note that it is least likely to be correlated with school

inputs and most likely to be correlated with family background. The

extent of such correlation is unknown, but it could affect the relative

contribution of school inputs.

From a sociological perspective, one would like to know more about

within and between group variation with respect to ability, motivation,

order, and achievement for various kinds of groups with which the indi-

vidual student is affiliated: his family; peer groups, classroom, and

schools; and associated group affiliations (work groups, etc.). Tracing

memberships and their effects on the individual student's effective ability,

motivation, and achievement would help to link individual experience

with system properties of the school, the community, and the larger

society.

APPENDICES

APPENDIX A

DIFFERENCES IN READING ACHIEVEMENT OF BLACKS AND WHITES

This appendix gives a brief comparison of average reading achievement of blacks and whites in this study and in the Coleman Report. The focus is on difference by residence. The Coleman Report documents the lower reading achievement of blacks (1966: 273). On both verbal ability and reading comprehension the average score for whites in all residential locations of the United States was found to be above that for blacks. Using the reading scores of whites in the metropolitan Northeast as a standard (since it was here that the average score was the highest), it can be seen in Table 16 that on either standard deviations behind or grade levels behind, the average score for blacks falls sub-stantially below that for whites.

Within regions, the Report found that the average black tended to be approximately one standard deviation below the average white; meaning that about 85 percent of the blacks scored below the mean score for whites. Regional variation tended to be similar for both groups. In each case those in the metropolitan Northeast exhibited the highest scores and those in the nonmetropolitan South the lowest.

It is easily seen, however, that within categories of residence the deprivation of blacks is far greater than that of whites. For example, in the nonmetropolitan South where the scores were the lowest for both groups, blacks in the twelvth grade are over five grades behind whites in reading comprehension. Similarly situated whites are only one grade behind on reading comprehension.

TABLE 16

READING COMPREHENSION: NUMBER OF STANDARD DEVIATIONS BELOW AND NUMBER OF GRADE LEVELS BEHIND THE AVERAGE WHITE IN METROPOLITAN NORTHEAST, FOR ALL GROUPS

Race and Area	Standard Deviations Below			Grade Levels Behind		
	Gr. 6	Gr. 9	Gr. 12	Gr. 6	Gr. 9	Gr. 12
White, Metropolitan						
Midwest	0.0	0.0	0.1	0.1	0.1	0.3
South	0.1	0.2	0.1	0.3	0.4	0.4
Southwest	0.2	0.2	0.1	0.4	0.7	0.4
West	0.1	0.2	0.2	0.2	0.5	0.8
White, Nonmetropolitan						
South	0.2	0.3	0.3	0.5	0.8	1.0
Southwest	0.1	0.1	0.1	0.1	0.3	0.5
North	0.1	0.1	0.1	0.2	0.3	0.5
Negro, Metropolitan						
Northeast	0.8	0.9	0.8	1.8	2.6	2.9
Midwest	0.8	0.8	0.8	1.8	2.3	2.8
South	0.9	1.1	1.2	2.1	3.0	3.9
Southwest	0.9	1.2	1.3	2.1	3.0	4.1
West	0.9	1.1	1.2	2.1	3.1	3.8
Negro, Nonmetropolitan						
South	1.2	1.4	1.6	2.7	3.7	4.9
Southwest	1.0	1.2	1.4	2.4	3.3	4.5
North	1.0	1.0	1.2	2.2	2.6	3.8

Source: James S. Coleman, et al., Equality of Educational Opportunity, Washington, D. C.: U. S. Government Printing Office, 1966, Table 3.121.2, p. 274.

Other studies which have looked at racial differences on achievement and ability tests have also found blacks to score, on the average, lower than whites (Ells, et al., 1951; Milner, 1951; Osborne, 1960; Anderson, 1962; Deutsch, 1963; Kennedy, et al., 1963; Bloom, 1964; Deutsch and

Brown, 1964; Clark, 1965; Silverman, 1965). Hence, the finding of the

Coleman Report has substantial support in the literature.

