

Intergenerational Family Predictors of the Black–White Achievement Gap

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The authors examined intergenerational family predictors of the Black–White achievement gap among 4,406 adolescents from the National Longitudinal Survey of Youth. An intergenerational model of the process by which family factors contribute to the achievement gap was also tested. The results showed that the ethnic gaps in socioeconomic status (SES) and achievement had significantly reduced over the past few generations. Moreover, measures of grandparent SES, mothers' achievement, parent SES, and a comprehensive set of reliable parenting practices explained all of the ethnic differences in achievement scores. Parenting practices such as creating a school-oriented home environment, allowing adolescents to make decisions, and not burdening them with too many chores had particularly important effects on the achievement gap. The authors conclude that adjusting for these differences would eliminate the ethnic achievement gap.

Keywords: achievement gap, parenting, intergenerational

The ethnic variation in achievement has been a contentious topic for several decades (Jencks & Phillips, 1998). Studies of school-based factors show that the ethnic gaps in achievement are associated with ethnic differences in academic tracking (Oakes, 2005), teacher expectations (Ferguson, 2003), and the overall quality and quantity of educational experiences (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; Fryer & Levitt, 2004). A study of data from the National Assessment of Educational Progress found that almost 40% of the achievement gap in math can be explained by the amount and type of math courses taken, rigor of curriculum, frequency of calculator use, and the degree to which students believe that math is fact learning (Byrnes, 2003). However, there has been less focus in educational research on the importance of parents' role in the achievement gap and their children's achievement generally. Consequently, the research on the family factors that may account for the achievement gap is less comprehensive.

Many researchers argue that family factors such as socioeconomic status (SES; Brooks-Gunn, Klebanov, Smith, Duncan, & Lee, 2003; McLoyd, 1998), parents' education (Byrnes, 2003), and certain parenting practices (Bradley et al., 1989; Moore, 1986)

account for some of the ethnic differences in achievement, but the remaining variance is due to innate genetic differences (Herrnstein & Murray, 1994). For instance, one study assessed economic resources and family environment factors and concluded that they explained up to two thirds of the achievement gap between Black and White 5- and 6-year-olds (Phillips, Brooks-Gunn, Duncan, Klebanov, & Crane, 1998). Phillips, Brooks-Gunn, et al. (1998) further concluded that 26% of the family environment effect is genetic in nature.

However, there are significant methodological flaws in most previous studies of family factors that reduce the validity of the conclusions. For one, most previous studies tended to examine only a few parenting factors at a time—usually only parental warmth and/or cognitive stimulation in the home. Furthermore, many of the studies tended to use poorly measured parenting variables or single-item SES indicators. This can mask the true effects of the variables and lead to the conclusion that they do not account for much of the ethnic gap. Almost all of the large-scale achievement gap studies that assessed family factors have examined only young children. Given that ethnic gaps in achievement have been shown to increase as youths get older (Phillips, Crouse, & Ralph, 1998), failure to understand how family factors affect the gap during adolescence is a major shortcoming. Another limitation of previous studies is that they rarely examined the long-term impact of past generations' economic and social resources on the recent achievement gap. Only the Phillips et al. (1998) study described above examined grandparent factors. Probably the major limitation of prior studies is that little is known about the family processes that link differences in ethnic background to ethnic differences in achievement.

The purpose of the current study was to address these limitations and determine how much of the ethnic gap in adolescent achievement test scores can be explained by using a comprehensive set of relatively well-measured family factors. A further purpose was to test an intergenerational model of the process by which generations of SES and parenting differences may lead to ethnic differences in adolescent achievement. Specifically, data from the Na-

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tional Longitudinal Survey of Youth (NLSY) and National Longitudinal Survey of Youth–Child Supplement (NLSY-C) were used to examine the effects of grandparent SES, parent achievement and SES, and parenting factors on the achievement gap between African American and European American adolescents.

Conceptual Model of Intergenerational Family Predictors of the Achievement Gap

The model tested in this study is illustrated in Figure 1. The model suggests that events in American history created rather large ethnic differences in family SES. These differences in SES are the initial link in the chain of events leading to current ethnic differences in achievement. This hypothesis stems from the consistent finding that components of SES such as parental education, occupation, income, and wealth are highly correlated with academic achievement (Brooks-Gunn, Klebanov, & Duncan, 1996; Crane, 1996; McLoyd, 1998; Orr, 2003). There are also large ethnic differences in SES that appear to coincide with the ethnic differences in test scores. For instance, recent census data show that Asian Americans’ average total household income was \$44,080, European Americans’ was \$40,212, Hispanic Americans’ was \$30,291, and African Americans’ was \$26,168 (DeNavas-Walt, Cleveland, & Webster, 2003). In addition, African American children are not only more likely to live in poverty but also more likely to live in persistent poverty (Duncan, Brooks-Gunn, & Klebanov, 1994). Several researchers have therefore argued that differences in family SES account for much of the ethnic differences in test scores.

A few studies using the NLSY have found consistent support for this idea. Brooks-Gunn et al. (2003) used low-birth-weight 3- and

5-year-olds from the control group of a clinical trial study and 3- to 6-year-olds from the NLSY to assess the effects of family characteristics on the Black–White test score gap. Analyses of their tables show that income-to-needs ratio explained 16% to 50% of the ethnic differences in test scores beyond child characteristics, depending on the test, sample, and age of the children. Another study using the NLSY examined the impact of wealth on the Black–White test score gap (Orr, 2003). This is an important study because African American families have significantly less wealth than European American families, even when income, occupation, and parental education are controlled (Eller, 1994). Results showed that wealth explained an additional 15% of the test score gap, even after traditional measures of SES, maternal test scores, family structure, and other variables were controlled (Orr, 2003). Thus, various measures of family SES seem to account for significant portions of the ethnic test score gap.

