

**School Segregation and Racial Gaps in
Special Education Identification**

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ABSTRACT

The researchers use linked birth and education records from Florida to investigate how the identification of childhood disabilities varies by race and school racial composition. Using a series of decompositions, they find that black and Hispanic students are identified with disabilities at lower rates than are observationally similar white students. Black students are over-identified in schools with relatively small shares of minorities and substantially under-identified in schools with large minority shares. They find similar gradients among Hispanic students but opposite patterns among white students. The researchers provide suggestive evidence that these findings are unlikely to stem from differential resource allocations, economic characteristics of students, or achievement differences. Instead, they argue that the results are consistent with a heightened awareness among school officials of disabilities in students who are racially and ethnically distinct from the majority race in the school.

1. Introduction

Disparities across racial groups in economic and educational outcomes have been stubbornly persistent in the United States. Recent evidence using novel data sources has shown that the economic mobility of black individuals lags far behind their white peers (Chetty, Hendren, Jones and Porter, 2018; Bhattacharya and Mazumder, 2011), while large black-white wage gaps have been documented for decades (e.g., Neal and Johnson, 1996; Oettinger, 1996; Trejo, 1997; Black et al., 2006; Fryer, Pager, and Spenkuch, 2013; Kriesman and Rangel, 2015). Some of the disparities in adult outcomes can be traced to early life experiences, including educational attainment and achievement gaps (Bond and Lang, 2013; Rothstein and Wozny, 2013; Reardon & Galindo, 2009; Card and Rothstein, 2007; Todd and Wolpin, 2007; Fryer and Levitt, 2004, 2006; Jencks and Phillips, 1998).

In this study, we focus on another potential early driver of racial gaps in adulthood – special education identification. Roughly 6.4 million public school students in the U.S. receive special education services annually, at an estimated cost of nearly \$40 billion (National Center for Education Statistics, 2015). Special education provides a vehicle for accommodations and, in many cases, treatment for students with learning disabilities. A range of conditions are covered under the special education umbrella, including speech and language disorders, Autism Spectrum Disorder (ASD), intellectual disabilities, specific learning disabilities, developmental delay, Attention-Deficit Hyperactivity Disorder (ADHD), sensory disorders, emotional disorders, and physical disabilities. Students who have one of these disabilities are provided with an “individualized education plan” (IEP) which outlines the services and accommodations to which they are legally entitled under the Individuals with Disabilities in Education Act (IDEA).

We examine the extent of identification gaps across racial groups conditioning on a rich set of health and economic endowments, with a focus on how the gaps vary by the racial composition of schools. The bulk of the previous research in this area considers whether special education identification rates differ across racial groups in terms of simple means or using basic control variables. This is in part due to how the Federal government regulates identification gaps, commonly also referred to as “disproportionality”. The IDEA defines disproportionality based on ratios of identification rates for different racial groups in a school (or a district).¹ For example, if 15 percent of black students in a school are identified as disabled, compared to 10 and 12 percent of white and Hispanic students, respectively, IDEA’s 3 pairwise measures of disproportionality are 1.5, 1.2, and 1.25 (15/12). States have some latitude to determine what defines “significant disproportionality”. For example, in 2010-2011, Florida’s threshold was 3.5 with a one-year trigger – meaning that a school must take corrective action if any pairwise ratio was greater than 3.5 in a single year. As a result, 15 of the state’s 72 districts (67 county-level and 5 special) were forced to implement corrective action in that year (GAO, 2013).

The existence of disproportionate identification rates in special education by race had been a concern long before the 1997 amendments to the IDEA first required states to address disproportionality. Earlier studies consistently showed that black students, in particular, were often identified with disabilities at higher rates than white students (e.g. Dunn, 1968; National Research Council, 1982; Chinn and Hughes, 1987; Coutinho & Oswald, 2000). Recent work has shown that this story becomes more complex after conditioning on economic factors. Studies using aggregate data typically find evidence of overrepresentation conditional on basic observable characteristics (Sullivan, 2011; Skiba et al., 2005; Oswald et al., 1999), while

¹ See <https://sites.ed.gov/idea/files/significant-disproportionality-qa-03-08-17.pdf> for specific clauses in IDEA relating to disproportionality.

estimates based on individual survey data imply conditional underrepresentation (Morgan et al., 2012, 2013, 2015, 2017; Shifrer et al., 2011; Hibel et al., 2010).

To further our understanding of racial disproportionality in disability identification, we use a rich data source that links education records to birth certificate records for every child born in Florida between 1992 and 2002.² These data provide us with the ability to perform several novel analyses. First, the birth records include a large set of information on health endowments and baseline demographics. Previous work has only limited information, if any, on health and economic endowments.³ It is also worth noting that controlling for contemporaneous characteristics, as in some previous studies, runs the risk of introducing endogeneity because awareness of a child’s disability may influence her parents’ economic and schooling decisions. The nature of the birth certificate data allows us to condition on initial *endowments*, substantially mitigating this concern. Further, it allows us to test whether our estimates are driven by ex-post school switching of parents by assigning a student to a “pseudo-school” based on their birth residence.

Second, the size of our data, which encompasses a decade of births in Florida, allows us to examine specific disability categories. We estimate gaps for intellectual disabilities, developmental delays and Autism Spectrum Disorder (ASD), speech/language impairments, specific learning disabilities (SLD), physical disabilities, and other disabilities.

Finally, we consider the role that racial segregation plays in the development of identification gaps. One lingering question in establishing which factors drive disability

² We use “special education identification” and “disability” synonymously throughout, following studies such as Avchen, Scott, and Mason (2001).

³ For example Morgen et al. (2015) include only an indicator for whether a child was low birth weight, while Hibel et al. (2010), Shifrer et al. (2011), and Skiba et. al. (2005) do not have access to health information. Morgan et al. (2012) use the Early Childhood Longitudinal Study – Birth Cohort and are able to include several measures of health, but they are only able to study placement in early childhood (pre-Kindergarten) programs.

identification is how peers and larger social environments affect who is identified. For example, Elder and Lubotsky (2009) and Elder (2010) show that a substantial number of ADHD diagnoses are driven by a child's age relative to his or her peers in the same grade and school. In this paper, we focus on the role of a school's racial composition. Previous work has shown that schools with high percentages of black students are characterized by low achievement among minority students (e.g., Hanushek, Kain and Rivkin, 2009), while Bohrnstedt et al. (2015) show evidence of positive associations between segregation and achievement gaps. However, to our knowledge there has been no systematic analysis of how segregation across schools relates to racial gaps in special education identification. Apart from the potential role of resource differences, if the determination of special education identification is a function of one's health relative to one's peers, and if minorities have relatively poor health endowments, segregation could lead to underrepresentation of minorities in heavily-minority schools and overrepresentation in heavily-white schools.

Through a series of Blinder-Oaxaca decompositions (Blinder, 1973; Oaxaca, 1973), our estimates show that by fourth grade, black students are no more likely to be unconditionally identified for special education than are white students. However, the actual disability rate among black students is 13 percent lower in fourth grade (and 27 percent lower in Kindergarten) than it would have been if they were identified at the same rate as white students with similar economic and health endowments. For Hispanics, the overall identification rate is 8 percent lower than predicted in fourth grade (and 38 percent lower in Kindergarten). These overall gaps mask substantial heterogeneity across disability categories, with extensive overrepresentation in some cases and underrepresentation in others.

We then turn to considering how identification gaps vary with a school's racial composition. We find a strong negative association between black and Hispanic identification rates and the minority share (which we measure as the fraction of students who are black and / or Hispanic) of the student body. Black and Hispanic students in schools with few minorities tend to be overrepresented in special education relative to their predicted rates but are underrepresented in heavily-minority schools. This gradient is particularly large for black students: in fourth grade, a black student in a school with more than 90 percent minorities is roughly 9 percentage points less likely to be identified as disabled than an observationally identical black student in a school with fewer than 10 percent minorities. This is a strikingly large gradient, given that the overall disability rate among black students is roughly 15.7 percent. White students exhibit the opposite pattern, in that they are slightly more likely to be identified as disabled, conditional on their observable characteristics, when they attend heavily-minority schools than when they attend schools with few minorities.

Finally, we provide suggestive evidence that the gradient in identification gaps with respect to school racial composition is a racial phenomenon *per se*, rather than reflecting underlying economic factors. For example, to consider the potential role of resources, we study how gifted identification rates relate to a school's racial composition, based on the logic that gifted classifications are similar to disability classifications in that they require additional resources. We find that, in contrast to the results for disabilities, gifted classifications are sharply increasing with school minority shares among all racial groups. Further, we find that little of the gradient in identification gaps with respect to minority shares among black students can be explained by school-level measures of free/reduced-price lunch (FRL) rates or mothers' educational attainment. While the gaps are declining in FRL unconditionally, among black

students, the FRL gradient disappears entirely after conditioning on minority shares. Taken together, these patterns are inconsistent with a large role for resource constraints in the gradients of identification gaps with respect to school minority shares in Florida, particularly for black students. We posit that, instead, schools are either more likely to notice actual disabilities or tend to incorrectly apply disabilities to normal behaviors in students who are racially distinct in comparison to the student body as a whole.

Regardless of potential mechanism, our estimates suggest that minority students in heavily-minority schools are underrepresented in special education relative to their underlying incidence of disability. If so, their long-term educational outcomes could suffer, as Hanushek, Kain, and Rivkin (2002) find significant positive effects on mathematics achievement for students in special education. Similarly, Ballis (2018) finds that marginal students who are denied special education services are less likely to complete high school and enroll in college. Nonetheless, a limitation of this study is that the “optimal” identification rate is inherently unobservable, so we are unable to show definitively whether under- or over-representation is a problem from the standpoint of improving student performance. We instead follow the existing literature and focus on the magnitude of differences in identification rates across observationally identical students. Even so, our results suggest that the implications of underrepresentation for academic performance among minority students could be substantial.

2. Background on Socioeconomic and Racial Issues in Special Education Identification

The literature on questions of how the socioeconomic status of students affect the likelihood of a special education diagnosis is decidedly mixed, which is part of what motivates our study. While some studies find that low income children are more likely to be referred for

special education (Achilles et al, 2007; Frey, 2002), others find the opposite when accounting for a variety of other student characteristics (Skiba et al, 2005). However, Elder, Figlio, Imberman and Persico (2019) compare twins and siblings and show that a variety of neonatal health characteristics (but particularly birth weight) strongly predicts the likelihood of childhood disability across socioeconomic conditions, implying that socioeconomic status alone does not drive disability status.

Another factor that could influence disability referral is the race match between students and teachers. While there are few papers on whether black students are more likely to be referred for special education when taught by a white teacher than when taught by a black teacher, two qualitative studies find that the best predictors of teachers' referral judgments for special education are the presence of behavioral problems and academic competence. Students' demographic characteristics were not statistically significant predictors of special education referrals (Abidin and Robinson, 2002; Gottlieb and Weinberg, 1999). On the other hand, a qualitative study by Tobias (1982) finds that teachers are more likely to recommend special education referrals for students whose ethnic background differed from their own. Studies using random assignment have showed that teachers exhibit bias in their special education evaluations of non-white children (Prieto & Zucker, 1981; Zucker & Prieto, 1977).

While there is some evidence that there could be differences in the stigma associated with some types of disabilities across ethnic categories (Harry, 1992; Mascayano et al, 2016), the evidence is again mixed. For example, Zuckerman et al (2014) shows that in some cases providers dismissed Hispanic parents' concerns about their children's development. While other studies document stigma regarding disability diagnoses in Hispanic communities, it is unclear whether the same level of stigma exists in white communities. Unfortunately, we are unable to

test whether stigma or teacher bias are mechanisms that drive our results since we lack data on both teacher race and how communities interpret diagnoses with various disabilities. However, some of these factors might explain the results we find below.

3. Special Education in Florida

The IDEA requires the provision of a “free and appropriate public education” to students with special needs. This phrase, and the wider law, is the lynchpin for special education services in the U.S. Nonetheless, states vary considerably in how they direct special education funding, the services provided, and how students are evaluated. In Florida, as in most states, identification for special education, which is established by the production of an individualized education plan (IEP), is jointly determined by parents, teachers, and administrators. Often the process is initiated at the request of a parent or teacher, which leads to the possibility that parents who are more active in their children’s schooling would be more likely to advocate for an IEP. Further, teachers may differ in their propensity to identify disabilities. For example, Sideridis et al. (2008) find that male teachers are twice as likely to identify a student with a learning disability as are female teachers. These factors suggest that there is likely a substantial amount of variability in identification relative to the underlying incidence of disability.

Funding for special education in Florida comes from a mix of local and state sources. Since 2001 each district receives a lump-sum amount called the “Exceptional Student Education (ESE) Guaranteed Allocation.”⁴ The exact amount provided to each district is based on projected growth in exceptional student population relative to overall student population rather than actual enrollment. Districts also receive an additional per-student allotment for students with

⁴ The State of Florida uses the term “exceptional students” to include both students with an IEP and students identified as gifted and talented.

exceptionally severe disabilities. These funding formulas substantially limit the incentives of districts to increase special education identification for marginal students to secure additional funding, as the district is essentially responsible for the entire marginal cost of providing services to a student. Further, even for the average ESE student, the state covers a relatively small portion of the additional costs. In 2009, the most recent year for which data on spending by ESE status is available, the average school spent \$6,117 more on an ESE student than on a regular program student. In that year, the Guaranteed Allocation only provided an average of \$2,081 per ESE student.⁵

Rules regarding racial gaps also vary by state, but as noted above, IDEA requires states to monitor and correct disproportionality. Prior to 2004, districts with significant disproportionality were mandated to review their policies and adopt new policies to reduce the disproportionality. However, in 2004 the law was amended to require school districts exceeding the thresholds to set aside 15% of their IDEA funding to provide early intervention services, with the goal of reducing identification rates in highly-identified groups. This financial penalty can be a substantial – in Florida, IDEA funding accounted for \$604 million in 2010-11, which was 34% of all Federal funding.⁶ Hence, districts have strong financial incentives to limit the size of identification gaps by reducing identification rates in overrepresented groups.⁷ These incentives may generate suboptimal outcomes if overrepresentation of a racial group reflects students who would

⁵ Authors' calculations from Florida Membership in Programs for Exceptional Students, 2008-09 (<http://www.fldoe.org/core/fileparse.php/7584/urlt/0086517-ese0809.xls>), Florida Education Finance Program Calculations, 2008-09 Final Calculation (<http://www.fldoe.org/finance/fl-edu-finance-program-fefp/fl-edu-finance-program-fefp-calculatio.stml>), and Florida School Information Report, 2009 (<http://www.fldoe.org/accountability/accountability-reporting/school-grades/archives.stml>).

