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AUTHOR Guthrie, John T.; And Others

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ABSTRACT

A study examined the relationships of reading achievement and constructs about student literacy activities for four ethnic-gender groups. A secondary analysis of nearly 3,000 9-, 13-, and 17-year-olds' reading achievement and student questionnaire data from the 1986 National Assessment of Educational Progress was undertaken. The constructs varied slightly by age and included: home literacy, social interactions, teacher-directed instruction, student-centered instruction, study strategies, library use, nonfiction reading, fiction reading, and news reading. For black males, white males, black females, and white females linear and nonlinear models of the associations of reading achievement and these constructs were tested. Results indicated: (1) that the ethnic gender subgroups generally had parallel functions at age nine; (2) black males diverged from other groups in non-parallel functions at age 13; and (3) generally the groups showed parallel and linear and nonlinear functions at age 17. Findings take into account empirical literature, socialization theories, and personal identity theories regarding the achievements and roles of blacks, and particularly black males, in the United States. (Twenty-five tables and 34 figures of data are included; 23 references are attached.) (Author/RS)

Minority Reading Achievement: Motivational, Instructional, and Familial Variables for Black and White Males and Females

John T. Guthrie

William D. Schafer

Yuh-Yin Wang

University of Maryland at College Park

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Abstract

This study examined the relationships of reading achievement and constructs about student literacy activities for four ethnic-gender groups. Secondary analyses of the 1986 NAEP reading achievement scores and student questionnaire data from national samples of 9, 13, and 17 year olds were conducted. The constructs varied slightly by age and included: home literacy, social interactions, teacher-directed instruction, student-centered instruction, study strategies, library use, non-fiction reading, fiction reading, and news reading. For black males, white males, black females and white females linear and nonlinear models of the associations of reading achievement and these constructs were tested. The results showed that the ethnic gender subgroups generally had parallel functions at age 9; black males diverged from the other groups in non-parallel functions at age 13; and generally the groups showed parallel linear and nonlinear functions at age 17. The findings are interpreted in terms of empirical literature, socialization theories, and personal identity theories regarding the achievements and roles of blacks, and particularly black males, in the U.S.A.

INTRODUCTION

The purpose of this paper is to examine the factors that influence achievement in four demographic groups. The paper examines the performance of black male students in comparison to white males, black females, and white females. The emphasis on black males is due to the traditionally low achievement of this group in reading as well as other school subjects (NAEP). In this paper we search for intra-group differences. We assume that if black males are relatively low in achievement, there may be certain factors that predict achievement for them that are not predictive for other groups. We are guided by the following questions: Do some variables predict achievement more effectively for certain social groups (i.e., black males) than other social groups i.e., white males? Do the variables that predict achievement for black males and other groups change across 4th, 8th, and 12th grades?

Previous research on the effects of race and gender on reading achievement may be described in terms of four approaches to the problem. First, the empirical approach asks: "What factors influence achievement?" This approach is exemplified by Grant and Sleeter (1986) who reviewed a literature of seventy-one empirical papers. A second approach emphasizes family socialization. Exemplifying this line of inquiry, Slaughter-Defoe (1990) summarized studies from the 1970's and 80's on the relationship of underachievement among black children to sociological and home literacy factors. A third approach treats the personal identity of students. Writers such as Ogbu (1987) and motivational psychologists such as Harter () attribute achievement to cultural identity and the motivation of minority students. Fourth, an instructional perspective on minority achievement has been emphasized by investigators such as Comer (1984, 1986, 1986) who devised institutional interventions that provide improved instruction for minority students. Some of the literature from each of these approaches is presented to illustrate the lines of inquiry and to provide theoretical orientations for interpretation of the findings in this investigation.

Empirical Approach

Empirical studies of the effects of race and class in education have been reviewed by Grant and Sleeter (1986) and Huston (1983). Grant and Sleeter (1986) reported that out of seventy-one articles that were addressed to either race or gender, three were focused equally on both of these factors, but they did not include achievement. Simpson and Erickson (1983) reported that teachers attended to male students more than female students and that teachers criticized black males more than any other group. Regrettably, these data were not corrected for the behavior of individuals in the groups, and the conclusions must be qualified. Hennessy and Merrifield (1978) found some cognitive aptitude differences between race-gender groups; however, these were not corrected for social class. Three articles of the 71 included race, gender, and social class in the analyses, but unfortunately, these articles did not discuss achievement. Kirp (1977) and Tollett (1982) discussed litigation and legislation to create equal opportunity programs that would be open to all groups. Rumberger (1983) examined factors for dropping out of school. He

found stronger predictions by integrating race, social class, and gender than by separating these factors. In the Grant and Sleeter (1986) review there were no unique effects reported for black males. Achievement was found to be higher for females than males and higher for whites than blacks, but an interaction that would place black males inordinately low was not reported.

The unique characteristics of black males were examined by Winfield and Lee (1986), who reanalyzed the National Assessment of Educational Progress (NAEP) data from 1983-84. Their reanalyses are particularly valuable because the data are a national sample from all regions, all locations, and all ethnic groups in the continental United States. They analyzed black and white, males and females, in grades 4, 8 and 11. The sample sizes are approximately 26,000 whites, 5,300 blacks, and 3,200 Hispanics at each grade level. Winfield and Lee (1986) reviewed more than 100 studies which reported either gender effects or race effects on achievement. Although females typically had higher reading achievement than males, and whites typically had higher reading achievement than blacks, there were no reports of an interaction of these factors on achievement.

Winfield and Lee (1986) found that the gender effect, consisting of a female advantage was more pronounced for black students than white students at age 9. For nine year olds, white females were .07 standard deviations above white males. Among nine year olds, black females were .26 standard deviations above black males in reading achievement. These were based on adjusted scores which were controlled for student age, student academic behaviors, family background characteristics, and mother's employment. The difference between the female advantages for blacks and whites was highly significant ($p. < .001$). Black males were inordinately low. In other words, in the 1983-84 NAEP data, race and gender had a unique interactive effect on reading achievement for 9 year olds. This unique effect has not been reported for other subject matters such as mathematics (Entwisle & Alexander, 1990) to our knowledge. Although race and gender have been studied separately for reading, math, and science (Haertel, Walberg, Junker, & Pascarella, 1981) they have rarely been examined in conjunction.

Family Socialization Approach

Family socialization has been argued to be critical factor in the achievement of minority students. According to a review by Slaughter-Defoe (1990) academic-achievement-socialization research with black children and families assumes a cultural perspective. Under achievement by black children has traditionally been attributed to reference to father absence and poverty. More recently it has been argued (Fowler & Richards, 1978; Heath, 1982) that the family discourse and communication styles of low income black homes may be incompatable with formal schooling. These studies suggest that low income black children are ill-equipped for the didactic, pedagogic communication of the first grade classroom because it is not valued or practiced in their families. Other investigators (Wilson & Allen, 1987) have added the personality factors to family socialization variables to predict achievement of black young adults. They reported that a combination of socialization, personality, and educational curricula was optimal for predicting educational attainment of 19-28

year olds. Most predictors using family socialization construct have not been unique to black students (Mackler, 1970; Ross & Glaser, 1973; Scott Jones (1987). Although Scott Jones (1987) reported that education level among black mothers increased their ability to teach their children a complex task, similar findings have been reported for both black and white populations (Pellegrini, Permutter, Galda, & Brody, 1990). Family socialization has a strong main effect on achievement, but these processes do not affected black males in different ways than other groups according to previous research.

Personal Identity Approach

A third approach to understanding minority achievement has been based on the perspective of personal identity and motivation. One of the more extreme positions has been taken by Ogbu (1987). He claims that black males acquire an "oppositional" identity at a young age. Ogbu (1987) views the society of the U.S.A., and the schooling system in which it is embedded, as "caste-like." He claims that accesses to jobs, income, prestige, power, and education are restricted for blacks. As a consequence, blacks acquire an oppositional cultural frame of reference. In this frame of reference a cultural inversion occurs in which specific behaviors, symbols, and meanings are considered inappropriate for blacks. Literacy and schooling are two of these symbols that are considered to be forbidden by those who acquire the oppositional identity. Students who adopt this identity are likely to be motivated to be successful in arenas that do not include schooling and literacy; and they are not motivated to be successful in the schooling enterprise.

Theories of motivation such as Harter's (1983) effectance motivation are related to Ogbu's (1987) concept of oppositional identity. Harter (1983) summarizes evidence that reward for achievement from such agents as reading teachers leads to intrinsic pleasure and satisfaction in reading. From this satisfaction springs intrinsic motivation for mastery and competence in reading and literacy. If students are not rewarded for reading achievement, their effectance motivation will not be well developed. Lack of reward for a particular student may be due to low achievement which does not earn reward, or failure of recognition by teachers. In either case, their willingness to commit effort to literacy and their competence motivation will be decoupled from achievement. The traditional linkage of achievement and motivation for reading may be broken. Bright students may choose to oppose the school norm, and to avoid the literacy of the classroom, homework, and testing that are legitimated by schools. In this perspective, low achievement of black males is attributed to low motivation for schooling and the decoupling of motivation from literacy activities.

Instruction Approach

Instructional programs for minority children, which represent a fourth approach, have been emphasized by Comer (1986, 1985) as well as other investigators (Holiday, 1985). Comer (1986, 1985) developed a School Development Model which was premised on the belief that the school as an institution can be improved through the application of social and behavioral science principles. The goals of his school program are to: 1) modify the climate to facilitate learning; 2)

improve achievement in basic skills; 3) raise motivation for learning mastery and achievement; 4) develop patterns of shared responsibility in decision making among parents and staff. His plan for implementation includes a mental health team that works with the school governance management body, a school governance body that meets regularly to carry out systematic school planning, a parental program that fosters participation of parent/teacher groups, and a curriculum staff development program that integrates academic arts, social, and extra curricular activities. Evaluations of this school program have been positive. Following a two-year trial in Connecticut and another similar trial in Minnesota, significant advantages were found for classroom behavior, group participation, attitude toward authority, school climate, and achievement in reading and math. These advantages consist of improvements over the prior standing of the school and advantages of the school in comparison to control schools (Comer, 1985). It should be noted that this intervention, as well as other interventions such as cooperative learning (Slavin, 1990) are based on instructional designs for all students. The males and females are treated identically and there is no distinction between the desirable interventions for whites and blacks. These studies suggest that effective pedagogy improves black male performance, but the studies do not suggest that a unique instructional strategy is needed for this social group.

Purpose

The purpose of the present study was to examine variables that represent the domains of family socialization, personal motivation, and instructional programs for four social groups consisting of: black males, white males, black females, and white females. We attempted to determine whether these factors influence achievement in similar ways across the groups. We intended to examine the influences of these factors on achievement (in terms of variances account for) and whether they were similarly patterned (in terms of the linearity and non-linearity of the association) across race and gender groups.

METHOD

Sample Selection and Data Collection

This study is a reanalysis of the 1986 NAEP (National Assessment of Eudcational Progress) study in reading. This section briefly describes the features of the 1986 NAEP sample design and data collection. Detailed discussion can be found in User Guide (Roger, Kline, and et. al., 1988). The sample for the 1986 NAEP assessment was selected using a complex multistage sample design involving four stages. In the first stage, the United States was divided into 94 geographic primary sampling units (PSU). In the second stage, schools within each PSU were selected without replacement with probabilities proportional to the number of eligible students. Probabilities of selection for high-minority schools were twice those for other schools to enlarge the sample for Black and Hispanic students for the sake of enhancing reliability of estimatation. The third stage involved assigning three types of samples. One of the three samples, designated spiralled, is our target population. In the fourth stage of sampling, a consolidated list of all eligible students was listed

for each selected school and systematic selection of students was made to develop the target sample size. To be conservative when performing regression analyses, the number of subjects of each age group was determined as a quotient of unweighted total number of spiralled sample divided by the number of blocks of items. As a result, N = 926 (dividing 21287 by 23) for age 9, N = 922 (dividing 27668 by 30) for age 13, and N = 947 (dividing 39753 by 42) for age 17.

Instrument Design

In each subject area, two sets of items, attitudinal items and cognitive items, were developed to be administered to each student. The contractor, Educational Testing Service, assigned items to students by means of balanced incomplete block design with spiralled administration. Items within a subject area were assembled into sixteen-minute blocks, each block comprising 2 minutes of attitude items and 14 minutes of cognitive items. Each student was administered a booklet containing 3 subject area blocks and a block of common background items, for a total testing time of approximately 54 minutes. The order of booklets for each grade/age was spiralled in such a way that no two students in any one assessment session received the same booklet. Reading achievement, as a dependent variable in our study, was comprised of 69 items for age 9, and 74 items in common for ages 13 and 17. Due to the spiralled sample, students who were assigned reading items did not take more than 14 cognitive reading items for one administration. Reading scores have been rescaled using 3 parameter item response model to form a 100-point scale. Each student thus has one reading score to represent his or her reading achievement level.

Factor Analyses

Based on the purpose of the present study and an inspection of reading related items in the NAEP data set, five conceptual categories, home literacy, study strategies, teachers' instruction, general reading activities, and library-involved activities (age 9 group does not have this category) were expected to be associated with reading achievement. Items which logically can be classified under these categories were selected for analysis. The age 9 group had 16 items in home literacy, 9 items in study strategies, 9 items in teachers' instruction, and 13 items in general reading activities, for a total of 47 items. The groups of age 13 and 17 share the same items. They had 17 items in home literacy, 9 items in study strategies, 14 items in teachers' instruction, 13 items in general reading activities, and 5 items in library-involved activities, for a total of 58 items.

At each age level, exploratory principal factor analyses with varimax rotation were performed using all selected items across categories. Based on these results the conceptual categories were revised by moving items or subdividing categories to form psychological constructs. For example, the constructs, social interactions and oral reading activities were newly formed; the conceptual category, teachers' instruction was divided into two constructs, teacher-directed instruction and student-centered instruction; the category of general reading activities was broken into general reading activities and news reading activities for age

13, and into fiction reading, non-fiction reading, and news reading for age 17. A final allocation of items to constructs was developed such that the constructs were consistent as much as possible across the three ages (see Table 1). For example, the construct 'home literacy' consists of the same six items for each age; the newly formed construct 'social interaction' consists of seven common items for all three ages and one item unique to age 9. Ten constructs were identified: fiction reading, non-fiction reading (these were combined into general reading at ages 9 and 13), news reading, library-involved activities, study strategies, home literacy, social interactions, teacher-directed instruction, student-centered instruction, and oral reading.

After the structure was set, factor analyses with maximum likelihood estimation procedure installed in LISREL were conducted to determine their unidimensionality and to obtain reliability indices, goodness of fit indices and standardized factor coefficients. Internal consistency, a traditional method to estimate reliability, can not be used in the present study due to the problem of spiralled sampling design; therefore the index used in LISREL was adopted, which is expressed by coefficient of determination as :

$$R = 1 - \frac{|\hat{\theta}|}{|\hat{\Sigma}|}$$

where $\hat{\theta}$ is estimated error variance, and $\hat{\Sigma}$ is fitted covariance matrix of observed variables.

Results indicated that reliability indices of constructs ranged from .49 to .87, while goodness of fit indices ranged from .94 to .99, which suggests that the constructs we developed are unidimensional and sufficiently reliable for use in the present study. Table 1 gives the indicators for each construct and their loadings.

Covariance Matrices

As described in the session of sampling procedure, no subject was measured on all indicators, even for a single given construct. One way to predict dependent variables using an independent construct is to calculate the factor score on the construct for each subject and then the resulting scores as an independent variable. However, if this method were used in the present study, all subjects would have had scores only on one or two indicators of a given construct due to the spiralled sampling design. To overcome the deficit of the data set, a method using covariance matrices was developed.

We weighted indicators, x_i's equally to their corresponding construct, X. So that

$$\text{Var}(X) = \text{Var}\left(\sum_{i=1}^{I} x_i\right) = \sum_{i=1}^{I} \text{Var}(x_i) + \sum_{i \neq j} \text{Cov}(x_i \cdot x_j). \qquad (1)$$

To fulfill equation 1 in our case to get Var (X), we first produced a covariance matrix of x_i's. This matrix contained variance of each x_i as well as covariance of each pair of x_i and x_j. With the matrix available, we used the following procedure to calculate the variance of construct X, given an example that the construct contained

4 indicators:

$$\text{Var}(X) = \begin{bmatrix} 1 & 1 & 1 & 1 \end{bmatrix} * \begin{bmatrix} s^2_1 & s_{12} & s_{13} & s_{14} \\ s_{21} & s^2_2 & s_{23} & s_{24} \\ s_{31} & s_{32} & s^2_3 & s_{34} \\ s_{41} & s_{42} & s_{43} & s^2_4 \end{bmatrix} * \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

To get a quadratic form of a construct, we need to use the formula as follows:

$$\text{Var}(X^2) = \text{Var}\left(\left(\sum_{i=1}^{I} x_i \right)^2 \right)$$

$$= \text{Var}\left(\sum_{i=1}^{I} x_i^2 + \sum_{i \neq j} (x_i * x_j) \right) \qquad (2)$$

With the same example, covariance matrix of linear form and quadratic form of a construct is produced by:

$$\begin{matrix} & X & X^2 \end{matrix}$$

$$\begin{bmatrix} S^2_1 & S_{12} \\ S_{21} & S^2_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \end{bmatrix} *$$

$$\begin{matrix} x_1 & x_2 & x_3 & x_4 & x^2_1 & x^2_2 & x^2_3 & x^2_4 & 2x_1x_2 & 2x_1x_3 & 2x_1x_4 & 2x_2x_3 & 2x_2x_4 & 2x_3x_4 \end{matrix}$$

$$\begin{bmatrix} & & & & & & & & & & & & & \\ & & & & & & & & & & & & & \\ & & & & & S_{i.j} & & & & & & & & \\ & & & & & & & & & & & & & \\ & & & & & & & & & & & & & \end{bmatrix} * \begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 1 & 0 \\ 1 & 0 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \end{bmatrix}$$

Since reading achievement as a dependent variable, Y, has to be included in the covariance matrix, we added the dependent variable in the matrix of indicators in order to form covariance with the construct. An example would be like this:

$$\begin{matrix} X & X^2 & Y \end{matrix}$$

$$\begin{bmatrix} \\ S_{i,j} \\ \\ \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} *$$

$$\begin{matrix} x_1 & x_2 & x_3 & x_4 & x^2_1 & x^2_2 & x^2_3 & x^2_4 & 2x_1x_2 & 2x_1x_3 & 2x_1x_4 & 2x_2x_3 & 2x_2x_4 & 2x_3x_4 & Y \end{matrix}$$

$$\begin{bmatrix} \\ S_{i,j} \\ \\ \end{bmatrix} * \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 0 \\ 1 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Regression Model Comparisons

Previous research indicated low linear associations between reading activities and reading achievement for elementary school children, high school studerts, and adults (Guthrie and Greaney, 1991). Our preliminary linear regression results have similar tendency, which led us to consider quadratic regression model to evaluate potential nonlinear effects. For each construct we conducted a linear as well as a quadratic regression analyses for reading achievement with race, sex, and the construct itself as independent variables. The linear regression model was preferred if it explained a significant amount of variance of reading achievement and thd quadratic regression did not account for the variance to a significant degree beyond the linear one. If the quadratic form of the independent construct added a significant amount of explained variance after the linear form had been exhausted, the quadratic model was preferred.

A Johnson-Neyman technique was applied when final models were determined to be non-parallel regression models. For each non-parallel model, there were 6 pairs of Johnson-Neyman comparisons. Details about applying Johnson-Neyman technique containing linear or quadratic forms of an independent variable can be found in Schafer and Wang (1991).

RESULTS

For each construct, we created an ordered regression summary table to describe linear as well as quadratic association of the construct with reading achievement. Race and sex were coded as dummy variables. Each independent input used to explain reading achievement accounted for one degree of freedom. In linear association (see Table 2 for an example), we first considered if the construct explained reading achievement to a significant degree; secondly, we checked if race difference accounted for some variance; thirdly, sex difference was considered; fourthly, interaction between race and sex was

examined; finally, regression lines of four social groups were checked to see if they differed in slope. In quadratic regression model, a similar procedure was followed with 11 degrees of freedom being used (see Tables 3 to 24). The order of independent inputs was ordered similarly. importance. A significant quadratic association between the construct and the reading achievement led us to do a model comparison to decide if the quadratic form accounted for significant incremental variance after the linear form had been considered (for an example, see Table 25). Equations corresponding to final decisions were produced in order to draw regression graphs (see figures 1 to 34). For all analyses we found significant differences in intercepts for the four race-sex groups assuming parallel linear models.

The age 9 group produced non-parallel quadratic model for the construct of study strategies. The age 13 group produced non-parallel quadratic models for the constructs of teacher-directed instructions, oral reading, general reading and news reading. The age 17 group produced non-parallel quadratic models for the constructs of student-centered instruction, oral reading, study strategies, and news reading. A Johnson-Neyman technique was applied to all non-parallel linear and quadratic models. Figures of important non-parallel models were provided to display the interactions among the social groups. Detailed explanations of the results for each construct for the three age groups are provided:

Age 9

HOME LITERACY. The linear predictor accounted for 6% of the variance ($F = 67.27$, $P < .0000$) while the squared predictor accounted for less than 1% of the variance (see Table 3). There was no interaction between dummy variables (i.e. race and sex) and the predictor. The selected model is of parallel linear form as shown in Figure 1.

SOCIAL INTERACTIONS. The linear predictor accounted for 2% of the variance ($F = 16.26$ and $P < .0001$, see Table 4). Since we found a non-significant quadratic association with reading achievement, a parallel linear model was selected. The construct related to reading achievement negatively (see Figure 2).

