Where are Gaps the Largest? A Look at within and Across Group Differences

The first line of the No Child Left Behind Act (NCLB) of 2001 states "An Act: To close the achievement gap with accountability, flexibility, and choice, so that no child is left behind (US Department of Education, 2002)." The essence of NCLB and the driving force behind, therefore, it is to reduce educational disparities in the increasingly diverse child population of the U.S. Researchers have spent a great deal of time examining the racial gap and the poverty gap in achievement (Entwisle and Alexander, 1993; Yeung et al., 2002; Seccombe, 2004; Yan and Lin, 2005). One challenge, however, is that these two gaps overlap considerably, often involving the same children trying to catch up. We know that minority children and children from lower income homes start school at a disadvantage compared to children who are non-Hispanic white and children who are from more affluent families, respectively (Aikens and Barbarin, 2008; Duncan and Magnuson, 2005; Entwisle and Alexander, 1993; Lee and Burkham, 2002), but our attention to each of these disparities on their own can obscure who is most vulnerable within the child population as well as where in this population interventions targeting each kind of disparity are most likely to bring the greatest returns. Clearly identifying where the largest gaps exist along the socioeconomic spectrum across racial groups and within SES groups along the racial hierarchy can potentially increase the efficiency of policy intervention and ensure that the most at-risk children are served.

The general goal of this paper, therefore, is to identify which specific groups of children should be the focus of policy aimed at decreasing racial and socioeconomic gaps in academic achievement. Where and when do the largest disparities occur? Using two of the designations laid out in NCLB, race and socioeconomic status, this study maps out the learning trajectories of children from diverse segments of the population as they move through elementary school and

seeks to identify the socioeconomic strata in which racial disparities in level and growth of achievement are largest and the racial groups in which corresponding socioeconomic disparities are largest. These analyses will apply multilevel growth curves to four waves of data from The Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K).

The significance of this study lies in its ability to elucidate some of the mixed results of NCLB and other educational policies in closing achievement gaps. Policy and programs aimed at increasing the proficiency of these groups must be able to clearly identify the children who are most at risk for having the poorest academic outcomes (i.e. the lowest proficiency) and, therefore, driving the disparities being targeted. Recognizing the significant overlap between socioeconomic and racial stratification in these policy goals better reflects the reality of American society and increases the potential for intervention targeting socioeconomic gaps and interventions targeting racial gaps to be delivered where they are most needed, moving from a universal approach to a more tailored approach that could increase efficiency.

Analytic Plan and Preliminary Results

The data use for these analyses come from the first four waves of The Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). The ECLS-K is a nationally representative sample of children who entered kindergarten during the 1998-1999 school year. The data were collected by the National Center for Education Statistics (NCES), within the U.S. Department of Education's Institute of Education Sciences using a multistage probability sampling design.

This study is concerned with indentifying where the largest gaps in math and reading scores exist across socioeconomic and racial categories. The sample is analyzed using the ECLS-K designated SES quintiles and the parental designation of child's racial background. For both

sets of analysis I control for a number a number of school factors, school type, and percent of the student body that receives free or reduced lunch, whether 50% or more of the student body is a racial/ethnic minority and if the school receives Title I funds. Missing data is dealt with using multiple imputation methods. All of the models will be analyzed using SAS 9.3. PROC MIXED and MI ANALYZE.

I have currently run the first set of models for Math IRT scores across SES quintiles and within racial/ethnic groups. The finding of these models can be found in preliminary Tables 1 and 2. Table 1 presents the results within each racial group. The most interesting findings here are within the Hispanic group. As expected children in higher income quintiles start with higher math scores compared to their counterparts in the lowest quintile. However, there is no differential growth in the scores over time across the income categories. This suggests that for Hispanic children there is potential for the lowest quintile to "catch-up" over time. For Asian children we see no difference in initial scores or change in scores over time for those in the second or third quintile compared to those in the first quintile. Those children in both the fourth and fifth quintile however have higher initial scores but no differential growth over time. These models suggest that there are differential disparities within racial groups across income categories.

Table 2 of the preliminary analysis present the growth curve results within each socioeconomic group. These findings suggest that the racial/ethnic gap in math scores (both initial and change over time) vary by income quintile. Across the income quintiles Black students start with lower math scores and experience less growth over time compared to their white counterparts. The Black-white gap seems to be the largest in the highest income category. Hispanic students have lower initial scores compared to whites across the quintiles but not less

growth. In the first quintile Asian students have higher starting scores and greater growth over time compared to white students. However, in the third and fourth quintiles their scores are not significantly different from whites. In the fourth quintile Asian students experience more growth in math scores but not higher initial scores, while in the fifth quintile they experience higher initial score but not more growth over time.