⁶ Florida School District Summary Budget, 2010-2011 (<http://www.fldoe.org/finance/fl-edu-finance-program-fefp/school-dis-summary-budget.stml>).

⁷ Research has previously shown that special education identification is influenced by financial incentives (Cullen, 2003), while seemingly innocuous regulations that require interventions if special education rates exceed thresholds have the unintended effect of reducing rates through manipulation of diagnoses (Ballis, 2018; Rosenthal, 2016).

potentially benefit from special education services but do not receive those services when districts respond to IDEA.

In sum, the funding environment in Florida in the period that we study does not provide schools with incentives to identify students with disabilities if the school does not view them as genuinely disabled. Combined with the incentives embedded in IDEA, theoretically we would expect schools and districts to attempt to reduce identification rates among minority groups.

4. Data and Descriptive Statistics

Our data include a unique merger of information from the Florida Education Data Warehouse, maintained by the Florida Department of Education, and birth records from Florida's Bureau of Vital Statistics. The linked records include all children born in the state of Florida from 1992 to 2002 who were enrolled at any time from the 1995-96 through 2012-13 school years. These data were merged based on last name, first name, date of birth, and Social Security Number, and all records were de-identified before being provided to the research team. Ultimately, 80.7% of birth records were later matched to a record in the education data. Figlio et al. (2014) and Autor et al. (2015) provide further details on the match quality and matching algorithm. Both of these studies compare the matched data to information in the American Community Survey and the Census of Population from 2000 to 2009 and find that the match rates are close to the proportion of students born in Florida who subsequently enroll in public schools in Florida (80.9%), suggesting a high match quality.⁸

⁸ Note that the denominator in the Census / ACS analysis does not include children who were born in Florida but subsequently left the country, while the denominator in the Florida analysis necessarily does, as we do not know where Florida-born children live if they are not enrolled in public schools in Florida. As a result, the two groups are not identical.

In total, the data includes 1.6 million individual students. However, we restrict our analysis samples to include only singletons observed in both Kindergarten and fourth grade in order to maintain a balanced sample across grades, leaving us with 869,000 students.⁹ Using these data, we focus on characteristics of children at birth, including both health and economic variables, along with detailed data on the identification of students for special education services under various categorizations.¹⁰ The birth certificate data includes a wealth of information about both child and maternal health status at birth and during the pregnancy. This information includes birth weight, gestational age, APGAR scores (a test of a newborn's responsiveness at one and five minutes after birth), the mother's prior births, and diagnosis codes for congenital anomalies, abnormal conditions, complications during delivery, and the mother's pregnancy-related health diagnoses.¹¹

The birth records also include demographic and economic characteristics of both the child and the mother, which we use to control for economic endowments. These characteristics include child gender, month and year of birth, mother's marital status, mother's educational attainment, mother's race, mother's immigration status, language spoken at home, and the mother's zip code of residence when the child was born.¹² For child's race, we use racial indicators from education records, which include mutually exclusive indicators for black, white,

⁹ A concern with restricting to those students observed in Kindergarten is that Kindergarten attendance is optional in Florida. This does not appear to have any impact on our results, as models that restrict to being observed in first and fourth grade provide nearly identical estimates.

¹⁰ A student is defined as being in special education if he or she has an Individualized Education Plan (IEP) under the Individuals with Disabilities in Education Act.

¹¹ By restricting to public school students, we are missing a subset of students who tend to have higher socioeconomic status. While most studies that rely on education records cannot show this pattern directly, the birth records allow us to do so. Online Appendix Table A1 shows estimates of the relationship between being included in the education sample and economic and health measures in the Vital Statistics data. Children of lower educated, minority, and unmarried mothers are more likely to be in the sample, as are children who have longer gestational terms.

¹² All of these variables come from the vital statistics except for home language, which comes from school records.

Hispanic, Asian/Pacific Islander, and Native American. For this study, we exclude the small numbers of Asian/Pacific Islanders (2.0% in 2004) and Native Americans (0.3% in 2004) so that we only examine the gaps between white, black and Hispanic children. It is important to note that we must restrict our analyses to native-born children; this limitation is particularly important for estimating identification gaps for Hispanics, as we necessarily exclude a large portion of the Hispanic population who are themselves immigrants.

Table 1 provides health and economic endowment statistics for our sample by racial category, revealing some notable differences by race / ethnicity. First, black students have an average birth weight of 3170 grams, which is roughly 6-7 percent lower than the average birth weights among Hispanic and white students. Elder, Figlio, Imberman, and Persico (2018) show that a birth weight deficit of this size implies a 0.8 percentage-point increase in disability rates, suggesting that disparities in health endowments across race / ethnicity may play a substantive role in special education gaps. Relative to white students, black students also have slightly lower gestational ages, higher rates of maternal anemia, and higher rates of meconium in gestational fluid. On the other hand, white students have higher rates of assisted ventilation (which may reflect higher-quality medical care rather than worse health) and breech births. For Hispanics, health endowments are generally better than those for both black and white students. In terms of socioeconomic measures, as expected, black students have the lowest education levels, age at birth, and marriage rates, followed by Hispanics and then whites. Hispanics have by far the lowest level of English as the home language.

To measure disability status, we use information on the child's special education identification in each year from Kindergarten through fourth grade. Figure 1 shows a listing of the disability categories used by the Florida Department of Education during our sample period.

Since many of these conditions are relatively rare, we aggregate them into a six larger categories: intellectual disabilities (W); physical disabilities (C - “orthopedically impaired”; H - “deaf or hard of hearing”; I - “visually impaired”); speech and language impairments (SLI) include F - “speech impaired” and G - “language impaired”; specific learning disabilities (SLD) correspond to code K; developmental delays or Autism Spectrum Disorder (ASD) correspond to codes T and P; and finally we aggregate all remaining classifications other than “gifted” into a single “other” category. Note that in Florida, attention deficit disorder and attention deficit hyperactivity disorder are typically placed in category V (“other health impairments”), which we include in this residual category.

Table 2 provides disability rates by race along with school racial compositions. We calculate racial composition as the percent of a student’s Kindergarten cohort that belongs to each racial / ethnic group. We focus on the Kindergarten cohort rather than the student’s current composition to minimize the risk of ex-post endogenous movements of students to new schools in response to disability diagnoses (we return to this issue below). On average, black students attend schools that are heavily black, while Hispanic students attend schools that are heavily Hispanic. However, Figure 2 provides more detailed context to these school-level racial distributions while highlighting a key source of variation used in this study. The figure shows that black, Hispanic, and white students in Florida experience a wide distribution of experiences in terms of racial composition of their schools. Importantly, there appears to be substantial density of all races in schools with low or high same-race or combined black/Hispanic shares.

Returning to Table 2, disability rate differences by race depend on grade and type of disability. For any disability, black and Hispanic students start out with lower rates than white students in Kindergarten, but by fourth grade white and black students are roughly at parity, with

Hispanic disability rates slightly lower. Nonetheless, minorities are less likely than white students to be identified for speech and language impairment (SLI / ASD) but more likely to be identified with an SLD. Other conditions do not substantially vary across races in Kindergarten, but by fourth grade black students have substantially higher intellectual and “other” disability rates than both whites and Hispanics.

5. Empirical Methods

To measure the effects of race and school racial composition on special education placement rates, we start with simple linear probability models that relate child-level special education indicators to the characteristics described above. Consider the following model:

$$(1) \quad SpEd_i = \mathbf{X}_i \boldsymbol{\Phi}_{r(i)} + \varepsilon_i,$$

where $SpEd_i$ is an indicator for whether student i is placed into special education (or a specific category thereof). The vector \mathbf{X} denotes the socioeconomic and health characteristics of the student derived from birth certificate and schooling data, and ε_i represents unobservable determinants of special education placement.¹³

Our goal is to compare “predicted” and actual special education identification rates across racial / ethnic groups and by school composition. To do so, we follow the approach of Blinder-Oaxaca decompositions and estimate race-specific parameters $\boldsymbol{\Phi}_{r(i)}$. Taking as an example the decomposition of the black-white gap, we denote $\boldsymbol{\Phi}_B$ and $\boldsymbol{\Phi}_W$ as the vector of parameters for

¹³ In our full models, the variables in \mathbf{X} include a quartic in birth weight; gestation length; indicators for Apgar scores of 8 or lower, 9 or 10, or missing for both 1 minute and 5 minute tests; indicators for requiring assisted ventilation for less than or greater than 30 minutes; other birth abnormalities; maternal anemia, diabetes, hypertension, or other pregnancy related health conditions; meconium; premature membrane rupture; breech birth; other labor/delivery complications; any congenital anomalies; indicators for parity up to 4th plus or missing; a quadratic in mother’s age; child gender; mother’s immigration status; mother’s education – HS, some college, college grad; and whether the mother is married.

black and white students, respectively. We decompose the gap in average special education placement rates as follows:

$$(2) \quad \begin{aligned} & E(SpEd_i|r(i) = B) - E(SpEd_i|r(i) = W) \\ & = [E(SpEd_i|r(i) = B) - E(\mathbf{X}'_i|r(i) = B)\Phi_W] + \\ & \quad [E(\mathbf{X}'_i|r(i) = B)\Phi_W - E(SpEd_i|r(i) = W)]. \end{aligned}$$

The first term to the right of the equality in (2) captures how much of the gap is due to differences in the coefficients, i.e., the unexplained component.¹⁴ This term reflects the average difference between actual identification rates for black students and the predicted rates – based on observable characteristics – if they had been white instead. The last term in (3) is often described as the “explained component”, which in this context measures how much of the gap can be explained by differences in observable characteristics, as scaled by the white students’ coefficients Φ_W .

In our model, \mathbf{X} includes a large number of health and economic endowments. For health endowments we use a quartic in birth weight, gestational age, APGAR scores at 1 and 5 minutes, birth abnormalities (assisted ventilation for less than 30 minute, for more than 30 minutes, and other abnormalities), mother’s pregnancy-related health (anemia, diabetes, hypertension, other), labor and delivery complications (meconium, premature membrane rupture, breech birth, other), and congenital anomalies. Economic variables include mother’s educational attainment, mother’s immigrant status, and mother’s marital status. All models also include indicators for child’s gender and parity (birth order), a quadratic in mother’s age, and indicators for birth cohort and birth month. We also provide models that include zip code of birth fixed effects.

¹⁴ As Blinder (1973) and Oaxaca (1973) both describe, the decomposition shown in expression (2) is not unique. One obvious alternative decomposition involves using black students’ coefficients to measure the endowment effect. For our purposes, however, the use of white students as a “baseline group” arguably makes more sense than the alternatives.

Our primary interest lies in assessing the extent to which racial differences in economic, social and health characteristics “explain” racial differences in special education classification. In order to do so, we first estimate specification (1) using white students only, then we calculate predicted special education placement rates for black or Hispanic students. Specifically, estimates of Φ_W allow us to predict the probability of identification for each black and Hispanic student based on their demographic and health characteristics, using white students’ mapping from these characteristics to placement rates. We next subtract the predicted identification likelihood from the actual identification incidence for each black or Hispanic student and average across all students. These “unexplained” identification gaps tell us how much higher or lower we would expect the identification rate for a group of minority students to be if they were identified at a rate similar to white students with the same characteristics – that is, the extent of the conditionally disproportional identification. Positive values indicate that the racial group is overrepresented, so that identification rates are higher than predicted, while negative values indicate the group is underrepresented. In order to conduct inference on the estimated explained and unexplained gaps shown in (2), we use clustered bootstraps, resampling at the school district-birth cohort level in each replication.

Our analyses based on specification (2) do not imply causal effects on disability identification, but are instead linear prediction exercises. Specifically, unobservable determinants of disability identification might be related to the corresponding observable characteristics. Most importantly, white and minority students with identical observable characteristics might have systematically different latent needs for special education services. We return to this issue below in Section 7, in which we explore the extent to which unobservable differences across

observationally identical groups of students might generate misleading inferences about the role of race in disability identification.

Along with estimating how identification rates vary with race, we seek to assess whether gaps in identification relate to the racial composition, economic composition, and resource allocations of schools and districts. Specifically, we ask whether two observationally identical students have different identification likelihoods if they are enrolled in different schools. There may be systematic differences across schools and districts in the identification of special education students, and such differences may be partly responsible for variation across schools and districts in racial achievement gaps.

An important issue arises when comparing identification patterns across schools: students' latent need for special education services might lead parents to choose schools based on the available resources for addressing special education needs. If so, students who need special education services would attend schools with more resources, inducing spurious correlations between the likelihood of special education identification and school characteristics (such as racial distributions). To address this complication, below we use the location of the student's residence at birth to generate measures of predicted school racial composition. The key insight to this strategy is that residence of birth is measured prior to parents' knowledge of a child's disabilities, so it is arguably exogenous to those aspects of school choice that are driven by disabilities.¹⁵ The Florida data include location of residence at the zip code level. Because school and zip code boundaries are not coterminous, we generate predicted school-level variables by zip code as a function of the share of students born in each zip code who attend each school,

¹⁵ One exception to this would be a congenital anomaly like Down syndrome that can be diagnosed while the child is in the womb. Nonetheless, this is arguably a negligible concern since it is unlikely that parents would change residences prior to birth in order to ensure receipt of services five years later.

including both traditional public and charter schools. We then use these predicted values in place of the actual school composition. This strategy allows us to abstract from non-random sorting into schools by students and parents in response to how well schools and districts serve students with disabilities.