TEACHER-DIRECTED INSTRUCTION. Linear association accounted for 4% of the variance of reading achievement in the negative direction ($F = 37.89$, $P < .0000$, see Table 5). No other independent variable significantly explained reading achievement except for race and sex. Thus the final model selected was parallel linear one in negative direction as shown in Figure 3.

STUDY STRATEGIES. The construct did not explain the association to a significant degree in either linear or quadratic forms until race and sex were entered. Non parallel quadratic regression accounted for a significant amount of variance (see Table 6). As a result, a non-parallel quadratic model was selected. With an application of Johnson-Neyman procedure, black males were significantly different from white males at the range of study strategies index of 1.38 to 6.51 (maximum is 8), while different from black females when the index is larger than 5.30 (see Figures 4 to 6).

GENERAL READING ACTIVITIES. The model selected for this construct is a parallel linear one with significant linear association ($F = 9.59$, $p < .0020$). Interactions of race by predictor, sex by

predictor, and race by sex by linear predictor, using 3 degrees of freedom, did not have significant contribution but the single interaction of race by predictor did have a significant contribution (see Table 7). The linear relationship between the construct and reading achievement is negative (see Figure 7).

Age 13

HOME LITERACY. Linear association of home literacy with reading achievement was significant ($F = 66.53$ and $P < .0000$, see Table 8). Because race by squared predictor developed a significant result, a model comparison of linear versus quadratic was conducted. The resulted non-significant quadratic effect led us to select a parallel linear model (see Figure 8.)

SOCIAL INTERACTIONS. A parallel linear model was selected accounting for a total R^2 of .11 (see Table 9 and Figure 9).

STUDENT-CENTERED INSTRUCTION. The predictor did not associate with reading achievement significantly in quadratic form with $F = 2.06$ and $P = .0845$ (see Table 10). However, a non-parallel linear model was selected because the interaction of the dummy variables with predictor had a significant contribution ($F = 2.61$ and $P < .05$) Black males were different from white males in reading achievement through most of the range of student-centered instruction index, while different from black females when the instruction index was below 2.95 (see Figures 10 to 12).

TEACHER-DIRECTED INSTRUCTION. A non-parallel quadratic model was selected for this construct with a total of 21% variance accounted for. The interaction of race by sex by squared predictor explained was significant ($F = 63.29$ and $P < .0000$, see Table 11). Black males' reading achievement scores were significantly different from white males' where teacher-directed instruction index was lower than 1.86 and above 2.81 (maximum is 5), while they were significantly different from black females where the index was below 2.84, according to Johnson-Neyman results (see Figures 13 to 15).

STUDY STRATEGIES. The linear predictor did not account for a significant amount of variance and neither did squared predictor, whereas when considering race and sex, 10% of total variance was explained. A parallel linear model was selected ($F = 64.80$ and $P < .0000$, see Table 12).

LIBRARY-INVOLVED READING ACTIVITIES. A parallel quadratic model was selected with 13% of variance being accounted for (see Table 13).

GENERAL READING ACTIVITIES. A non-parallel quadratic model was selected (see Table 14). Figure 16 shows that black males presented a peculiar regression line different from all others. The pattern of differences of black males from white males was similar to the one from black females. Both groups were significantly different from each other in the middle, high, and low ranges while not different at the ranges around 2 and around 7, see Figures 17 and 18.

NEWS READING ACTIVITIES. A non-parallel quadratic model was selected with 32% of variance has been accounted for (see Table 15). Black males were significantly different from white males throughout the range of the news reading index. Black males were also significantly different from black females except at the range from 2 to 3 (maximum is 5, see Figures 19 to 21).

Age 17

HOME LITERACY. This construct had a strong linear relationship with reading achievement ($F = 62.22$ and $P < .0000$, see Table 16). A parallel linear model was selected with 13% variance accounted for.

SOCIAL INTERACTIONS. A non-parallel quadratic model was selected accounting for 14% of variance (see Table 17). Black males were significantly different from white males in reading achievement through almost the entire range of social interaction index. Black females were significantly higher and ascending at a higher rate than black males in reading achievement when the social interaction index was above 2.35 (see Figures 22 to 24).

STUDENT-CENTERED INSTRUCTION. This construct had significant linear association with reading achievement ($F = 13.32$ and $P < .0003$, see Table 18). A parallel linear model was selected to the relationship (see Figure 25).

TEACHER-DIRECTED INSTRUCTION. A parallel quadratic model was selected accounting for 12% of the variance (see Table 19). Teacher-directed instruction was related to reading achievement positively up to 2 and then negatively as the index increased further (see Figure 26).

STUDY STRATEGIES. A non-parallel quadratic model was selected to describe the association with 12% of the variance being accounted for. Groups were found to be parallel within races, but non-parallel between races (see Figure 27). The Johnson-Neyman procedure indicated that black males were not significantly different from black females, but were significantly different from white males in reading achievement when the study strategies index was below 3.91 (see Figures 28 and 29).

LIBRARY-INVOLVED READING ACTIVITIES. A parallel quadratic model was selected with 9% of variance being accounted for (see Table 21 and Figure 30).

NON-FICTION READING ACTIVITIES. A parallel linear model was selected to describe the association between the construct and reading achievement (see Table 22). The squared predictor did not explain significant variance beyond linear association (after 7 degrees of freedom entered) despite the fact that its incremental R^2 was significant if entered second (see Table 22).

FICTION READING ACTIVITIES. A parallel linear model was selected to describe the relationship between the construct and reading achievement (see Figure 31). Linear association explained 1.4% of the variance (see Table 23). Four parallel linear regression lines were needed because both dummy variables contributed significantly.

NEWS READING ACTIVITIES. A Non-parallel quadratic model was selected to explain the relationship (see Table 24). The Johnson-Neyman comparisons indicated that black females were not significantly different from black females throughout the range of news reading index; whereas, black males were significantly different from white males across almost the entire range (see Figures 32 to 34).

DISCUSSION

The four social groups in this study may be described in terms of three of the four theoretical approaches to understanding minority achievement that were presented in the introduction. The first approach was family socialization which was operationalized in this

study in the construct of home literacy. This construct consisted of the availability of books, newspapers, and magazines as well as the value of literacy activities in the family. Home literacy had a positive, linear effect on achievement for all social groups, including black males, at ages 9, 13, and 17. These findings indicate that the strength of association for home literacy and achievement is similar for black males and other groups. Furthermore, the shape of the influence of home literacy on reading achievement is linear for black males as well as the other social groups. A remarkable finding in this data analysis is the size of the achievement gap between black males and other social groups. At age nine, the reading achievement of the black males with the highest level of home literacy was not higher than the reading achievement of white males at the lowest levels of home literacy. From these data, family socialization variables appear to act in similar ways in all social groups. Advantages in home literacy confer advantages in reading achievement at all levels of the home literacy scale for all ages in the study. Therefore, the data do not suggest that black males are unusual or inordinate in terms of how school achievement is mediated by family socialization factors.

At age 13, the black male students appear to be unique from two major theoretical perspectives. First, we observed a striking pattern in the association between general reading activities and reading achievement in this age group. Association of these variables was markedly nonlinear for black males whereas it was essentially flat for the other three social groups. As Figure 16 to 18 shows, black males who were high achievers were divided into two subgroups. One group of the high achievers reported a high amount of general reading activities. Their reported volume of reading was similar in magnitude to the highest levels of general reading activities among white males, black females, and white females. A second group of black males who were high achievers reported very low amounts of general reading activities or none at all. General reading may be viewed as not only an act that fosters reading achievement but also as a symbolic choice with respect to the school culture. The first subgroup of black males appear to choose the school culture as a medium for success. They reported reading avidly from a wide range of sources and to embrace literacy as a vehicle for identity and accomplishment. The second subgroup of black males may have adopted an oppositional identity (Ogbu, 1987). They appeared to be bright students who were competent readers but they choose to avoid literacy and schooling.

These data suggest that Ogbu's (1987) view of oppositional identity was supported for one subgroup of black males. Black males, however, were a heterogeneous social group because a traditionally achievement-oriented subgroup was clearly identified in addition to the oppositional group. These finding suggest that black males at age 13 are unique from the other social groups in the shape of the relationship between their literacy activities and their reading achievement levels.

At age 13 the black male group also appeared to be distinct from other social groups in the nature of the relationship between instruction and reading achievement. For black males the construct of teacher directed instruction seemed not to be associated with the level of reading achievement. A similar (flat) relationship appeared

for student-centered instruction and reading achievement. Students who received high amounts of these types of instruction were as likely to be high achievers as they were to be low achievers. Students who received low amounts of both of these forms of instruction were as likely to be high achievers as they were to be low achievers. This lack of association between instruction and achievement suggests that teachers of 13 year olds were not adapting their teaching strategies to the achievement levels of black male students.

Unlike black male students, black female students had a substantial relationship between teacher directed instruction and achievement. Black female students who were lower achievers received higher amounts of directed teaching; and teachers provided lower amounts of this directed instruction for black females who were higher achievers. Teachers permited high achieving black females to read independently on their own, pursuing their own interests. The data for white males was consistent with the data for black females, showing a strong association between explicitness of instruction and reading achievement. Teachers provided more explicit, directed instruction for lower achieving males than for higher achieving males. Black males were unique in the shape of the association between instructional explicitedness and achievement. Black males were unique in the sense that there was a lack of relationship between these constructs whereas there was a clearly adaptive and probably a healthy relationship between these variables for black females and white males.

These findings may be combined with the Winfield and Lee (1986) reanalysis of NAEP data (1983-84). Their study showed that the achievement of black males at age 9 was inordinately low. Race and gender in those data interacted to produce disproportionally low achievement for black males. This circumstance has been succeeded by a unique situation for black males at age 13. It appears that the black males at age 13 have responded to their uniquely low performance in one of two motivational forms, either becoming more highly active in their literacy choices or becoming oppositional and avoidant of literacy. Teachers seem not to have responded to their reading achievement needs as they have for other social groups. The combination of the identity-motivational findings and the failure of instructional appropriation suggests that the middle school crisis is more pervasive for black males than the other social groups.

At age 17, the black males appear to be more similar to the other social groups than they were at age 13. At 17, the instructional variable of student centered instruction had a positive linear, parallel effect for all groups. More student-centered instruction was provided for higher achieving students than for lower achieving students. The teaching program was as responsive to the achievement levels of black males as it was to the achievement levels of other social groups.

Literacy choices of black males at 17 possess a relationship to achievement that is similar to the relationship of literacy choices and achievement of the other social groups. The study strategies of black males increased with reading achievement. This increase was nearly identical to the shape and strength of the increase for black females.

Black males and white males were highly similar, but not

identical to each other in terms of the relationship of study strategies to achievement. Black and white males who reported a high number of study strategies had equal reading achievement; however, the black males who reported a lower number of study strategies (below about three strategies) had a significantly lower achievement than white males. The positive effect of study strategies on achievement was higher for black males than white males.

The literacy choice represented by reading the news showed a positive relationship with reading achievement for black males and for all social groups. Higher amounts of news reading were associated with higher amounts of reading achievement. The strength and shape of the association was similar for all social groups. Social interaction with regard to reading is another form of literacy choice that was positively related to achievement for all social groups. The strength of the relationship was higher for white males and the black females than black males. At the highest levels of social interaction (higher than 5 on the scale) the black females and white males had significantly higher achievement than comparable black males. However, social interaction had a positive influence on reading achievement and this influence increased across the scale for all three groups.

The similarity of black males at age 17 to other social groups may be partially due to the high rate of drop out from high school in this group. According to the Condition of Education (1987) 27 percent of black males who attended their sophomore year dropped out of high school before their expected graduation. The comparable figure for white males was 15 percent. The black males at age 13 adopted an oppositional identity and did not appear to be motivated for schooling. They undoubtedly constitute the group of students who dropped out of school. In the absence of this subgroup of black males, the in-school population of black males at age 17 appears to be similar to other groups. In-school black males appear to be engaged in school life and to chose reading activities, study strategies, and social interaction patterns around literacy that are associated with reading achievement. These patterns of literacy choice have high utilities in the mainstream culture and appear to provide a firm base for academic achievement.

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Table 1

Factor Structure of Constructs for Three Age Groups

		9	13*	17
	HOME LITERACY (HL)			
HL1	Does your family get a newspaper regularly?	.11	.16	.14
HL2	Does your family get magazines regularly?	.12	.18	.17
HL3	Are there more than 25 books in your family?	.13	.10	.08
HL4	Is there an encyclopedia in your family?	.27	.20	.15
HL5	Is there a dictionary in your family?	.10	.07	.04
HL6	Does your family own computer with keyboard and screen?	.10	.13	.10
	SOCIAL INTERACTIONS (SI)	9	13**	17**
SI1	During the last month how often did you talk with your friends about something you read?	.21	.34	.35
SI2	During the last month how often did you talk with someone at home about something you read?	.20	.38	.33
SI3	How often do you have papers been printed in school work?	.07	.24	.15
SI4	How often have you shown friends your writings?	.17	.27	.31
SI5	How often do people in your family read papers you have written?	.04	.31	.31
SI6	How often does someone at home ask about school work?	.10	.22	.20
SI7	Does your family have rules about amount or TV watched?	.08	.17	.12
SI8	How often do you tell a friend about a good book?	.14	n/a	n/a
	TEACHER-DIRECTED INSTRUCTION (TI)	9**	13	17
TI1	How often does your teacher point out hard and new words when you get something new to read?	.18	.23	.24
TI2	How often does your teacher tell a little about what you will be reading when you get something new to read?	.13	.15	.14
TI3	How often does your teacher tell how to find the main idea of a paragraph when you read?	.17	.11	.17
TI4	How often does your teacher tell you how to read faster when you read?	.13	.10	.08
TI5	How often does your teacher give you a list of questions to answer when you read?	.18	.11	.13
	STUDENT-CENTERED INSTRUCTION (SC)	9*	13	17
SC1	How often does your teacher ask you to give your ideas or opinions about what you are reading?	n/a	.22	.25

SC2	How often does your teacher ask you which part of story or article supports your ideas or opinions?	n/a	.26	.26
SC3	How often does your teacher ask you questions about how one idea or story is like another?	n/a	.18	.21
SC4	How often does your teacher point out how authors choose words for a special effects?	n/a	.16	.20
SC5	How often does your teacher have small groups of students read and discuss the same novel or library book?	n/a	.12	.14

ORAL READING (OR)

		9	13	17
OR1	How often do you read out loud in school?	.26	.42	.27
OR2	How often does your teacher read parts out loud, or ask someone to do it when get something new to read?	.11	.07	.05
OR3	How often do you read to someone else?	.22	n/a	n/a
OR4	How often does someone read aloud to you?	.19	n/a	n/a

STUDY STRATEGIES (SS)

		9	13	17
SS1	How often do you take notes on what you read when you study for a test?	.22	.23	.24
SS2	How often do you make outlines when you study for a test?	.23	.19	.20
SS3	How often do you read the materials over a few times when you study for a test?	.13	.18	.16
SS4	How often do you answer the questions in the textbook?	.08	.15	.16
SS5	How often do you work with somebody else and ask each other questions when you study for a test?	.13	.15	.15
SS6	How often do you answer the questions that you make up?	.13	.20	.16
SS7	How much do you usually spend on homework each time when you study for a test?	.06	.09	.14
SS8	How often do you work in a workbook?	-.01	.06	.07

LIBRARY-INVOLVED READING ACTIVITIES (LR)

		9	13	17
LR1	How often do you go to the library to read on your own just for fun?	n/a	.20	.17
LR2	How often do you go to the library to have a quiet place to read?	n/a	.23	.19
LR3	How often do you go to the library to take out books?	n/a	.18	.13
LR4	How often do you go to the library to find books to help you with your hobbies?	n/a	.16	.09
LR5	How often do you go to the library to look up facts for school?	n/a	.14	.09

Age 9 -- GENERAL READING (GR)
Age 13 -- GENERAL READING (GR)
Age 17 -- FICTION READING (FR) and NON-FACTION READING (NF)

	GENERAL - 9	9	13	17
GR1	How often do you read comic books?	.16	n/a	n/a
GR2	How often do you read a book after you see a TV show or movie that was based on the book?	.15	n/a	n/a
GR3	How often do you read more than one book by an author you like?	.16	n/a	n/a
GR4	How often do you read for fun on your own time?	.18	n/a	n/a

GENERAL - 9, GENERAL - 13, FICTION - 17

		9*	13	17
FR1	How often do you read on your own in school?	n/a	n/a	.17
FR2	How often do you read part of story of a novel?	n/a	n/a	.19
FR3	How often do you read a poem?	n/a	n/a	.12
FR4	How often do you read a play?	n/a	n/a	.06
GR5(FR5)	How often do you read the words of a song?	n/a	.13	.17
GR6(FR6)	How often do you read a book about other times or other places?	.15	.11	.17

GENERAL - 9, GENERAL - 13, NONFICTION - 17

GR7(NF1)	How often do you read sports book?	.17	.12	.12
GR8(NF2)	How often do you read a biography?	.15	n/a	.04
GR9(NF3)	How often do you a science book?	n/a	.10	.09
GR10(NF4)	How often do you a magazine?	.15	.24	.23
GR11(NF5)	How often do you read a news magazine?	.12	.13	.12
GR12(NF6)	How often do the people you live with read magazines?	n/a	.24	.27
GR13(NF7)	How often do people you live with read recipes or instructions on how to do something?	n/a	.17	.21
GR14(NF8)	How often do people you live with read books?	n/a	.16	.21

NEWS READING ACTIVITIES (NW)

		9*	13	17
NW1	How often do you read a newspaper?	n/a	.27	.39
NW2	How often do you read parts of the newspaper besides the comics and sports section?	n/a	.33	.32
NW3	How often do you read a news magazine?	n/a	.13	.15
NW4	How often do you watch news on television?	n/a	.13	.14
NW5	How often do the people you live with read newspaper?	n/a	.12	.16

* The unweighted covariance matrix was used.
** Since both wiehghted and unweighted covariance matrices were not positive definite using LISREL, weighted covariance matrix was thus used as input for SAS to conduct a principal factor analysis.

Table 2

Linear Association between General Reading Activities and Reading Achievement for Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Predictor	.00395	.00395	1	234.915	234.915	4.051	.0444
Race	.06095	.057	1	3386.289	3386.289	58.394	.0000
Sex	.09931	.03836	1	2279.149	2279.149	39.302	.0000
Race * Sex	.09934	.00003	1	1.673	1.673	0.029	.8648
Slopes	.10786	.00852	3	506.125	168.708	2.909	.0337
Residual			914	53002.796	57.990		

Table 3
Ordered Regression Source Table for Home Literacy at Age 9

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0630	0.0630	1	4414.86	4414.86	67.27	.0000
Pred.^{2}	0.0638	0.0008	1	57.13	57.13	.87	.3511
Race	0.1256	0.0618	1	4331.71	4331.71	66.00	.0000
Sex	0.1393	0.0135	1	946.85	946.85	14.43	.0001
Race*Sex	0.1401	0.0009	1	65.25	65.25	1.00	.3190
R * Pred.	0.1428	0.0027	1	190.64	190.64	2.90	.0886
S * Pred.	0.1432	0.0005	1	34.42	34.42	0.52	.4691
R*S*Pred.	0.1433	0.0000	1	3.30	3.30	0.05	.8226
R * Pred.^{2}	0.1439	0.0005	1	36.17	36.17	0.55	.4580
S * Pred.^{2}	0.1439	0.0000	1	0.03	0.03	0.00	.9842
R*S*Pred.^{2}	0.1439	0.0001	1	4.70	4.70	0.07	.7890
Residual			914	59985.53	65.63		

Figure 1. Regression Lines on Home Literacy at Age 9 for 4 Social Groups

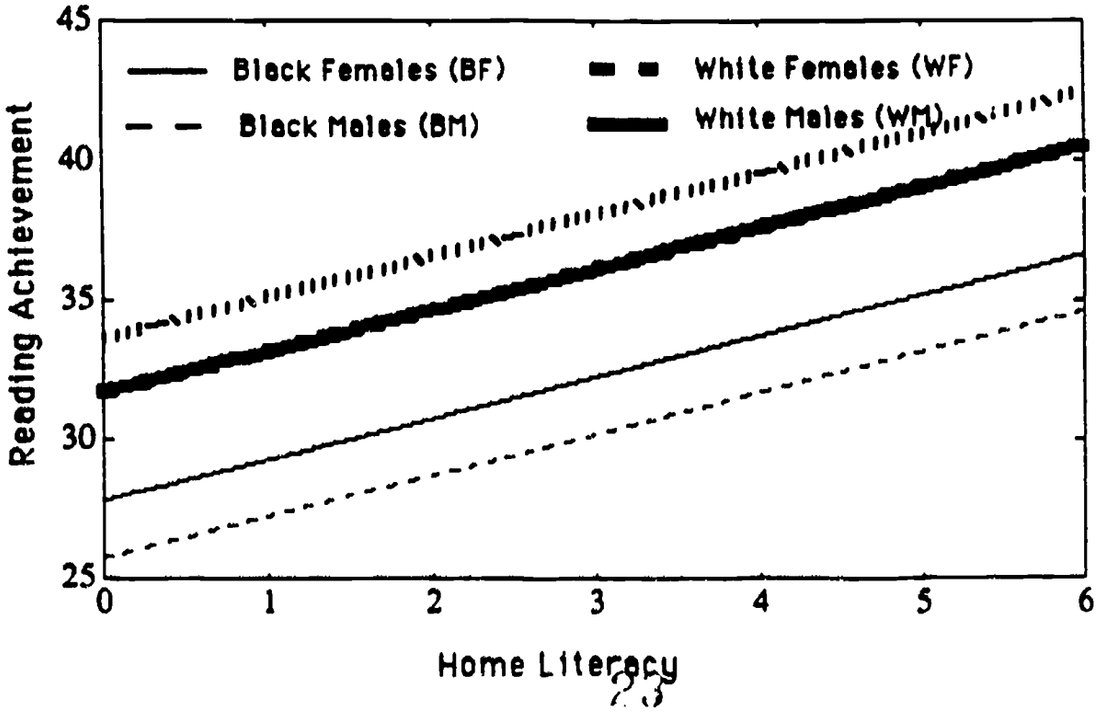

Table 4

Ordered Regression Source Table for Social Interactions at Age 9

Sourc	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0157	0.0157	1	1101.62	1101.62	16.26	.0001
Pred.^{2}	0.0213	0.0055	1	387.21	387.21	5.72	.0170
Race	0.0989	0.0776	1	5437.81	5437.81	80.26	.0000
Sex	0.1106	0.0118	1	825.74	825.74	12.18	.0005
Race*Sex	0.1118	0.0012	1	82.86	82.86	1.22	.2691
R * Pred.	0.1120	0.0002	1	12.31	12.31	0.18	.6700
S * Pred.	0.1132	0.0012	1	82.55	82.55	1.22	.2700
R*S*Pred.	0.1134	0.0003	1	18.65	18.65	0.28	.6000
R * Pred.^{2}	0.1139	0.0004	1	29.29	29.29	0.43	.5110
S * Pred.^{2}	0.1152	0.0014	1	96.65	96.65	1.43	.2326
R*S*Pred.^{2}	0.1163	0.0011	1	74.26	74.26	1.10	.2954
Residual			914	61921.68	67.75		