The conceptual model in Figure 1 also suggests that the quality of parenting is the main mediator of the effects of SES on achievement. The higher the SES of parents, the more likely they are to use parenting practices associated with academic achievement. This assumption is consistent with the family stress model, which predicts that families’ experience with economic pressure negatively impacts youths because it interferes with parents’ mental health, which reduces the quality of parenting the youths receive (Conger et al., 2002). In support of this, several studies find that the effects of various SES factors on child and adolescent achievement are almost completely mediated by family functioning and parenting (Brody & Flor, 1997; Crane, 1996; Guo & Harris, 2000; Linver, Brooks-Gunn, & Kohen, 2002; Mistry, Vandewater, Huston, & McLoyd, 2002). For instance, Guo and Harris (2000) used

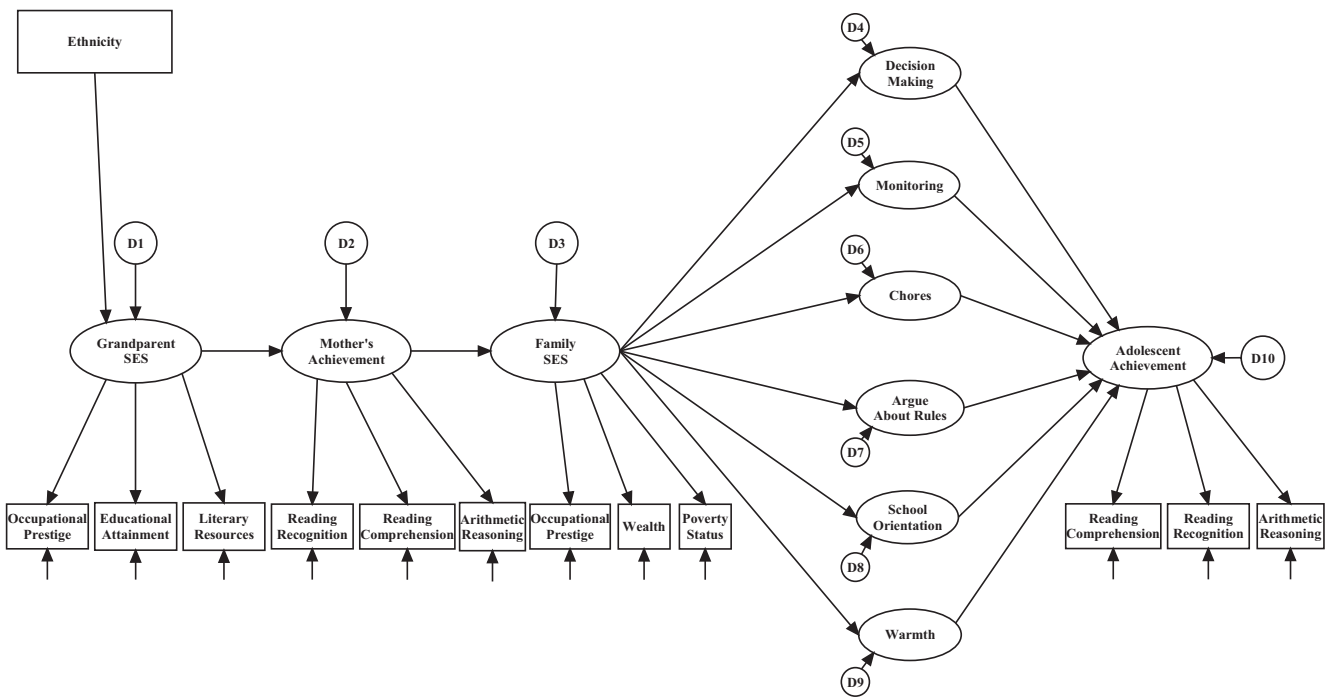


Figure 1. Conceptual model of intergenerational family factors on adolescent achievement. SES = socioeconomic status.

the NLSY and found that parental warmth, the physical setting of the home, and especially cognitive stimulation in the home completely mediated the effects of poverty on preschool children's cognitive development.

Parenting is also theorized to account for ethnic differences in achievement. This stems from the consistent findings that European American parents are rated by themselves and observers as enacting more practices consistent with achievement than African American parents. For instance, European American parents are higher in parental warmth and support (Bradley, Corwyn, Pipes McAdoo, & Garcia Coll, 2001; Moore, 1986), allow their children more autonomy to make decisions (Goldstein, Davis-Kean, & Eccles, 2005), and have a more cognitively stimulating home environment (Bradley et al., 2001; Brooks-Gunn et al., 1996), even after SES factors are controlled. In one of the most compelling studies, 23 African American children adopted by middle-class African American families were found to have an average IQ score of 103.6, whereas 23 others adopted by middle-class European American families had an average IQ of 117 (Moore, 1986). Mothers were also observed while helping their adopted children perform a difficult cognitive task. European American mothers were more likely than African American mothers to use positive reinforcement and other parenting strategies shown to be positively correlated with test scores (Moore, 1986). Each of these parenting practices is consistently related to academic achievement and cognitive development for European American and African American youth (Bradley et al., 2001; Brody & Flor, 1997; Brody, Stoneman, & McCoy, 1994; Linver et al., 2002).

Similarly, the research on parenting styles also clearly shows that European American youths are much more likely to have authoritative parents than African American youths (Steinberg, Mounts, Lamborn, & Dornbusch, 1991). Authoritative parents are warm and highly responsive to adolescents' emotional needs and allow autonomy of decision making, but they also monitor adolescents' friends and whereabouts, set high expectations, and have clear rules and behavioral boundaries (Baumrind, 1996). Studies consistently show that European American youths with authoritative parents outperform other European American adolescents at every level of education (Spera, 2005; Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994; Strage & Brandt, 1999). Although early studies did not find a strong advantage for having authoritative parents among African American adolescents, as they did with European American adolescents, more recent studies do show that African American adolescents with authoritative parents have higher achievement and better mental health than those with authoritarian or other types of parents (Spera, 2005; Taylor, Hinton, & Wilson, 1995).

Only a few studies have directly tested the assumption that ethnic differences in parenting explain ethnic differences in achievement. One study using the low-birth-weight data set discussed above found that cognitive stimulation in the home and parental warmth explained 28% of the test score gap in preschool children, even after SES, maternal education, neighborhood conditions, and other factors were controlled (Brooks-Gunn et al., 1996). Brooks-Gunn et al. (2003) also found that these parenting variables explained 14% of the test score gap in the 3-year-olds of the NLSY and 16% of the gap for 5-year-olds, after SES and maternal achievement were controlled. Therefore, as these studies imply, the model in Figure 1 suggests that one reason European

American adolescents have higher achievement scores than African American adolescents is that their parents have higher SES, which makes them more likely to use parenting strategies that foster academic achievement.

The conceptual model in Figure 1 also suggests that one consequence of differential family SES and parenting practices is that these resources tend to be transmitted from one generation to the next (Phillips et al., 1998; Saltaris et al., 2004). For instance, 12% of European Americans receive inheritances over \$10,000, whereas only 1% of African Americans do (Gittleman & Wolff, 2002). European American parents are also more able to help their children financially with their education costs, home purchases, and payment of debt than African American parents are. This transmission of resources is one reason why European American families tend to have more wealth than African American families, even when parental education and incomes are equal (Gittleman & Wolff, 2002).