6. Results

A. Average Identification Gaps

We start our analysis by investigating Blinder-Oaxaca decompositions of racial gaps in special education identification for the full Florida sample. We study identification in Kindergarten and fourth grade, two points that span most of primary school and potentially capture different disability conditions. In both of these grade levels, we are assured of having all of the birth cohorts linked to education records; not all birth cohorts appear in grades five and beyond. Table 3 shows our disproportionality estimates for black students relative to what we would predict if they were identified at rates of observably similar white students. Starting with any disability, columns (1)-(3) show that unconditional identification rates in Kindergarten are 2.5 percentage points lower among black students than white students, indicating that blacks are underrepresented in special education overall.

We next estimate predicted identification rates among black students if they were identified at the same rate as white students with the same observable characteristics. Column (4) shows that this predicted identification rate is 0.125; this is larger than the actual identification rate among whites of 0.116 shown in column (2), reflecting that black students are disadvantaged on the basis of observable characteristics that predict identification among white students. As column (5) shows, the gap between the actual and predicted black identification rates is -0.034,

which is roughly 38 percent of the baseline identification rate of 0.090 among black students. In other words, estimates from specification (1) suggest that black students are underrepresented by 38 percent, given their observable characteristics.¹⁶

Turning to fourth grade, columns (1) and (2) of panel B show little evidence of a raw black-white identification gap. However, the predicted gap in column (5) is -0.023. Overall, after accounting for observable health and economic differences between black and white students, there is modest but statistically significant underrepresentation of black students in special education in fourth grade equal to 15 percent of the baseline black rate, consistent with the findings of recent literature.¹⁷

The remaining rows of Table 3 consider the gaps in specific categories of disability. Focusing on fourth grade, most disabilities fall into the categories of SLI and SLD. Black students are conditionally underrepresented in SLI, SLD, ASD, and physical disabilities by roughly similar proportions.¹⁸ For intellectual disabilities, however, black students are noticeably overrepresented. Accounting for the health and economic characteristics reduces the size of the raw black-white gap by one-fifth, but the remaining unexplained gap is 44 percent of the baseline identification rate. It is possible that unobserved black-white endowment differences may explain overrepresentation in this category, but such differences would have to be both large and fundamentally different from Hispanic-white differences; as we show below, there is essentially

¹⁶ Throughout the paper, we interpret negative values as underrepresentation and positive values as overrepresentation.

¹⁷ We also estimated models that include zip code fixed effects. These fixed effects, while accounting for additional socio-economic differences, also may remove some variation in underlying disability rates that are correlated with geographic clustering into schools. Hence, our preferred models do not include them. Nonetheless, inclusion of these fixed effects have little impact on the estimates in Table 3. In particular the estimates for any disability are -0.026 and -0.021 for Kindergarten and 4th grade, respectively.

¹⁸ Developmental delay identifications are universally removed or changed after first grade, so all fourth grade students in this category have an Autism Spectrum Disorder identification.

no Hispanic-white gap in intellectual disability rates, in spite of Hispanics being relatively disadvantaged along many of the same dimensions as black children.

In sum, black students appear to be underrepresented overall in special education in Florida relative to observably similar whites, but they are considerably overrepresented in intellectual disabilities. In the two most empirically relevant disability categories, SLI and SLD, conditioning on the information available on students' birth records increases the implied underrepresentation.

In Table 4, we repeat this analysis with Hispanic students. The patterns for Hispanic-white gaps are largely similar in direction to those for the black-white gaps, but the gaps are smaller in magnitude in fourth grade. For any disability, we estimate that there is underrepresentation of 3.0 percentage points in Kindergarten (40 percent of the baseline rate for Hispanics), but only 1.1 percentage points in fourth grade (8 percent).¹⁹ The small overall gap in fourth grade primarily reflects underrepresentation in SLI and a slight overrepresentation in SLD. Further, unlike black students, Hispanics are not overrepresented in intellectual disabilities. The fact that Hispanics are substantially underrepresented in SLI may reflect difficulties schools have in assessing these concerns for foreign language speakers. Nonetheless, overall, while the estimates are statistically significant and sizable for certain conditions, there is little indication of consistent underrepresentation or overrepresentation of Hispanics relative to whites conditional on health and economic endowments.

B. Racial Segregation and Identification Gaps

¹⁹ When zip code fixed effects are included, the estimates are smaller but qualitatively similar at -0.016 and -0.006 for Kindergarten and 4th grade, respectively.

We now examine how disproportionalities in special education identification vary across the racial composition of schools. We focus on fourth grade hereafter, providing results for Kindergarten in the Online Appendix. Figure 3 shows results for students with any disability. The top panels show how actual (solid line) and predicted (dotted line) disability rates vary with the percent of a student's Kindergarten cohort who are minorities (black or Hispanic). We estimate the predicted values from decompositions using the variables described in Section 4. The bottom panels combine these to show the identification gaps (actual minus predicted) with 95% confidence intervals generated from 100 bootstrap replications. Negative values indicate underrepresentation while positive values indicate overrepresentation. We show these values separately for black, Hispanic, and white students. Note that since the decomposition uses the white group as the baseline, on average there is no difference between actual and predicted rates for white students; however, gaps can emerge within subsets of schools such as those defined by different racial compositions.

Importantly, we intentionally exclude racial composition from the conditioning set in the decomposition. We do so in order to have a consistent baseline comparison across schools in order to assess the role that racial composition plays in the appearance of identification gaps. That is, by excluding these measures, the gap estimates for two observationally identical black students in schools with different racial compositions are relative to the *same* observationally equivalent white student. If we included racial composition, then the gap for a black student in a heavily-minority school would be defined relative to observationally equivalent white students in heavily-minority schools, while the gap for a black student in a mostly-white school would be defined relative to observationally similar white students in mostly-white schools. As a result, we could not make meaningful comparisons between the two estimated gaps.

The left panels of Figure 3 shows the results for black students. The identification gap exhibits a clear negative gradient. In schools with fewer than 10 percent minority students, a black student is 3.8 percentage points more likely to be identified as disabled than an observationally equivalent white student. This value steadily decreases as the minority share of a school grows, so that a black student in a school with more than 90 percent minority students is 5.3 percentage points *less* likely to be identified than an observationally equivalent white student. The gradient is roughly linear, implying that for every 10-point increase in the minority share, underrepresentation among black students increases by approximately 0.9 percentage points. Black students tend to be underrepresented in special education in mixed and heavily minority schools (with 40 percent or higher minority shares) and overrepresented in schools with few minority peers.

The middle columns of the figure show results for Hispanics. As was the case for black students, we find evidence of overrepresentation in schools with few minorities and underrepresentation in schools with relatively high minority shares, but the gradient is flatter. Students in schools with fewer than 10 percent minority peers are overrepresented by 2.0 percentage points – roughly half the analogous figure for black students – while those in schools that are 90 percent or more minority are slightly underrepresented by 2.0 percentage points.²⁰

We turn to white students in the final column. Note that the overall average gap for white students is zero by construction, but because we do not condition on minority share in the school in the decompositions, there can be differences in the estimated gaps for different racial

²⁰ One potential explanation for why the gradient for black students is steeper than for Hispanic students is that black students are more likely to be native English speakers. In Figure A1 of the Online Appendix, we examine whether there are differences in the gradients for both black and Hispanic students by whether their home language is English. While there are shifts in the level of disproportionality, there are no changes in the gradients for either black or Hispanic children, implying that English ability is unlikely to be driving the differences shown in Figure 3.

compositions. Interestingly, we see the little difference in predicted gaps for white students in high or low minority schools. Across the school racial distribution, the difference between the largest and smallest gap estimates is 2.1 percentage points; this is in contrast to 4.1 and 9.1 percentage points for Hispanics and black students, respectively.

In sum, Figure 3 shows that minorities tend to be overrepresented in special education in schools where there are few minorities, but there is little gradient for white students.²¹ Further, it appears that conditional under/overrepresentation of white students in special education is far less sensitive to racial composition than that for Hispanic and black students.

In all of these cases, we use white students as the baseline group for the decomposition. In Online Appendix Figure A4, we examine the sensitivity of our findings to the choice of alternative baselines. The left panels show results using black students as the baseline, while the right panels use Hispanic students as the baseline. While there are some level shifts in comparison to Figure 3, there is little change in the gradient with respect to minority share for all three racial groups. Similarly, in Online Appendix Figure A5, we restrict the baseline group to only those white students in schools with fewer than 10% minority students, which allows us to use a relatively homogenous baseline group that experiences little variation in school racial composition. Again, we see similar gradients to those shown in Figure 4.

Figures 4 and 5 show analogous results for the two largest categories of disability in fourth grade, specific learning disabilities (SLD) and speech and language impairments (SLI).

Figure 4 shows that for black students much of the negative association between identification

²¹ Figure A2 in the Online Appendix shows analogous results based on models that include zip code fixed effects. The overall patterns shown there are similar to those shown in Figure 3, though the Hispanic gap gradient is slightly weaker. Figure A3 shows results for Kindergarten. In general, the gradient is flatter for black students and similar for Hispanics and whites but show the same general patterns. Further, we see no overrepresentation in Kindergarten for any minority share.

gaps and school minority shares is driven by SLD. While there are small negative gradients for SLI and other disabilities, these are much smaller than that for SLD. It is also worth noting that both ASD and physical disabilities show little evidence of significant under- or over-representation (shown in Online Appendix Figures A6 and A8). Although we are wary of drawing firm conclusions from these relatively rare conditions, both are severe and arguably more “objectively” defined than conditions such as SLD. Thus, most of the racial composition gradient appears to operate through relatively subjective conditions.

For Hispanics, on the other hand, SLD play a relatively small role in the racial composition gradient, which operates almost entirely through SLI. Hence, the primary difference between black and Hispanic students is that black identification rates for SLD, intellectual and emotional/behavioral disabilities (shown in Online Appendix Figures A7 and A9) are particularly sensitive to the racial composition of the school. Finally, for white students, there are small positive gradients with respect to minority shares for ASD and “other” disabilities (in Online Appendix Figure A10), and a negative gradient for SLI.

In Figures 6 and 7, we explore the dynamic patterns of racial gaps in special education for black students. In Figure 6 we show models that first restrict to students who are not disabled in the given grade, then estimate predicted values for all black students using white students as the baseline group, and finally generate actual minus predicted gaps by minority share in the school. Thus, the figure considers the rate at which black students are identified for any disability relative to predicted rates, given that they were not already identified. While the identification hazards in mostly-white schools do not evolve much over time, in heavily-minority schools black students become increasingly under-represented over time through third grade. That trend slightly reverses in fourth grade.

Figure 7 instead conditions on students who are identified in the given grade – thereby providing de-identification hazards. These patterns mirror those in Figure 6, in that black students exit special education relative to their predicted rate far more slowly in low-minority schools, so that they are over-represented by grades 3 and 4. Overall, these figures show that black students in heavily-minority schools are less likely than black students in mostly-white schools to be placed in special education if they are not identified early and are kept in special education longer if they are identified early.²²

C. Contributions of Different Background Variables

Figure 8 shows the estimated identification gaps by minority share when different subsets of the conditioning variables are included in the decomposition. This allows us to investigate what roles each type of variable might play in the identification gaps. The left panel shows results for black students. Focusing first on gap estimates with no conditioning variables (i.e., the average black identification rate for each minority share minus the grand mean, labeled “No Controls” in the figure), students in only the highest minority-share schools tend to be identified at lower than average rates. However, as one accounts for observable characteristics, this underrepresentation emerges at lower and lower minority shares. Accounting for observables shifts the identification gaps downward by 2 to 3 percentage points across the minority share distribution. This is a sizable shift given that baseline identification rates are 15 percent, and it suggests that our conditioning variables account for a substantial amount of variation in special

²² Results for Hispanics are provided in Online Appendix Figures A11 and A12 and show qualitatively similar, but much more muted, patterns with generally statistically insignificant differences by racial composition.

education identification. While the observables have a noticeable effect on identification of black students, they do not appear to change the overall gradient with respect to minority share.²³

Considering the roles of specific sets of controls, the health variables account for nearly the entire downward shift shown in the “All controls” line. Economic variables, basic demographics, and zip code fixed effects contribute as well, but neonatal health appears to have its own independent contribution beyond these economic and demographic factors. This highlights the importance of being able to account for health factors when measuring disproportionality.

Panel B shows the same results for Hispanics. Using all conditioning variables except for zip code fixed effects shifts the gap in the same direction as for black students. Nonetheless, some variables work in different directions: basic demographics (parity, mom’s age, gender) shift the gaps downwards (towards more underrepresentation), while economic factors and cohort and month effects shift the gaps upwards (toward more overrepresentation). While zip code of birth provides little additional information for black students beyond the basic economic measures, for Hispanics they are important, particularly in heavily-minority schools. As a result, accounting for residence at birth substantially reduces the underrepresentation estimates for Hispanics in heavily-minority schools.

We further break these estimates down in Online Appendix Figure A14, which highlights the value of the birth records by investigating the contributions of the various health measures.

The figures show that after conditioning on baseline characteristics, the inclusion of birth weight

²³ In Online Appendix Figure A13 we show these breakdowns for three categories – SLD, intellectual disability, and “other” disabilities – where the observables appear to have the most explanatory power. In all three of these cases, the health and economic variables generate large downward shifts for black students. For Hispanics, there are large changes for SLD and intellectual disabilities, but the shifts vary in sign. Two notable patterns emerge. First, as in the “any disability” figures, there are no changes in the slope of the gradient except for when we condition on zip code fixed effects for Hispanics. Second, for Hispanics the observables play only a minor role in “other disabilities,” which includes behavioral/emotional disabilities and ADD/ADHD, but they play large roles for black students.

shifts the gaps downward considerably for black students, though additional health variables have little further impact. For Hispanics the health variable contributions are considerably smaller. It is also worth noting that the health variables seem to affect the level but not the gradient with respect to school minority shares.

