



Dynamics of the black–white gap in academic achievement



Ian K. McDonough*

Department of Economics, University of Nevada, Las Vegas, 4505 S Maryland Pkwy, Box 6005, Las Vegas, NV 89154, United States

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ABSTRACT

The black–white test score gap remains a measurable phenomenon in the United States. Up to this point the literature has primarily focused on the black–white achievement gap without taking into account the underlying mobility patterns of individual students as they progress from one grade to the next. However, the degree to which policy makers and educators should be concerned about the black–white test score gap should be tied to how mobile the two groups of students are through the distribution of test scores from one grade to the next. In this paper I apply two nonparametric estimators of distributional mobility to data on test scores and track black–white differences in mobility across the entire distribution of achievement. When compared to whites, blacks tend to be less upwardly mobile and more downwardly mobile for both math and reading. This pattern is particularly prominent for reading in the very early years of schooling.

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1. Introduction

The debate surrounding the black–white achievement gap has a long standing, controversial history in the United States and really gained the attention of researchers after the Supreme Court decision in *Brown v. Board of Education*. This landmark decision ended school segregation and set the stage for closing the gaps in education between black and white students. In a seminal book on the subject, [Jencks and Phillips \(1998\)](#) suggest that closing the test score gap would do more to advance racial equality in America than any other measure considered by policy makers.

Given how gaps in cognitive measures between black and white students translate into employment and wage gaps between black and white adults, reconciling educational disparities prior to joining the labor market is key to closing the

documented gap in economic outcomes ([Mitra, 2000](#); [Rivkin, 1995](#)). However, to effectively craft policy aimed at closing the black–white achievement gap, one needs to better understand the mobility patterns of students as they make their way through the educational process.¹ Without taking into account the dynamics of how students traverse through the distribution of test scores over time, it would be seemingly difficult to design effective, education-based interventions aimed at closing the racial divide in test scores. In this paper I examine the differences in mobility patterns of black and white students during primary school and provide a novel, *complementary* perspective on how the black–white achievement gap evolves during early childhood.

¹ In this paper I use the term ‘mobility’ to refer to a student’s movement through some distribution of test scores as opposed to the traditional use of the term in the education literature that refers to actual movements across some geographic region. As a note, [Bloome and Western \(2011\)](#) use the term ‘educational mobility’ in describing the intergenerational transfer of educational attainment from parents to sons.

* Tel.: +1 702 895 3652; fax: +1 702 895 1354.
E-mail address: ian.mcdonough@unlv.edu

One of the first rigorous studies to examine the disparate performance between black and white students is summarized in the Coleman report, where the authors conclude that the structure of the family and levels of poverty are the main contributors to the existence of the gap (Coleman et al., 1966). The report also finds that the achievement gap not only exists at every grade level, but becomes progressively wider as students advance through school. Subsequent to the findings in the Coleman report, a large body of research has been produced to explore the reasons behind the existence and persistence of the black–white achievement gap, the magnitude of which has vacillated over the years.

During the 1970s and 1980s the gap shrunk dramatically in reading and mathematics, but since then this trend has stalled (Barton & Coley, 2010; Burton & Jones, 1982; Hedges & Nowell, 1999; Lee, 2002; 2004; Neal, 2006). Several potential reasons for the persistence of the gap have been suggested including differences in parental education, socioeconomic status, teacher and school quality, and family structure. However, even after controlling for such factors, researchers conclude that the black–white test score gap is still a measurable concern (Berends, Lucas, & Peñalosa, 2008; Clotfelter, Ladd, & Vigdor, 2005; 2009; Hernstein & Murray, 1994; Phillips, 2000).

