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Segregated school effects on first grade reading gains: Using propensity score matching to disentangle effects for African-American, Latino, and European-American students

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ABSTRACT

Increasing evidence from observational studies indicates that students attending minority segregated schools are at risk for constrained performance in reading. However, analyses of data gathered under observational conditions may yield biased results. Using data from the Early Childhood Longitudinal Study, 1998–1999 Kindergarten Cohort, this study used propensity score matching to address selection bias due to students' observed socio-economic, literacy, and social-emotional background characteristics, allowing for a less biased estimate of minority segregated schooling on African-American, Latino, and European-American students' reading gains in first grade. We found that African-American students attending segregated schools made less gain in reading across the first grade year than African-American students in non-segregated schools. There was no evidence for significant negative effects of segregation on reading gains for Latino and European-American students.

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Although the United States is becoming more racially and ethnically diverse, school segregation is on the rise (Boger & Orfield, 2005; Reardon & Yun, 2001). The power of school district leaders to disrupt patterns of segregation is increasingly limited, not only by recent Supreme Court decisions (for a review of the ruling in Parents Involved in Community Schools vs the Seattle School District No. 1, see: Goldstein, 2008), but also because most segregation is due to between-district residential segregation rather than within-district assignment practices (Reardon, Yun, & McNulty Eitle, 2000). That is, large sections of metropolitan residential areas in the United States have become racially segregated making it infeasible to create racially diverse schools in many urban districts. As segregation increases, national and local education policy-makers must consider whether, how, and to what degree segregated schools hinder academic performance.

Multiple studies indicate that integrated schools are associated with more equitable academic outcomes for students regardless of race or socio-economic background. Integrated schools are associated with more equitable math achievement (Berends & Penaloza, 2010; Harris, 2006); reading achievement (Borman et al., 2004);

and high school graduation and post-secondary education success (Massey, Charles, & Dinwiddie, 2004; Swanson, 2004). Conversely, minority segregated schools are associated with constrained academic achievement (Mickelson, Bottia, & Lambert, 2013), especially reading achievement for African-American students (Benson & Borman, 2010; Croninger, Rice, Rathbun, & Nishio, 2007; Hanushek, Kain, & Rivkin, 2002; Kainz & Vernon Feagans, 2007; Mickelson, 2008).

In previous work (Kainz & Vernon Feagans, 2007) we used growth curve analysis to explore the relations between school contexts and reading development from kindergarten through third grade for economically disadvantaged students. Controlling for variation in reading at kindergarten entry and growth over time due to child and family characteristics, we chose to model classroom and school characteristics as time-varying covariates so that we could examine their association with reading performance at different points along children's growth trajectories: the end of kindergarten, first grade, and third grade. The purpose of this analytic technique was to examine when and to what degree classroom characteristics (i.e., full-day kindergarten, comprehensive literacy instruction, proficiency composition) and school characteristics (i.e., urbanicity, poverty composition, minority segregation) were associated with children's time-specific reading performance after accounting for their expected growth trajectories. Our findings indicated that at different points along the trajectory classroom characteristics did account for enhanced or constrained

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time-specific reading performance, yet only a single factor accounted for constrained performance at all three time points along the trajectory. Attending a school where 75% or more of the students were from racial and ethnic minorities was associated with lower reading performance at the end of kindergarten, first grade, and third grade than would have been expected based on students' kindergarten entry skills and child and family characteristics. Moreover, the magnitude of the negative relation between segregated schooling and time-specific reading performance more than doubled between the end of kindergarten and the end of third grade. Although this work provided compelling evidence of the magnitude and timing of associations between segregated schools and early reading performance above and beyond important child, family, classroom, and school characteristics, the study did not identify a causal relation between segregation and reading achievement.

Identifying the causal effect of segregation on student reading achievement is complicated by the non-random selection of students into segregated and non-segregated school settings. That is, socio-economic, academic, and social-emotional background characteristics of students attending segregated schools could be the causes of observed achievement differences, and not the segregated settings themselves. In such circumstances, ordinary regression analyses can confound the effect of segregation with student background, making it difficult to disentangle the effect of segregation from other potential drivers of student reading development. The purpose of this paper is to implement propensity score matching techniques to improve the estimated effect of segregation on first graders' reading development and determine whether those effects are partially explained by school and classroom characteristics.