The data utilized in the present study also finds the achievement

of blacks to be lower, on the average, than that of whites. Overall,

Table 17 shows results very similar to those of the Coleman study. As

TABLE 17

MEAN READING SCORES, IN STANINES, OF WHITES AND BLACKS: BY REGION
AND RESIDENCE

Residence	Whites	Blacks
Total	4.50	2.57
North	4.62	2.88
South	4.12	2.27
Metropolitan	4.63	2.64
Nonmetropolitan	4.25	2.43
North		
Metropolitan	4.69	2.82
Nonmetropolitan	4.43	----*
South		
Metropolitan	4.35	2.25
Nonmetropolitan	3.90	2.28

*Too few cases for computation.

was true in the Report, the lowest scores for both groups were in the

nonmetropolitan South and the highest scores were in the metropolitan

North. Similarly, regardless of race, those who live in the South and

nonmetropolitan regions exhibit the lowest scores. The most prominent

feature of the table, however, is the fact that residential-regional differences within the two racial groups nowhere approaches the black-white differences per se in reading achievement levels; a finding again similar to that of the Coleman Report. With an overall mean score falling within the second stanine this means that fifty percent of the blacks in this sample are achieving at or below grade level as compared with only eleven percent scoring below grade level in the total sample. Unfortunately, the results of this study and those of the Coleman Report are not directly comparable since the former uses scores expressed as stanines and the latter does not. However, it seems clear that the patterns of race differences by residence are similar in the two studies.

APPENDIX B

THE PROBLEM OF COMMON OR SHARED VARIANCE

If the unique explanatory powers of each of the three variable groups are added together within each of the residential locations, it will be found that their sum is less than the "total" explanatory power (R^2) of all the variables taken together. The difference is the "common" or "shared" explained variance. This is the proportion of the total explained variation which cannot be attributed to any one of the three variable groups. As was noted in the methods chapter of this report, the existence of a high degree of shared variance or multicollinearity among the Report's predictor variables made the question of how to allocate shared variance a critical issue. One of the major criticisms of the Coleman study was that a high degree of multicollinearity among predictors in conjunction with consistently entering "family background" into the regression equation first resulted in an inflation of the importance of background and an underestimation of the effects of school factors. In this study, a different strategy was used. Unique explained variation was examined by controlling for the effects of the other two variable groups and type of curriculum. While this minimizes to a great extent the problem of multicollinearity, it still says nothing about the common or shared variance. That is, where the Coleman Report always attributed all of the common variance explained to family background, this study has attributed it to no variable group. This appendix will examine the question of

"shared" explained variance as an additional method for considering the seriousness of multicollinearity.

Table 18 takes the total amount of variation explained by all three of the variable groups acting together and divides it into its total unique and total common parts. The most striking characteristic of the table is the generally small size of the commonly explained variation in reading achievement; one indication of the independence of the predictor variables and thus one indicator that the problem of multi-collinearity is not particularly serious in this study. In no instance for blacks or whites does the amount of commonly explained variance exceed 50 percent of the total explained variation. And only in the case of whites in the South and blacks in nonmetropolitan areas does the shared variance approach near 50 percent of the total explained variation.

For whites as a group, 72.5 percent of the explained variation is held uniquely and 27.5 percent of it is held in common. In the North, over 80 percent of the explained variation is held uniquely while in the South the same is true for only 55.6 percent of the variation. Hence, for whites in the South, a substantial proportion of the explained variation could be attributed to any of the three variable groups. In both the metropolitan and nonmetropolitan areas approximately 75 percent of the variation is explained uniquely by the three variable groups. This holds true whether the white subject lives in the metropolitan North or South. In the non-metropolitan North, nearly all of the explained variance is held uniquely (95.5 percent) while in the nonmetropolitan South only 67.3 percent of the explained variance is held uniquely.