Grandparents may also have a direct impact on children because they often act as caregivers to their grandchildren. This may be particularly true for African Americans, considering the large amount of time they spend with their grandparents (Kamo, 2000). However, only one study to date has examined the effects of these factors on the test score gap in grandchildren (Phillips et al., 1998). In support of the conceptual model proposed here, they found that grandparents' resources explained about 25% of the test score gap before second generation factors were controlled. When the second generation factors were added to the model, grandparent effects were reduced. Thus, the model tested in this study suggests that European Americans' SES advantages from prior generations helps produce future generations' advantages in achievement through the middle generation's SES and parenting.

The Current Study

This study attempts to build on the strengths of prior studies and address their limitations by using a larger set of reliable SES and parenting factors from the 1979–2000 NLSY and NLSY-C data. The NLSY is a national panel study of over 12,000 women and men who began participating in 1979. At that time, participants were ages 14 to 21. The participants have been followed every year or every other year since 1979. In 1986 and every other year since, in-home assessments of the NLSY women's children were taken as part of the NLSY-C. Therefore, the NLSY and NLSY-C have data on grandparents (i.e., parents of the NLSY women), parents (i.e., the NLSY women), and adolescents (i.e., children of the NLSY women). These unique data allow for the assessment of SES factors in the mother's home when she was an adolescent. Unfortunately, grandparents' parenting practices and information about the adolescent's paternal grandparents were not assessed in the NLSY. The mother's achievement test scores when she was an adolescent were also assessed. As mothers grew up and had children, their families' SES and a comprehensive set of parenting practices were assessed, as well as the achievement test scores of their adolescents. To account for measurement error and test the conceptual model, structural equation modeling (SEM) methods were employed (Arbuckle, 2007; Bollen, 1989).

Given the literature reviewed above, we expected that the factors in the model would account for almost the entire ethnic achievement gap among the adolescents. Thus, the large differ-

ences in African American and European American adolescent achievement would be eliminated once the family factors were entered into the SEM. As depicted in Figure 1, we also hypothesized that the effects of grandparents' SES on adolescent achievement would be mediated by their daughters' achievement and SES. These factors would then be mediated by the parenting practices used in the adolescents' homes.

Method

Participants

The participants included 2,284 women from the original NLSY sample and 4,406 of their adolescents who were at least 10 years old in 2000 and who had data on the achievement variables. Age of adolescents was the criterion because most children at the age of 10 would be cognitively ready to answer questions about the parenting they received. To maintain the integrity of other design features of the NLSY-C, such as measuring grandparent factors before the children were born, those born before 1980 were not used in the current study. In 2000, the average age of the adolescents was 14.4 ($SD = 2.3$), and their mothers' average age was 39 ($SD = 2.2$). Fifty-one percent of the children were male. From 1986 to 2000, the average family income in 1999 dollars was \$44,000 ($SD = \$40,109$). Ethnic group differences and other descriptive statistics are discussed in the Results section.

Procedure

In 1978, the National Opinion Research Center identified over 150,000 people from a list of housing units in selected areas of the United States. From this list, they identified a sample of over 11,000 noninstitutionalized individuals who were 14 to 21 by the end of 1978. The NLSY also oversampled African Americans so that better comparisons with European Americans could be made. Yearly 1-hr personal interviews of the respondents by trained personnel occurred from 1979 through 1994. Respondents have been interviewed every other year since 1994. Beginning in 1986, all the available children of the female respondents were assessed every other year with a variety of interview and survey methods. From ages 10–11 until 13–14, children were interviewed separately. Most parenting measures used in the current study derived from those interviews. The respondents were paid \$10 for each interview from 1979 to 1994. They were paid \$20 plus \$5 per child for each assessment since 1994. The mothers were also paid \$50 for the Armed Forces Qualification Test in 1980. Chase-Lansdale, Mott, Brooks-Gunn, and Phillips (1991) discussed the methods in more detail.

Instruments

Various measures of grandparents' SES, mother's achievement, the immediate family's SES, six parenting practices, and adolescent achievement were assessed. Grandparent factors were assessed when the mother was in the first year of the NLSY study in 1979–1980. Mother's achievement was assessed in 1979–1980 before the adolescents were born. Family SES was derived from the mother's self-reports as she became an adult. From the time a child turned 10–11 until the age of 13–14, he or she was interviewed separately once and sometimes twice between those years.

The parenting scores were averaged for those with two assessments. Other parenting variables were derived from mothers' self-reports and observations of trained staff. Factor and reliability analyses were conducted to create each variable. The data file was also split by ethnicity, and the final results were repeated to verify equivalence across ethnic groups. Each of the variables had roughly equal factor loadings and reliabilities for African Americans and European Americans. Due to space limitations, the details of the factor analyses are not presented here. The coefficient alphas and other measurement details are presented below.

Grandparents' educational level. During the first year of the study, the mothers were asked the highest levels of education completed by their mother and their father (if known) by 1979. A composite of grandparents' education was then created by averaging grandmother's and grandfather's highest levels of education ($\alpha = .70$).

Grandparents' occupational prestige. Interviewers assessed the occupations of the grandmothers and grandfathers in the study by asking their daughters four questions. The first questions asked each daughter (i.e., mother in the current study) to name the occupations of her mother in 1979 and her father in 1979 (if known). The daughters were also asked to state the occupations of the adult male in their home when they were 14 and the adult female in their home when they were 14 (if known). As a way to classify occupations and organize them according to a hierarchy of prestige, the NLSY used the Census Bureau's three-digit 1980 occupational classification system. The one to four separate three-digit codes were then averaged to form the grandparents' occupational prestige composite ($\alpha = .82$). The scale was reversed so that higher scores represent more prestigious occupations.

Grandparents' literacy resources. Another indicator of grandparents' SES was the amount of reading material around the home when the mother was 14. This was estimated from three items. The first item asked whether someone in the family subscribed to newspapers. The second asked whether someone in the family subscribed to magazines. The last item asked whether someone in the family had a library card. A composite was created by averaging these three items ($\alpha = .56$).

Mothers' achievement test scores. Mothers' achievement was estimated in 1980 with the Armed Forces Qualification Test raw scores. The test is composed of the arithmetic reasoning, reading recognition, and reading comprehension sections of the Armed Services Vocational Aptitude Battery. The mothers took the test in 1980. Cronbach's alpha for each subtest was around .90.

Parents' occupational prestige. The mothers were asked to state their occupation, if any, and their husband or partner's occupation, if any, during each assessment. The Census Bureau's three-digit 1980 occupational classification system was applied to the reported occupations. Mother's and father's three-digit occupational prestige scores were averaged at each assessment until the child was 12–14 years old ($\alpha = .85$). The scale was reversed so that higher scores indicate more prestigious occupations.

