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Gap or *Gaps*

Challenging the Singular Definition of the Achievement Gap

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For decades, researchers examined the "achievement gap" between minority and nonminority students. This singular definition of *achievement gap* ignores important within-group differences. This article uses National Education Longitudinal Study (NELS:88) data to examine within-group differences and compares those across Latino, African American, and White populations. Results question the singular definition of *achievement gap*. Given the importance of how issues are defined, a singular definition of *achievement gap* may mean current policies miss the mark in raising achievement levels between and within groups.

Keywords: *achievement gaps; NELS*

For decades, educational researchers, politicians, and various groups interested in K-12 education examined, discussed, and crafted proposals to close the "achievement gap" between minority and nonminority students (Bainbridge & Lasley, 2002; Bartley, Sutton, Swihart, & Thiery, 1999; Henderson, 1975; Lewy, 1985). Typically, attention focused on "static differences" (Orellana & Bowman, 2003, p. 26) between but not within racial groups (Rumberger, 1998; Schmid, 2001), particularly White and African American students (Henderson, 1975), because the latter traditionally represented the largest minority population.

Many researchers appeared to assume factors contributing to the achievement gap are the same or sufficiently similar for all minority groups (Bowman, 2001). This meant much of the literature focused on the difference between African American and White students, which left other minority populations underresearched, particularly Hispanics or Latina/os. This proves troublesome on multiple counts.

First, the contributory sociological factors assumed in the achievement gap for all minorities are just that—assumptions (English, 2002). Clearly, the African American and Latino populations differ; likewise those differences may manifest themselves in academic settings (Lee, 2003). Second, the Latino population recently surpassed the African American population as the largest minority group in the United States (Griffin, 2003). Thus, conceptualizing the achievement gap primarily in terms of only one group may prove an inaccurate measure for other populations. Exacerbating this phenomenon is a singular definition of *achievement gap* as the academic performance difference between Whites and minorities. Such a definition ignores important differences among minority populations and, perhaps equally significant, within-group differences. The lack of attention on the latter form of achievement gap is built on yet another assumption of group identity; that is, there are regularities in groups carried by the fixed cultural traits of a collection of individuals (F. D. Gutierrez & Rogoff, 2003).

Given recent calls for an expanded understanding of achievement gap, particularly studies that examine variation within groups (Lee, 2003), the current research seeks to contribute a more comprehensive, quantitative understanding of this phenomenon using information contained within National Education Longitudinal Study (NELS:88) database. Rather than limit the examination to differences between groups, we consider within-group differences and compare them across Latino, African American, and White student populations. Two major questions guide this research: (a) Given an index of variables, what factors best predict 12th-grade student achievement in math for each student group separately? (b) How do these best-fit models compare across groups?

Drawing on divergent streams of research on achievement gap, student performance, and various literature on school and family structures, and adhering to the principle of "scientific parsimony" (Stevens, 2002, p. 93), the index of independent variables in the current study is limited and can be conceptualized into two categories, family and/or personal and school. In prior research, each of the following variables has been shown to possess significant relationships with student achievement and/or contribute to the achievement gap. However, this does not mean consensus exists on the nature of those relationships or even their significance. Moreover, few studies consider them all together.

Family and/or personal variables in the current study include socioeconomic status (Blair & Legazpi, 1999; Byrnes, 2003; DeGarmo, Forgatch, & Martinez, 1999; Hativa, 1989; Rumberger, 1998; Trusty & Peck, 1994; Trusty, Robinson, Plata, & Ng, 2000; White, 1982), inclusion in an ESL

program (Adams, Astone, Nunez-Wormack, & Smodlaka, 1994; Buriel, Perez, DeMent, Chavez, & Moran, 1998; Derwing, DeCorby, Ichikawa, & Jamieson, 1999; R. Gutiérrez, 2002; Rumberger, 1998; Wang & Goldschmidt, 1999; Warren, 1996; Watt & Roessingh, 1994), primary language in the home (Laosa, 1984; Llagas & Snyder, 2003; U.S. Department of Education, 2000), number of parents in the home (Alspaugh, 1991; Mulkey, Crain, & Harrington, 1992; O'Conner & Miranda, 2002; Rumberger, Ghatak, Poulos, Ritter, & Dornbusch, 1990; Velez, 1989), and parental involvement (Izzo, Weissberg, Kasprow, & Fredrich, 1999; Jeynes, 2003; Valdez, 2002; Weiss et al., 2003).