TABLE 18

THE TOTAL PERCENT OF VARIANCE IN READING ACHIEVEMENT <u>UNIQUELY</u> AND
<u>COMMONLY</u> EXPLAINED BY ALL THREE OF THE INDEPENDENT VARIABLE GROUPS
BEYOND THAT EXPLAINED BY TYPE OF CURRICULUM IN WHICH STUDENT IS
ENROLLED; BY RACE, REGION OF RESIDENCE, AND TYPE OF PLACE OF
RESIDENCE[a]

Race and Residence	Unique Explanatory Power[b]	Shared Explanatory Power	Percent of Explained Variance	
			Unique	Shared
Total Whites	5.95	2.26	72.5	27.5
Whites				
North	6.35	1.41	81.8	18.2
South	5.72	4.56	55.6	44.4
Whites				
Metropolitan	5.68	2.05	73.5	26.5
Nonmetropolitan	7.63	2.17	77.8	22.2
Whites, North				
Metropolitan	5.79	1.89	75.4	24.6
Nonmetropolitan	10.48	4.5	95.5	4.5
Whites, South				
Metropolitan	8.06	2.73	74.7	25.3
Nonmetropolitan	7.42	3.61	67.3	32.7
Total Blacks	12.87	6.18	67.5	19.05
Blacks				
North	18.76	1.57	92.4	7.6
South	11.12	3.86	74.2	25.8
Blacks				
Metropolitan	16.04	4.43	78.3	21.7
Nonmetropolitan	18.02	11.43	61.2	38.8
Blacks, North				
Metropolitan	17.34	1.02	94.4	5.6
Nonmetropolitan	-	-	-	-
Blacks, South				
Metropolitan	16.53	8.73	65.4	34.6
Nonmetropolitan	15.87	4.48	78.0	22.04

[a]The commonly explained variance is obtained by subtracting the
total unique explanatory power from the total column of Table 12.

[b]These values have not been corrected for the degrees of freedom.

For blacks as a group, 67.5 percent of the explained variation
in reading achievement is held uniquely by the three variable groups
and 32.5 percent is shared. For blacks in the North, nearly all of
the explained variation is uniquely held variation (92.4 percent).
For blacks in the South, the equivalent value is 74.2 percent. In the
metropolitan areas, more explained variance is held uniquely (78.3 percent)
than is the case in the nonmetropolitan areas (61.2 percent). In the
metropolitan North, nearly all of the explained variation is held   by
the variable groups uniquely (94.4 percent). In the metropolitan South,
only 65.4 percent of the variation explained is held uniquely while the
same is true of 78.0 percent in the nonmetropolitan South.

In summary, a review of this analysis suggests that the problem
of multicollinearity or shared variance is not severe since most of the
explained variance is explained by the three variable groups uniquely.
Only in the South for whites and in the nonmetropolitan areas for blacks
do the figures become relatively large for shared variance. However, an
analysis was carried out to investigate this problem further.

Taking the commonly explained variation, a method may be used to
partition it among the various combinations of variable groups, or into
what may be termed second-order and third-order commonalities (Wisler,
1969). The extent to which this may prove useful remains to be seen, but
it may be instructive for others facing problems encountered in this study.
The unique explained variance which this report has concentrated on, may
also be referred to as the first-order commonality and defined by the

equation $U_{(i)} = R^2_{0(ijk)} - R^2_{0(k)}$. U indicates that the value obtained
is the unique explanatory power of a variable. I, J, and k are the
variable names for the independent variables and 0 the name of the dependent
variable. 0(ijk) and 0(k) are each different correlations between the
independent and dependent variables and R^2 is the square of these corre-
lations.

It was noted in the methods chapter that in a three variable
equation, the effect of adding two of these variables to the regression
equation already containing the third could be expressed as $R^2_{0(ijk)} - R^2_{0(k)}$.
This may also be indicated by writing: $R^2_{0(ijk)} - R^2_{0(k)} = U_{(i)} + U_{(j)} +$
$C_{(ij)}$. $C_{(ij)}$ that part of the difference in the squared multiple correlation
coefficient which may be associated with either variable i or variable j.
It may be regarded as that part of the explained variation attributable to
i and j in common, or for short, the commonality coefficient of ij. Since
there are two regressor variables involved, it is referred to as a second-
order commonality coefficient. By rearranging the equation, a definition
of the second-order commonality coefficient can be obtained: $C_{(ij)} =$
$R^2_{0(ijk)} - R^2_{0(k)} - U_{(i)} - U_{(j)}$.