Parents' poverty status. In the NLSY, family poverty status was determined using the poverty income guidelines from the U.S. Department of Health and Human Services. This index of poverty takes into consideration family income and family size and is adjusted for inflation annually. The factor used in the current study is the proportion of time the family did not live in poverty from the adolescent's birth until the age of 12–14.

Parents' wealth. During the yearly interviews, respondents were asked to estimate the value of their home if they were homeowners. The average value of the home the family lived in from the adolescent's birth to age 12–14 was used as the indicator of parents' wealth. Those who never owned their homes were given a value of \$0.

Adolescent decision making. During the NLSY-C, adolescents were asked a series of questions with the stem, "Who usually makes the decisions about ____?" The questions were: (a) "buying your clothes," (b) "how to spend money," (c) "which friends to go out with," (d) "how late you can stay out," (e) "how much allowance you get," and (f) "how much TV you can watch." They were asked to circle responses indicating themselves, their mother, father, stepfather, friend and/or other person. For the purposes of this study, only those times in which the adolescents indicated themselves were counted as a "yes" response. If they did not indicate themselves, it was scored as a "no" response. These scores were averaged to create the variable ($\alpha = .63$).

Parental monitoring. The degree to which parents monitored the whereabouts of their adolescents was assessed on the NLSY-C with three items. Using a 5-point scale, two items had the stem, "How much do you tell your parent(s) about ____?" The questions were, "where you are when you are not at home" and "who you are with when you are not at home." A third question asked, "About how often does each parent know who you are with when you're not at home?" These scores were averaged to create the variable ($\alpha = .71$).

Household chores. Adolescents were also asked the stem, "In your home, are you regularly expected to help out with ____?" They answered *yes* or *no* to (a) "keeping the rest of the house clean," (b) "doing the dishes," and (c) "cooking." These scores were averaged to create the variable ($\alpha = .50$).

Arguing about rules. Also from the NLSY-C, this variable was derived from a set of questions that used the stem, "How often do you argue with your parent(s) about the rules about ____?" The questions were (a) "watching television," (b) "keeping your parents informed about where you are," (c) "doing your homework," and (d) "dating and going to parties with boys and girls." A 3-point Likert-type scale (from 1 = *hardly ever* to 3 = *often*) was used. Factor and reliability analyses found that the questions about watching television and dating did not correlate well with the other two items or each other. The remaining two items about keeping parents informed and homework rules were averaged to form the variable. Higher scores mean hardly ever arguing about the rules ($\alpha = .70$).

Maternal warmth. Starting in 1986 and continuing every other year, observers completed a short form of the Home Observation for Measurement of the Environment (Caldwell & Bradley, 1984) for each family. A total of four items that were concerned with the mother's warmth toward and support of the child (i.e., "Did the mother encourage the child to contribute to the conversation?") were rated by trained and experienced observers on a *yes* or *no* scale. The items were averaged to form the variable ($\alpha = .70$).

School-oriented home. During the same home visits, mothers were asked three questions about the school orientation of their home environment. They were asked about the number of books in the home (*10 or more books, 3 to 9 books, 1 or 2 books, none*); they were asked, "Is there a musical instrument that the child can use here at home?" (*yes* or *no*); and, "Does the child get special

lessons or belong to any organization that encourages activities such as sports, music, art, dance, drama, etc?" (*yes* or *no*). The items were averaged to form the variable ($\alpha = .53$).

Adolescent achievement. Adolescent achievement was estimated with the reading recognition, reading comprehension, and mathematical reasoning subtests of the Peabody Individual Achievement Test (PIAT). The PIAT battery is a wide-range, brief assessment of academic achievement first developed in 1970. The latest revisions and restandardization of the PIAT were conducted after the initial 1986 assessments. The adolescents took the PIAT battery every other year, beginning in their first year in the study. They completed the PIAT in their homes with trained interviewers. For this study, only the assessments of each subtest between the ages of 10–11 and 13–14 were aggregated. The alpha for each of the subtests was around .90.

Analysis Plan

To determine if the effects of ethnicity could be explained by the family factors and to test the intergenerational model in Figure 1, we employed latent variable SEM with maximum likelihood estimation using Amos 16.0 (Amos Development Corporation, Spring House, PA). SEM with latent variables is advantageous because it allows for the measurement error to be modeled. Furthermore, SEM allows for a test of the statistical significance of the direct (i.e., nonmediated) and indirect (i.e., mediated) effects. A nonsignificant direct effect and a significant indirect effect of ethnicity would indicate that ethnic differences in adolescent achievement were completely explained by the other variables in the model. Bootstrap methods were used to estimate the standard errors and *p* values of the indirect effects (Arbuckle, 2007). Overall model fit was assessed with the comparative fit index (CFI), the adjusted goodness-of-fit index (AGFI) and the root-mean-square error of approximation (RMSEA). Established criteria suggest that a CFI and AGFI of .95 or better and an RMSEA less than .06 indicate an excellent fit of the model to the data (Hu & Bentler, 1999).

Because some mothers had multiple children in the study, there is the possibility that the standard errors could be underestimated due to a violation of the assumption of independence. In other studies with the NLSY this has not been a concern, because of the relatively large sample size. Nevertheless, to check for this possibility, the adolescents were divided into the first, second, and third or later birth order groups, and multigroup analyses were conducted on the final model. The results were virtually identical in each subsample. The achievement gap was slightly larger at first for the first-born adolescents, but after the final model results were the same. Therefore, only the full sample results are presented.

Imputation of Missing Data

During the collection of the NLSY data, some participants were not available during every assessment. However, many issues had to be considered before data could be imputed. The participants were different ages in each year, and assessments only occurred every other year. Also, the parenting variables were assessed no more than twice between the ages of about 10 to 14. To account for these issues, we converted each variable to the age of the participant at assessment. Variables were then collapsed into age groups: 0–2, 3–4, 5–6, 7–8, 9–11, and 12–14. Adolescents had to have at

least one assessment of achievement between the ages of 10 and 14 to be included in the study. Missing data were then analyzed with the Missing Value Analysis add-on module in SPSS 16.0. Little's test showed that the data were not missing completely at random, $\chi^2(67758, N = 4,406) = 75,877.91, p < .001$. We therefore imputed missing data with the expectation maximization (EM) algorithm. This method replaces missing values with iterative maximum likelihood estimations based on the available data (Arbuckle, 2007). Once data were imputed, the 12- to 14-year-old data for those who were younger than 12 during the final assessment were removed. The age groups were then aggregated as described in the Method section.