Online Appendix Figure A15 also shows how observable characteristics of students relate to school racial compositions. Based on five observable maternal and birth characteristics, the figure shows that average socioeconomic conditions worsen for all groups as minority shares increase. For example, for black children, estimates from linear plots imply that a 50 percentage-point increase in minority share is associated with a 0.24-year decrease in average maternal age at birth, 0.35 fewer years of average maternal education, and a 6.5 percentage-point reduction in maternal marriage rates at birth. The analogous values for Hispanic children are even larger than for black children. On the other hand, the gradients with respect to both birth weight and gestational age are no larger for Hispanics than for black children.

D. Ex-Post Selection

One potential source of bias that could affect our estimates is that parents may change schools after they discover their child has a disability in order to better match the student's needs.²⁴ If the tendency to change schools is related to racial composition of the school, this could introduce spurious correlations between disability rates and school characteristics. We are able to use a unique feature of our data – information on the zip code of residence at birth – to address this source of potential bias. To do this, we create “pseudo schools” based on where

²⁴ A related issue is that school switching itself could affect identification. Our data show mixed evidence of this phenomenon. While transition rates into special education are lower for students who switch than those who stay in the same school (0.84% vs. 1.29%), exit rates out of disability status are higher for switchers than stayers (1.07% vs. 0.67%). It is unclear what implications these patterns have for the role of mobility in classification.

students would have enrolled had they remained in the school local to their birth residence. Because zip codes are not coterminous with school zones, we assign the student a weighted average of racial compositions for Kindergarten cohorts across all students born in the same zip code and year. Specifically, we calculate

$$(3) \quad PseudoRaceShare_{zc} = \sum_{j=1}^J ZipSchoolShare_{zjc} \times SchoolRaceShare_{jc}.$$

Thus, the pseudo-school race share is calculated by multiplying the share of students in each zip code z and birth cohort c who attend a given school j , $ZipSchoolShare_{zjc}$, by $SchoolRaceShare_{jc}$, the share of students in that school who are of a particular race / ethnicity, and then summing over all schools in the zip code. For example, to create the fraction of black students in a pseudo-school, we calculate a weighted average of the fraction of black students in each actual school, with weights given by the share of students who attend that school in Kindergarten. Because the vast majority of disabilities are diagnosed after birth, this measure provides us with estimates of school-level racial shares that are exogenous to parental decisions that respond to disability status.

Figure 9 provides the results from these analyses. We present results for pseudo-schools with minority shares up to 80 percent because few pseudo-schools have minority shares above that level. Nonetheless, the patterns for black students are similar to those shown in Figure 3. Specifically, there is a sizeable negative gradient in the raw-predicted gap, implying overrepresentation for black students in low-minority schools and underrepresentation in heavily-minority schools. For Hispanics, the negative gradient is smaller, but apparent for pseudo-schools with more than 10 percent minorities. For white students, the estimated actual-predicted gaps disappear regardless of the school racial distribution. This suggests that ex-post school switching is likely more common for white students, which could reflect that white

families have resources that facilitate residential moves. More importantly, our results for black and Hispanic students appear to be robust to accounting for ex-post residential movement in response to disability diagnoses.

E. Race versus Economic Conditions

To this point, we have focused on how identification gaps vary by the racial composition of the school. While there is a clear negative gradient between identification net of predicted rates and minority shares, a school's racial composition might be a proxy for other school characteristics. While we cannot rule out all potential factors for which race is a proxy, the most likely measures would be economic conditions and resources available to schools. In Figure 10, we illustrate this possibility by plotting achievement gaps relative to the share of students eligible for free or reduced-price lunch (FRL). While all three gaps are relatively flat among schools that are less than 50% FRL, a negative gradient for both blacks and Hispanics emerges for schools that are more than 50% FRL, while a positive gradient emerges for white students. The apparent similarity of Figures 3 and 10 highlights the possibility that some of the minority share gradients reflect economic conditions.

In order to further investigate the roles of racial composition and economic conditions, we generate two new variables. First, we generate residuals from a regression of percent FRL in a school-cohort on quartics in the minority share to create "residualized percent FRL". Second, we regress the minority shares in a school-cohort on the percent of mothers who are college graduates, the percent of mothers who are college dropouts, and a quartic in the percent FRL to create "residualized minority shares". If racial factors drive the patterns in Figure 3, we would expect to see the same patterns using residualized (rather than raw) minority shares. Instead, if

economic factors play a major role, we would expect to see similar patterns for residualized percent FRL.

Figure 11 presents the results from these decompositions. Panel A shows disability rates and gaps as a function of residualized percent FRL (because the residualized measure is mean-zero by construction, we add the overall sample mean of the percent FRL measure to all values when creating the figure). While a negative gradient remains for Hispanics, suggesting that the Hispanic gap primarily stems from school-level economic factors, for black students – where the racial composition gradient is most pronounced – the gradient is actually positive. Specifically, black students in poorer schools net of racial composition are identified at rates equal to observationally-equivalent white children, while black children in relatively wealthy schools (again, net of racial composition) tend to be underrepresented. Panel B shows the results for residualized minority shares. In this case, we see a strong negative gradient for black students, with little gradient overall for Hispanic or white students. These figures strongly suggest that underrepresentation of black students in heavily-minority schools is due to factors more closely aligned with racial composition than with economic status, at least as measured by school-level measures of FRL status and maternal education. On the other hand, the opposite case can be made for both Hispanic and white students.

F. Race versus Resource Constraints and School Achievement

Another possible explanation for the relationship between school racial composition and identification gaps is that schools with larger minority shares are under-resourced compared with schools that serve largely white populations. At the same time, heavily-minority schools may have larger proportions of students that could potentially benefit from special education services. If so, the rules for identifying children may vary systematically across schools as administrators

consider the marginal costs and benefits of identifications; specifically, the “threshold” disability level that triggers an identification may be substantially higher in heavily-minority schools than in heavily-white schools.

In order to investigate this possibility, we use an additional source of information that schools may use to determine disability status: achievement test scores. Our linked birth-education records include individual students’ scores from the Florida Comprehensive Assessment Test (FCAT), which was first administered to third and fourth grade students in the 1997-98 school year. We excluded achievement from our central specifications above because it is potentially endogenous to disability status, i.e., receipt of special education services likely influences learning for those children who would otherwise struggle in the absence of special education. Nonetheless, achievement may play an important role in producing the racial composition gradients shown above in Figure 3.

In addition, we hypothesize that disability identifications may depend not only on a student’s achievement, but also on her place in the within-school achievement distribution. We thus estimate models analogous to specification (1) above in which we control for a student’s own lagged (third grade) math and reading FCAT scores, as well as deciles of the school’s lagged math and reading FCAT distributions. We show the results of these decompositions in Figure 12.

In the upper-left panel of Figure 12, the predicted disability rate declines as the school minority share increases, in contrast to the analogous panel in Figure 3. This difference stems from the fact that the within-school test deciles are predictive of disability identifications – for a given value of a student’s own score, identification rates increase as the distribution of her schoolmates’ test scores shifts to the right. In addition, black students in heavily-minority

schools tend to score higher in their within-school test score distribution than do black students in heavily white schools. For example, the average score among black students in a school with more than 90 percent minority students is close to the median of the within-school score distribution in those schools. In contrast, the average score among black students in a school with fewer than 10 percent minority students lies at roughly the 30th percentile of the within-school distribution in those schools.

Because the “predicted value” series in Figure 12 is negatively sloped for black students (unlike the analogous series in Figure 3), while the two “raw” series have roughly the same slope in the two figures, the “raw minus predicted” gap series in Figure 12 is slightly less negatively sloped than that in Figure 3.²⁵ Nonetheless, the “raw minus predicted” gap still declines noticeably with school minority shares, implying that achievement – both absolute and relative to one’s schoolmates – accounts for some, but not all, of the gradient found in Figure 3.

One other notable difference between Figures 3 and 12 is that the level of the “predicted value” series for black students is substantially higher in the latter figure than in the former. For example, the predicted disability rate among black students in schools with more than 90 percent minority students is roughly 22 percent in Figure 12, compared to 18 percent in Figure 3. This difference emerges because a student’s own FCAT scores are predictive of identification among white students, and black students have lower average FCAT scores than do white students at all values of the school minority share. As a result, when FCAT scores are included in the conditioning set, black students are identified at lower rates than would be predicted throughout the distribution of school racial composition.

²⁵ The “raw” series in the two figures are not identical because we do not require students to have valid test score data to be included in Figure 3, while Figure 12 necessarily includes only students with non-missing FCAT scores. Those with missing FCAT scores have higher rates of disability, so the raw disability rates in Figure 12 are slightly lower than those in Figure 3.

Turning to the Hispanic gaps, we find little evidence that controlling for own and peers' FCAT scores influences the gradients with respect to school racial composition: the “raw minus predicted” gaps have similar slopes in Figures 3 and 12. As was the case for black students, those gaps are shifted downward in Figure 12 relative to Figure 3, reflecting that Hispanic students are identified at lower rates than would be predicted once we condition on FCAT scores. However, the downward shift is less pronounced than it was among black students, reflecting that Hispanic students have higher average FCAT scores than do observationally similar black students. In addition, the “raw minus predicted” gaps for white students are roughly similar in the two figures.

Finally, we consider another setting in which achievement may play a central role: the identification of gifted students. As with disabilities, there is a substantial amount of subjectivity in how gifted students are identified.²⁶ If resource constraints influence identification for both gifted and disabled students, we might expect similar minority share gradients for both sets of students – gifted rates will be lower in heavily-minority schools than among observationally equivalent students in richer, heavily-white schools. To assess this possibility, we repeat the above decomposition analysis using fourth grade gifted status as an outcome, providing the results in Figure 13. The figure shows the opposite patterns from those in Figure 12: for all three sets of students, the “raw minus predicted” gifted identification gaps increase in school minority shares.²⁷

²⁶ Universal testing programs for gifted and talented students as studied in Card and Giuliano (2016) are rare. More typically, districts identify students for screening based on subjective measures (such as teacher recommendations) and then proceed with formal testing.

²⁷ We note that measures of school resources in the Florida data are only weakly related to school racial composition. Specifically, minority shares are negatively correlated with teacher experience but positively correlated with the proportion of teachers with Masters' degrees and teacher / pupil ratios. In sum, we find little evidence of a systematic relationship between school racial composition and observable measures of school resources.

The striking differences in the patterns shown in Figures 12 and 13 are inconsistent with a setting in which resource constraints play significant roles in both disability and gifted identification. Nonetheless, we acknowledge that a number of factors may play a role in the development of racial gaps in gifted education, so the interpretation of these results is not straightforward. We consider these findings to be supportive but certainly not dispositive evidence that resource constraints do not drive the central results above.

Overall, the results in this section imply that resource constraints and achievement levels – both relative and absolute – may explain some, but not all, of the gradients in identification gaps among minority students with respect to school minority shares. We stress an important caveat with this interpretation, though: unlike information available at the time of a child’s birth, which is obviously determined prior to special education identification, achievement may be endogenous with respect to special education services.²⁸

7. Discussion

Our results establish clear negative gradients in special education identification gaps with respect to school minority shares for black and Hispanic students. Black students in schools with high minority shares are likely to be underrepresented in special education conditional on their observable characteristics, while they are overrepresented in schools with few minority students. We observe a similar, but more muted, pattern for Hispanic students. While we cannot be sure of the underlying mechanisms that drive these patterns, we provide some evidence that it is unlikely to be school resource constraints or economic factors.

²⁸ In order to circumvent concerns due to the endogeneity of achievement with respect to disability and gifted identification, in Section B of the Online Appendix we estimate specifications in which we condition on third grade test scores and analyze the racial composition gradients in fourth grade disability and gifted status, conditional on not being identified before fourth grade. While the gradients in those specifications are smaller than those in our main specifications above, a small negative disability gradient still exists for black students, while modest gifted gradients exist for black, Hispanic, and white students.

This leaves a few possibilities for potential mechanisms. First, it is possible that the identification of disabilities is peer reference-dependent. For example, suppose that each school community (including parents, students, and school employees) determines a threshold health level under which students are identified as disabled. Ideally, this would be a fixed value that is unrelated to contextual factors. However, it is possible that stakeholders use students' peers as a basis of comparison, so that if there are more students in a school with underlying disabilities, the likelihood of identification goes down for a particular student. In our data, we do see some evidence that both on average and within minority share bins, black students have worse neonatal health characteristics than both Hispanic and white students, with Hispanics students' health on average being similar to those of white students. For all three racial / ethnic groups we consider, observable factors that are related to child health (such as maternal education or birth weight) are negatively related to school minority shares.

Although peer reference dependency may play an important role in our central findings, it is inconsistent with the slight positive association between minority shares and disability rates among white students. An alternative, and potentially complementary, explanation is that school communities are more likely to notice disabilities – or perceived disabilities – when students appear dissimilar to their peers. For example, black and Hispanic students may “stand out” in schools comprised of mostly white students, making their perceived disabilities more readily noticed in comparison to identical students in schools with large black and Hispanic populations. Such a phenomenon would lead to overrepresentation (underrepresentation) for the minority (majority) group *in the school*, consistent with the patterns shown in Figure 3.