Similarly, the percentage of variation that can be accounted for
by all three variable groups (ijk) together can be written as: $R^2_{0(ijk)} =$
$U_{(i)} + U_{(j)} + U_{(k)} + C_{(ij)} + C_{(ik)} + C_{(jk)} + C_{(ijk)}$. Rearranging the
equation, a definition is obtained for the third-order commonality coef-
ficient: $C_{(ijk)} = R^2_{0(ijk)} - U_{(i)} - U_{(j)} - U_{(k)} - C_{(ij)} - C_{(ik)}$.

As with the unique proportion of variation explained, these second
and third order commonality coefficients can be related to part correlation

which provides an interpretation of the commonalities. With three variables, the second and third order commonalities can be written as follows: $C_{(ij)} = r^2_{0(i.k)} - r^2_{0(i.jk)}$ $C_{(ijk)} = (r^2_{0(i)} - r^2_{0(i.k)}) - (r^2_{0(i.j)} - r^2_{0(i.jk)})$.

Set forth in this manner, the second-order commonality gives the effect on i of controlling for j (or vice versa), i.e. it gives the increase or decrease in the proportion of variation explained by i (or j) as a result of controlling on j (or i). If controlling on J reduces the strength of the relationship between the dependent variable and i, the coefficient will be positive. If, on the other hand, the variable j is masking a relationship between 0 and i, controlling on j strengthens the relationship and the second-order coefficient will be negative.

In the third-order commonality coefficients, we see the effects of controlling on j when compounded by the presence or absence of a control on variable k. More specifically, we compare the change in variance associated with j when the effect of k on i has not been removed, to the corresponding second order commonality where the effect of k has been removed. If controlling k moderates the effect of j, the third order coefficient will be positive; if the effect of j is enhanced the coefficient will be negative.

The results of partitioning the total shared variance noted in Table 18 in found in Table 19. The results of this analysis again indicate that the correlation between the independent variables of this study are low and consequently the problem of multicollinearity should not be severe.

Arbitarily selecting an increase or decrease of .02 or more in the explanatory power of a variable as significant, it can be seen in Table 19 that in only five instances does such a decrease occur (there are no increases). The five instances are as follows: For whites in the South, controlling for either background or student body causes a decrease in the explanatory power of either variable by 2.18 percent. For blacks in nonmetropolitan areas, the same thing is true to the extent of 2.74 percent. It should be noted that these are the two instances noted earlier where there was a relatively large percentage of commonly held explained variation in reading achievement. The three additional instances come as a result of controlling for either teacher or student body characteristics. For blacks as a group, introducing such a control brings about a 3.04 percent reduction in the amount of variation accounted for by either of these two variables. For blacks in the South the same thing is true to the extent of 2.26 percent and again for blacks in nonmetropolitan areas controlling for either teacher or student body characteristics brings about a large 7.87 percent reduction in the other. In all the other two and three variable combinations the increase or decrease in explained variance is less than 2 percent.

In summary, whether looking at the total common variance or the common variance as it is distributed among the various combinations of variable groups, it can be seen that the correlation among these variables is low and thus a good indication of no severe problem of multicollinearity.

TABLE 19

THE RESULTS OF PARTITIONING THE TOTAL SHARED VARIANCE FOUND IN TABLE 18
AMONG THE VARIOUS COMBINATIONS OF THE THREE VARIABLE GROUPS