Reading development and segregation

Despite a decade of increased policy attention to reading instruction in the early grades, results from the 2007 National Assessment of Educational Progress (NAEP) indicate that more than 30% of the nation's elementary school students have yet to master the reading skills that would allow them to succeed at grade level work. The national averages mask stark differences by race/ethnicity. While only 23% of European-American fourth graders read below basic levels, the proportion of African-American and Latino fourth graders reading below basic is 54% and 55%, respectively (Lee, Grigg, & Donahue, 2007).

The relation between segregation and low performance for minority students begins early and emerges as a pattern of constrained learning throughout early elementary school. Before entering kindergarten, economically disadvantaged students attending racially segregated preschools gain fewer pre-academic skills than do economically disadvantaged students attending non-segregated preschools (Lee, Loeb, & Lubeck, 1998). First grade students attending segregated schools evidence lower reading achievement than those attending non-segregated schools, even when controlling via regression for student background, school-wide poverty, (Benson & Borman, 2010) and teacher qualifications (Croninger et al., 2007). In the period between kindergarten and third grade, economically disadvantaged students in segregated schools lose ground in reading development each year compared to economically disadvantaged students in non-segregated schools, even after controlling via regression for student characteristics, literacy instruction quality, and school-wide poverty (Kainz & Vernon Feagans, 2007). By the time students are in upper elementary school, their performance on state tests varies significantly across segregated and non-segregated schools. Students attending segregated schools, especially those with a majority of African-American

students, have lower reading achievement than students in integrated and European-American segregated schools (Borman et al., 2004; Hanushek, Kain, & Rivkin, 2009).

There are two distinct theoretical orientations used to explain low academic achievement among racial and ethnic minorities. The first orientation emphasizes the negative consequences of individual poverty that are highly correlated with ethnicity, race, and segregation. In fact, students who are poor and from racial and ethnic minorities are more likely to attend segregated schools (Orfield & Lee, 2005), and students who are poor begin school with fewer academic and social skills than their more affluent peers (Lee & Burkham, 2002; NICHD ECCRN, 2005; Rathbun, West, & Hausken, 2004). Research generated from this orientation focuses on the negative relation between poverty and academic achievement (Ladd, 2012; Lee & Burkham, 2002; McLoyd, 1998) and the child and family mediators of that relation (Mistry & Wadsworth, 2011), but overlooks potential effects from the contexts of segregation.

The second orientation suggests that school characteristics, such as staffing and curriculum differences between segregated and non-segregated schools, account for student-level differences in academic achievement beyond contributions from individual poverty. Research generated from this orientation seeks to identify the school factors that explain variation in student achievement, acknowledging that segregated schools on average are staffed with less qualified faculty than non-segregated schools (Boger, 2005; Rothstein, 2004), their teachers use more direct instruction in reading as opposed to a balanced literacy framework (Stipek, 2004), and the teaching staff turns over more frequently (Hanushek et al., 2002).

Considering the high degree of association between family poverty, family characteristics, child characteristics, school poverty, and school minority segregation, disentangling the unique effects of segregation on early education outcomes poses a challenge for researchers. Still, mounting evidence that early academic achievement, especially reading achievement, is potentially constrained by segregated schooling contexts warrants consideration from researchers and policy makers. The challenge before us is to construct a method that reduces confounds in estimating the effects of segregation due to selection bias toward enrollment in segregated schools.

The current study

The purpose of this study is to produce a minimally biased estimate of the effect of segregated schooling on first grade reading gains. To do so we use propensity score matching to control for observed differences in student background between segregated and non-segregated schools. Because the effect of segregation on reading gains may be different for students from different racial/ethnic groups, we estimate the effect separately for African-American, Latino, and European-American students. We go on to examine the effect of segregation on reading gains conditioned on school poverty, teacher qualifications, and literacy instruction so that we might examine whether these school factors account for the relation between segregation and reading development. We focus on first grade reading gains because: (1) early reading development becomes the foundation for all subsequent academic achievement; (2) students who do not read with comprehension by third grade are unlikely to catch up in later grades and are at a greater risk for dropping out of high school (Finn, Gerber, & Boyd-Zaharias, 2005; Hernandez, 2012); (3) there is empirical evidence that students in segregated schools demonstrate lower early reading performance at school entry and consequently are in need of school settings that can promote rapid reading gains; and (4) it may be especially timely to consider contextual constraints faced by segregated schools as