Finally, although we have access to an unusually rich set of health characteristics, along with measures of both economic resources and achievement, it is possible that important

unobserved determinants of disability identification are correlated with school minority shares. In Section A of the Online Appendix, we present estimates intended to gauge the potential importance of such determinants. Following the analyses of Altonji et al. (2005, 2008; hereafter “AET”), we ask what the implied gradient of disability gaps would be if the relationship between unobserved characteristics and school minority shares is similar to the analogous relationship between observed characteristics and minority shares. In light of our findings above that students in heavily-minority schools are disadvantaged along observable dimensions compared to students in heavily-white schools – regardless of the student’s own race – our estimates based on the AET approach suggest that students in heavily-minority schools may have much worse latent health and SES characteristics than students in schools with low minority shares. Thus, we would expect that disability rates would be strongly increasing in minority shares; in other words, our central estimates may understate the extent of underrepresentation of black and Hispanic students in schools with high minority shares. In order for us to attribute the negative gradient in disability gaps entirely to unobservables, the association between minority shares and unobserved characteristics would have to be both powerful and of the opposite sign as the association between minority shares and observed characteristics.²⁹

It is worth noting that our findings have potentially important implications for how disproportionality is determined. Fundamentally, the Individuals with Disabilities in Education

²⁹ The Online Appendix also describes an additional analysis into sorting on unobservables based on eventual Advanced Placement (AP) course-taking rates. Our primary concern with the AET analysis presented above is that, even though students in schools with low minority shares have observable characteristics that are negatively associated with underlying disabilities (compared to students in schools with high minority shares), it may be the case that these students’ parents are more likely to pursue disability identifications, conditional on underlying health. We use eventual AP course taking as a proxy for parents’ willingness to advocate on behalf of their children, and we find essentially no relationship between school-level AP course taking and school-level disability identification rates among black and Hispanic students. These patterns suggest that the gradients in identification gaps with respect to minority shares do not stem from a systematic relationship between minority shares and minority parents’ willingness to advocate for their children.

Act considers racial disproportionality to be an outcome in and of itself that requires remediation – hence the focus on unconditional racial differences in several previous studies. Our findings, however, add to an increasing body of literature that suggests that failing to account for health differences could lead disproportionality rules to unintentionally induce schools and districts to reduce access to special education services for those students who may benefit from them (Morgan et al., 2012, 2013, 2015, 2017; Shifrer et al., 2011; Hibel et al., 2010).

Our analysis adds an important element to this debate by showing the substantial heterogeneity in disproportional representation with respect to school racial composition. While we establish that this heterogeneity exists, we are unable to identify which students are on the margin from benefitting from special education services. Thus, while Hanushek, Kain and Rivkin (2002) and Ballis (2018) find evidence of positive effects of special education, we cannot determine with certainty what the effects on outcomes are among students impacted by disproportionality remediation.

8. Conclusion

Using a unique panel of data from the State of Florida that links the universe of birth records with education records over a decade of birth cohorts, we provide new evidence about the extent to which minority students are disproportionately placed in special education. One of our key contributions is the use of detailed data on economic and health endowments – such as birth weight, gestational age, and complications and abnormalities at birth – not typically available in the national surveys used in prior work. Using Blinder-Oaxaca decompositions, we generate predicted disability rates for minorities if they were identified at the same rates as white students with similar observable characteristics. Because we have large samples covering the

universe of children born in Florida between 1992 and 2002, we are also able to disaggregate identification into specific disability categories, some of which are relatively rare.

Our initial results confirm the findings of recent work by Morgan et al. (2015), who used the ECLS-K to argue that black and Hispanic students are underrepresented in special education. We find underrepresentation by 3.4 percentage points (38 percent of the baseline identification rate among black students) in Kindergarten and 2.3 percentage points (15 percent) in fourth grade. For Hispanics, we find underrepresentation of 3.0 percentage points (40 percent of the baseline Hispanic identification rate) in Kindergarten and 1.1 percentage points (8 percent) in fourth grade. We find substantial variation in these overall results by disability condition. In fourth grade, both Hispanic and black students are significantly underrepresented in speech / language impairments, and black students are underrepresented in specific learning disabilities, Autism Spectrum Disorder (ASD), and physical disabilities. In contrast, we find that black students are substantially overrepresented in intellectual disabilities, by 44 percent of the baseline identification rate.

Our primary focus involved assessing how special education identification gaps vary with the racial composition of schools. We estimate disability gaps by the share of a student's Kindergarten cohort (called the "school" for simplicity) that is black or Hispanic and find a clear negative gradient for black students, who are overrepresented in schools with relatively small minority shares and underrepresented in schools with large minority shares. The gradient is roughly linear, implying that every 10 percentage-point increase in the minority share is associated with a 0.9 percentage-point decline in the disability gap. The implied difference in the disability gaps between the schools with over 90 percent minority populations and those with under 10 percent minority populations is more than half of the overall fourth grade identification

rate of 14.9 percent. Specific learning disabilities, which may represent the most malleable and subjectively defined disabilities, drive most of the gradient for black students. In contrast, the negative gradient for Hispanics stems primarily from the speech and language impairment category.

Our analyses do not necessarily imply a causal relationship between school segregation and disability identification, as the racial composition of a school could be a proxy for a number of other factors. Nonetheless, we address several alternative mechanisms that potentially play significant roles. First, we utilize the fact that we have residential location at birth to generate pseudo-schools for students based on where they were born. The concern is that parents might change schools in response to their child's disability, and such transitions may be systematically related to the racial compositions of the "origin" and "destination" schools. Our estimates for black and Hispanic students are largely insensitive to whether we use pseudo-schools or the schools that students actually attend, suggesting that ex-post residential movement in response to disability diagnoses is not responsible for our central results. On the other hand, the gradient for white students disappears when we use pseudo-schools, perhaps because non-minority families are relatively more likely to move in response to child disabilities.

We next investigate whether our central findings simply reflect differences across schools in economic conditions, rather than differential treatment by race. We first verify that identification rates are systematically related to the fraction of students eligible for free or reduced-price lunch (FRL) in the school. We then use racial composition residualized by school-level economic variables (including the percent eligible for FRL) to investigate whether our results are sensitive to purging the racial composition of a substantial portion of the economic variation. While the gradient largely disappears for Hispanics, suggesting that much of the

pattern for Hispanics is related to economic status, the gradient for black students remains large. Such a pattern is arguably incompatible with a setting in which resource constraints drive the low overall identification rates in these schools.

We also consider the identification of gifted students, arguing that if resource constraints influence the identification of disabled students, we might expect similar impacts on gifted identification. Instead, we find positive associations between gifted identification gaps and school minority shares for black, Hispanic, and white students. These findings again suggest that resource constraints are not the principal mechanism underlying the gradients in disability gaps.

Given that ex-post school switching, economic factors, and resource constraints explain little of the strong relationship between identification gaps and racial composition, at least for black students, we offer some potential explanations. First, it is possible that identification for special education is reference-group dependent – if a school’s student population is relatively healthy, then the threshold impairment level for what defines a “disability” falls, inducing diagnoses among children who would not be identified as disabled in schools with less healthy peers. An alternative explanation is that the distinctness of students’ race might play a role; for example, teachers and administrators may pay particular attention to a black student in a school with very few black students merely because that student is relatively unique. As a result, teachers may notice exceptional traits in these students that would go unnoticed in other students.

Finally, we acknowledge that we are unable to account for all determinants of disability identification. However, if the association between school minority shares and unobservable determinants of identification is similar to the association between school minority shares and observable determinants of identification, we would expect that disability rates would be strongly increasing in minority shares – in sharp contrast to what we actually find. As a result,

our central estimates may understate the underrepresentation of disability among black and Hispanic students in schools with large minority populations.

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Table 1: Summary Statistics for Health & Economic Variables

	All	Black	Hispanic	Non-Black/Hispanic
<i>Basic Birth Information</i>				
Birthweight (grams)	3328 (557)	3170 (578)	3353 (532)	3398 (541)
Gest Age (weeks)	38.8 (2.0)	38.6 (2.3)	38.9 (1.9)	38.9 (1.8)
Child is Female	0.50 (0.50)	0.51 (0.50)	0.50 (0.50)	0.49 (0.50)
Apgar 1	8.4 (3.5)	8.4 (4.9)	8.6 (2.7)	8.3 (2.8)
Apgar 5	9.1 (3.2)	9.2 (4.7)	9.1 (2.6)	9.1 (2.5)
<i>Abnormality</i>				
Assisted Ventilation < 30 mins	0.019 (0.137)	0.015 (0.122)	0.017 (0.128)	0.021 (0.145)
Assisted Ventilation > 30 mins	0.007 (0.085)	0.009 (0.094)	0.004 (0.067)	0.007 (0.086)
Other	0.035 (0.183)	0.040 (0.196)	0.022 (0.147)	0.037 (0.189)
<i>Pregnancy Related Health</i>				
Anemia	0.026 (0.160)	0.042 (0.201)	0.018 (0.135)	0.022 (0.147)
Diabetes	0.027 (0.163)	0.023 (0.151)	0.024 (0.154)	0.029 (0.169)
Hypertension	0.044 (0.205)	0.050 (0.218)	0.032 (0.176)	0.046 (0.210)
Other	0.183 (0.387)	0.209 (0.406)	0.126 (0.332)	0.192 (0.394)
<i>Congenital Anomaly</i>				
	0.007 (0.085)	0.008 (0.090)	0.005 (0.070)	0.008 (0.087)
<i>L&D Complication</i>				
Meconium	0.054 (0.226)	0.074 (0.261)	0.047 (0.212)	0.047 (0.212)
Early Rupture	0.021 (0.144)	0.023 (0.150)	0.019 (0.136)	0.021 (0.144)
Breech	0.032 (0.175)	0.021 (0.143)	0.031 (0.172)	0.037 (0.190)
Other	0.217 (0.412)	0.215 (0.411)	0.202 (0.401)	0.223 (0.417)

Table 1: Summary Statistics for Health & Economic Variables (cont.)

	All	Black	Hispanic	Non-Black/Hispanic
<i>Parity</i>				
1st	0.41 (0.49)	0.36 (0.48)	0.41 (0.49)	0.42 (0.49)
2nd	0.34 (0.47)	0.29 (0.45)	0.35 (0.48)	0.36 (0.48)
3rd	0.16 (0.37)	0.19 (0.39)	0.16 (0.37)	0.15 (0.36)
4th or Higher	0.09 (0.29)	0.17 (0.37)	0.08 (0.28)	0.06 (0.24)
<i>Mother SES at Birth</i>				
Age	27.3 (6.3)	25.2 (6.3)	27.3 (6.1)	28.2 (6.0)
No HS	0.23 (0.42)	0.20 (0.40)	0.60 (0.49)	0.07 (0.26)
HS	0.38 (0.49)	0.43 (0.50)	0.37 (0.48)	0.37 (0.48)
Some College	0.24 (0.42)	0.19 (0.39)	0.22 (0.41)	0.26 (0.44)
College Grad	0.17 (0.37)	0.06 (0.25)	0.14 (0.35)	0.22 (0.41)
Married	0.62 (0.49)	0.30 (0.46)	0.65 (0.48)	0.76 (0.43)
Speaks English	0.81 (0.39)	0.89 (0.32)	0.34 (0.47)	0.96 (0.20)
Observations	852,293	209,653	165,967	432,600

Table 2: Racial Composition of Cohort and Disability Rates

	Kindergarten				4th grade			
	Any	Black	Hisp	Non Black/Hisp	Any	Black	Hisp	Non Black/Hisp
% of KG Cohort Black	25.2	53.6	16.9	14.9	-	-	-	-
	(26.2)	(30.4)	(19.2)	(14.1)	-	-	-	-
% of KG Cohort Hispanic	19.8	13.5	48.2	12.2	-	-	-	-
	(23.5)	(15.3)	(31.0)	(13.9)	-	-	-	-
% Any Disability	10.0	9.0	7.5	11.6	14.9	15.7	13.7	15.2
	(30.0)	(28.7)	(26.4)	(32.0)	(35.6)	(36.4)	(34.4)	(35.9)
% SLI	7.5	6.2	4.8	9.3	5.0	4.5	3.7	5.6
	(26.4)	(24.1)	(21.5)	(29.1)	(21.7)	(20.8)	(18.9)	(23.1)
% SLD	0.8	0.7	1.2	0.6	6.8	7.1	7.3	6.7
	(8.7)	(8.6)	(10.9)	(7.9)	(25.1)	(25.6)	(26.0)	(24.9)
% ASD or Dev't Delay	0.7	0.9	0.7	0.6	0.4	0.2	0.5	0.4
	(8.4)	(9.3)	(8.3)	(8.0)	(6.1)	(4.6)	(6.9)	(6.3)
% Intellectual Disability	0.3	0.6	0.3	0.3	0.7	1.3	0.4	0.5
	(5.8)	(7.5)	(5.2)	(5.1)	(8.1)	(11.5)	(6.3)	(6.8)
% Physical Disability	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4
	(5.0)	(4.7)	(4.6)	(5.3)	(5.8)	(5.4)	(5.4)	(6.1)
% Other Disability	0.4	0.4	0.3	0.4	1.8	2.3	1.6	1.7
	(6.3)	(6.5)	(5.4)	(6.5)	(13.3)	(15.0)	(12.4)	(12.8)
Observations	852,293	209,653	165,967	432,600	852,293	209,653	165,967	432,600

Table 3: Estimates of Disproportionality for Black Students

A. Kindergarten

B. Grade 4

Disability Category	Raw Black	Raw White	Raw Gap (1) - (2)	Predicted Black	Gap (1) - (4)	% Gap (5)/(1)	Raw Black	Raw White	Raw Gap (1) - (2)	Predicted Black	Gap (1) - (4)	% Gap (5)/(1)
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Any	0.090	0.116	-0.025	0.125	-0.034 (0.002)	-38%	0.157	0.152	0.005	0.181	-0.023 (0.003)	-15%
SLI	0.062	0.093	-0.031	0.096	-0.034 (0.002)	-55%	0.045	0.056	-0.011	0.057	-0.012 (0.002)	-26%
SLD	0.0074	0.0063	0.0011	0.0084	-0.0010 (0.0005)	-13%	0.071	0.067	0.004	0.086	-0.015 (0.002)	-21%
ASD/ Dev Delay	0.0088	0.0064	0.0024	0.0074	0.0014 (0.0005)	15%	0.0021	0.0040	-0.0019	0.0032	-0.0011 (0.0002)	-50%
Intellectual	0.0057	0.0026	0.0031	0.0038	0.0019 (0.0003)	33%	0.0134	0.0046	0.0088	0.0074	0.0059 (0.0008)	44%
Physical	0.0022	0.0028	-0.0006	0.0038	-0.0016 (0.0002)	-74%	0.003	0.004	-0.001	0.0048	-0.0018 (0.0002)	-61%
Other	0.0043	0.0042	0.0001	0.0054	-0.0011 (0.0003)	-26%	0.023	0.017	0.0064	0.023	0.0005 (0.0008)	2%
Observations	209653	432600	-	209653	209653	-	209653	432600	-	209653	209653	-

In each panel, columns (1) and (2) provide raw means from the working sample in the given grade. Column (4) provides the predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the paper text. Standard errors in column (5) are derived from 100 bootstrap replications resampled at the district-cohort level.