School variables include ethnic composition (Finn & Voelkl, 1993; Ogbu, 1978; Roberts, 1989; Rodriguez, 2002; Rumberger & Willms, 1992; Valencia, 2000), teacher quality (Denner, Norman, Salzman, & Pankratz, 2003; Dewey, Husted, & Kenny, 2000; Ferguson, 1991; Rockoff, 2003; Schacter & Thum, 2004), number of units of Algebra I taken by student (Atanda, 1999; Kamii, 1990; Stevenson, Schiller, & Schneider, 1994; Wang & Goldschmidt, 1999), public or private school populations (Bryk & Thum, 1989; Coleman, Hoffer, & Kilgore, 1981; Evans & Schwab, 1995; Sander, 1996), and urbanicity (Fan & Chen, 1999; Kaufman & Rosenbaum, 1992; Keith, 1996; Portes & McLeod, 1996).

Method

Conducted by the National Center for Education Statistics (NCES), NELS:88 represents the third in a series of longitudinal studies of cohorts of American students. NELS:88 began collecting data on students during their eighth-grade year and ended after their entrance into the labor force. The design for NELS:88 included a questionnaire and a cognitive test for each student. Questionnaires were also administered to each student's parents, school principal, and two of their teachers. NELS:88 employed a two-stage, stratified random sample design. To ensure a balanced sample, schools were first stratified by region, urbanicity, and percentage minority prior to sampling. The school sample was restricted to "regular" public and private schools (including independent, Catholic, and other types of religious schools). The second stage of the sampling process selected the students within the schools. Successive follow-ups, or waves, occurred in 1990 (F1-10th grade), 1992 (F2-12th grade), 1994 (F3-2 years after high school), and 2000 (F4-8 years after high school).

Sample

The sample in the current study includes 15,618 12th graders, which equals a weighted sample size of 3,156,664. Racial categories included 2,170 Hispanic students (weighted n = 361,143), 1,660 Black students (weighted n = 428,048), and 11,788 White students (weighted n = 2,204,359). One advantage of using 12th graders, or second-year follow-up students, is the inclusion of those excluded during the base year survey, some of whom were declared ineligible because of language proficiency issues. The 12th grade sample also includes "freshened" students: participants added at the second follow-up who did not have the opportunity to be included in the base year sample, such as recent immigrants, those home schooled at the time, and so on.

Instrumentation

The instruments used in NELS:88 pertinent to the current study include questionnaires and student tests. Each of the components underwent field-testing during the year prior to administration. Questionnaires were designed to be self-explanatory and to be completed within 1 hour. The mathematics tests included 40 questions and were to be completed in 30 mins. They tested simple mathematical skills, comprehension of mathematics concepts, and problem solving ability. During the 12th-grade year, there were three versions of the mathematics cognitive test of varying difficulty designed to guard against ceiling and floor effects.

Variables

The current study's dependent variable is mathematics achievement, as measured by the aforementioned math test. The 13 indicators chosen as independent variables are included in Table 1. Four of the independent variables, socioeconomic status (SES), number of students in the class, percentage minority, and number of Algebra I credits were continuous. The remainder was nominal, recoded as dummy variables.

Statistical Analysis

The current study utilizes multiple regression, analyzed via the American Institutes for Research AM software program (Cohen, 2005). The AM software is designed specifically for analyzing the complex sampling designs inherent within NCES datasets, such as NELS:88. Using the enter method of