Race and Residence	Background Teacher	Background, Student Body	Teacher, Student Body	Background, Teacher, Student Body
Total Whites	.0001	.0182	.0004	.0039
Whites				
North	−.0005	.0138	−.0002	.0010
South	.0016	.0218	.0039	.0083
Whites				
Metropolitan	.0001	.0181	.0007	.0016
Nonmetropolitan	.0034	.0105	.0017	.0061
Whites, North				
Metropolitan	.0001	.0182	.0003	.0003
Nonmetropolitan	.0013	.0038	−.0015	.0013
Whites, South				
Metropolitan	.0036	.0163	.0014	.0060
Nonmetropolitan	.0034	.0180	.0068	.0089
Total Blacks	−.0016	.0171	.0304	.0159
Blacks				
North	.0036	.0173	.0082	−.0134
South	−.0018	.0123	.0226	.0055
Blacks				
Metropolitan	−.0035	.0114	.0280	.0084
Nonmetropolitan	−.0004	.0274	.0787	.0086
Blacks, North				
Metropolitan	−.0095	.0177	.0049	−.0029
Nonmetropolitan	−	−	−	−
Blacks, South				
Metropolitan	.0103	−.0051	.0910	−.0089
Nonmetropolitan	−.0012	.0146	.0246	.0068

APPENDIX C

READING ACHIEVEMENT BY FAMILY BACKGROUND, STUDENT BODY, AND TEACHER CHARACTERISTICS WITH RELIGIOUS ORIENTATION AND CURRICULUM CONTROLLED

It was expected that there would be some difference in reading achievement by religious orientations of students. Previous research has shown that there are differences in educational ambition by religion: Jews are most likely to plan to attend college, Roman Catholics in parochial schools were next, followed by Protestants in the largest denominations, then Catholics in public schools, and Baptists were least likely to plan to attend college (Rhodes and Nam, 1970). Subsequent (unpublished) analysis revealed that it is the Southern Baptists who are least likely to plan to attend college. The differences were not particularly impressive except in the case of Jews.

Such differences as do exist are interpreted as reflections of subcultural differences in emphasis on educational endeavor and intellectual pursuits. In general, it would be expected that youths affiliated with the Jewish religion and its tradition of rabinical scholarship , or with the "social gospel" Protestant denominations which emphasize education (both religious and vocational), would receive greater impetus to achieve in school. Conversely, youths connected with those religious groups emphasizing instantaneous conversion and emotional experience of religion (such as the more fundamentalist Protestant sects) would be somewhat less pushed to achieve academically. Given the competing secular forces in the youths' experience, such differences by religion would not be expected

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to be marked. However, it is assumed in the present case that some difference in ambition by religion will carry over and affect level of achievement on standardized reading tests. An analysis was accomplished to test this notion.

The same kinds of analyses as described in the main body of the report were repeated for the various religious subgroups to find out if the three types of characteristics (family background, student body, and teacher variable groups) had differential explanatory power for reading achievement. Curriculum was included as a control variable since the foregoing analysis has shown it to be of considerable importance. Race and place of residence were not included as controls for several reasons. These center around lack of a sufficiently large number of cases to provide stable estimates within subgroups produced by cross-classification on one or more of these variables. For instance, most of the blacks in the sample are identified with the largest Protestant denominations. There are only 21 black Catholics with reading achievement scores. Likewise, there are not enough white Catholics in the South, particularly in parochial schools. Also, the group of subjects with no preference or no information on preferences is small.

The same groups of variables with the same levels of measurement, limitations, etc. as described in the main body of the report were used in the present analysis. Unfortunately, the data source does not provide sufficient detail on religion to distinguish between small Protestant fundamentalist sects and the larger Protestant denominations. Of the

five largest Protestant denominations (Baptist, Episcopalian, Lutheran, Methodist, and Presbyterian) which are treated as separate categories in the data source, the Baptist (particulary the Southern Baptist) denomination seemed to be the more fundamental in orientation. Hence, Southern Baptists were separated out for the analysis. The smaller fundamentalist sects were thrown in with the Congregational and Unitarian churches on the basic data source. Therefore, it was decided to include all of these and the remaining large Protestant denominations in one large category designated as "other Protestant." The few subjects identified with the Greek Orthodox church were included in the category, "Catholics in public schools." Roman Catholics in parochial schools were treated as a separate category. This means of classification pro-duced the six religious groupings shown in Table 20, and the five groupings shown in the remaining tables. There were not enough Jews to perform the analysis which compares the various effects of the three types of characteristics.