Results

Descriptive Statistics

The zero-order correlations of the study variables are presented in Table 1. As expected, all of the grandparent SES factors had moderate to large correlations with their daughters' achievement and family SES. Mothers' achievement and each of the family SES variables also had moderate to large correlations with the parenting variables in the expected directions. Adolescents whose mothers had higher achievement and SES experienced more autonomy in their decisions, more parental monitoring, warmer parent-adolescent relationships, and more school-oriented homes. As can be seen, adolescents' math and reading scores had significant correlations with all the other study variables. The school orientation of the home, adolescent freedom to make decisions, and the degree of arguing about the rules had particularly strong correlations for the parenting variables.

Table 2 presents the means, standard deviations, and independent sample *t* tests for each variable by ethnicity. The groups differed on all variables in typical directions. European American

grandparents had significantly higher education, occupational status, and more literacy resources than African American grandparents. European American parents were also less likely to have experienced poverty and had more prestigious occupations and much more wealth. Although European American mothers and adolescents outscored African Americans on the achievement tests, as is typically found, the effect size of the differences dramatically decreased in this one generation. Whereas 23% to 29% of the variance in mothers' test scores could be explained by ethnicity, only 9% to 14% of their adolescents' test scores could be explained by ethnicity. In like manner, although European American parents were better off on all the SES variables than African American parents, the sizes of the ethnic differences in occupational prestige dropped from the grandparents' generation to the parents' generation at roughly the same rate as the size of the achievement test score gap reduced from the parents' to the adolescents' generation.

Measurement Model

In the measurement phase of the analyses, a confirmatory factor analysis was conducted that included only the latent variables with multiple indicators (i.e., grandparents' SES, mothers' achievement, family SES, and adolescents' achievement). To scale each latent variable, the paths to the indicators with the highest loading for each latent variable were set to 1 (Arbuckle, 2007). The latent variables were allowed to covary in the model. The constrained model yielded a good fit, $\chi^2(48, N = 4,406) = 1040.13, p < .001$, CFI = .97, AGFI = .96, RMSEA = .06. Also, the loadings and *R*² for each indicator were moderate to large (see Table 3).

The six parenting variables were used as single indicators of their latent variables in the analyses. To account for measurement error, the paths from the latent variables to the indicators were

Table 1
Zero-Order Correlations Between Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Grandparents																		
1. Occupational prestige	—																	
2. Education	.55	—																
3. Literary resources	.37	.45	—															
Parents																		
4. Arithmetic reasoning	.37	.41	.39	—														
5. Word recognition	.43	.47	.47	.73	—													
6. Reading comprehension	.37	.42	.44	.69	.82	—												
7. Occupational prestige	.28	.32	.25	.33	.33	.31	—											
8. Poverty	.38	.37	.38	.50	.60	.58	.21	—										
9. Wealth	.36	.36	.32	.46	.43	.40	.39	.46	—									
10. Decisions	.22	.23	.21	.30	.34	.34	.12	.30	.21	—								
11. Monitoring	.18	.23	.20	.22	.23	.23	.21	.24	.29	.09	—							
12. House chores	-.19	-.17	-.16	-.25	-.29	-.27	-.16	-.29	-.24	-.14	-.10	—						
13. Argue about rules	-.13	-.17	-.13	-.20	-.24	-.25	-.15	-.19	-.16	-.24	-.13	.12	—					
14. School orientation	.39	.40	.42	.49	.54	.50	.33	.56	.45	.30	.27	-.23	-.23	—				
15. Warmth	.15	.15	.16	.19	.21	.21	.14	.27	.17	.13	.10	-.06	-.10	.26	—			
Adolescents																		
16. Arithmetic reasoning	.32	.35	.31	.49	.49	.48	.31	.42	.37	.42	.25	-.28	-.33	.47	.19	—		
17. Word recognition	.28	.30	.29	.41	.48	.45	.28	.39	.32	.36	.20	-.23	-.40	.44	.16	.68	—	
18. Reading comprehension	.28	.32	.31	.46	.52	.48	.27	.43	.35	.38	.18	-.26	-.38	.48	.17	.71	.83	—

Note. *N* = 4,406. All *r*s are significant at *p* < .001.

Table 2
Means, Standard Deviations, and *t* Tests of Each Factor by Ethnicity

Factor	Black		White		<i>t</i>	<i>d</i>
	\bar{X}	<i>SD</i>	\bar{X}	<i>SD</i>		
Grandparent SES						
Occupational prestige	316.80	200.75	490.34	219.78	27.00	0.82
Education	9.90	2.61	11.38	2.41	19.52	0.59
Literary resources	0.51	0.35	0.76	0.30	25.66	0.77
Mother's achievement						
Arithmetic reasoning	10.36	4.20	16.96	6.70	37.86	1.18
Word recognition	16.92	7.26	26.10	7.13	42.05	1.28
Reading comprehension	7.76	3.38	11.34	3.08	36.61	1.11
Family SES						
Occupational prestige	450.58	140.51	489.74	160.63	8.47	0.39
Poverty status	0.51	0.35	0.84	0.25	35.79	1.09
Wealth	9,344.38	29,416.75	62,940.85	77,992.11	28.63	0.91
Parenting practices						
Decision making	0.38	0.16	0.48	0.15	21.01	0.64
Parental monitoring	2.73	0.52	2.93	0.50	13.27	0.39
House chores	0.68	0.19	0.55	0.23	-20.00	0.62
Argue about rules	1.70	0.48	1.61	0.44	-7.14	0.20
School orientation	1.33	0.37	1.68	0.31	33.58	1.03
Warmth	0.83	0.19	0.90	0.14	12.22	0.42
Adolescent achievement						
Arithmetic reasoning	94.37	11.78	104.18	12.30	26.74	0.81
Word recognition	97.33	14.09	106.12	14.04	20.59	0.62
Reading comprehension	93.08	11.81	102.14	12.23	24.78	0.75

Note. *N* = 4,406. SES = socioeconomic status. All *t*s are significant at $p < .001$.

fixed to the square root of the internal consistency reliability of the indicator, and the residuals were fixed to the indicators' error variances (i.e., $1 - \alpha$) times their variances (Bollen, 1989).