Table 4: Estimates of Disproportionality for Hispanic Students

A. Kindergarten

B. Grade 4

Disability Category	Raw Hisp	Raw White	Raw Gap (1) - (2)	Predicted Hisp	Gap (1) - (4)	% Gap (5)/(1)	Raw Hisp	Raw White	Raw Gap (1) - (2)	Predicted Hisp	Gap (1) - (4)	% Gap (5)/(1)
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Any	0.075	0.116	-0.040	0.106	-0.030 (0.002)	-40%	0.137	0.152	-0.015	0.148	-0.011 (0.002)	-8%
SLI	0.048	0.093	-0.045	0.082	-0.034 (0.002)	-70%	0.037	0.056	-0.019	0.054	-0.017 (0.002)	-45%
SLD	0.0120	0.0063	0.0057	0.0072	0.0048 (0.001)	40%	0.073	0.067	0.0061	0.065	0.008 (0.002)	11%
ASD/ Dev Delay	0.0069	0.0064	0.0005	0.0075	-0.0006 (0.0004)	-8%	0.0048	0.0040	0.0008	0.0048	0.0000 (0.0004)	-1%
Intellectual	0.0028	0.0026	0.0001	0.0025	0.0002 (0.0003)	8%	0.0040	0.0046	-0.0005	0.0047	-0.0006 (0.0003)	-16%
Physical	0.0021	0.0028	-0.0007	0.0025	-0.0004 (0.0002)	-18%	0.0029	0.0037	-0.0008	0.0031	-0.0002 (0.0003)	-6%
Other	0.0030	0.0042	-0.0013	0.0037	-0.0007 (0.0003)	-23%	0.0156	0.0167	-0.0011	0.0169	-0.0013 (0.001)	-8%
Observations	165966	432600	-	165966	165966	-	165966	432600	-	165966	165966	-

In each panel, columns (1) and (2) provide raw means from the working sample in the given grade. Column (4) provides the predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the paper text. Standard errors in column (5) are derived from 100 bootstrap replications resampled at the district-cohort level.

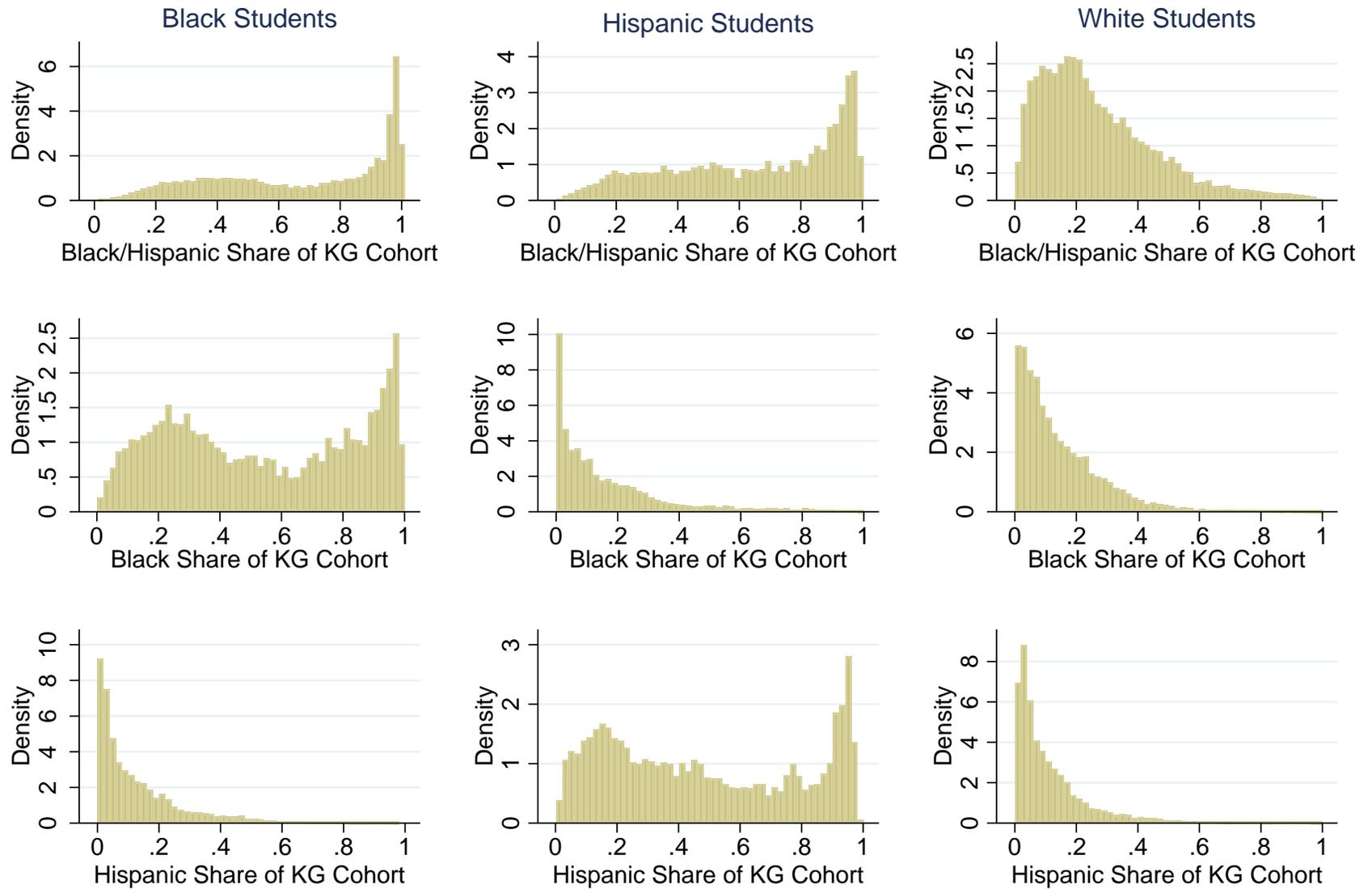
Figure 1 – Disability Classifications in Florida

**FLORIDA DEPARTMENT OF EDUCATION
DOE INFORMATION DATA BASE REQUIREMENTS
VOLUME I: AUTOMATED STUDENT INFORMATION SYSTEM
AUTOMATED STUDENT DATA ELEMENTS**

Implementation Date: Fiscal Year 1997-98 July 1, 1997
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Element Name: Exceptionality, Other	
Definition/Domain	
A code to identify each exceptionality or related service beyond the primary exceptionality for any child or youth enrolled in or eligible for enrollment in the public schools of a district who requires special instruction or related services to take full advantage of or respond to educational programs and opportunities because of a physical, mental, emotional, social or learning exceptionality. A maximum of nine exceptionalities may be included. The codes to be used follow:	
<u>CODE</u>	<u>EXCEPTIONALITY</u>
C	Orthopedically Impaired
D	Occupational Therapy
E	Physical Therapy
F	Speech Impaired
G	Language Impaired
H	Deaf or Hard of Hearing
I	Visually Impaired
J	Emotional/Behavioral Disability
K	Specific Learning Disability
L	Gifted
M	Hospital/Homebound
O	Dual-Sensory Impaired
P	Autism Spectrum Disorder
S	Traumatic Brain Injured
T	Developmentally Delayed
U	Established Conditions
V	Other Health Impaired
W	Intellectual Disability
Z	Not Applicable
Historical Notes: 1995-96 Code R was collapsed into Code H 2007-08 Code Q was collapsed into Code J [s. 1003.01(3)(a), Florida Statutes] 2008-09 Codes A, B, and N were collapsed into Code W [s. 1003.01(3)(a), Florida Statutes]	
Length: 9	Grades and Programs Requiring This Data Element:
Format: Alphabetic	Exceptional Student Education Grades PK-12
Compatibility Requirement: State Standard	
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Revised:	Volume I Effective: 7/10 Page Number: 135-1

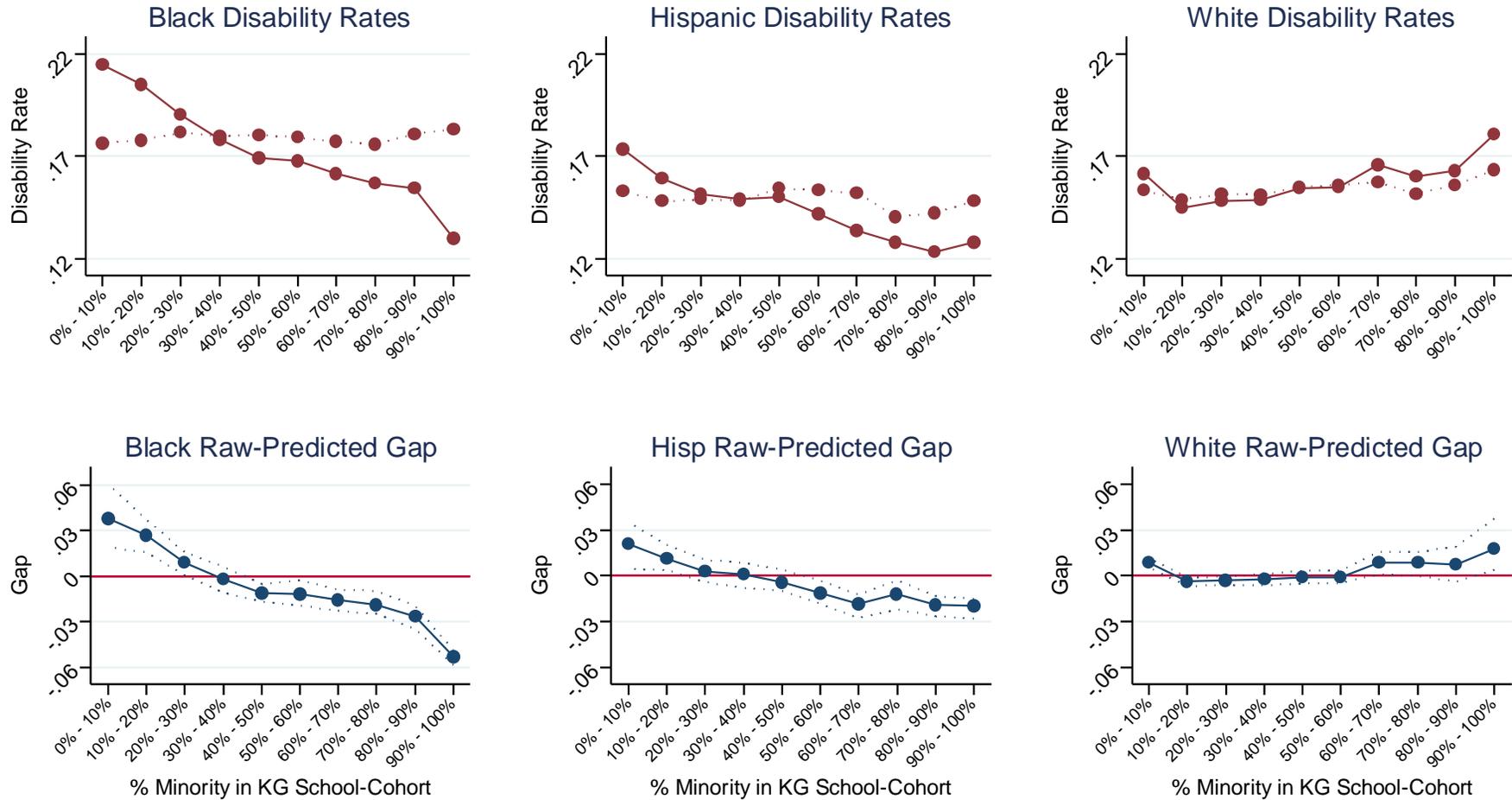
Figure 2 - School Racial Compositions by Student's Own Race



This figure shows density plots of the composition of a student's Kindergarten cohort by the race of the student.