Figure 2. Regression Lines on Social Interactions at Age 9 for 4 Social Groups

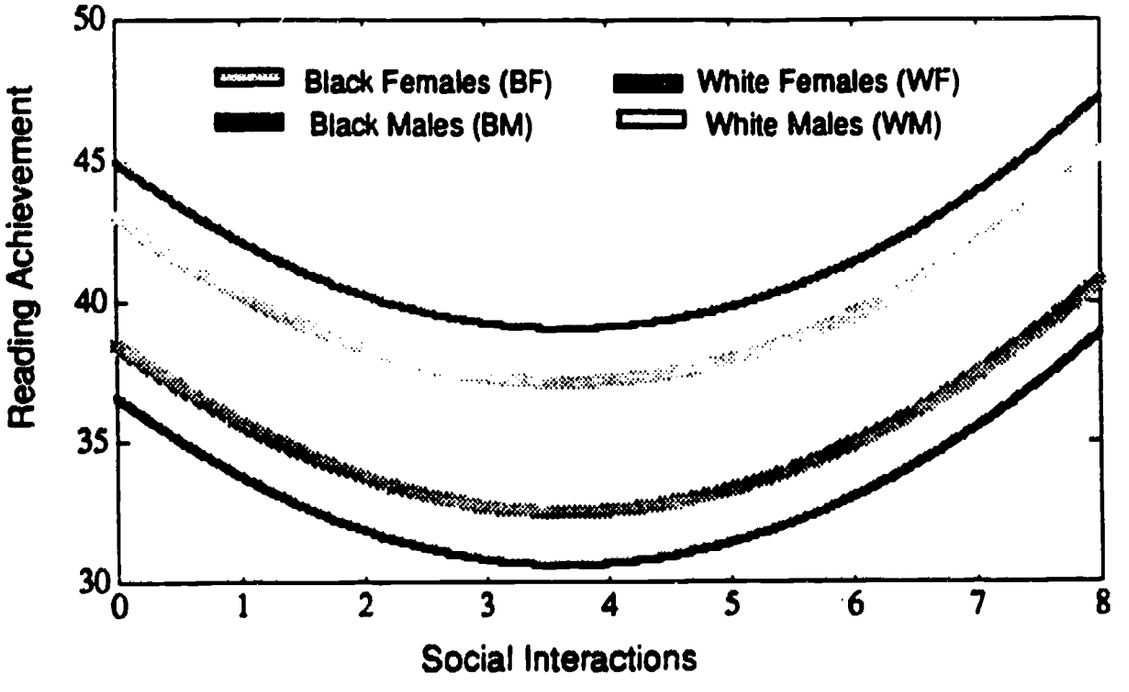

Table 5

Ordered Regression Source Table for Teacher-Directed Instruction at Age 9

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0363	0.0363	1	2541.19	2541.19	37.89	.0000
Pred.^{2}	0.0367	0.0005	1	33.05	33.05	0.49	.4829
Race	0.1041	0.0673	1	4717.48	4717.48	70.33	.0000
Sex	0.1165	0.0124	1	868.95	868.95	12.96	.0003
Race*Sex	0.1182	0.0018	1	123.41	123.41	1.84	.1753
R * Pred.	0.1190	0.0007	1	50.36	50.36	0.75	.3865
S * Pred.	0.1216	0.0027	1	186.30	186.30	2.78	.0959
R*S*Pred.	0.1227	0.0011	1	79.00	79.00	1.18	.2781
R * Pred.^{2}	0.1233	0.0006	1	36.30	36.30	0.54	.4621
S * Pred.^{2}	0.1250	0.0017	1	119.98	119.98	1.79	.1814
R*S*Pred.^{2}	0.1251	0.0002	1	10.26	10.26	0.15	.6958
Residual			914	61304.31	67.07254		

Figure 3. Regression Lines on Teacher-directed Instruction for 4 Social Groups at Age 9

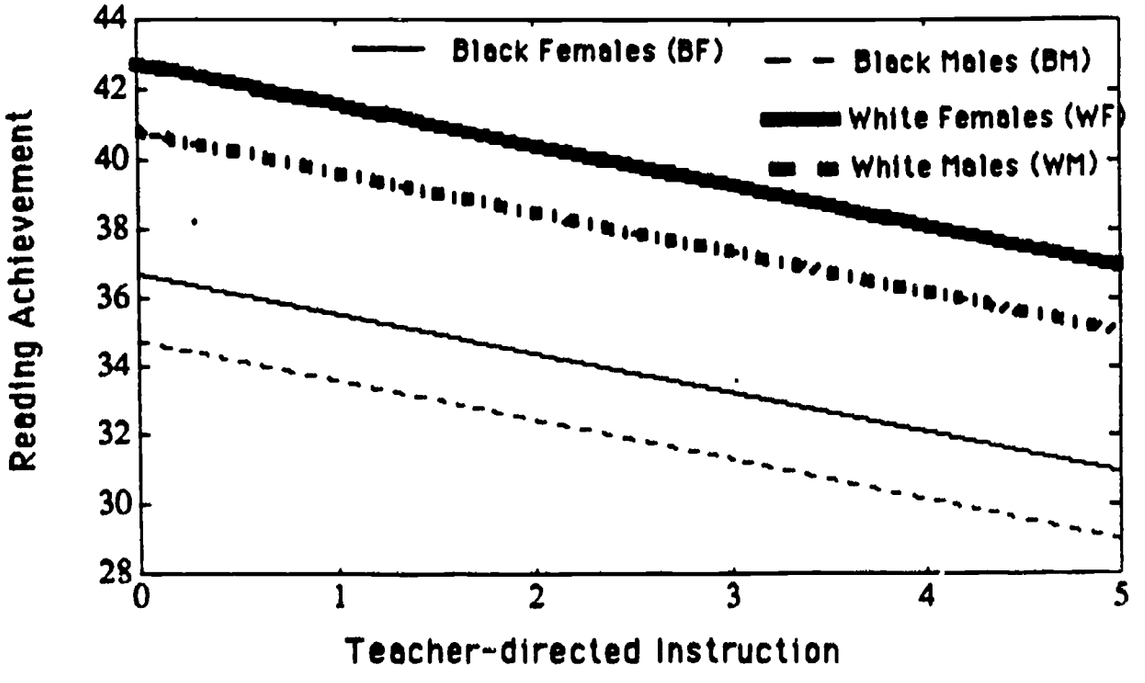

Table 6

Ordered Regression Source Table for Study Strategies at Age 9

Source	R^{-2}Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0005	0.0005	1	32.55	32.55	0.48	.4897
Pred.^{2}	0.0005	0.0000	1	0.36	0.35	0.01	.9421
Race	0.0821	0.0816	1	5719.44	5719.44	83.92	.0000
Sex	0.0943	0.0122	1	853.93	853.93	12.53	.0004
Race*Sex	0.0957	0.0015	1	101.99	101.99	1.50	.2215
R * Pred.	0.0989	0.0032	1	222.82	222.82	3.27	.0709
S * Pred.	0.0990	0.0000	1	2.41	2.41	0.04	.8508
R*S*Pred.	0.1022	0.0032	1	225.51	225.51	3.31	.0692
R * Pred.^{2}	0.1028	0.0007	1	46.74	46.74	0.69	.4078
S * Pred.^{2}	0.1101	0.0073	1	508.93	508.93	7.47	.0064
R*S*Pred.^{2}	(Not entered)						
Residual			915	62355.92	68.15		

Figure 4. Regression Lines on Study Strategies for 4 Social Groups at Age 9

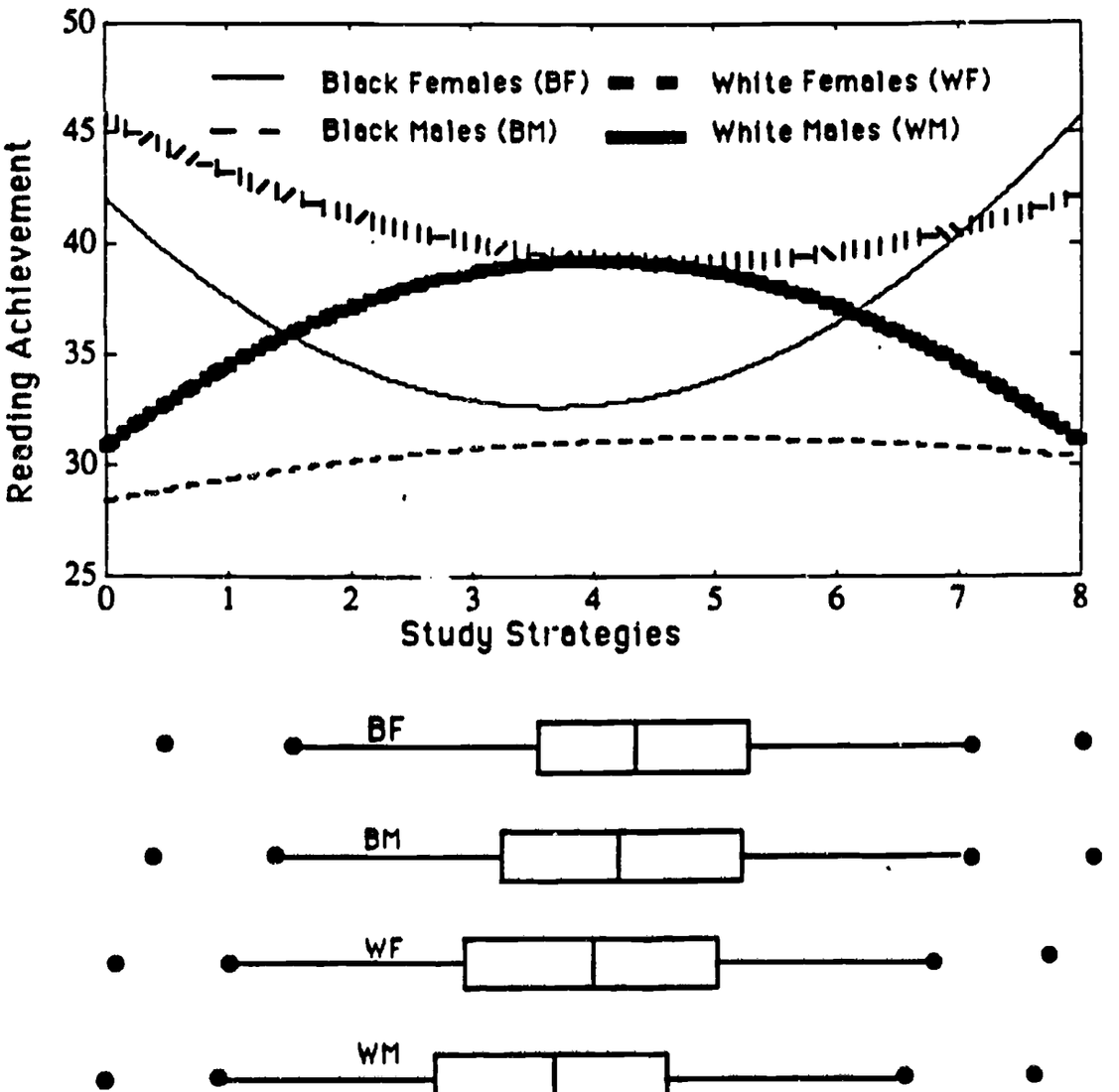

Figure 5. Regression Lines on Study Strategies for Black Females and Black Males at Age 9

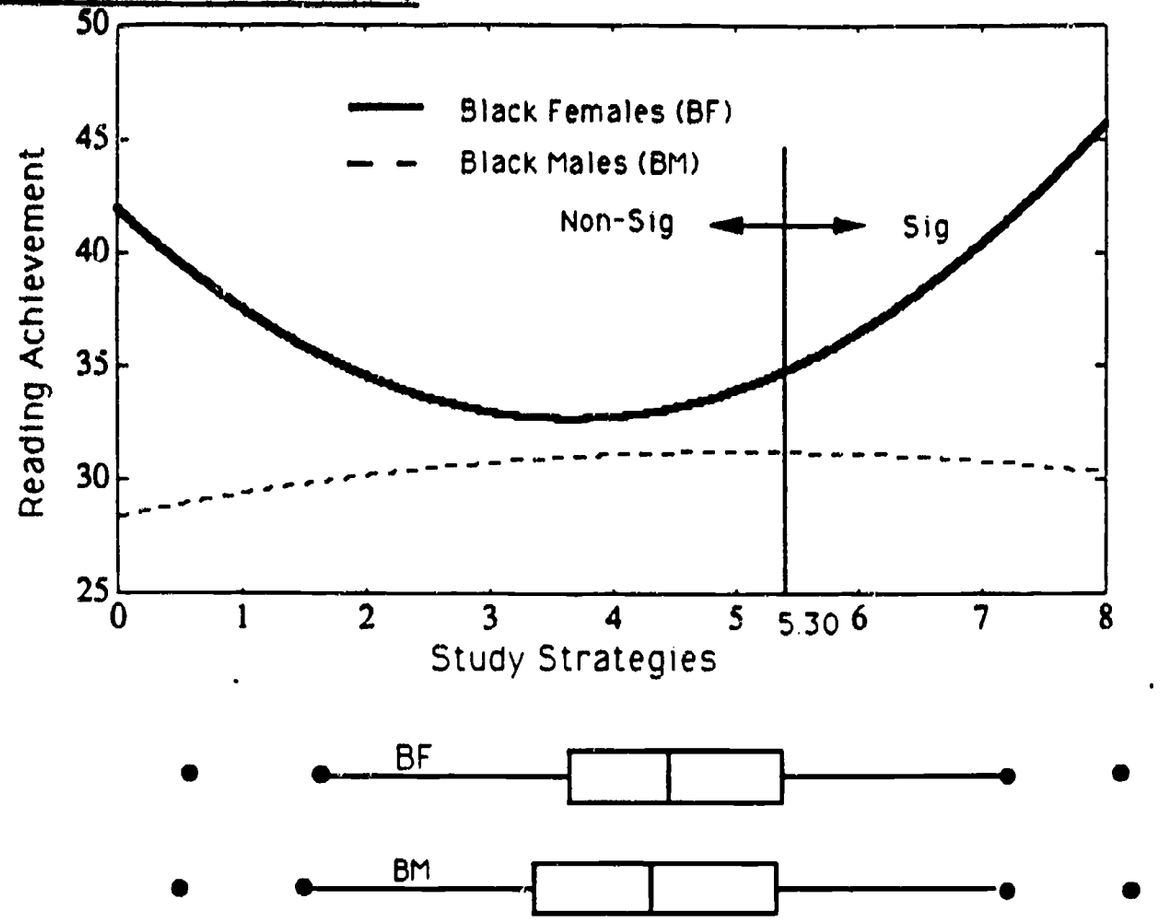

Figure 6. Regression Lines on Study Strategies for White Males and Black Males at Age 9

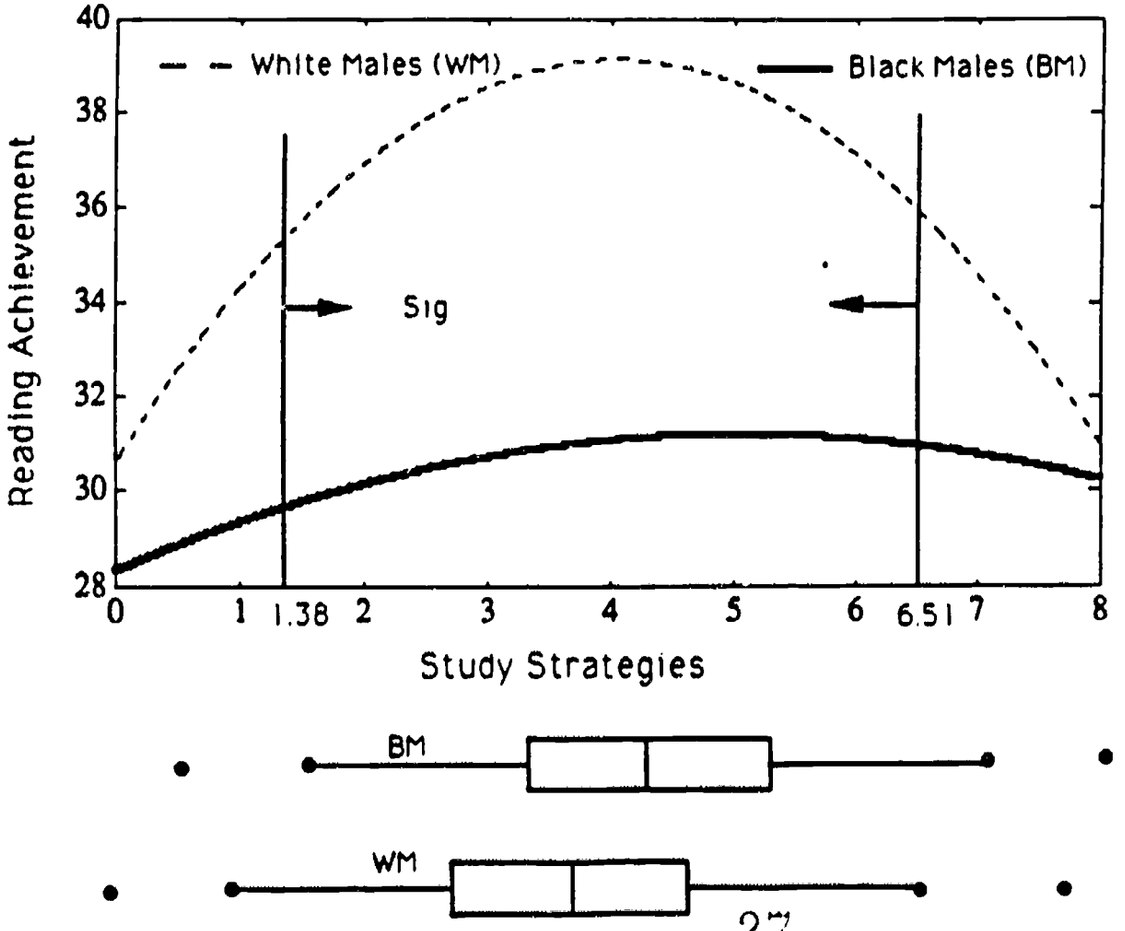

Table 7

Ordered Regression Source Table for General Reading Activities at Age 9

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0092	0.0092	1	647.11	647.11	9.59	.0020
Pred.^{2}	0.0120	0.0028	1	196.40	196.40	2.91	.0883
Race	0.0913	0.0792	1	5556.00	5556.00	82.36	.0000
Sex	0.1025	0.0112	1	784.07	784.07	11.62	.0007
Race*Sex	0.1049	0.0023	1	164.51	164.51	2.44	.1187
R * Pred.	0.1168	0.0119	1	836.54	836.54	12.40	.0004
S * Pred.	0.1189	0.0021	1	147.02	147.02	2.18	.1402
R*S*Pred.	0.1190	0.0001	1	5.29	5.29	0.08	.7796
R * Pred.^{2}	0.1190	0.0000	1	1.70	1.70	0.03	.8738
S * Pred.^{2}	0.1195	0.0005	1	36.0	36.09	0.54	.4647
R*S*Pred.^{2}	0.1201	0.0006	1	38.3	38.38	0.57	.4509
Residual			914	61657.49	67.46		

Figure 7. Regression Lines on General Reading Activities for 4 Social Groups at Age 9