Table 1
List and Description of Independent Variables

Variable	Label Description
F2SES1	Respondent composite socioeconomic status
F2P27	Language other than English regularly spoken at home (yes = 1, no = 0)
F2S13D	Ever been in an English as a Second Language program (yes = 1, no = 0)
F2S25F2	Time spent on homework out of school (three levels)
F2T2_5	Number of students in this class
F2T2_6	Number of minority students in this class (recoded as a percentage)
F2T4_13A	Number of undergraduate courses taken in the subject you teach most frequently (four levels)
F2T4_13B	Number of graduate courses taken in the subject you teach most frequently (four levels)
F2RAL1_C	Number of units of Algebra I taken by student
F2FCMP	Family composition—Two parents in the home (yes = 1, no = 0)
G12CTRL1	School classification (public = 1, private = 0)
G12URBN3	Urbanicity—urban, suburban, rural
F2T1_7	Parents level of involvement (three levels)

regression, 13 separate models were run for the African American, Latino, and White student groups. The first, or full model, included all the independent variables. Successive models excluded nonsignificant variables one at a time in an effort to find the "best fit," considering R^2, F, and p values.

Results

Table 2 includes nominal independent variables by race. Pursuant to the focus of this article, several trends are noteworthy. First, although much research, discussion, and debate centers on the achievement gap, that is between Whites and minorities, there appears to be more than one achievement gap. Indeed, these data indicate a "stair-step" of achievement, where Whites perform at higher levels than Latinos who perform at higher levels than African Americans, overall and given every independent variable. Second, in all but the number of credits taken by teachers, Latino and White mean differences for each variable closely parallel one another. For example, Latino and White students perform at higher levels if they have not been in an English-as-a-Second-Language (ESL) program, attended private schools, lived in intact homes, and so on. The same parallel appears not so strong between African American students and the other two groups.

Table 2
Nominal Independent Variable Means by Race

		Ever Been in an English as a Second Language Program		School Type		Language Other Than English in the Home		Two Parents in the Home	
	Overall	Yes	No	Public	Private	Yes	No	Yes	No
Hispanic	40.95	35.08	43.70	40.43	50.72	41.51	44.29	42.89	41.48
African American	37.96	31.34	39.58	37.36	49.56	38.88	38.19	39.12	37.64
White	49.74	41.43	51.40	49.20	55.96	49.31	50.07	51.93	47.07

	Hours Spent on Homework out of School			Urbanicity			Parents Level of Involvement		
	0 - 6	7 - 20	> 20	Urban	Suburban	Rural	None	Somewhat	Very
Hispanic	41.50	43.98	47.03	41.41	41.31	39.81	39.32	46.24	52.14
African American	37.31	45.95	44.91	37.87	39.11	37.15	36.53	41.90	43.51
White	48.41	54.58	57.00	51.58	50.51	48.10	46.88	52.39	58.59

	Number of Undergraduate Courses Taken in the Subject You Teach Most Frequently				Number of Graduate Courses Taken in the Subject You Teach Most Frequently			
	0	1 - 4	5 - 7	8 or more	0	1 - 4	5 - 7	8 or more
Hispanic	48.15	40.42	41.76	46.67	44.98	44.86	46.62	45.21
African American	37.89	38.07	39.06	41.83	38.75	39.97	42.41	43.70
White	46.05	51.51	51.60	54.45	51.19	51.93	53.07	56.52

Third, the expected direction of mean differences are present on nearly all the same variables for Hispanic and White students, as are the unexpected. For example, those not enrolled in ESL programs, who attend private schools, who spend more time on homework, who live in intact homes with more involved parents, and who speak English as the primary language perform at higher levels than their respective inverse counterparts. Similarly, both groups of students demonstrate a somewhat unexpected trend in urbanicity in that students in urban schools outperform those in suburban schools. Like the aforementioned parallels, African American student data indicate more unexpected findings than the other groups, such as with home language and time spent on homework.