Figure 3

Any Disability Rates and Identification Gaps by Racial Composition - Fourth Grade



The solid line in the top panel shows the raw average identification rates by student race and 10 percentage point bins of black/Hispanic share in the student's Kindergarten cohort. The dotted line provides the predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the text. The bottom panels show the results of the Blinder-Oaxaca decomposition by plotting the difference between the solid and dotted line in the top panels. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 4

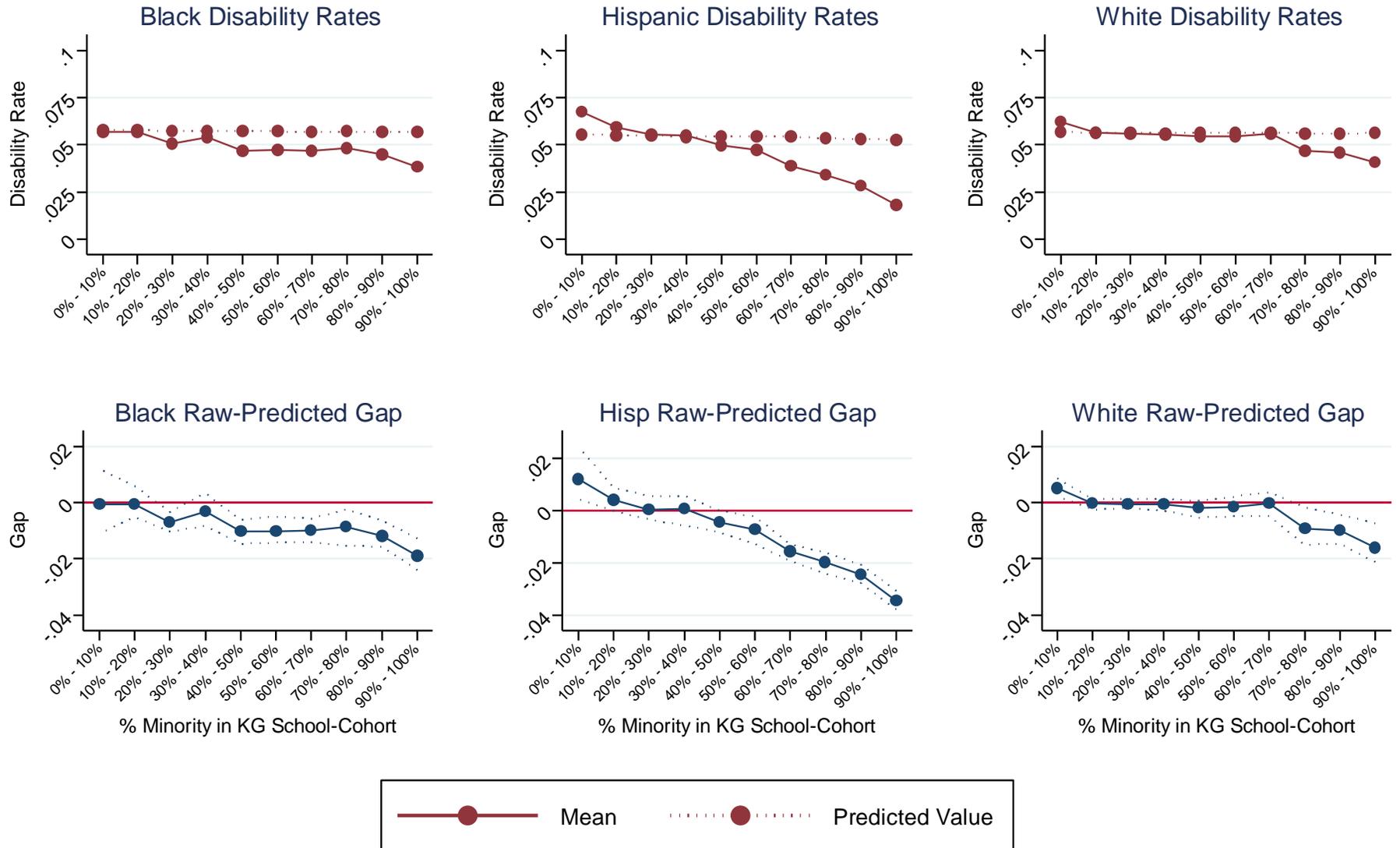
SLD Disability Rates and Identification Gaps by Racial Composition - Fourth Grade



The solid line in the top panel shows the raw average identification rates by student race and 10 percentage point bins of black/Hispanic share in the student's Kindergarten cohort. The dotted line provides the predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the text. The bottom panels show the results of the Blinder-Oaxaca decomposition by plotting the difference between the solid and dotted line in the top panels. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 5

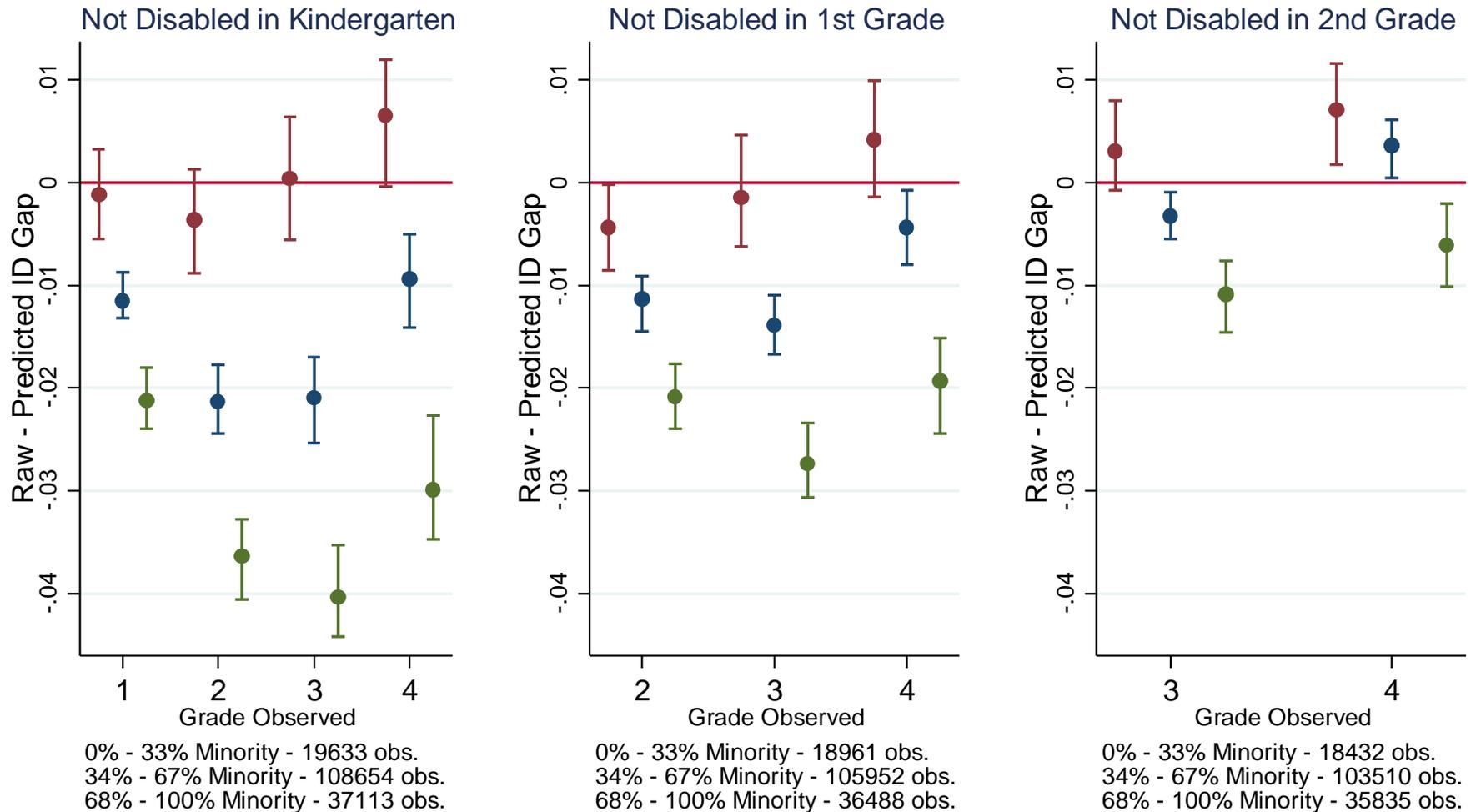
Speech/Language Disability Rates and Identification Gaps by Racial Composition - Fourth Grade



The solid line in the top panel shows the raw average identification rates by student race and 10 percentage point bins of black/Hispanic share in the student's Kindergarten cohort. The dotted line provides the predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the text. The bottom panels show the results of the Blinder-Oaxaca decomposition by plotting the difference between the solid and dotted line in the top panels. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 6

Black Raw-Predicted Gaps in Any Disability Rate by Racial Composition Conditional on Being Not Identified With the Disability in Given Grade

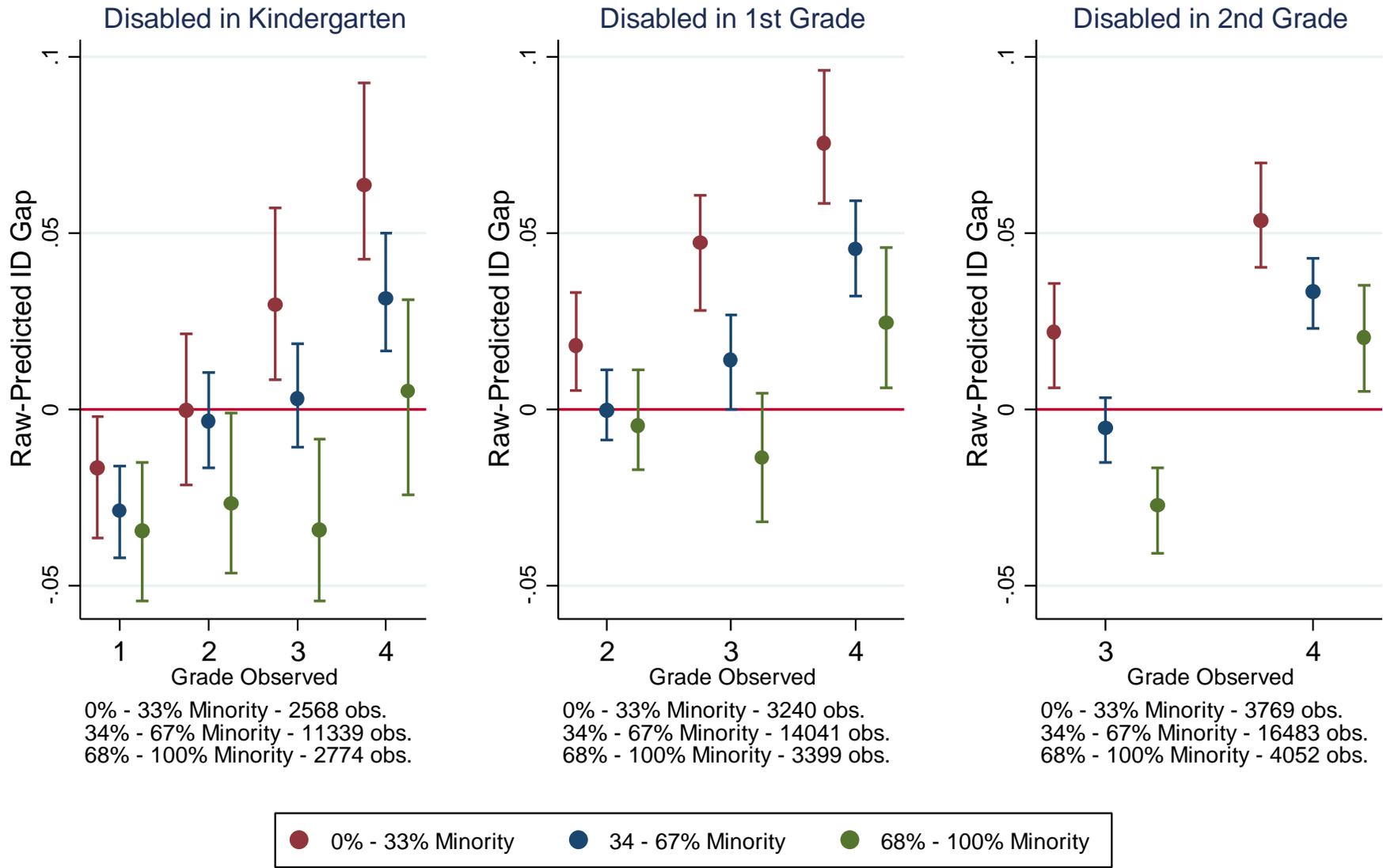


● 0% - 33% Minority ● 34 - 67% Minority ● 68% - 100% Minority

Each point reflects the difference between raw average identification rates and predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the text. Estimates are calculated separately by racial composition conditional on not being disabled in listed grade. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 7

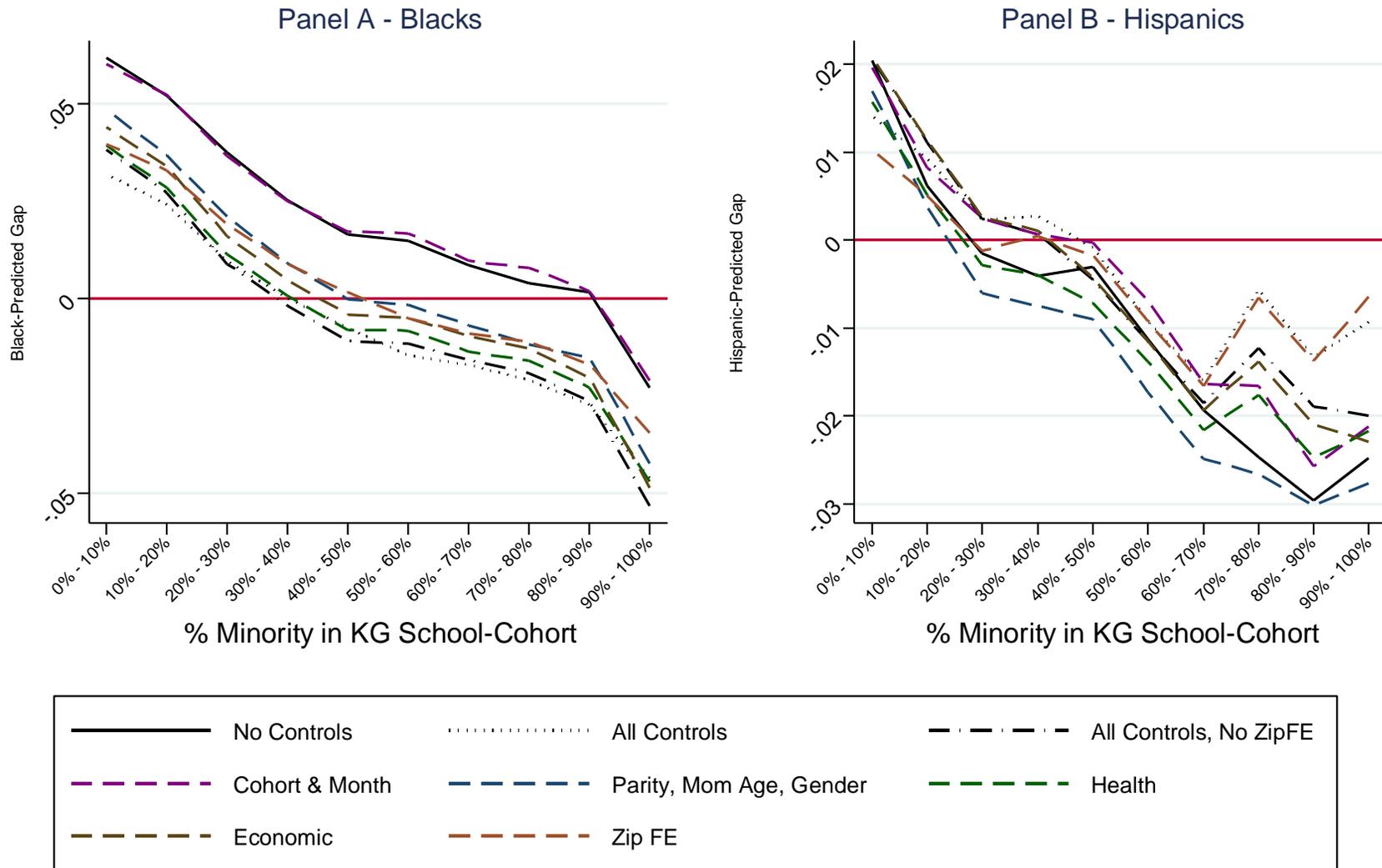
Black Raw-Predicted Gaps in Any Disability Rate by Racial Composition Conditional on Being Identified With the Disability in Given Grade