These preliminary analyses suggest that there are larger disparities within and across certain groups (for both race and SES). The full analysis will include similar models examining readings scores. In the final analysis both reading and math scores will be standardized enabling an accurate comparison across models. I will also test the difference between coefficients across models.

The racial and ethnic makeup of U.S. schools is changing to include children of many diverse backgrounds (Fry, 2007; Orfield and Lee, 2005; Reardon et al., 2000). This shift in the makeup of the child population must be considered if we intend to create policy aimed at decreasing achievement gaps. No longer is the Black-white comparison feasible. In addition to the increasing racial/ethnic diversity of the child population we are seeing staggering increasing in percent of the child population in living poverty. Research has suggested that minority children are the ones most likely to be living in poverty (U.S. Census Bureau, 2009; Macartney, 2011). Children who are both minority and poor are doubly disadvantage and have the worst achievement outcomes. The findings of this study will help clarify which students are the most disadvantaged.

Preliminary Results Table 1: Growth Curve Models for Math IRT by Student's Race/Ethnicity

	White	Black	Hispanic	Asian
Income Quintiles (vs. First Quintile)				
Second Quintile	0.18	0.83	2.44 ***	1.20
Second Quintile*Time	0.51 **	0.13	-0.17	-1.09
Third Quintile	1.19 *	1.76 **	3.88 ***	3.12
Third Quintile*Time	0.83 ***	0.80 **	-0.12	-0.64
Fourth Quintile	2.99 ***	2.21 **	5.10 ***	4.20 *
Fourth Quintile*Time	1.05 ***	0.90 **	-0.05	0.10
Fifth Quintile	5.43 ***	4.00 ***	6.75 ***	9.55 ***
Fifth Quintile*Time	1.19 ***	1.05 **	0.06	0.05
School Characteristics				
Private School (vs. Non-private)	-0.36	1.57	1.37	-0.83
Private School*Time	0.19	-0.64	-0.27	0.12
Percent of students receiving free/reduced lunch	-0.04 ***	-0.03 **	-0.02	-0.08 ***
Percent of students receiving free/reduced lunch*Time	-0.04 ***	-0.02 ***	-0.01 **	0.00
Percent of student body that are minority	0.11	0.79	-0.11	0.84
Percent of student body that are minority*Time	0.27	0.52 *	-0.43 *	-0.18
School Received Title I Funds	-0.92 **	-0.46	-0.76	-0.01
School Received Title I Funds*Time	0.47 ***	0.09	0.01	0.21
Intercept	40.37 ***	33.31 ***	33.84 ***	40.60 ***
Slope (time)	16.26 ***	14.75 ***	16.66 ***	17.48 ***

Source: The Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K).

* p<.05. **p<.01.*** p<.001 denotes statistically different from students in the first income quintile.

Preliminary Results Table 2: Growth Curve Models for Math IRT by Socioeconomic Status

	First Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile
Racial/Ethnic Groups (vs. White)					
Black	-4.34 ***	-3.98 ***	-4.56 ***	-5.01 ***	-5.99 ***
Black*Time	-1.68 ***	-1.56 ***	-0.87 **	-0.76 **	-0.86 *
Hispanic	-3.64 ***	-2.56 ***	-3.07 ***	-2.56 ***	-4.06 ***
Hispanic*Time	0.39	-0.07	0.18	0.00	-0.34
Asian	3.09 *	-0.70	-0.36	1.50	4.41 ***
Asian*Time	2.29 ***	0.29	0.30	0.96 **	0.28
School Characteristics					
Private School (vs. Non-private)	1.99	1.93 *	-0.22	-1.10	-0.95
Private School*Time	-0.86	0.13	-0.24	-0.06	0.16
Percent of students receiving free/reduced lunch	-0.01	-0.02 *	-0.05 ***	-0.05 ***	-0.05 **
Percent of students receiving free/reduced lunch*Time	-0.01 *	-0.01 *	-0.02 ***	-0.03 ***	-0.04 ***
Percent of student body that are minority	0.60	0.54	1.61 *	-0.13	-0.31
Percent of student body that are minority*Time	0.18	0.12	-0.28	-0.26	0.77 ***
School Received Title I Funds	-0.17	-0.31	-0.95	-0.66	-0.66
School Received Title I Funds*Time	0.15	0.22	0.03	0.32	0.41 **
Intercept	34.17 ***	37.59 ***	41.16 ***	43.36 ***	46.97 ***
Slope (time)	15.18 ***	15.83 ***	16.71 ***	17.28 ***	17.70 ***

Source: The Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). * p<.05. ** p<.01.*** p<.001 denotes statistically different from white students

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