Table 3
Full Regression Model for Hispanic, African American, and White Students

	Hispanic		African American		White	
Variable	Estimate	*p*	Estimate	*p*	Estimate	*p*
Socioeconomic status	5.44	.001	5.48	.000	4.71	.000
Units in Algebra I	–6.10	.000	.204	.857	–3.92	.000
Ever been in an English as a Second Language Program	–9.37	.004	–6.33	.005	–8.90	.000
Public or private school	–1.10	.736	.55	.844	–.01	.992
Language in the home	1.27	.597	3.77	.117	–.96	.619
Two parents in the home	–5.66	.001	1.16	.421	.95	.248
Percentage minority	–4.85	.140	–2.67	.302	–3.62	.174
Time on homework 7 – 20 hours[a]	–1.01	.594	7.20	.000	2.92	.000
Time on homework > 20 hours[a]	4.48	.371	4.73	.369	2.95	.010
1 – 4 undergraduate courses[a]	–3.50	.518	2.72	.624	–.42	.858
5 – 7 undergraduate courses[a]	–6.14	.249	–3.79	.509	–2.50	.325
8 or more undergraduate courses[a]	–.94	.840	2.28	.641	.16	.923
1 – 4 graduate courses[a]	–4.65	.096	–1.96	.337	–.21	.852
5 – 7 graduate courses[a]	–1.40	.695	2.37	.355	1.51	.195
8 or more graduate courses[a]	–1.73	.494	2.79	.119	4.00	.000
Suburban[a]	–1.00	.719	–1.63	.374	–1.22	.222
Rural[a]	–1.80	.477	1.59	.382	–1.59	.162
Parent somewhat involved[a]	6.11	.014	2.29	.134	2.74	.010
Parent very involved[a]	9.57	.002	2.85	.189	5.33	.000
Mean square error	105.88	—	92.21	—	110.45	—
Constant	63.14	.000	36.94	.000	52.19	.000
F	(19, 99) = 6.8121		(19, 129) = 7.8046		(19, 614) = 33.8761	
R^2	.466		.353		.322	

a. Compared to omitted variable in each category.

Table 3 includes the full regression model for all three groups. In the full model, only two variables appear consistently significant across groups, SES and inclusion in ESL. As SES increases, so too does math achievement, and learning ESL, as indicated by inclusion in an ESL program, hinders math achievement similarly for all groups. In addition, in comparing Hispanics and Whites, the number of Algebra I units and parental involvement achieve significance, and coefficients indicate the same direction. Of note is the direction of the Algebra coefficients. For Whites and Hispanics,

more units of Algebra I appears negatively related to achievement in math, whereas not so for African American students.

Although homework appears not to be a significant predictor of math achievement for Hispanic students, spending 7 to 20 hours on homework per week does increase math achievement for African American and White students. However, more homework than that appears to profit little in both cases. In the full model, differences in school type and setting, number of parents in the home, ethnic composition, and more "qualified" teachers seem not to act as significant predictors for math achievement.

The search for the "best fit" resulted in models for each group that closely paralleled each other. As Table 4 indicates, all three models include SES, inclusion in ESL, and parental involvement. The African American and White models also share homework as a significant predictor, and Hispanic and White models share units in Algebra I. Like the full model, the coefficient directions across groups are identical. Increases in SES, time spent on homework, and parental involvement result in higher math achievement. However, the effect of parental involvement appears greater for Hispanic students than for African American or White students. And although learning ESL proves to be a significant predictor for decreased math achievement, the largest coefficient lies with White students, not with Hispanic.

Discussion and Conclusion

This article sought to identify an index of independent variables that best explained academic achievement for Latino, African American, and White student groups separately (within-group differences) using the NELS:88 database. Moreover, it compared the best-fit models across groups, looking for between-group differences inherent in the achievement gap. Results indicate not one but multiple achievement gaps, within and between groups. However, variables contributing to within-group achievement gaps are quite similar across all three student categories.

Such results prove striking on several counts. First, assumptions about differences in predictive variables between White and minority students appear unfounded. As the data indicate, "best-fit" models closely parallel each other. All three models include SES, inclusion in ESL, and parental involvement, and coefficient directions across groups are identical. Increases in SES, time spent on homework, and parental involvement result in higher math achievement. Moreover, the African American and White models share homework as a significant predictor, and Hispanic and White models share