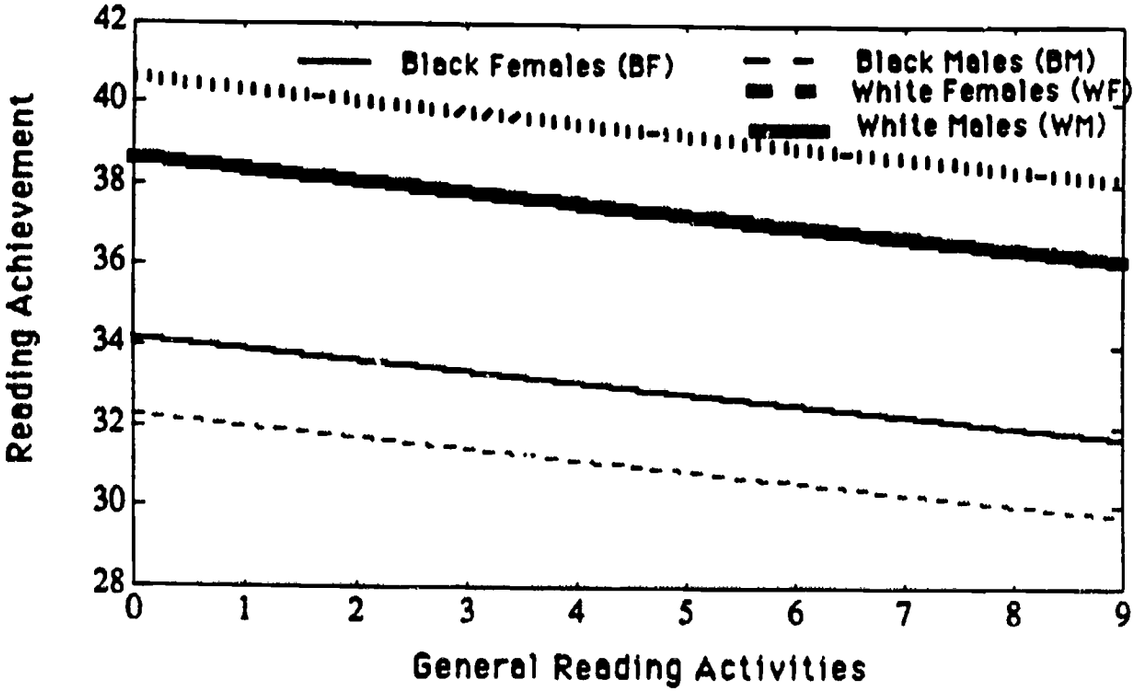

Table 8

Ordered Regression Source Table for Home Literacy at Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
ed.	0.0618	0.0618	1	3673.51	3673.51	66.53	.0000
ed.^{2}	0.0621	0.0003	1	18.01	18.01	0.33	.5681
Race	0.1051	0.0430	1	2554.98	2554.98	46.27	.0000
Sex	0.1451	0.0400	1	2373.65	2373.65	42.99	.0000
Race*Sex	0.1451	0.0000	1	0.92	0.92	0.02	.8972
R * Pred.	0.1495	0.0043	1	257.61	257.61	4.67	.0310
S * Pred.	0.1496	0.0002	1	9.92	9.92	0.18	.6718
R*S*Pred.	0.1498	0.0002	1	9.24	9.24	0.17	.6825
R * Pred.^{2}	0.1541	0.0044	1	259.71	259.71	4.70	.0303
S * Pred.^{2}	0.1542	0.0001	1	4.43	4.43	0.08	.7772
R*S*Pred.^{2}	0.1543	0.0001	1	5.48	5.48	0.10	.7527
Residual			910	50243.50	55.21		

Figure 8. Regression Lines on Home Literacy for 4 Social Groups at Age 13

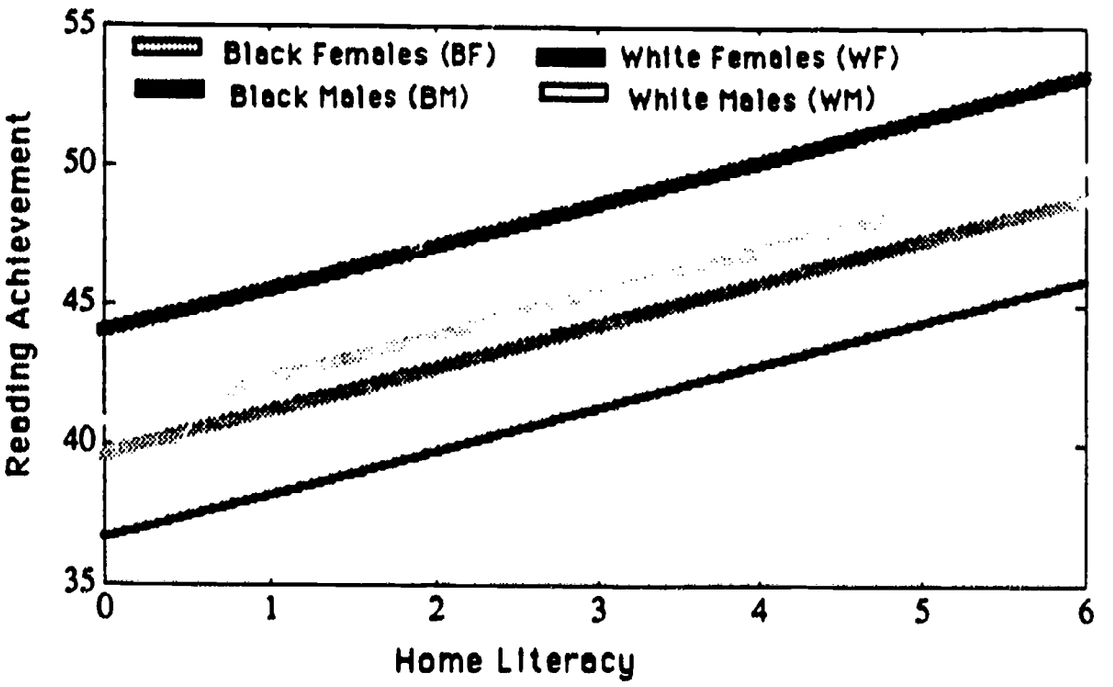

Table 9

Ordered Regression Source Table for Social Interactions at Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0045	0.0045	1	264.11	264.11	4.58	.0329
Pred.^{2}	0.0062	0.0018	1	106.81	106.81	1.86	.1746
Race	0.0719	0.0657	1	3901.83	3901.83	67.44	.0000
Sex	0.1083	0.0363	1	2158.39	2158.39	37.31	.0000
Race*Sex	0.1082	0.0000	1	1.67	1.67	0.03	.8651
R * Pred.	0.1095	0.0012	1	71.19	71.19	1.23	.2676
S * Pred.	0.1095	0.0001	1	2.80	2.80	0.05	.8260
R*S*Pred.	0.1103	0.0008	1	48.32	48.32	0.84	.3610
R * Pred.^{2}	0.1115	0.0012	1	69.57	69.57	1.20	.2731
S * Pred.^{2}	0.1138	0.0023	1	136.32	136.32	2.36	.125
R*S*Pred.^{2}	0.1139	0.0001	1	2.93	2.93	0.05	.8219
Residual			910	52647.00	57.85		

Figure 9. Regression Lines on Social Interactions for 4 Social Groups at Age 13

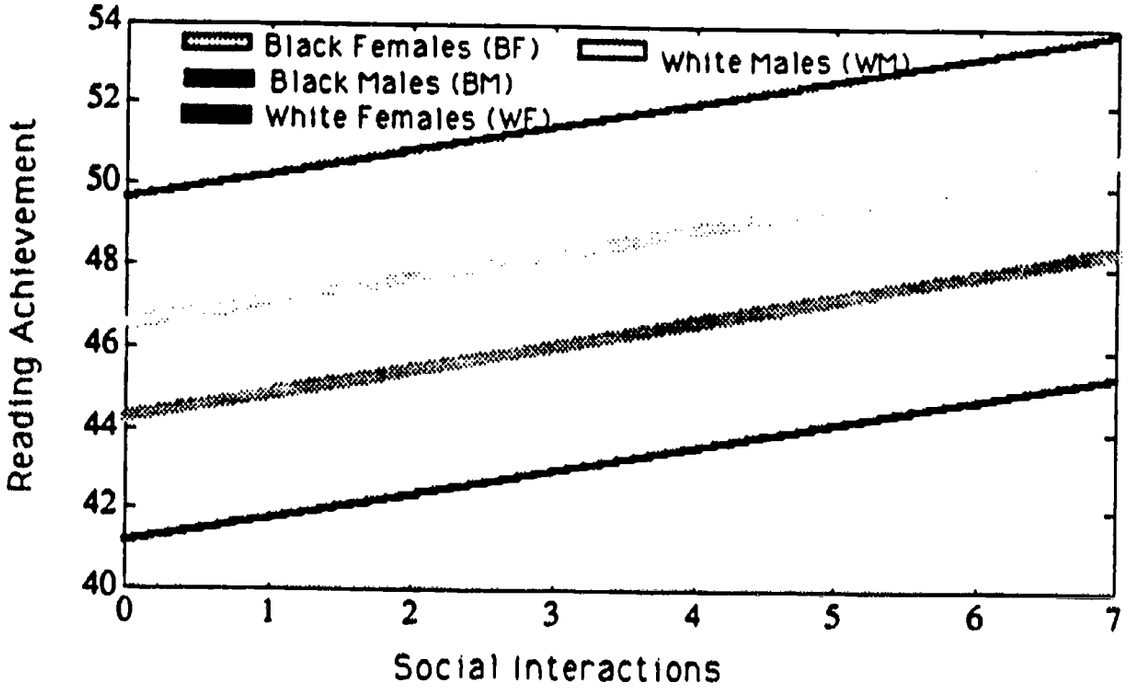

Table 10

Ordered Regression Source Table for Student-Centered Instruction at Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0168	0.0168	1	999.49	999.49	17.43	.0000
Pred.^{2}	0.0174	0.0005	1	31.37	31.37	0.55	.4597
Race	0.0677	0.0503	1	2990.43	2990.43	52.16	.0000
Sex	0.1064	0.0388	1	2302.08	2302.08	40.15	.0000
Race*Sex	0.1065	0.0001	1	3.06	3.06	0.05	.8174
R * Pred.	0.1076	0.0011	1	65.33	65.33	1.14	.2860
S * Pred.	0.1112	0.0036	1	213.29	213.29	3.72	.0541
R*S*Pred.	0.1139	0.0027	1	161.62	161.62	2.82	.0935
R * Pred.^{2}	0.1139	0.0000	1	0.29	0.29	0.00	.9436
S * Pred.^{2}	0.1197	0.0058	1	342.47	342.47	5.97	.0147
R*S*Pred.^{2}	0.1218	0.0022	1	129.06	129.06	2.25	.1339
Residual			910	52172.46	57.33		

Figure 10. Regression Lines on Student-Centered Instruction for 4 Social Groups at Age 13

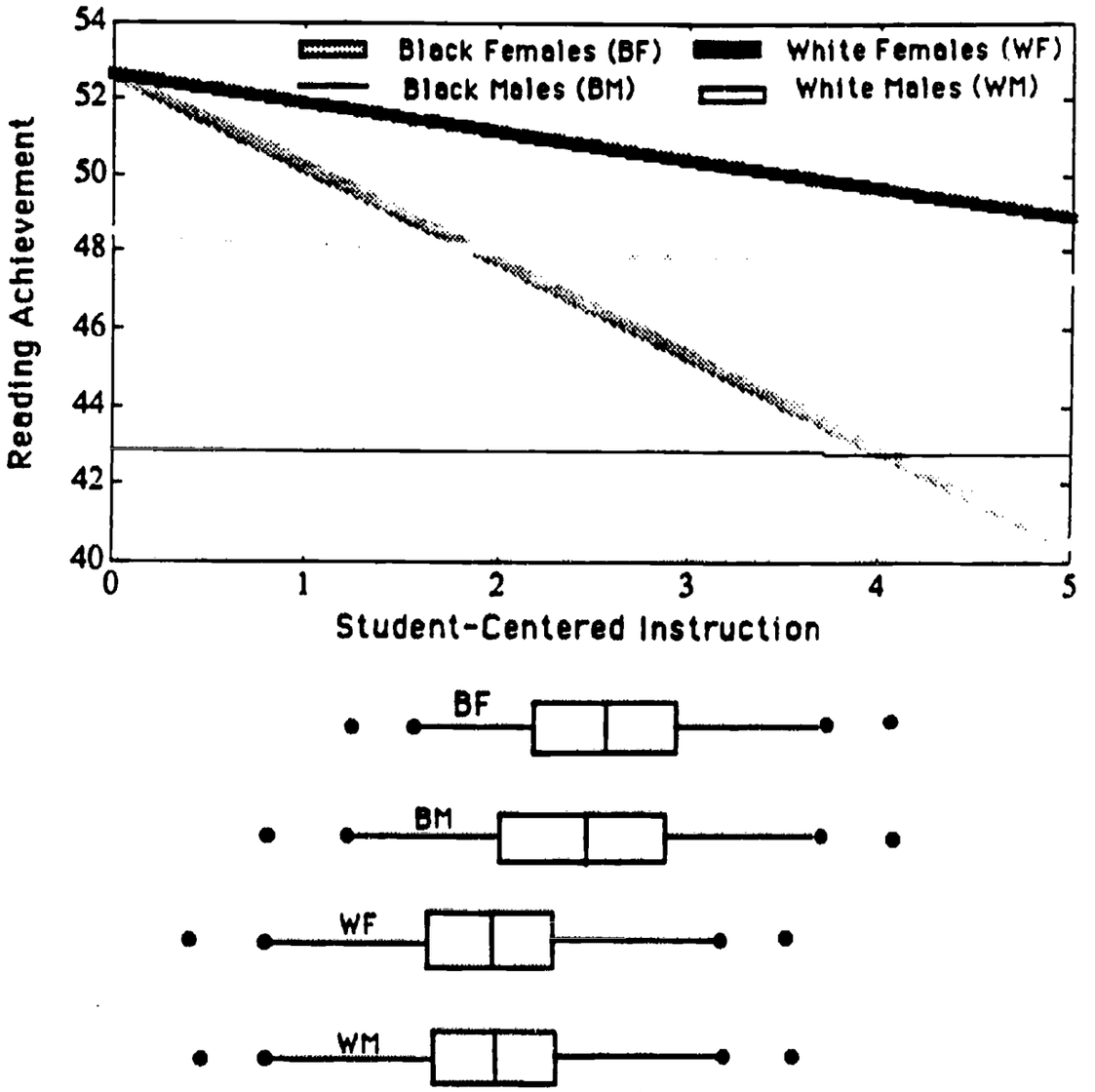

Figure 11. Regression Lines on Student-Centered Instruction for Black Females and Black Males at Age 13

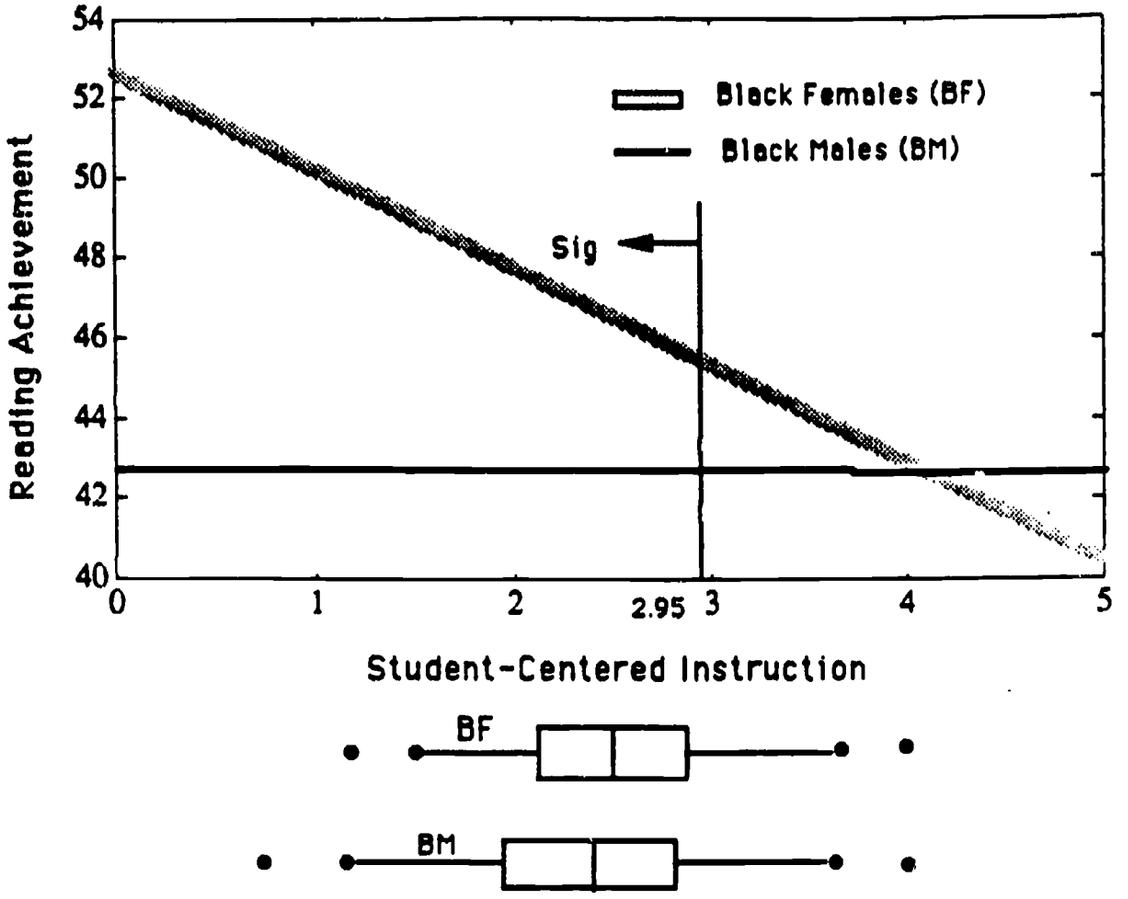

Figure 12. Regression Lines on Student-Centered Instruction for Black Males and White Males at Age 13

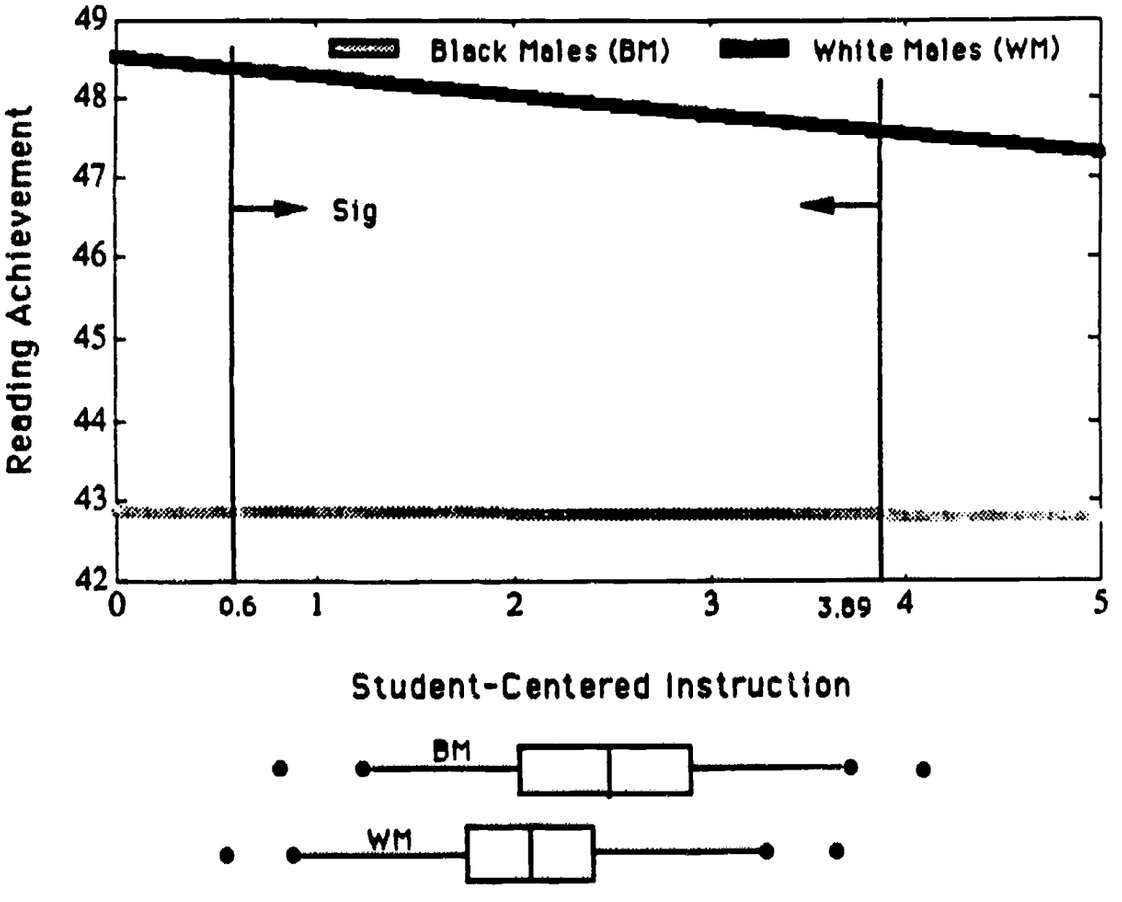

Table 11

Ordered Regression Source Table for Teacher-Directed Instruction at Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0209	0.0209	1	1240.00	1240.00	24.07	.0000
Pred.^{2}	0.0283	0.0075	1	442.51	442.51	8.59	.0035
Race	0.0724	0.0441	1	2620.67	2620.67	50.88	.0000
Sex	0.1106	0.0382	1	2266.82	2266.82	44.01	.0000
Race*Sex	0.1108	0.0002	1	9.73	9.73	0.19	.6639
R * Pred.	0.1150	0.0042	1	251.05	251.05	4.87	.0275
S * Pred.	0.1186	0.0037	1	217.22	217.22	4.22	.0403
R*S*Pred.	0.1329	0.0143	1	848.20	848.20	16.47	.0000
R * Pred.^{2}	0.1389	0.0060	1	354.77	354.77	6.89	.0088
S * Pred.^{2}	0.1561	0.0173	1	1025.30	1025.30	19.90	.0000
R*S*Pred.^{2}	0.2110	0.0549	1	3259.94	3259.94	63.29	.0000
Residual			910	46874.75	51.51		

Figure 13. Regression Lines on Teacher-Directed Instruction for 4 Social Groups at Age 13