Results

There are differences in the level of reading achievement (See Table 20). The Souther Baptists have a somewhat lower level of reading achievement (mean = 4.5) and the Jews have the highest level of reading achievement (mean = 6.6). Roman Catholics in private schools also have a relatively higher level of reading achievement. The standard deviations are uniform for the religious subgroups except that Catholics in private schools and Jews are somewhat more homogeneous in reading level.

TABLE 20

READING ACHIEVEMENT STANINE SCORE BY RELIGION: MEANS AND STANDARD
DEVIATIONS*

Religion	N	Means	Standard Deviations
All Cases	3179	5.3	2.0
Southern Baptists	310	4.5	2.1
All Other Large Protestants	1484	5.4	2.0
Catholics			
Private School	277	6.0	1.7
Public School	711	5.1	1.9
Jews	96	6.6	1.7
All Others (including no infor-			
mation)	301	5.3	2.0

*F test: reading achievement by religion. $p. < .001$

Although the difference in reading achievement by religion is

not large, the difference is statistically significant. Therefore, it

seems worthwhile to examine how different characteristics contribute to

explained variation in reading achievement within the various religious

subgroups. Thus, the type of analysis which was performed for blacks

and for whites in the main body of this study was once again performed

for each major category of religion except that there are not enough

Jews in the sample to provide stable results in a regression analysis.

The contributions of each of the three groups of variables (family

background, student body, and teacher characteristics) to explained vari-

ation in reading achievement were determined for the different categories

of religion. The results are shown in Table 21. Family background seems
to be about equally important for each religious subgroup except for
Catholics, particularly those in public schools. Data are lacking to
explain why family background should be less important for Catholics
than for other groups. It may be some artifact of selection of one
particular socioeconomic subgroup of Catholics in to public as opposed
to private schools.

TABLE 21

PERCENT OF VARIATION IN READING ACHIEVEMENT SCORES (R^2) EXPLAINED BY
EACH OF THREE GROUPS OF VARIABLES: STUDENT'S FAMILY BACKGROUND,
CHARACTERISTICS OF STUDENT BODY, AND CHARACTERISTICS OF
TEACHERS; ACCORDING TO RELIGION

Religion	All Characteristics	Family Background	Student Body	Teacher
Southern Baptists	30.6	16.4	15.5	15.8
All Other Large Protestants	21.2	16.8	9.4	4.5
Catholics				
Private School	13.5	9.2	4.5	3.6
Public School	9.9	6.9	4.5	.9*
All Other Cases	30.9	16.6	17.7	9.0

*All R^2 are statistically significant (p<.01) except for teacher
characteristics for Catholic students in public schools.

Student body characteristics are equally important for Southern
Baptists and for subjects in the miscellaneous category (which includes
Jews, persons with no religious preference, and cases with no information).

One suspects that the "Southern Baptists" category and the "no information" category includes an over-represenation of blacks which may account for the greater importance of student body composition in these religious subgroups as compared with the others. Teacher characteristics are least important for all subgroups except Southern Baptists. Why teacher characteristics would be more important for this group is not particularly apparent, except that it probably includes a disproportionate fraction of nonmetropolitan Southern blacks. Teacher characteristics were found to be important for this subgroup of blacks in the main body of this report.

The influence of curriculum on reading score was examined within categories of religion. (See Table 22) Curriculum appears to be most

TABLE 22

PERCENT OF VARIATION IN READING ACHIEVEMENT SCORES (R^2)
EXPLAINED BY TYPE OF CURRICULUM IN WHICH THE STUDENT IS
ENROLLED; ACCORDING TO RELIGIOUS AFFILIATION

Religious Affiliation	Curriculum Only	Curriculum + Three Variable Groups
Southern Baptists	6.58	32.28
All Other Large Protestants	15.50	27.87
Catholics		
Private School	8.28	18.36
Public School	10.34	17.71
All Other Cases	17.79	36.52

important in the case of the large Protestant denominations and also
for the small miscellaneous category. It is least important for
Southern Baptists. The latter is probably a function of the relatively
greater homogenity of curriculum for persons in that subgroup. Looking
at the effects of all explanatory variables plus curriculum, it can be
seen (by comparing corresponding entries in Tables 21 and 22) that cur-
riculum makes the greatest addition to explained variation in reading
in the case of Catholics in public schools and for Protestants in the
largest denominations. It adds the least for Southern Baptists and
Catholics in private schools. Again, the latter two situations may
represent greater homogenity of curriculum.