Table 4
Models of Best Fit by Race

Hispanic	Estimate	*p*	African American	Estimate	*p*	White	Estimate	*p*
Socioeconomic status	4.12	.056	Socioeconomic status	4.83	.000	Socioeconomic status	5.80	.000
Units in Algebra I	–6.67	.000	Ever been in an English as a Second Language Program	–7.72	.000	Units in Algebra I	–3.93	.000
Ever been in an English as a Second Language Program	–8.43	.001	Homework: 7 – 20 hours[a]	6.79	.000	Ever been in an English as a Second Language Program	–10.07	.000
Parents somewhat involved[a]	5.80	.071	Homework: = 20 hour[a]	9.12	.041	Homework: 7 – 20 hours[a]	3.02	.000
Parents very involved[a]	11.44	.001	Parents somewhat involved[a]	3.70	.024	Homework: > 20 hours[a`]	3.78	.000
Constant	51.08	.000	Parents very involved[a]	4.09	.059	Parents somewhat involved[a]	3.02	.008
			Constant	38.08	.000	Parents very involved[a]	5.54	.000
						Constant	51.73	.000
F	(5, 158) =15.96			(6,169) = 16.94			(7,697) = 80.94	
R^2	.336			.271			.301	
Mean square error	123.24			103.77			120.38	

a. Compared to omitted variable in each category.

Table 5
Composite Best-Fit Model With Race[a]

	Estimate	*p*
Socioeconomic status	5.55	.000
Units in Algebra I	–3.83	.000
Ever been in an English as a Second Language Program	–9.21	.000
Homework: 7 - 20 hours	3.35	.000
Homework: > 20 hours	4.22	.000
Parents somewhat involved	3.61	.000
Parents very involved	5.91	.000
Race: Hispanic	–1.82	.291
Race: African American	–7.88	.000
Mean square error	120.40	—
Constant	51.10	.000
$R^2 = .376$		

a. White as comparison category for race.

units in Algebra I. Stated bluntly, the color of one's skin does not change the importance of certain variables in academic achievement. Just because one is Hispanic does not mean parental involvement is not important, and poverty pays no respect to white skin.

Second, noticeably absent from the best-fit models are the school variables thought by some to be important, including qualified teachers, urbanicity, and public versus private schools. Instead, the most significant predictors appear to be rooted in the home, including language, parental involvement, SES, and even the homework control variable. It is important to remember the latter measured time spent on homework away from school. Furthermore, SES is a composite variable consisting of parental education, occupation, and family income.

Third, the singular definition of *achievement gap* ignores what the data herein reveal. There are multiple achievement gaps, and gaps between races may not be the most serious of them. Table 5 combines the "best-fit" models into one and adds race as another predictor.

In this model, race is not nearly as important a predictor than the other variables. Moreover, using White students as the comparison group, only the gap between Whites and African Americans reaches significance. Running the regression again with Hispanics as the comparison (Table 6)

Table 6
Composite Best-fit Model With Race[a]

	Estimate	*p*
Socioeconomic status	5.55	.000
Units in Algebra I	–3.83	.000
Ever been in an English as a Second Language Program	–9.21	.000
Homework: 7-20 hours	3.35	.000
Homework: > 20 hours	4.22	.000
Parents somewhat involved	3.61	.000
Parents very involved	5.91	.000
Race: African American	–6.05	.001
Race: White	1.82	.291
Mean square error	120.40	—
Constant	49.275	.000
$R^2 = .376$		

a. Hispanic as comparison category for race.

reveals a significant difference between Hispanics and African Americans. Thus, the current definition of *achievement gap* fails to describe accurately the divergent dynamics at work.

Although on the surface, a singular definition of *achievement gap* may seem small, in the world of policy making, leadership, and decision making, definitions are powerful. As Schon (1994) and Edelman (1988) asserted, how issues are defined largely determines the public's understanding of them, the policies crafted to influence them, and how success is measured. With a singular definition of *achievement gap*, it could be that current policies miss the mark in attempting to influence the most significant variables in raising achievement levels between and, perhaps more important, within groups.

For practitioners, this underscores the need to disaggregate student data into many combinations of subsets to understand the dynamic relationships that exist within and between groups. The practice of lumping together data from all students of color, and even data from divisions within one group, is a mistake bound to produce poor policy choices and detrimental educational practices. Yet, even if school- or district-based researchers and leaders practice finer data disaggregation, skepticism about substantive change still lingers in this era of legislatively driven pedagogy. Given the policy-making myopia endemic in legislative and executive bodies, the tyranny of quick-fix ideologies, and demagogic class and group politics created by candidates

and special interest leaders, a fuller understanding of *achievement gap* and requisite policies appears a long way off. As such, "the intractability of the achievement gap" (English, 2002) likely will remain the status quo.

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