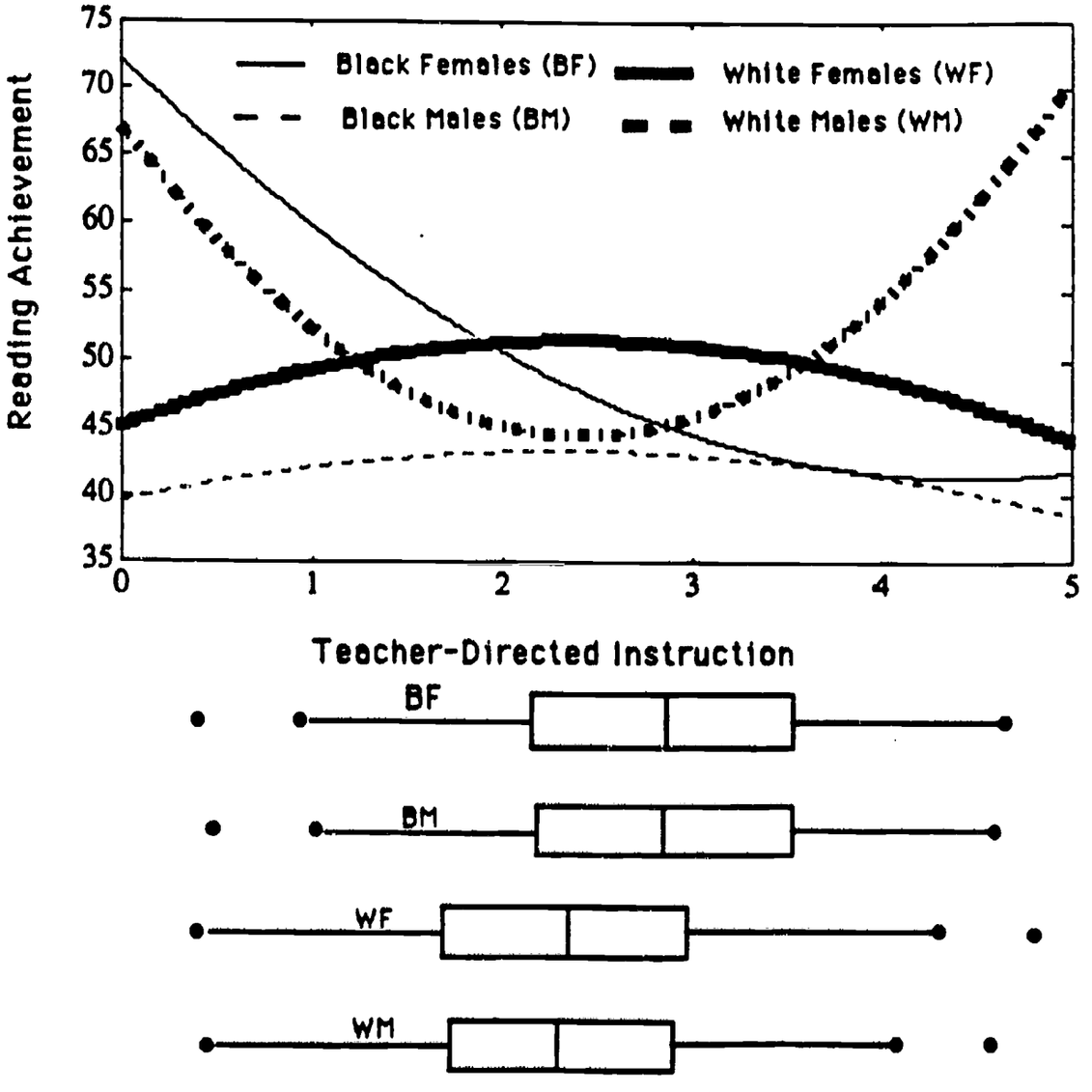

Figure 14. Regression Lines on Teacher-Directed Instruction for Black Females and Black Males at Age 13

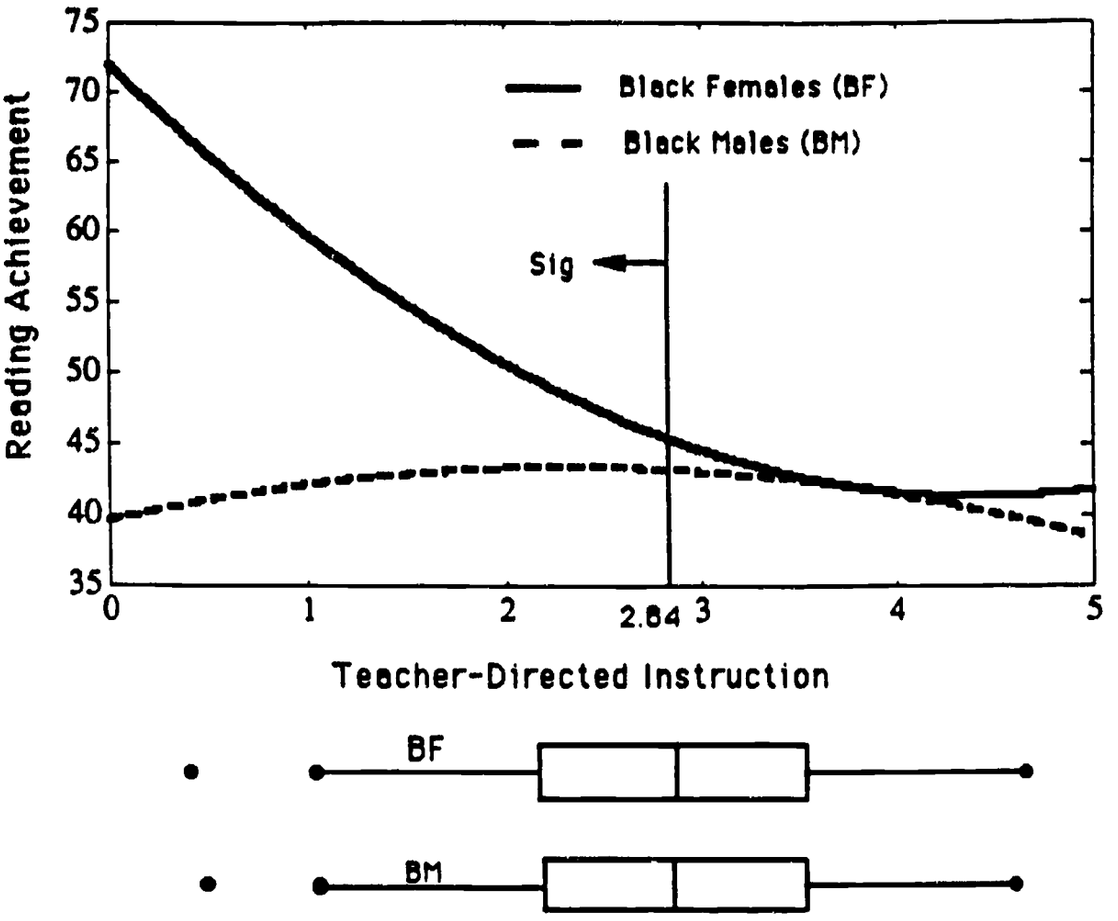

Figure 15. Regression Lines on Teacher-Directed Instruction for Black Males and White Males at Age 13

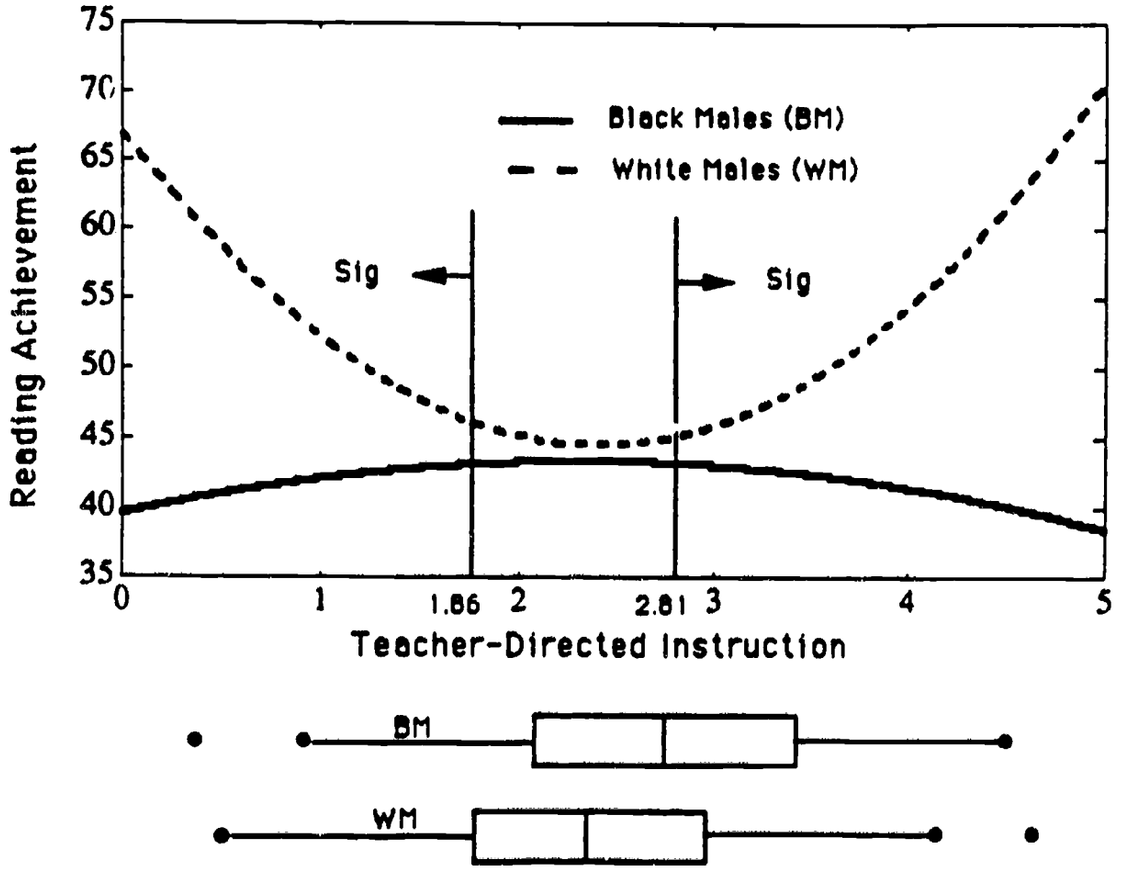

Table 12

Ordered Regression Source Table for Study Strategies at Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0003	0.0003	1	19.69	19.69	0.34	.5605
Pred.^{2}	0.0011	0.0008	1	46.21	46.21	0.80	.3726
Race	0.0646	0.0635	1	3774.62	3774.62	65.00	.0000
Sex	0.1010	0.0364	1	2160.34	2160.34	37.20	.0000
Race*Sex	0.1010	0.0000	1	2.22	2.22	0.04	.8451
R * Pred.	0.1035	0.0024	1	142.78	142.78	2.46	.1172
S * Pred.	0.1035	0.0000	1	1.80	1.80	0.03	.8602
R*S*Pred.	0.1066	0.0030	1	177.46	177.46	3.06	.0808
R * Pred.^{2}	0.1089	0.0024	1	142.12	142.12	2.45	.1181
S * Pred.^{2}	0.1092	0.0004	1	21.92	21.92	0.38	.5392
R*S*Pred.^{2}	0.1105	0.0013	1	75.76	75.76	1.30	.2537
Residual			910	52846.03	58.07		

Table 13

Ordered Regression Source Table for Library-Involved Reading Activities at Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0477	0.0477	1	2832.32	2832.32	50.11	.0000
Pred.^{2}	0.0548	0.0072	1	425.47	425.47	7.53	.0062
Race	0.0952	0.0404	1	2397.79	2397.79	42.42	.0000
Sex	0.1315	0.0363	1	2154.17	2154.17	38.11	.0000
Race*Sex	0.1315	0.0000	1	0.19	0.19	0.00	.9853
R * Pred.	0.1315	0.0001	1	4.63	4.63	0.08	.7747
S * Pred.	0.1315	0.0000	1	0.06	0.06	0.00	.9916
R*S*Pred.	0.1341	0.0025	1	151.07	151.07	2.67	.1024
R * Pred.^{2}	0.1342	0.0001	1	4.87	4.87	0.09	.7691
S * Pred.^{2}	0.1342	0.0000	1	0.00	0.00	0.00	.9964
R*S*Pred.^{2}	0.1342	0.0000	1	0.72	0.72	0.01	.9109
Residual			910	51439.63	56.52		

Table 14

Ordered Regression Source Table for General Reading Activities at Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0040	0.0040	1	234.91	234.91	4.19	.0409
Pred.^{2}	0.0102	0.0063	1	371.41	371.41	6.62	.0102
Race	0.0660	0.0558	1	3314.75	3314.75	59.12	.0000
Sex	0.1040	0.0381	1	2260.64	2260.64	40.32	.0000
Race*Sex	0.1041	0.0000	1	1.24	1.24	0.02	.8818
R * Pred.	0.1062	0.0021	1	123.68	123.68	2.21	.1378
S * Pred.	0.1065	0.0003	1	18.59	18.59	0.33	.5649
R*S*Pred.	0.1128	0.0063	1	376.08	376.08	6.71	.0097
R * Pred.^{2}	0.1201	0.0073	1	433.69	433.69	7.74	.0055
S * Pred.^{2}	0.1202	0.0001	1	5.74	5.74	0.10	.7491
R*S*Pred.^{2}	0.1413	0.0211	1	1251.21	1251.21	22.31	.0000
Residual			910	51019.01	56.06		

Figure 16. Regression Lines on General Reading Activities for 4 Social Groups at Age 13

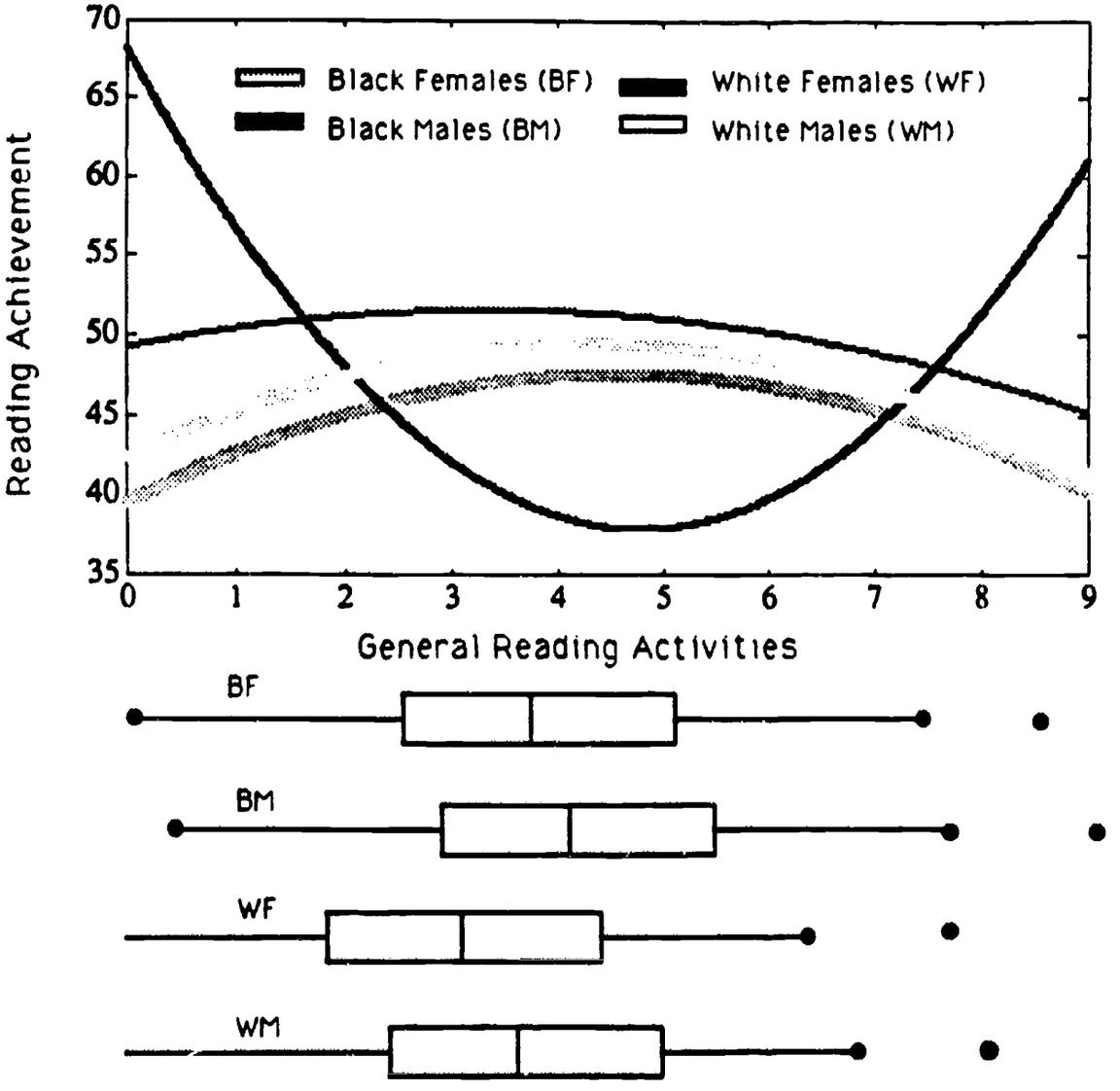

Figure 17. Regression Lines on General Reading Activities for Black Females and Black Males at Age 13

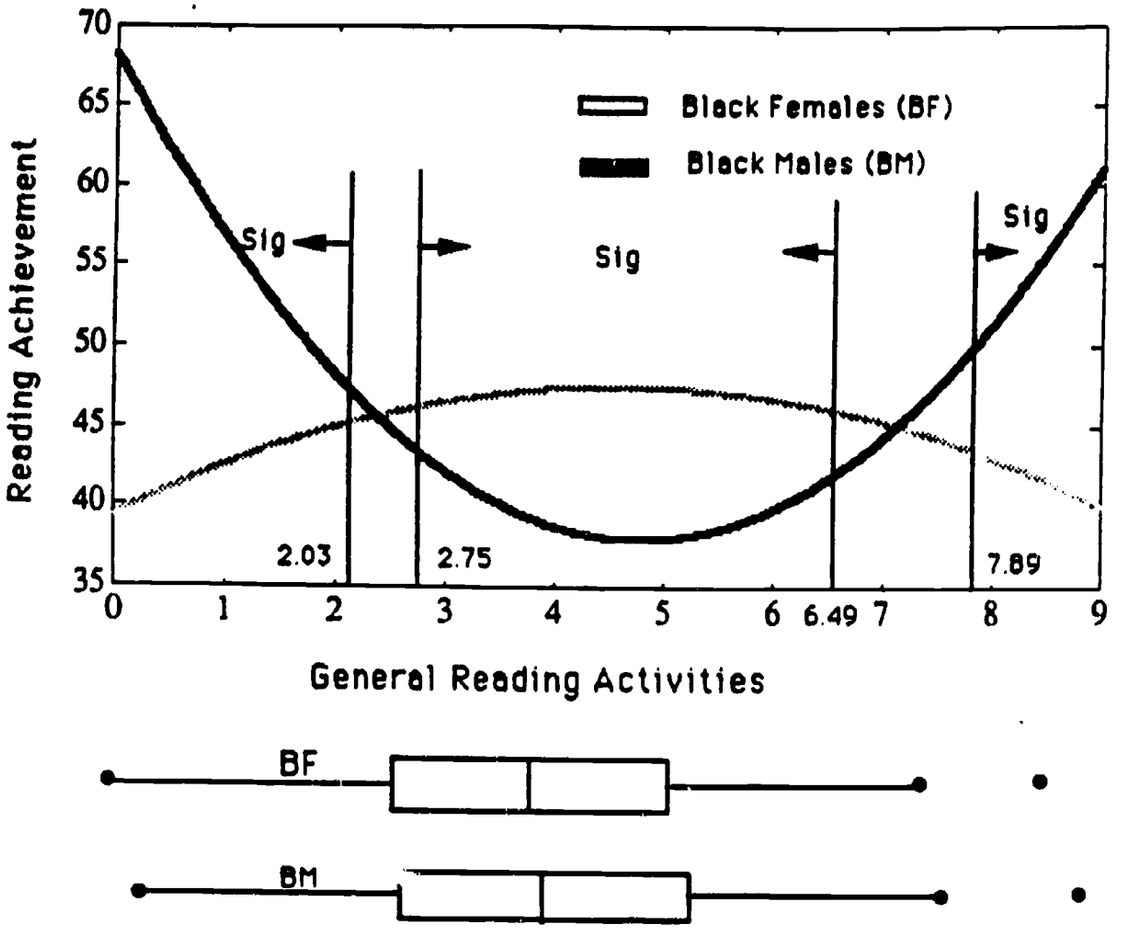

Figure 18. Regression Lines on General Reading Activities for Black Males and White Males at Age 13