Using data gathered from the Early Childhood Longitudinal Study Kindergarten Cohort (ECLS-K), Fryer and Levitt (2004, 2006) find a noticeable gap in performance between black and white students immediately upon entering kindergarten, but are able to eliminate most of the gap by conditioning on just a small set of observables. However, Fryer and Levitt find that the gap returns as students age. Specifically, by the end of third grade, even after conditioning on certain observable and unobservable characteristics, the racial divide in test scores between blacks and whites is apparent in virtually every skill tested and is widening at a rate of 0.10 standard deviations per year for math and reading.² The authors conclude that “the racial achievement gap remains a stubborn reality” and that “the explanation as to why blacks are losing ground proves elusive” (p. 279). The authors do note, however, that differences in school quality across the two races does explain some of the achievement gap between blacks and whites, though the relationship between school quality and the test score gap is attenuated when the data are augmented to include multiple years of schooling. Once the data are extended to include third grade, including school fixed effects no longer provides a sufficient explanation as to why blacks and whites are on antithetical trajectories of academic achievement.

Cook and Evans (2000), using data from the National Assessment of Educational Progress (NAEP), also find that changes in the gap are not attributable to school characteristics. In fact, they find that 75% of the gap narrowing during the 1970s can be explained by within school changes. Hanushek and Rivkin (2006), on the other hand, using both the Texas Schools Project administration dataset and the ECLS-K dataset, find strong evidence that school quality does

play an important role in explaining the black–white performance gap. Specifically, the authors find that it is the differing concentrations of races and inexperienced teachers across schools that can explain all of the widening in the gap between third and eighth grade.

Sohn (2010) extends the existing literature one step further by using quantile regression techniques to investigate the racial gaps in performance across different parts of the distribution, not simply at the mean of the distribution. Sohn finds that the gap is initially visible at the upper and middle parts of the distribution, however, the gap at the top end of the distribution narrows while the gap in the middle of the distribution widens as students age. Further, applying the Oaxaca–Blinder decomposition, Sohn finds that racial differences in the returns to covariates become more important than racial differences in the covariates themselves as students progress through school.

Even with the vast body of research exploring the black–white achievement gap, one shortcoming of the literature is the reliance on measures of disparity between blacks and whites that do not take into account the underlying mobility patterns of individual students as they progress through school. Further, the existing literature focuses on measures of inequality that are not robust to various scaling methods of the underlying test scores.³ This paper explores black–white differences in a dynamic sense and contributes to the literature by providing a new, *complementary* measure to help better understand the evolution of the black–white achievement gap during early childhood. Specifically, the motivations for this paper are two-fold.

First, solely evaluating the achievement gap in levels without understanding the underlying dynamics is incomplete. Not taking into account student mobility patterns can lead researchers to draw incomplete conclusions regarding the severity of the black–white test score gap. For example, suppose a gap in performance exists, yet mobilities are equally high between black and white students. Under this scenario it is reasonable to think that such movements through the distribution will lead to more evenly dispersed black–white test scores over the children’s academic careers relative to the distribution of test scores within a particular grade. More specifically, one could argue that a situation where there is a ‘small’ gap in achievement with no mobility is more problematic relative to a state where the gap in achievement is ‘modest’ yet the students are highly mobile. Though the gap in absolute terms is ‘small’ in the previous case, it is permanent. As in the income inequality literature, inequality in academic achievement alone is not meaningful, rather, it is the combination of the achievement gap in levels *and* the underlying mobility patterns that matter for assessing the severity of the achievement gap between blacks and whites.

Second, as pointed out by Bond and Lang (2013), the black–white test score gap as currently measured in the

² In Fryer and Levitt (2006) the authors had access to the restricted version of the data allowing them to use additional covariates that were suppressed in the public use version of the data used in Fryer and Levitt (2004). However, adding more covariates marginally improved the goodness of fit, hence, they focus on a limited number of covariates in each paper.

³ I am familiar with the scale invariant measures derived via Probability–Probability Plots. This method plots the percentile associated with a test score from one group against the percentile associated with a test score from another group. Though this method is invariant to horizontal scale transformations, it does not address the underlying mobility patterns underlying the gaps in academic achievement. See Braun (1988), Holland (2002), Ho and Haertel (2006), and Reardon (2008) for examples.

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