SEM

The main analyses assessed the intergenerational model in Figure 1 with latent variable SEM. Although the path between

ethnicity and adolescent achievement was predicted to be zero, it was allowed to freely vary to get a better estimate of the indirect and direct effects of ethnicity. The constrained model had an acceptable fit with the data, $\chi^2(143, N = 4,406) = 3,045$, CFI = .92, GFI = .93, RMSEA = .07. As predicted, the direct effects of ethnicity reduced to no difference between African Americans and European Americans. Also, most of the hypothesized paths in the model were significant in the expected direction. However, an

Table 3
Factor Loadings of Indicators for Latent Variables With Multiple Indicators

Multi-indicator latent variables	Unstandardized factor loadings	Standardized factor loadings	<i>R</i> ²
Grandparent SES			
Grandparent SES → Occupational prestige	1.00 ^a	.62	.38
Grandparent SES → Education	729.95**	.68	.46
Grandparent SES → Literary resources	9.14**	.75	.56
Mother's achievement			
Mother's ach. → Arithmetic reasoning	1.00 ^a	.93	.86
Mother's ach. → Word recognition	0.66**	.79	.62
Mother's ach. → Reading comprehension	0.41**	.88	.77
Family SES			
Family SES → Occupational prestige	1.00 ^a	.72	.52
Family SES → Poverty status	278.27**	.44	.20
Family SES → Wealth	168,478.32**	.62	.38
Adolescent achievement			
Adolescent ach. → Arithmetic reasoning	1.00 ^a	.92	.85
Adolescent ach. → Word recognition	0.85**	.77	.60
Adolescent ach. → Reading comprehension	1.10**	.89	.79

Note. *N* = 4,406. SES = socioeconomic status; ach. = achievement.

^a Unstandardized factor loading was fixed to equal 1.00 and was not tested for significance. $\chi^2(48) = 1,040.13$, $p < .001$, CFI = .97, adjusted goodness-of-fit index = .96, root-mean-square error of approximation = .06.

** $p < .001$.

examination of the modification indices suggested that the model could be substantially improved by adding a path from grandparents' SES to family SES and a direct path from mother's achievement to adolescent's achievement. The modification indices also suggested adding direct paths from ethnicity to mother's achievement, family SES, and three of the parenting variables. This modified model is presented in Figure 2. The modified model resulted in a good fit to the data, $\chi^2(136) = 2,118, p < .001, CFI = .95, AGFI = .95, RMSEA = .06$, and a significant improvement in model fit compared with the conceptual model, $\Delta\chi^2(7) = 927, p < .001$. The variables in the model explained 57% of the variance in adolescent achievement scores.

The modified model shows that the large ethnic gap reduced to a significant but very small difference between African American and European American adolescents, with African American scores predicted to be higher by 1.6 points if everything else was equal (see Table 4). The analysis also shows that the effects of ethnicity were not completely explained by the originally proposed chain of intergenerational events. As suggested by the modification indices, ethnic differences in mothers' achievement, family SES, and three of the parenting variables could not be explained by the earlier variables in the hypothesized model. The model also suggests that grandparents' SES was mediated by their daughters' achievement and SES. Although most of the effects of mothers' achievement were mediated by their family's later SES, as predicted, mothers' achievement still had an important unique effect on their adolescents' achievement. Family SES had equally strong effects on each of the parenting variables, and as predicted in the original model, family SES was completely me-

diated by the parenting variables in the model. Four of the parenting variables also had significant direct effects on adolescent achievement. On average, the fewer arguments the parents and adolescents had about the rules, the more the family allowed adolescent decisions, and the more school-oriented the home environment, the better the adolescents tended to perform on the tests. A smaller but significant direct effect of household chores also implied that adolescents with high levels of household chore responsibilities had poorer achievement. Parental monitoring and warmth did not have a significant direct effect on adolescent achievement after the other variables were controlled.

Discussion

The primary purpose of the current study was to determine if various intergenerational family factors could account for the Black-White achievement gap in adolescence. Previous studies tended to use a smaller number of factors and/or relatively unreliable parenting measures and explained 40% to 50% of the ethnic achievement gap at best (e.g., Brooks-Gunn et al., 1996, 2003; Phillips et al., 1998). We predicted that by addressing their limitations with a larger set of reliable intergenerational SES and parenting factors, most of the ethnic differences in achievement would be explained. The results were very much in line with this prediction. The large, 10-point advantage European American adolescents have over African American adolescents was reduced to zero once the intergenerational family factors in the study were statistically controlled. This suggests that if their grandparents had

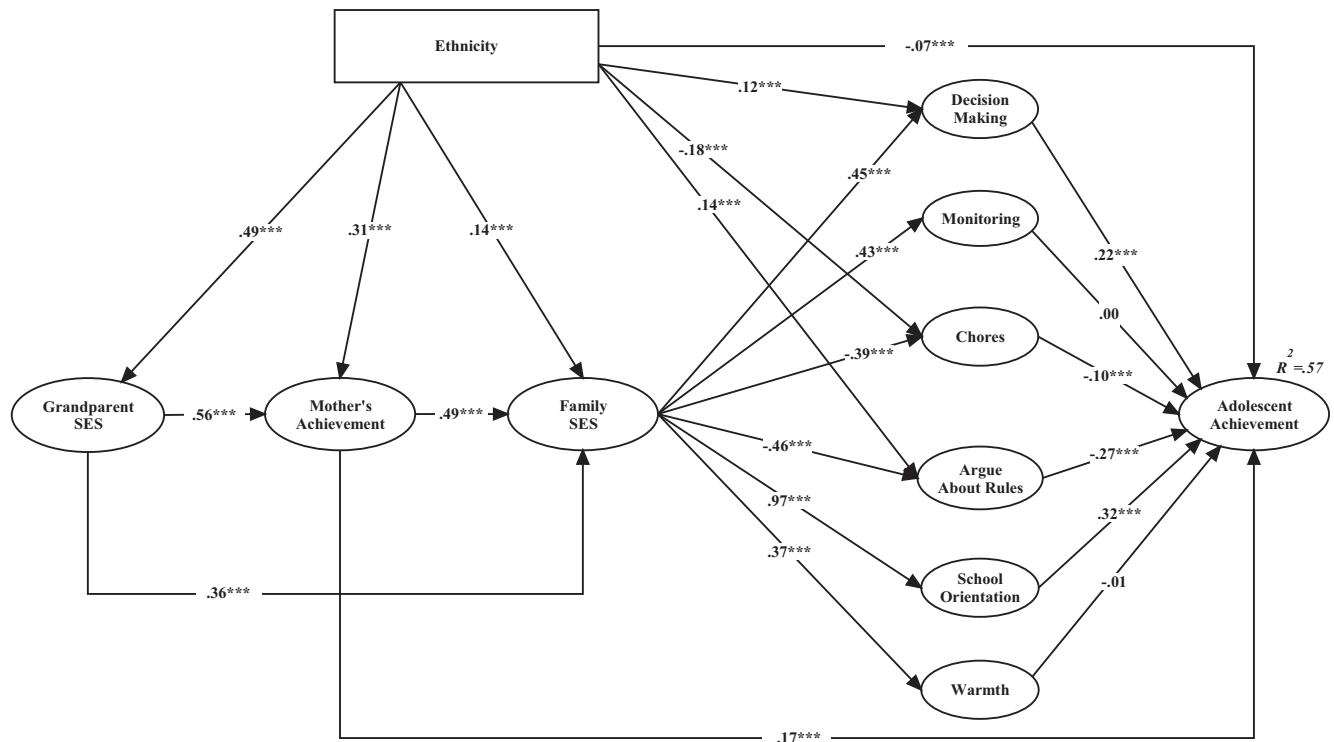


Figure 2. Modified conceptual model with direct and indirect effects. Standardized solution is shown. $\chi^2(136) = 2,118, p < .001$, comparative fit index = .95, adjusted goodness-of-fit index = .95, RMSEA = .06. $N = 4,406$ adolescents. SES = socioeconomic status. *** $p < .01$.