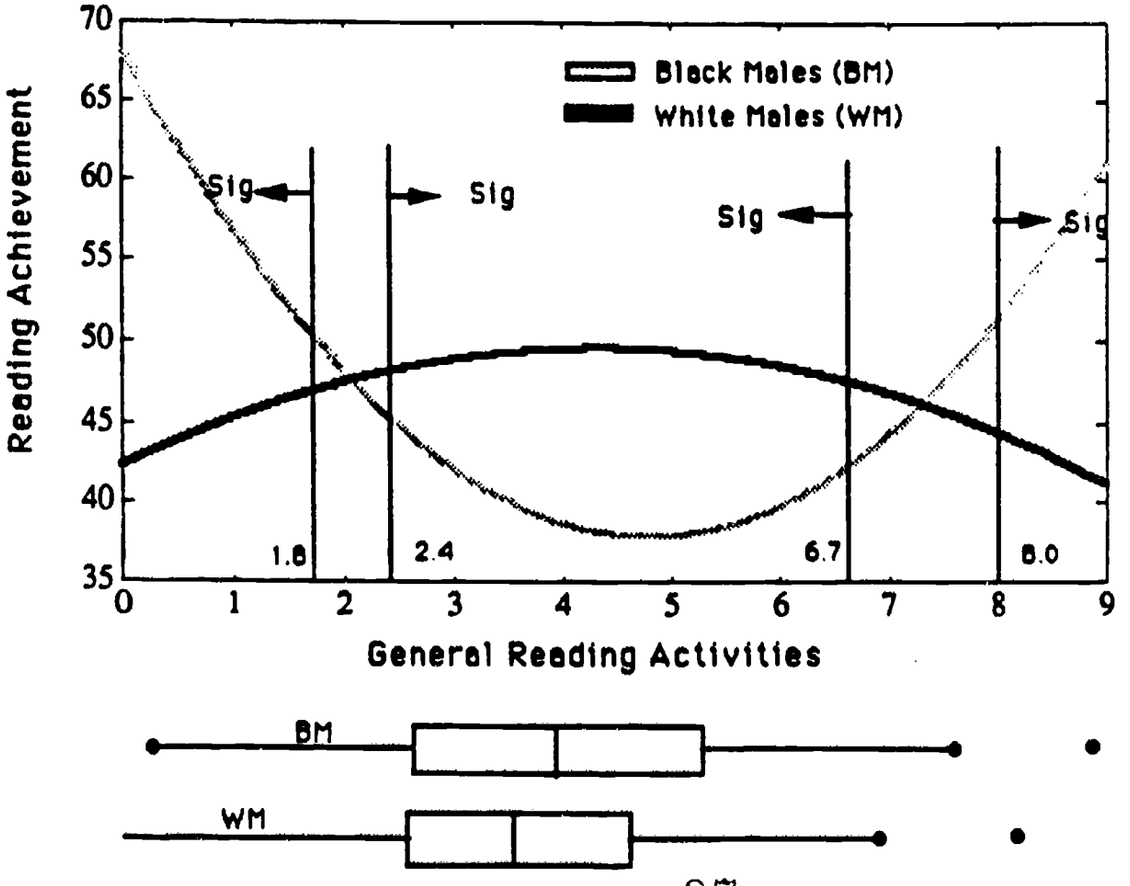

Table 15

Ordered Regression Source Table for News Reading Activities at Age 13

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0036	0.0036	1	211.38	211.38	4.76	.0294
Pred.^{2}	0.0114	0.0078	1	465.25	465.25	10.47	.0013
Race	0.0747	0.0633	1	3762.86	3762.86	84.67	.0000
Sex	0.1156	0.0408	1	2425.60	2425.60	54.58	.0000
Race*Sex	0.1159	0.0003	1	19.14	19.14	0.43	.5119
R * Pred.	0.1175	0.0016	1	93.50	93.50	2.10	.1473
S * Pred.	0.1175	0.0000	1	2.30	2.30	0.05	.8201
R*S*Pred.	0.1176	0.0001	1	5.35	5.35	0.12	.7287
R * Pred.^{2}	0.1183	0.0008	1	45.08	45.08	1.01	.3141
S * Pred.^{2}	0.1234	0.0051	1	303.32	303.32	6.82	.0091
R*S*Pred.^{2}	0.3193	0.1958	1	11633.15	11633.15	261.75	.0000
Residual			910	40444.01	44.44		

Figure 19. Regression Lines on News Reading Activities for 4 Social Groups at Age 13

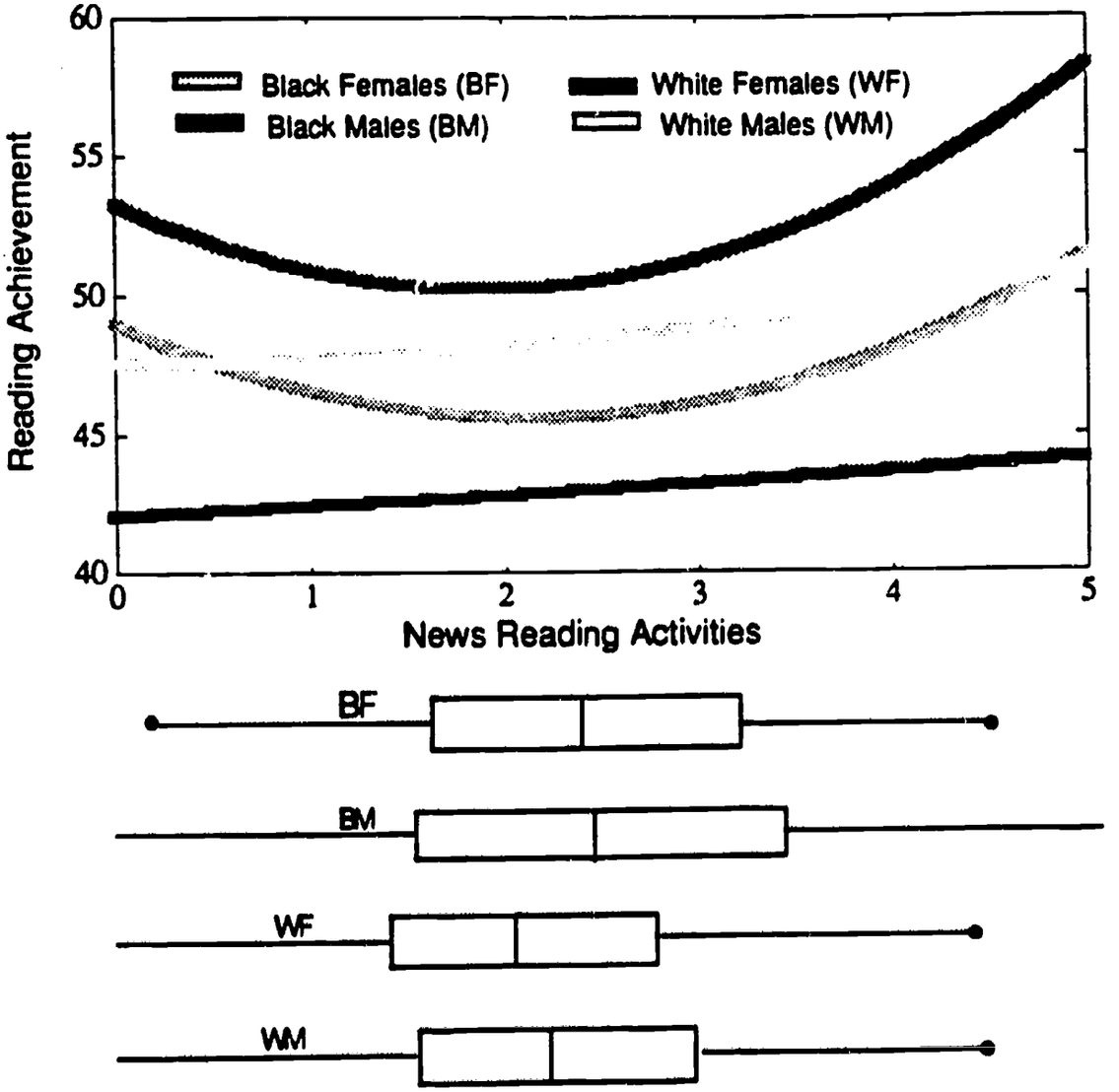

Table 16

Ordered Regression Source Table for Home Literacy at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0575	0.0575	1	5333.21	5333.21	62.22	.0000
Pred.^{2}	0..581	0.0006	1	56.67	56.67	0.66	.4146
Race	0.0959	0.0378	1	3504.89	3504.89	40.89	.0000
Sex	0.1318	0.0359	1	3332.96	3332.96	38.89	.0000
R * S	0.1325	0.0007	1	66.90	66.90	0.78	.3772
R * Pred.	0.1335	0.0010	1	89.60	89.60	1.05	.3068
S * Pred.	0.1348	0.0013	1	122.17	122.17	1.42	.2328
R*S*Pred.	0.1349	0.0001	1	7.50	7.50	0.09	.7674
R * Pred.^{2}	0.1353	0.0005	1	42.61	42.61	0.50	.4809
S * Pred.^{2}	0.1361	0.0008	1	73.06	73.06	0.85	.3561
R*S*Pred.^{2}	0.1361	0.0000	1	1.28	1.28	0.01	.9027
Residuals			935	80141.48	85.71		

Table 17

Ordered Regression Source Table for Social Interactions at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0201	0.0200	1	1861.52	1861.52	21.82	.0000
Pred.^{2}	0.0216	0.0015	1	142.43	142.43	1.68	.1967
Race	0.0805	0.0589	1	5465.35	5465.35	64.05	.0000
Sex	0.1110	0.0305	1	2828.63	2828.63	33.15	.0000
R * S	0.1113	0.0003	1	28.33	28.33	0.33	.5646
R * Pred.	0.1124	0.0011	1	102.75	102.75	1.20	.2727
S * Pred.	0.1124	0.0000	1	0.15	0.15	0.00	.9668
R*S*Pred.	0.1134	0.0010	1	89.67	89.67	1.05	.3056
R * Pred.^{2}	0.1167	0.0033	1	307.16	307.16	3.60	.0581
S * Pred.^{2}	0.1328	0.0161	1	1491.41	1491.41	17.48	.0000
R*S*Pred.^{2}	0.1401	0.0073	1	677.93	677.93	7.95	.0049
Residuals			935	79777.01	85.32		

Figure 20. Regression Lines on News Reading Activities for Black Females and Black Males at Age 13

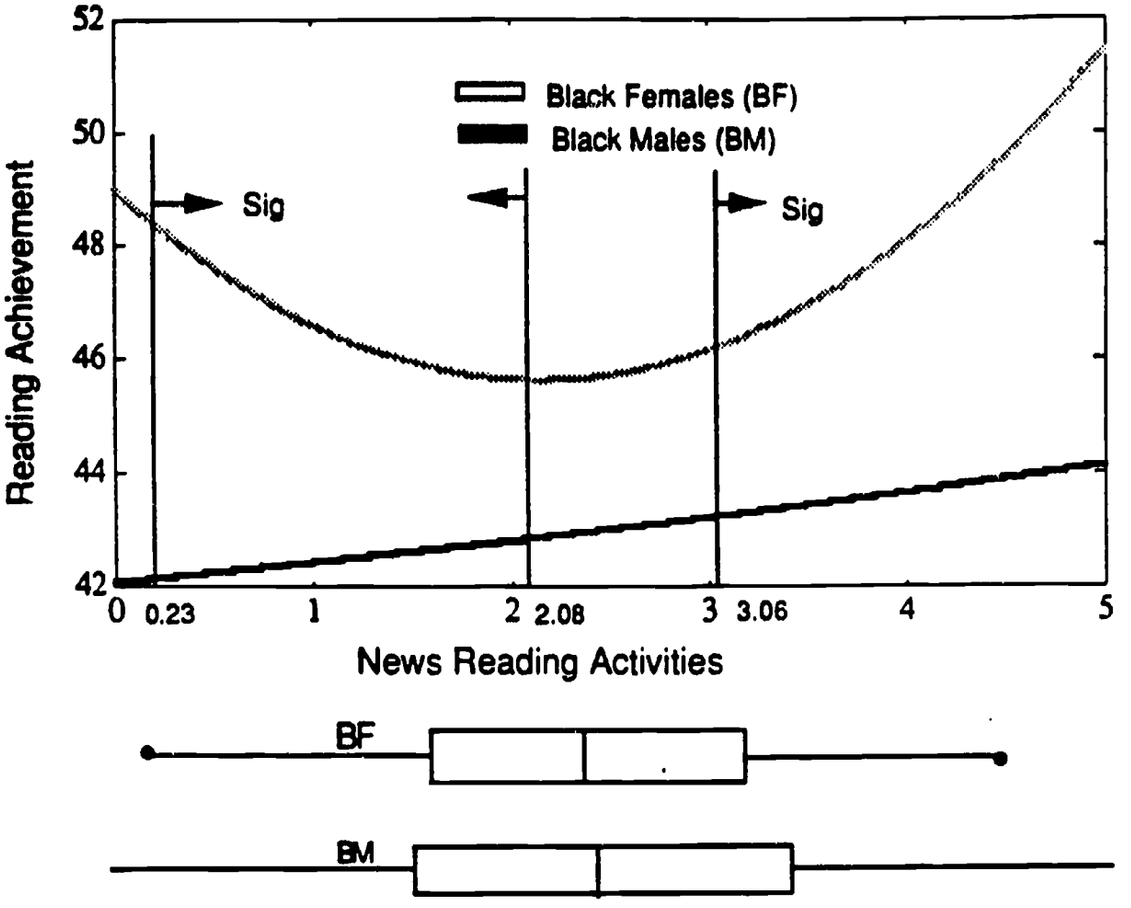

Figure 21. Regression Lines on News Reading Activities for Black Males and White Males at Age 13

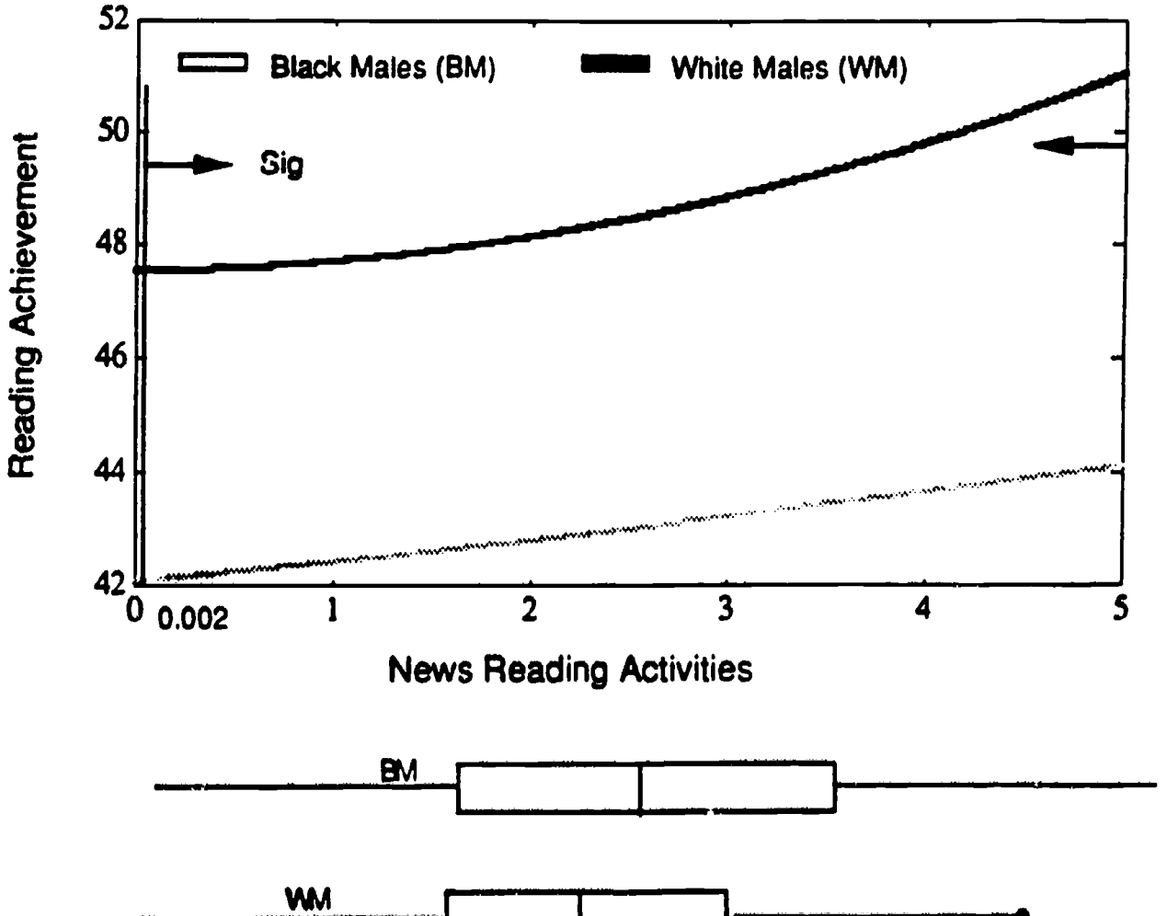

Figure 22. Regression Lines on Social Interactions for 4 Social Groups at Age 17

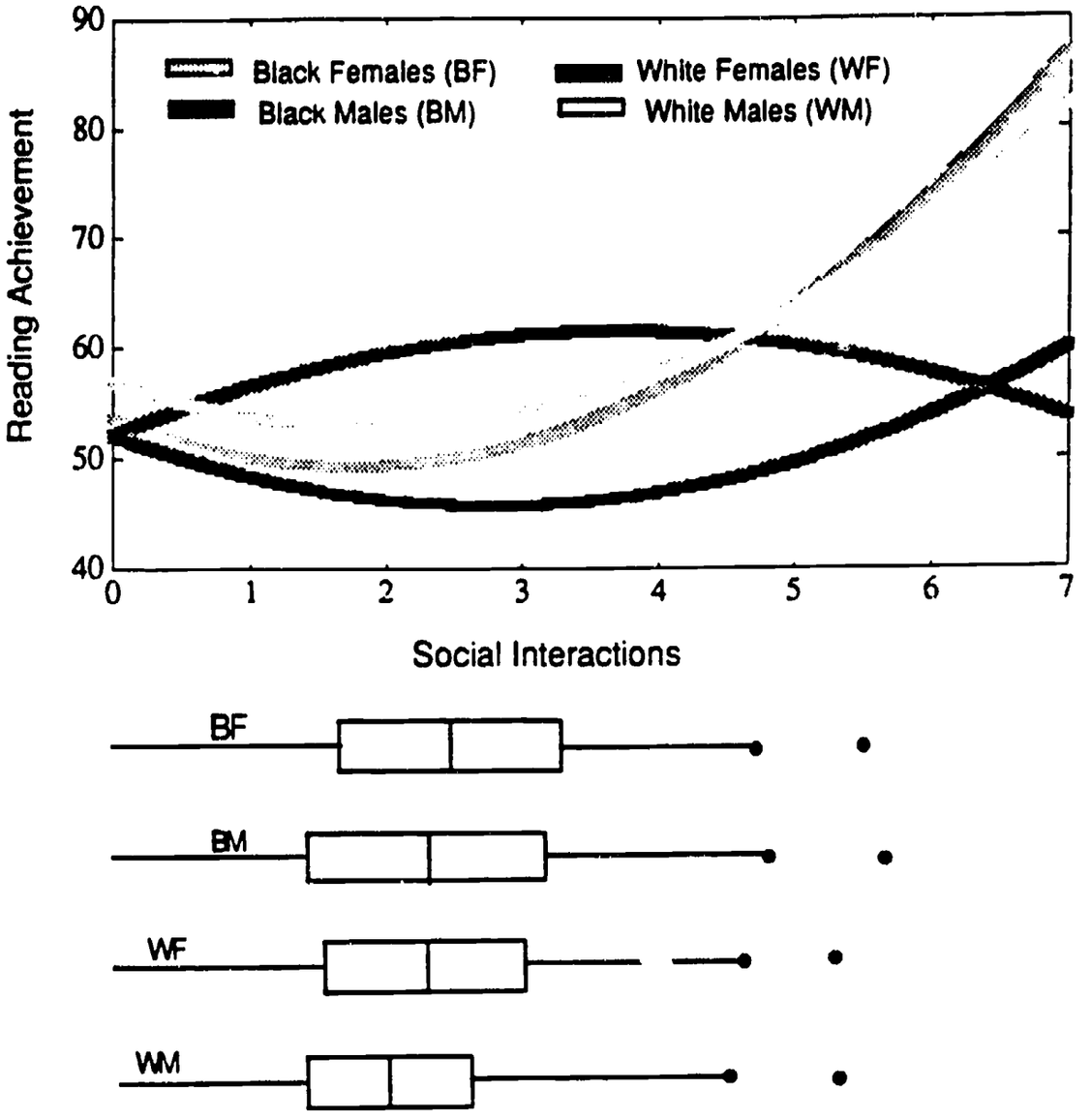

Figure 23. Regression Lines on Social Interactions for Black Females and Black Males at Age 17