Next, the contributions of each of the three groups of variables
(family, school, and teacher) were examined after first entering curriculum
in the regressions. The results are shown in Table 23. The effect of

TABLE 23

PERCENT OF THE VARIATION IN READING ACHIEVEMENT SCORES (R^2)
EXPLAINED BY THREE GROUPS OF VARIABLES: STUDENT'S FAMILY
BACKGROUND, CHARACTERISTICS OF STUDENT BODY, AND
CHARACTERISTICS OF TEACHERS BEYOND THAT FIRST
EXPLAINED BY TYPE OF CURRICULUM IN WHICH
STUDENT IS ENROLLED; ACCORDING TO
RELIGION

Religious Affiliation	Total	Variable		
		Family	Student	Teacher
Southern Baptist	25.70	12.64 (.01)	12.78	14.62
All Other Large Protestants	12.37	9.00	5.23	2.82
Catholics				
Private School	10.08	6.01	1.92	2.88
Public School	7.37	3.95	3.77	0.84
All Other Cases	18.73	7.63	11.31	5.97

including curriculum has the least effect on the Southern Baptists and
Catholics across the three variable groups and for all variable groups
combined. The relative contributions of the three variable groups to
explanation of reading skill tends to remain the same within each of
the categories of religion, even though the amount of explanation is
reduced in each case. That is, controlling for curriculum does not
make much change in the pattern of differences report in Table 20.

Finally, the unique contribution of each of the three variable
groups was computed (See Appendix B). The results are shown in Table 24.

TABLE 24

PERCENT OF VARIATION IN READING ACHIEVEMENT SCORES UNIQUELY (R^2)
EXPLAINED BY THREE GROUPS OF VARIABLES: STUDENT'S FAMILY
BACKGROUND, CHARACTERISTICS OF STUDENT BODY, AND
CHARACTERISTICS OF TEACHERS; ACCORDING TO
RELIGION

Religious Affiliation	Variable		
	Family	Student	Teacher
Southern Baptist	5.87	3.18	7.46
All Other Large Protestants	5.79	1.37	1.30
Catholics			
Private School	5.61	1.11	2.66
Public School	2.78	2.74	0.83
All Other Cases	2.57	6.83	4.33

In general, it can be seen that family background characteristics have the
closest relationship with reading score in each of the relation groups.
However, the teacher characteristics have the greatest unique effect in
the case of the Southern Baptists, while student body characteristics

have the greatest unique effect on the reading skill of students in the miscellaneous category. It should be noted that in every case the unique effects are small, indicating that there is a considerable amount of variance shared among the several variable groups together with curriculum.

A review of the foregoing findings supports the general notion that there will be higher levels of reading skill among students identified with the Jewish and the liberal Protestant denominations and lower levels of reading skill among students identified with a more fundamentalist type of Protestantism. However, Catholics in private schools have a higher mean level of reading achievement.

Examination of the relative contributions of family background factors, student-body characteristics, and teacher characteristics reveals that family background factors are generally the best predictors of level of reading achievement within the various categories of religious identification. Student body characteristics are next most important and teacher characteristics are least important. Adding curriculum to the regression systems does not add all that much in explained variance of reading scores. However, curriculum and the other variables taken together explain a substantial amount of the variance in reading skill; i.e. about one-third in the case of Southern Baptists and the miscellaneous religious subgroups. In the case of Catholics, all variables taken together explain only about a sixth of the variance. That the unique effects of any cluster of variables tends to be less than six percent provides evidence that there is considerable shared variance among the groups of explanatory variables. The relatively strong teacher effect which was observed in the case of Southern Baptists is worthy of further study. Additional data will be

necessary to determine why quality of teacher is particularly important for a student in this group. The results presented here provide sufficient justification for further study of effects of religion on achievement with larger samples of Jews and of students identified with small fundamentalist Protestant sects.

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