Table 4
Parameter Estimates and Significant Levels for Direct and Indirect Effects on Adolescent Achievement

Variable	Direct effects			Indirect effects		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
Ethnicity	-1.61***	0.41	-.07	10.61***	0.38	.45
Grandparent SES				24.63***	0.95	.45
Mother's achievement	0.26***	0.04	.17	0.41***	0.03	.28
Family SES				26.22***	1.65	.56
Decision making	15.56***	1.35	.22			
Parental monitoring	-0.05	0.37	-.00			
House chores	-5.00***	1.10	-.10			
Argue about rules	-6.98***	0.41	-.28			
School-oriented	9.74***	1.23	.32			
Warmth	-0.86	1.08	-.01			

Note. Standard errors and *p* values for the indirect effects were estimated with 500 bootstrap samples in AMOS 16.0. Ethnicity was coded as Black = 0 and White = 1. *N* = 4,406 adolescents. SES = socioeconomic status. *** *p* < .001.

equal SES, their parents had the same achievement and SES, and they were exposed to the same parenting practices, the ethnic groups would score the same on achievement tests.

A further purpose of the study was to test a conceptual model of the process by which family factors have facilitated the development of ethnic achievement gaps over the past few generations. The model postulates that ethnic differences in SES make it more likely that European American parents will use parenting practices associated with achievement than African American parents. This difference in parenting facilitated ethnic differences in achievement. The model further postulates that this process is repeated in the following generations because those adolescents with higher achievement grow up to have better jobs and make more money. Their higher SES and experiences with their own parents increases the likelihood that they will use more academically oriented parenting with their own children. Thus, the model suggests that European Americans' SES advantages from prior generations help produce future generations' advantages in achievement, primarily through more achievement-oriented parenting.

Overall, we found strong support for a slightly modified version of the hypothesized intergenerational model. For instance, it was argued that one reason European American adolescents outperform African American adolescents is that their grandparents tended to have many more social and economic resources than African American grandparents. We found support for this assumption. The sizes of the economic and educational differences between European American and African American grandparents in this study were rather large. Furthermore, these past-generation advantages in occupational status, education, and literary resources predicted higher test scores for future generations. Thus, even though grandparents' resources were assessed in the late 1970s, they still had moderate to large relationships to their grandchildren's test scores in the mid- to late 1990s.

Also as expected, the effects of grandparents' resources were mediated by their own children's resources. We predicted that their daughters' achievement would account for all of the grandparents' SES, but this was not entirely the case. Grandparents' SES also had a direct effect on their grown daughters' family SES, above

and beyond their daughters' achievement as adolescents. This suggests that besides higher achievement, much of the SES advantages enjoyed by European American parents may be due to inheritance and other direct forms of assistance (Gittleman & Wolff, 2002). This finding also supports the intergenerational transmission of resources theory, which argues that grandparents' primarily impact their grandchildren through their effects on their own children (Phillips et al., 1998). As a result, when parents pass down social and economic resources to their children, they are essentially passing much of those resources down to later generations of their family as well.

As found in several previous studies (e.g., Crane, 1996), mothers' achievement was highly correlated with adolescent achievement and most other factors in the study. One interesting finding was that the ethnic differences in mothers' test scores were much larger than the ethnic differences in their adolescents' test scores, even before any background factors were controlled. In fact, the Black-White test score gap decreased by 50% in this one generation. This finding could be an artifact of differences in the tests. However, the tests cover basically the same content. Also, because the gap in SES also decreased from the grandparents' generation to the parents' generation, and because these factors were correlated with achievement, it is logical to expect that a reduction in the test score gap between the parents' generation and their adolescents' generation would occur.

The intergenerational model further predicted that the effects of mothers' achievement on their adolescents' achievement would be mediated by family SES. This was partially supported. Most of the effects of mothers' achievement were explained by family SES and the parenting practices later in the chain of events, but mothers' achievement still had a direct effect on adolescent achievement. There are many possible reasons for this. The remaining direct effect could be the genetic contribution of mothers' innate intelligence, which cannot be explained by social factors. This perspective certainly has proponents (e.g., Herrnstein & Murray, 1994). However, no conclusions about genetic contributions can be drawn from these data. This is especially the case because the small remaining ethnic gap in adolescent achievement is in the opposite direction from what most supporters of the hereditarian perspective would have predicted. Regardless, it is more likely the case that unmeasured factors, such as the degree to which mothers read to their children or exposed them to the children of other educated parents, accounts for the remaining effects of mothers' achievement. One strong possibility is that more educated mothers have greater confidence in their ability to help their adolescents (McCarthy, 2000), and they know better how to navigate the educational environment by teaching their children how to take tests and being more actively involved at school (Hoover-Dempsey & Sandler, 1997). Future studies should examine other potential mediating factors of parents' own achievement on their children's achievement.

It was also expected that parents' economic resources would account for much of the ethnic achievement gap through their effect on parenting. This hypothesis was fully supported. Although the ethnic differences in SES were smaller than in the grandparents' generation, European American parents still had much higher levels of wealth and prestigious occupations and a lower likelihood of living in poverty than African American parents. Each of these factors also correlated strongly with adolescent achievement.

There was also a strong direct path between ethnicity and parents' SES, even after the other variables in the model were controlled. This implies that one reason European American children outperform African American adolescents is that their parents have higher levels of SES.

As predicted by the model and found in prior studies (Guo & Harris, 2000; Linver et al., 2002; Mistry et al., 2002), parents' SES was completely mediated by the parenting practices assessed in the study. The higher the parents' SES, the more likely they were to use achievement-oriented parenting practices. Specifically, the degree to which adolescents argued with parents was a strong predictor of achievement, net of all the other variables in the study. The higher adolescents were on that measure, the worse off they were in achievement. The reason for this is not clear. This variable could be a marker for lack of behavioral control, which is consistently related to poor achievement for all ethnic groups (Mandara, 2006; Spera, 2005). It could also just as easily be a marker of adolescents responding negatively to excessive behavioral control. Considering the strong relationship of this variable to achievement, future studies should explore the nature of this variable.