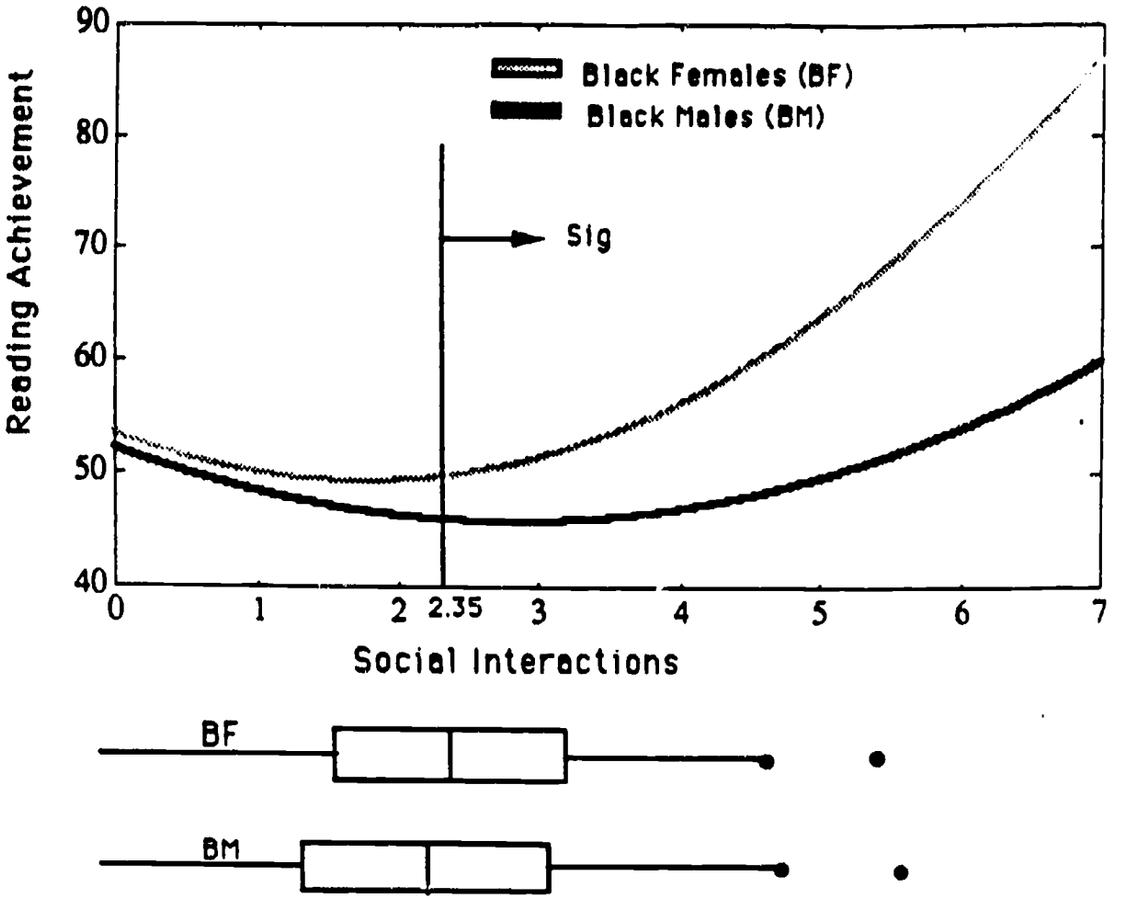

Figure 24. Regression Lines on Social Interactions for Black Males and White Males at Age 17

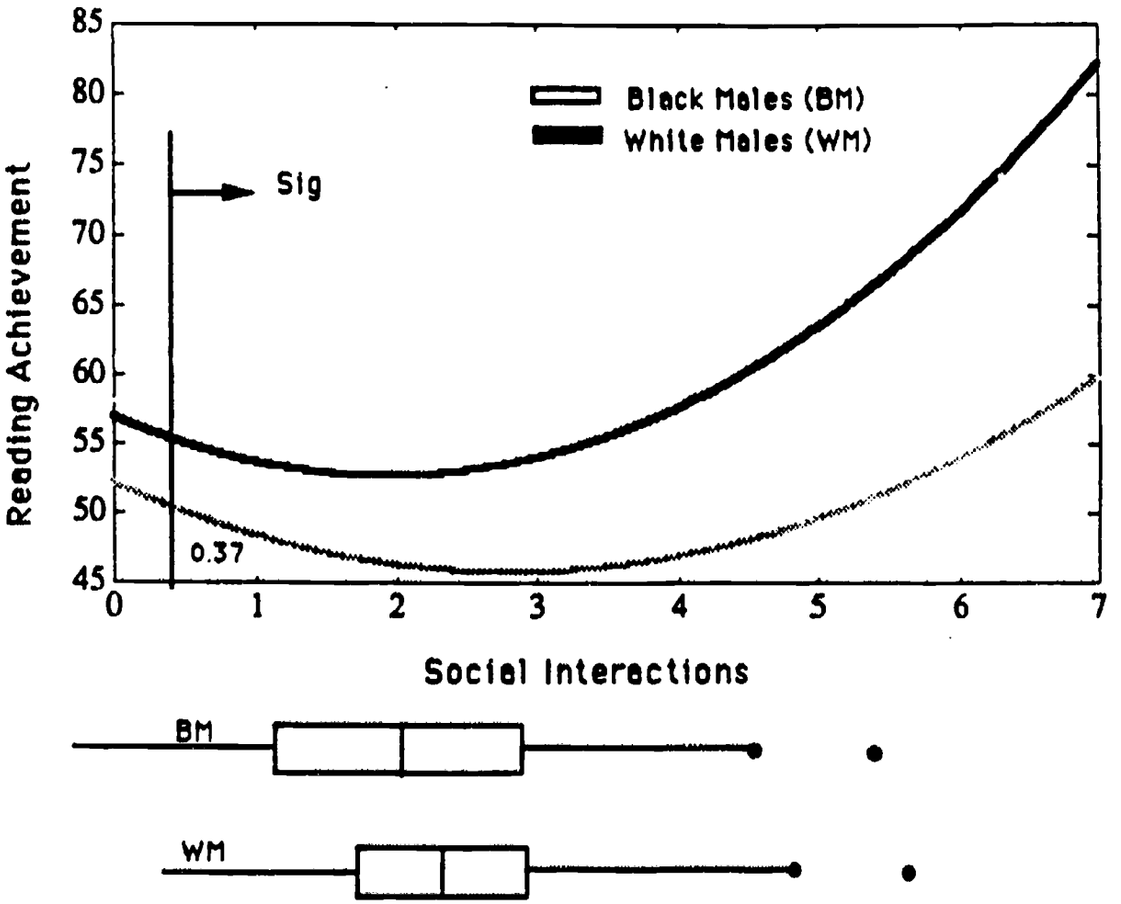

Table 18

Ordered Regression Source Table for Student-Centered Instruction at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0127	0.0127	1	1174.66	1174.66	13.32	.0003
Pred.^{2}	0.0135	0.0008	1	74.39	74.39	0.84	.3674
Race	0.0726	0.0591	1	5483.98	5483.98	62.19	.0000
Sex	0.1034	0.0308	1	2860.53	2860.53	32.44	.0000
R * S	0.1041	0.0006	1	59.40	59.40	0.67	.4120
R * Pred.	0.1082	0.0041	1	381.50	381.50	4.33	.0378
S * Pred.	0.1082	0.0000	1	4.56	4.56	0.05	.8202
R*S*Pred.	0.1082	0.0000	1	0.21	0.21	0.00	.9614
R * Pred.^{2}	0.1111	0.0029	1	268.60	268.60	3.05	.0813
S * Pred.^{2}	0.1112	0.0001	1	7.56	7.57	0.09	.7697
R*S*Pred.^{2}	0.1112	0.0000	1	3.13	3.13	0.04	.8506
Residuals			935	82453.81	88.19		

Figure 25. Regression Lines on Student-Centered Instruction for 4 Social Groups at Age 17

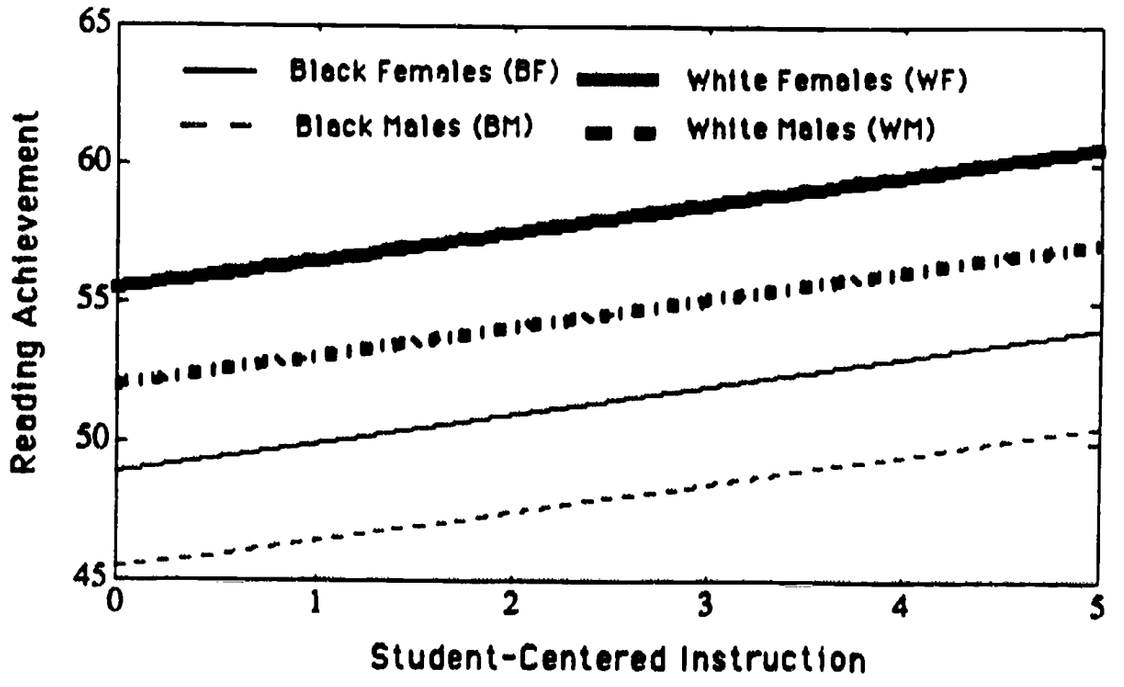

Table 19

Ordered Regression Source Table for Teacher-Directed Instruction at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0232	0.0232	1	2151.32	2151.32	24.92	.0000
Pred.^{2}	0.0673	0.0441	1	4095.88	4095.88	47.46	.0000
Race	0.0991	0.0318	1	2948.20	2948.20	34.16	.0000
Sex	0.1239	0.0248	1	2298.09	2298.09	26.62	.0000
R * S	0.1252	0.0013	1	117.27	117.27	1.36	.2440
R * Pred.	0.1262	0.0011	1	97.8	97.86	1.13	.2872
S * Pred.	0.1264	0.0002	1	16.36	16.36	0.19	.6634
R*S*Pred.	0.1274	0.0011	1	98.24	98.24	1.14	.2863
R * Pred.^{2}							
S * Pred.^{2}	(Not entered)						
R*S*Pred.^{2}							
Residuals			938	80949.11	86.30		

Figure 26. Regression Lines on Teacher-Directed Instruction for 4 Social Groups at Age 17

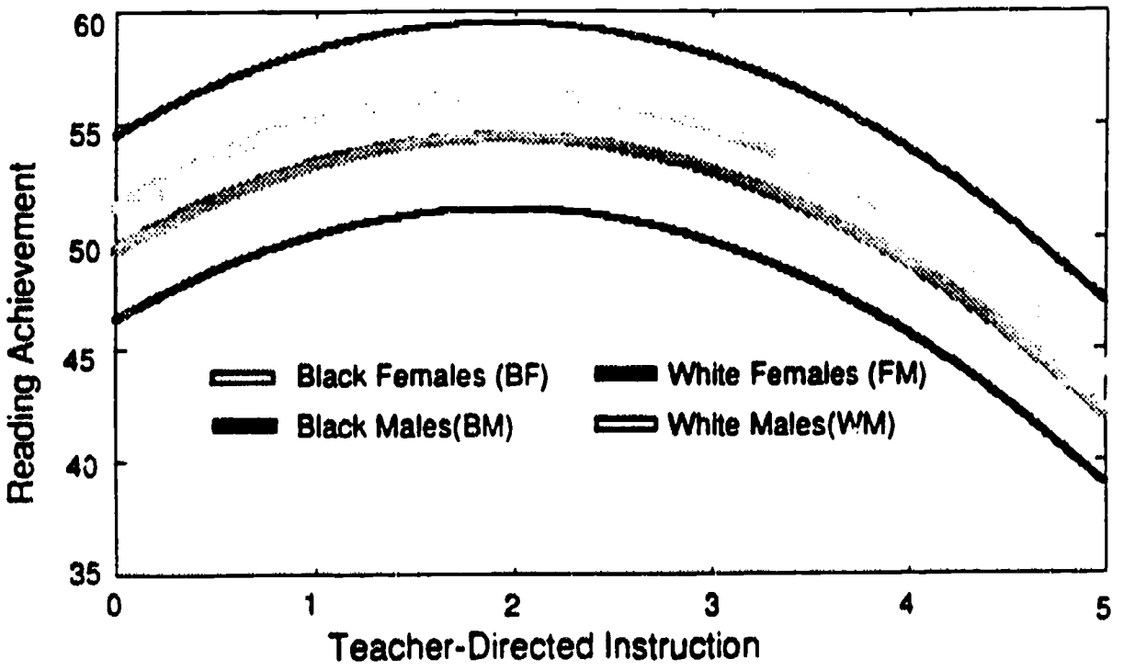

Table 20

Ordered Regression Source Table for Study Strategies at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0044	0.0044	1	404.98	404.98	4.64	.0316
Pred.^{2}	0.0219	0.0177	1	1630.95	1630.95	18.67	.0000
Race	0.0823	0.0603	1	5596.83	5596.83	64.06	.0000
Sex	0.1082	0.0259	1	2405.88	2405.88	27.54	.0000
R * S	0.1085	0.0003	1	27.28	27.28	0.31	.5765
R * Pred.	0.1160	0.0075	1	692 16	692.16	77.92	.0050
S * Pred.	0.1174	0.0014	1	132.70	132.70	1.52	.2181
R*S*Pred.	0.1174	0.0000	1	4.51	4.51	0.05	.8204
R * Pred.^{2}	(Not entered)						
S * Pred.^{2}							
R*S*Pred.^{2}	0.1176	0.00012	1	11.72	11.72	0.13	.7143
Residuals			937	81865.34	87.37		

Figure 27. Regression Lines on Study Strategies for 4 Social Groups at Age 17

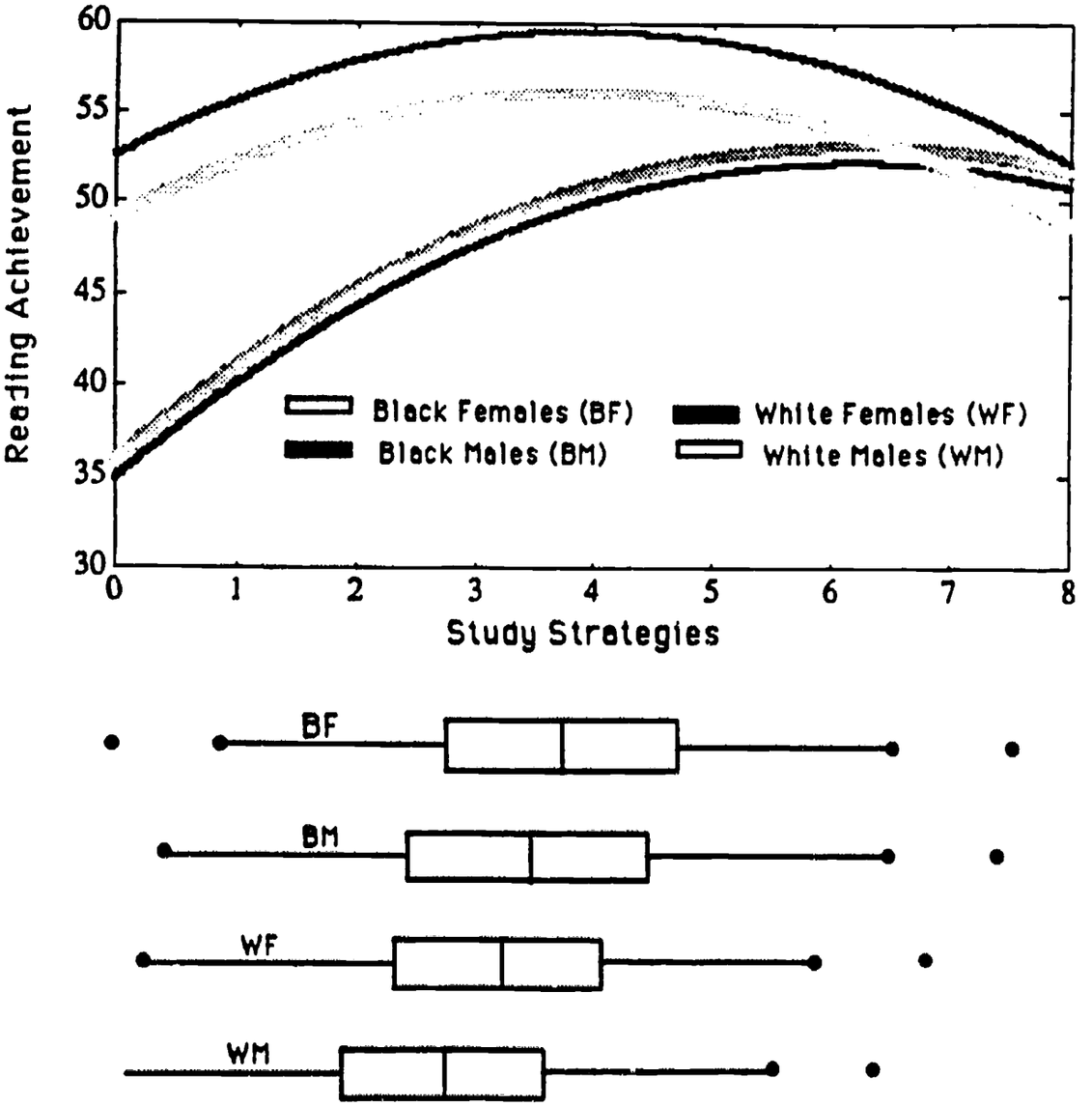

Figure 28. Regression Lines on Study Strategies for Black Females and Black Males at Age 17

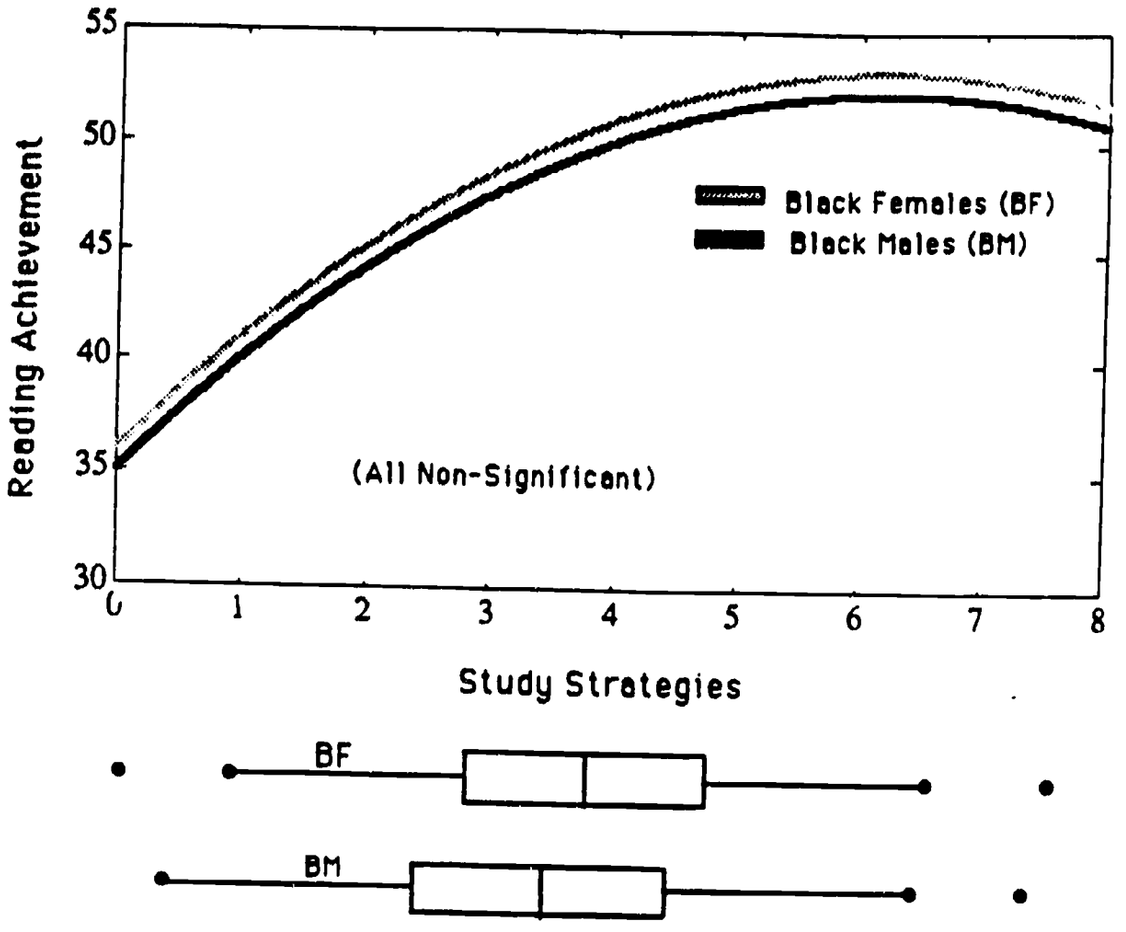

Figure 29. Regression Lines on Study Strategies for Black Males and White Males at Age 17