Another very important parenting predictor was the degree of freedom adolescents had to make certain decisions. The more decision-making freedom they had, the better adolescents performed on the tests. This may be because adolescents who are generally well behaved and who perform well in school receive rewards from parents, such as freedom to make choices. Thus, the direction of the arrow may be reversed in the real world. Other theorists have suggested that allowing adolescents' freedom to make developmentally appropriate decisions is an aspect of some parents' general philosophy about what is best for children (Baumrind, 1996). It may also be that decisions are associated with intellectual development because those regularly allowed autonomy of decisions get more experience at thinking about the pros and cons of various options (Mann, Harmoni, & Power, 1989). These everyday cognitive exercises may act as training for cognitive ability and achievement tests.

Similarly, one of the main parenting predictors of adolescent's academic success in this study was the school orientation of the home. In the current study, this included having an abundance of books at home, going on intellectually stimulating field trips to destinations such as museums, and taking music or other lessons. This is likely related to the reasons decision making was so strongly related to achievement. Constantly being exposed to intellectually stimulating material at home that mimics the school environment likely helps to teach adolescents the skills assessed in most achievement tests. It should also make learning novel concepts easier, because it facilitates more contextual background knowledge (Pazzani, 1991).

When parents did not burden adolescents with excessive amounts of household chores, the adolescents also tended to score higher on the tests, over and above the effects of the other parenting and SES variables. Although the effect was not very large, other studies have found similar results (Shanahan & Flaherty, 2001). The most likely reason is that excessive time spent on cooking, washing dishes, and cleaning the house takes time and energy away from schoolwork. Because the effect of household chores was not very large, a small to moderate amount of regular household responsibilities is likely not problematic. Future studies

should examine possible curvilinear relationships with household chores and adolescent achievement.

African American and European American adolescents also perceived very different parenting experiences. They differed on all of the parenting practices. Even after controlling for grandparents' SES, mothers' achievement, and family SES, European American parents were still more likely to allow their adolescents freedom to make decisions and offer a more school oriented home environment than African American parents. African American parents also gave their adolescents more household chores and had more arguments with their adolescents about the rules than European American parents. The differences in the specific parenting practices explained much of the ethnic achievement gap. Because two generations of reliable SES and achievement variables were controlled, the ethnic differences in these parenting practices most likely represent different cultural beliefs about parenting (Mandara, 2006). Regardless of cultural beliefs, these results suggest that they are important reasons why African American adolescents do not perform as well on achievement tests as European American youth.

Summary and Implications

The overall pattern of results was clear. The ethnic achievement gap has been significantly reduced over the past few generations, but the social and economic differences of previous generations continue to advantage some and hinder others. Grandparent and parental social and economic resources explained the entire gap in achievement between African Americans and European Americans. This implies that African American parents who have high levels of formal education, wealth, prestigious occupations, and a school-oriented home environment, and use various parenting practices associated with achievement, tend to have adolescents who score as high as European American adolescents who come from similar backgrounds. Therefore, the general improvement in the quantity and quality of education, reduction in poverty, and more achievement oriented parenting in African American communities over the past generation may explain their relative increase in achievement (Ceci, 1991; Grissmer, Flanagan, & Williamson, 1998; McLoyd, 1998).

However, these results must be interpreted in light of some limitations. Although this study has many advantages over previous studies, including a relatively large sample and a diverse set of family factors, as with all correlational studies, causation is still a question. Even though many design features were implemented to reduce the overlap between the predictors and outcomes, much uncontrollable overlap remained. For instance, it is still possible that children's achievement influences parenting as much as parenting influences achievement. Parents may respond to poor achievement in the early grades by being more involved and increasing the educational experiences in the home.

Another problem with our ability to make causal claims is that many other potentially important factors were not assessed. For instance, exposure to family violence, parents' mental health, grandparents' parenting, and time spent with their grandparents may have important and unique effects on test scores and the achievement gap. We also had relatively crude measures of behavioral control and no information on parents' use of psychological control. These variables may shed more light on the factors

important to adolescent achievement and the achievement gap. Furthermore, a few of the variables included in the study had relatively low internal consistencies. A strong point of the study compared to prior achievement gap studies was the use of SEM to help adjust for measurement error. However, as the reliability of the indicators increases, latent variable modeling produces more accurate estimates (Bollen, 1989). Thus, these results can still be interpreted as somewhat conservative, and studies with more reliable indicators may result in slightly different estimates.

In spite of the limitations, these findings have many important implications for policy, practice, and educational research. One of the most important implications of this study is that it illustrates the importance of SEM for producing more powerful and accurate estimates (Bollen, 1989) of the effects of family factors. This study also shows how a more comprehensive set of measures can account for more of the achievement gap. For instance, a measure of parental warmth was a relatively weak predictor of achievement once the SES and other parenting factors were included in the model. A variation of this instrument has been the primary measure of parenting used in previous achievement gap studies (e.g., Brooks-Gunn et al., 1996, 2003). This study shows that parenting practices explain a great deal more about achievement than can be captured by just assessing parental warmth or even cognitive stimulation in the home.

Probably the most important implication of this study is that the entire gap in achievement between African American and European Americans may be due to modifiable social factors as opposed to immutable genetic factors. This suggests that researchers should not so easily assume that error variance in regression models is due to genetic effects (Block, 1995). This is important because it could help to transform social stereotypes about differences in innate intelligence and modify the negative and low expectations many teachers have of low-income and African American students (Ferguson, 2003; McKown & Weinstein, 2008; Rubie-Davies, Hattie, & Hamilton, 2006).

This study may also have important implications for the development of parent training prevention-interventions. Parenting explained most of the achievement gap, even after very good measures of SES and mothers' achievement were controlled. This implies that the parenting effects were as much a result of parental beliefs, customs, knowledge, and priorities about what practices are best for their adolescents as the economic class they come from (Mandara, 2006). Thus, it seems clear that one promising and practical way to help reduce the current achievement gap is through academically oriented parenting interventions (Mandara & Murray, 2007). Although African American and European American parents may have different cultural beliefs about parenting, the results of this study suggest that the achievement gap between their adolescents would be dramatically reduced if they used many of the parenting practices assessed in this study to the same degree.

The results of this study do not minimize the contribution of school, neighborhood, or peer factors typically studied in educational research. What this study shows is that family factors are major predictors of achievement and the achievement gap as well. Future research that combines comprehensive sets of well measured variables at all levels of student's social ecology will be best suited for uncovering the unique effects of each factor and the mechanisms by which these factors relate to achievement.

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