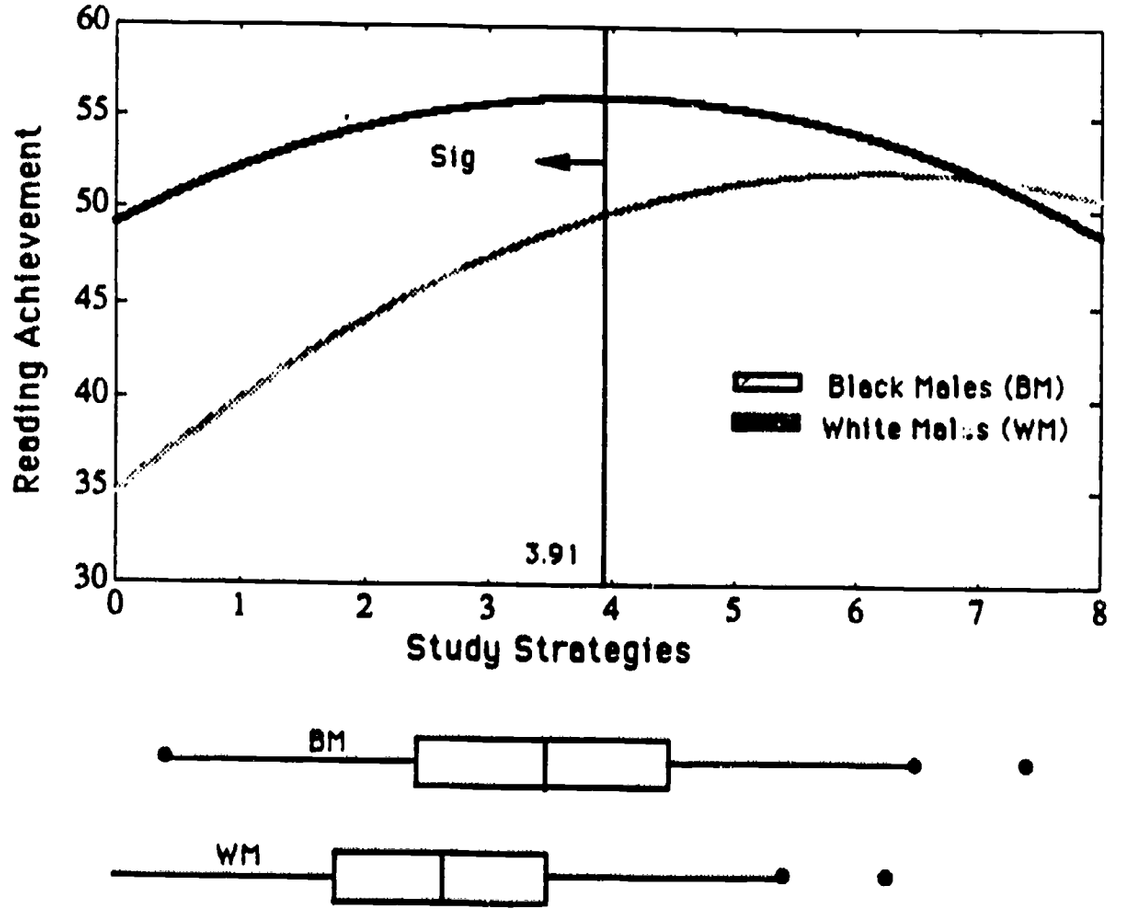

Table 21

Ordered Regression Source Table for Library-Involved Reading Activities at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0041	0.0041	1	378.40	378.40	4.23	.0399
Pred.^{2}	0.0081	0.0040	1	372.07	372.07	4.16	.0416
Race	0.0617	0.0536	1	4975.38	4975.38	55.67	.0000
Sex	0.0945	0.0327	1	3036.96	3036.96	33.98	.0000
R * S	0.0950	0.0006	1	52.54	52.54	0.59	.4435
R * Pred.	0.0952	0.0002	1	20.75	20.75	0.23	.6301
S * Pred.	0.0971	0.0019	1	175.05	175.05	1.96	.1620
R*S*Pred.	0.0973	0.0002	1	16.17	16.17	0.18	.6706
R * Pred.^{2}	0.0983	0.0010	1	95.62	95.62	1.07	.3013
S * Pred.^{2}	0.0992	0.0008	1	77.20	77.20	0.86	.3529
R*S*Pred.^{2}	0.0992	0.0000	1	1.58	1.58	0.02	.8942
Residuals			935	83570.60	89.39		

Figure 30. Regression Lines on Library-Involved Reading Activities for 4 Social Groups at Age 17

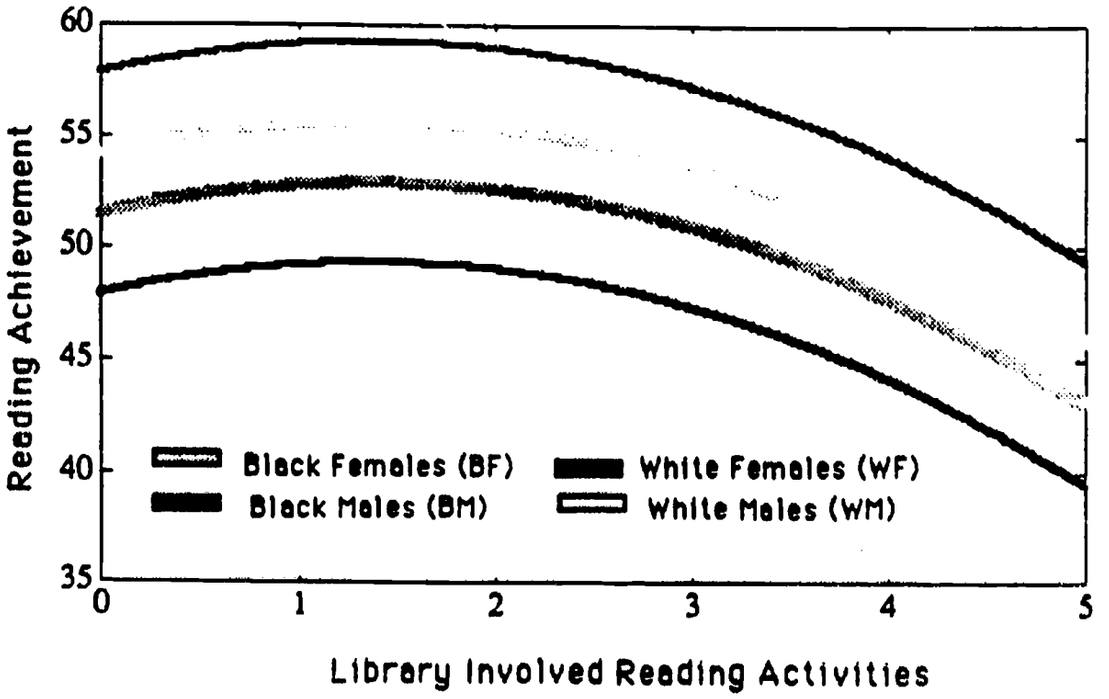

Table 22

Ordered Regression Source Table for Non-Fiction Reading Activities at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0003	0.0003	1	23.66	23.66	0.26	.6076
Pred.^{2}	0.0083	0.0081	1	747.17	747.17	8.33	.0040
Race	0.0621	0.0538	1	4993.85	4993.85	55.67	.0000
Sex	0.0944	0.0323	1	2995.55	2995.55	33.39	.0000
R * S	0.0949	0.0005	1	46.87	46.87	0.52	.4700
R * Pred.	0.0949	0.0000	1	0.39	0.39	0.00	.9475
S * Pred.	0.0952	0.0003	1	26.56	26.56	0.30	.5865
R*S*Pred.	0.0957	0.0005	1	44.62	44.62	0.50	.4808
R * Pred.^{2}	0.0957	0.0000	1	0.16	0.16	0.00	.9667
S * Pred.^{2}	0.0959	0.0002	1	21.46	21.46	0.24	.6249
R*S*Pred.^{2}	0.0959	0.0000	1	0.69	0.69	0.01	.9302
Residuals			935	83871.36	89.70		

Table 23

Ordered Regression Source Table for Fiction Reading Activities at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0141	0.0141	1	1312.66	1312.66	14.91	.0001
Pred.^{2}	0.0142	0.0000	1	0.15	0.15	0.00	.9671
Race	0.0727	0.0585	1	5430.94	5430.94	61.67	.0000
Sex	0.0997	0.0271	1	2509.78	2509.78	28.50	.0000
R * S	0.1004	0.0006	1	59.64	59.64	0.68	.4108
R * Pred.	0.1007	0.0003	1	29.73	29.73	0.34	.5614
S * Pred.	0.1039	0.0032	1	297.14	297.14	3.37	.0665
R*S*Pred.	0.1039	0.0000	1	1.35	1.35	0.02	.9015
R * Pred.^{2}	0.1049	0.0010	1	88.79	88.79	1.01	.3156
S * Pred.^{2}	0.1049	0.0000	1	0.01	0.01	0.00	.9929
R*S*Pred.^{2}	0.1125	0.0076	1	704.41	704.41	8.00	.0048
Residuals			935	82337.73	88.06		

Figure 31. Regression Lines on Fiction Reading Activities for 4 Social Groups at Age 17

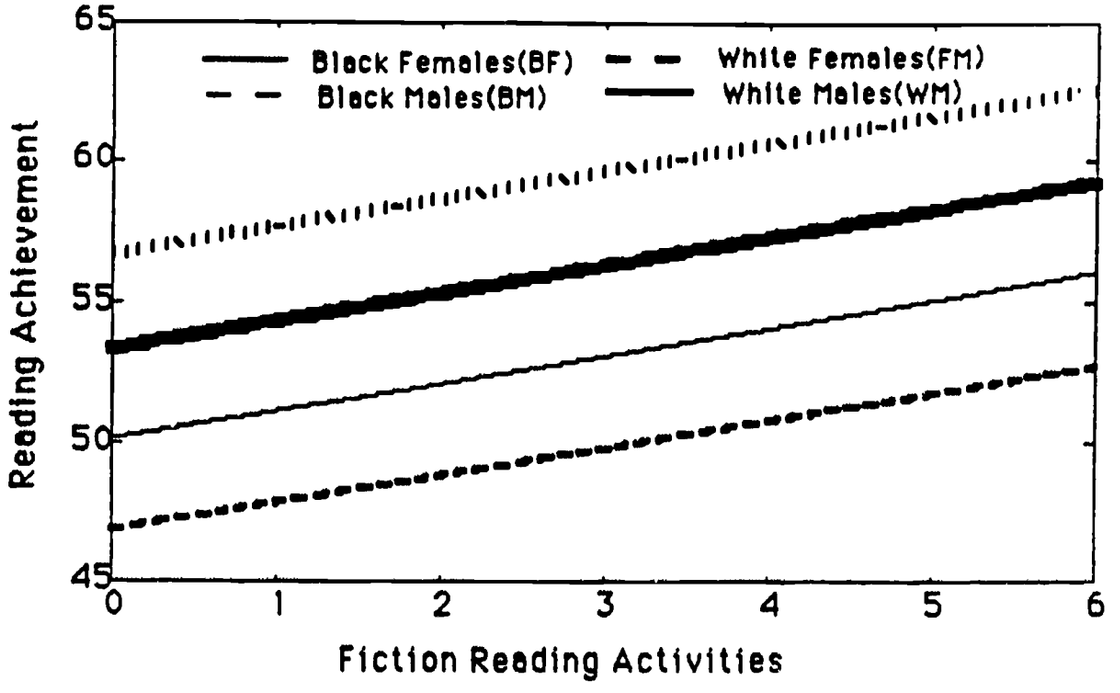

Table 24

Ordered Regression Source Table for News Reading Activities at Age 17

Source	R^2-Tot	R^2-Inc	df	SS-Inc	MS-Inc	F	P
Pred.	0.0074	0.0074	1	686.99	686.99	7.81	.0053
Pred.^{2}	0.0123	0.0049	1	450.91	450.91	5.12	.0238
Race	0.0700	0.0577	1	5352.25	5352.25	60.81	.0000
Sex	0.1015	0.0316	1	2930.10	2930.10	33.29	.0000
Race*Sex	0.1026	0.0011	1	101.07	101.07	1.15	.2842
R * Pred.	0.1050	0.0024	1	220.35	220.35	2.50	.1139
S * Pred.	0.1094	0.0044	1	409.80	409.80	4.66	.0321
R*S*Pred.	0.1101	0.0007	1	65.00	65.00	0.74	.3904
R * Pred.^{2}							
S * Pred.^{2}	(Not entered due to impossible tolerance values)						
R*S*Pred.^{2}							
Residual			938	82555.85	88.01		

Figure 32. Regression Lines on News Reading Activities for 4 Social Groups at Age 17

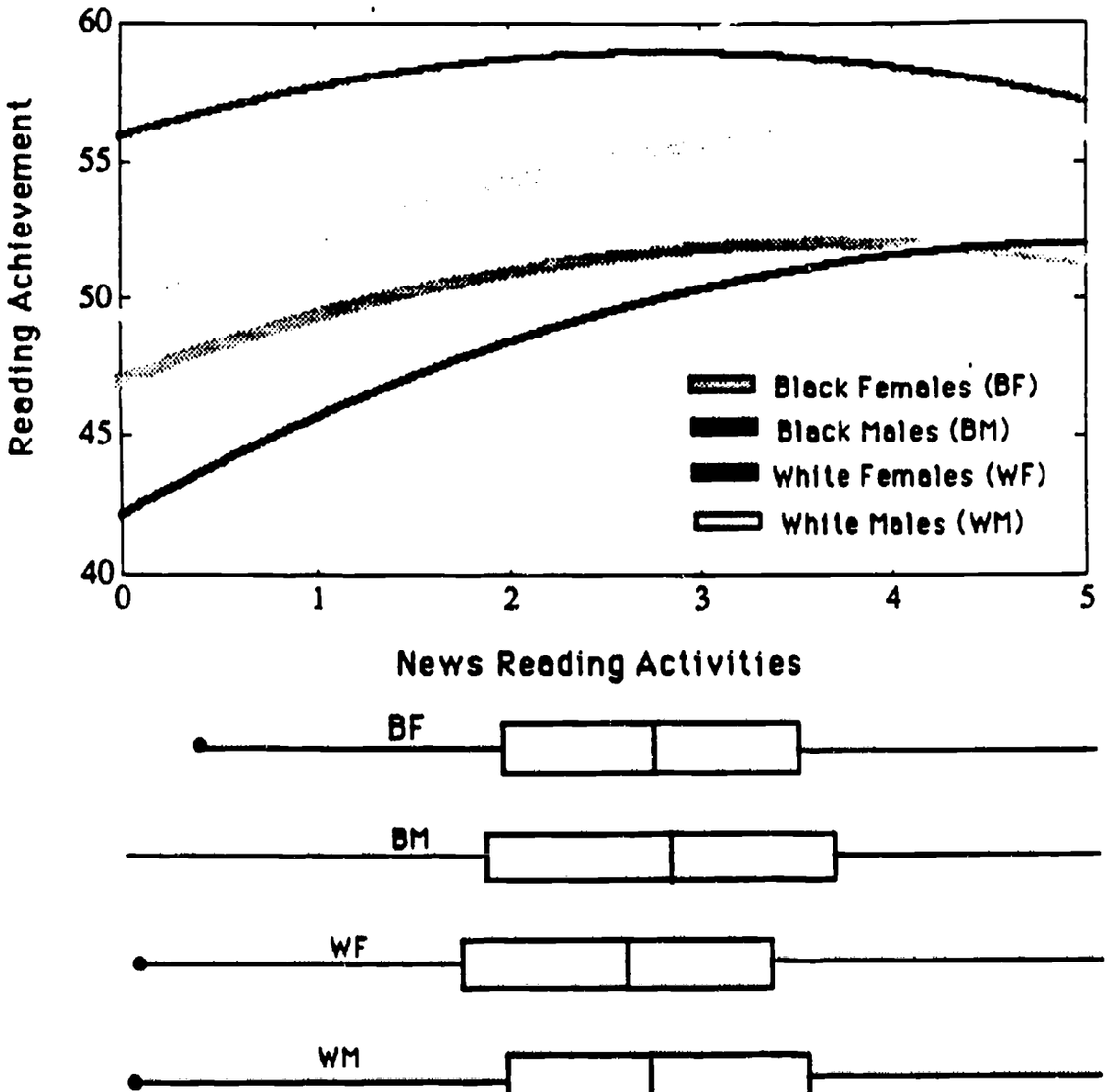

Figure 33. Regression Lines on News Reading Activities for Black Females and Black Males at Age 17

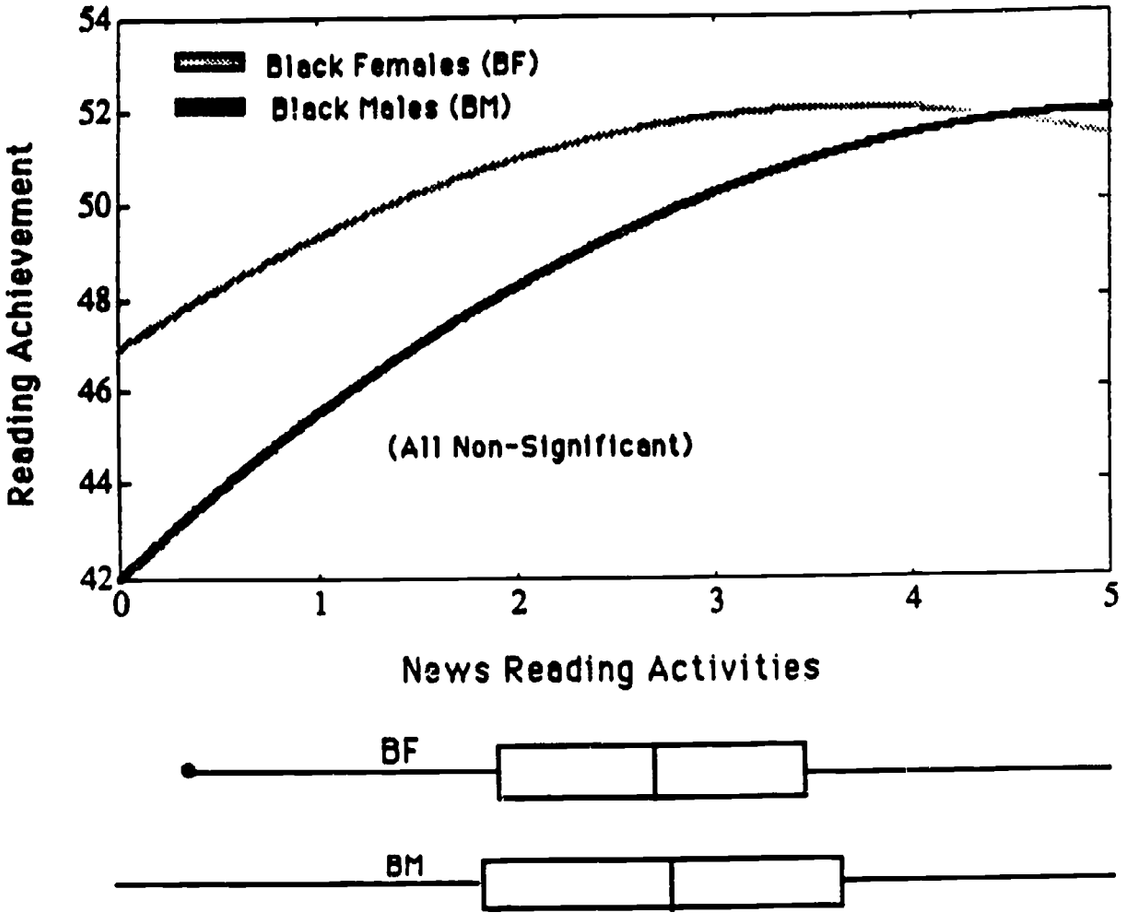

Figure 34. Regression Lines on News Reading Activities for Black Males and White Males at Age 17

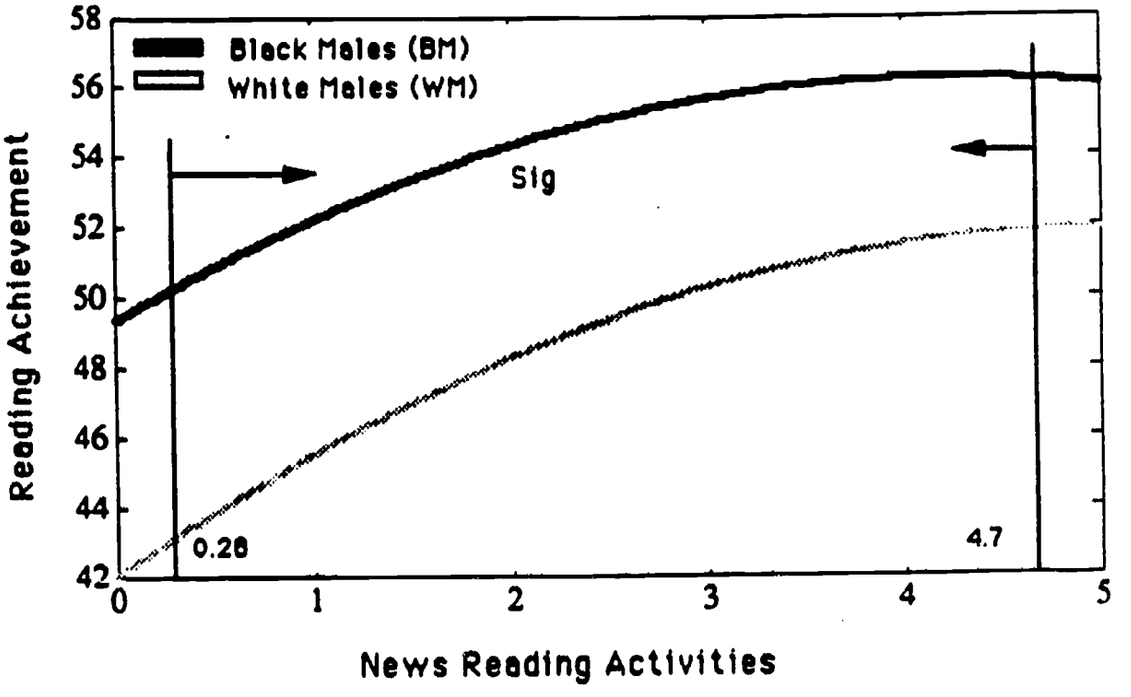

Table 25

Model Comparison of Linear vs. Quadratic Association of General Reading Activities with Reading Achievement at Age 13

Source	SS-tot	SS-inc	df	MS-inc	F	P
Linear	6408.15	6408.15	7	915.45	16.32	.0000
Quadratic	8391.94	1983.79	4	459.95	8.20	.0000
Residual	51019.01		910	56.06		