Each point reflects the difference between raw average identification rates and predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the text. Estimates are calculated separately by racial composition conditional on being disabled in listed grade. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 8

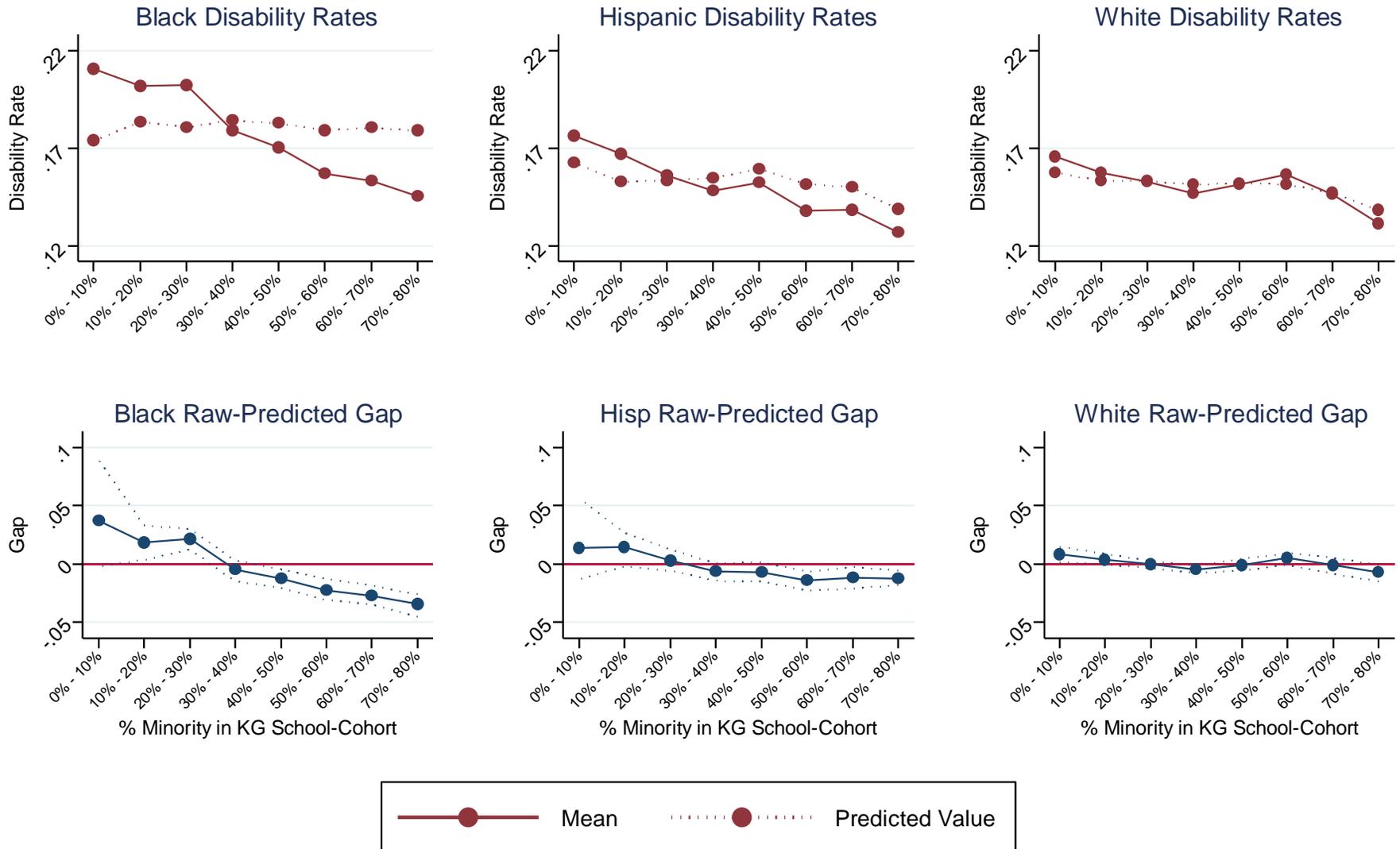
Estimated Identification Gaps for Any Disability By Conditioning Set and Percent Minority in KG Cohort - Fourth Grade



Each line reflects the difference between raw average identification rates and predicted values from a regression restricted to white students of identification rates on the variables listed in the figure legend calculated in 10 percentage point bins of black/Hispanic share in the student's Kindergarten cohort. Negative values reflect underrepresentation.

Figure 9

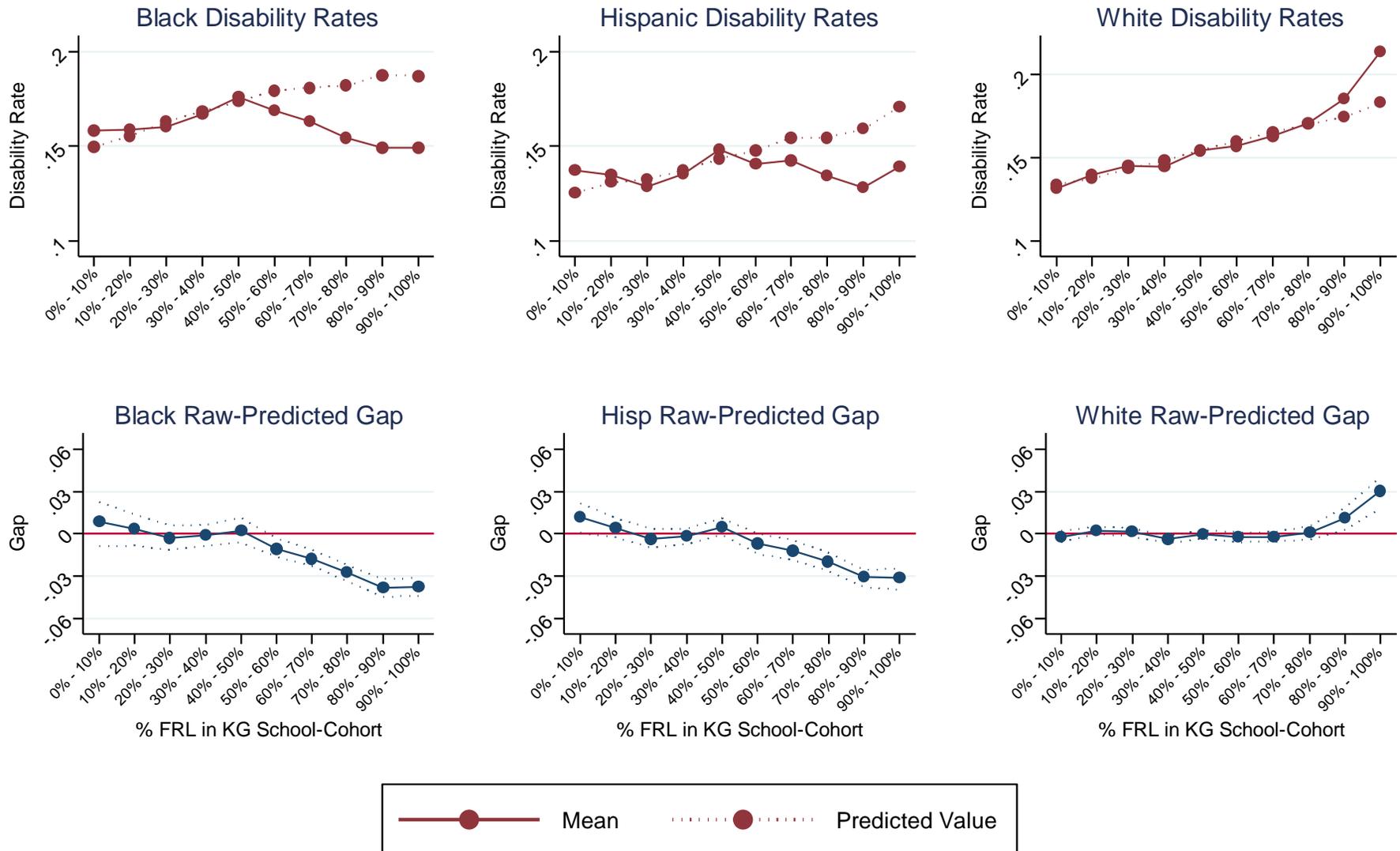
Any Disability Rates and Identification Gaps by Pseudo-School Racial Composition - Fourth Grade



The solid line in the top panel shows the raw average identification rates by student race and 10 percentage point bins of black/Hispanic share in the student's pseudo Kindergarten-cohort, which is determined as the weighted average of Kindergarten-cohorts of all children born in the same school-entry year and zip code. See text for more details. The dotted line provides the predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the text. The bottom panels shows the results of the Blinder-Oaxaca decomposition by plotting the difference between the solid and dotted line in the top panels. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 10

Any Disability Rates and Identification Gaps by Percent FRL Eligible - Fourth Grade

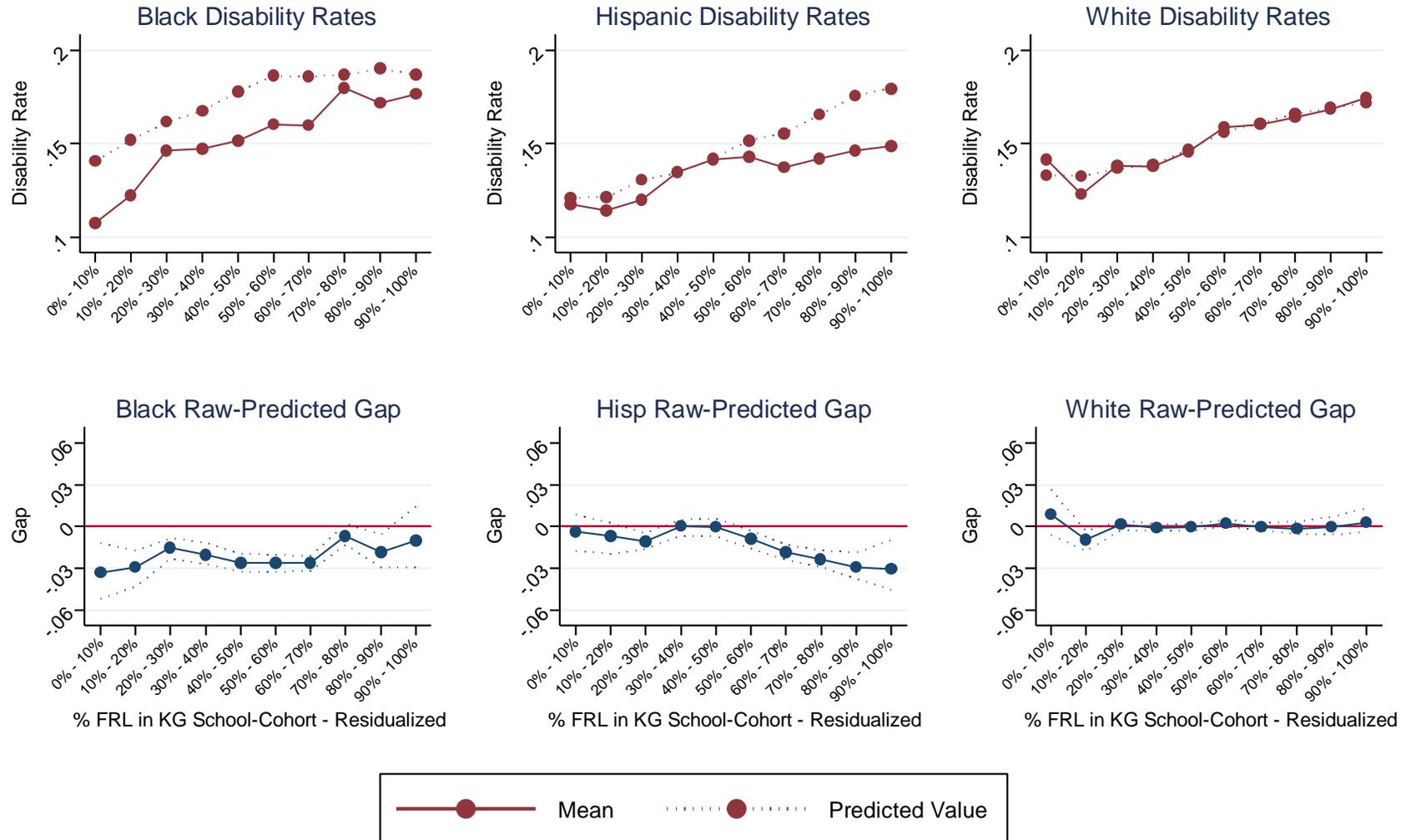


The solid line in the top panel shows the raw average identification rates by student race and 10 percentage point bins of free/reduced-price lunch eligibility share in the student's Kindergarten cohort. The dotted line provides the predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the text. The bottom panels shows the results of the Blinder-Oaxaca decomposition by plotting the difference between the solid and dotted line in the top panels. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 11

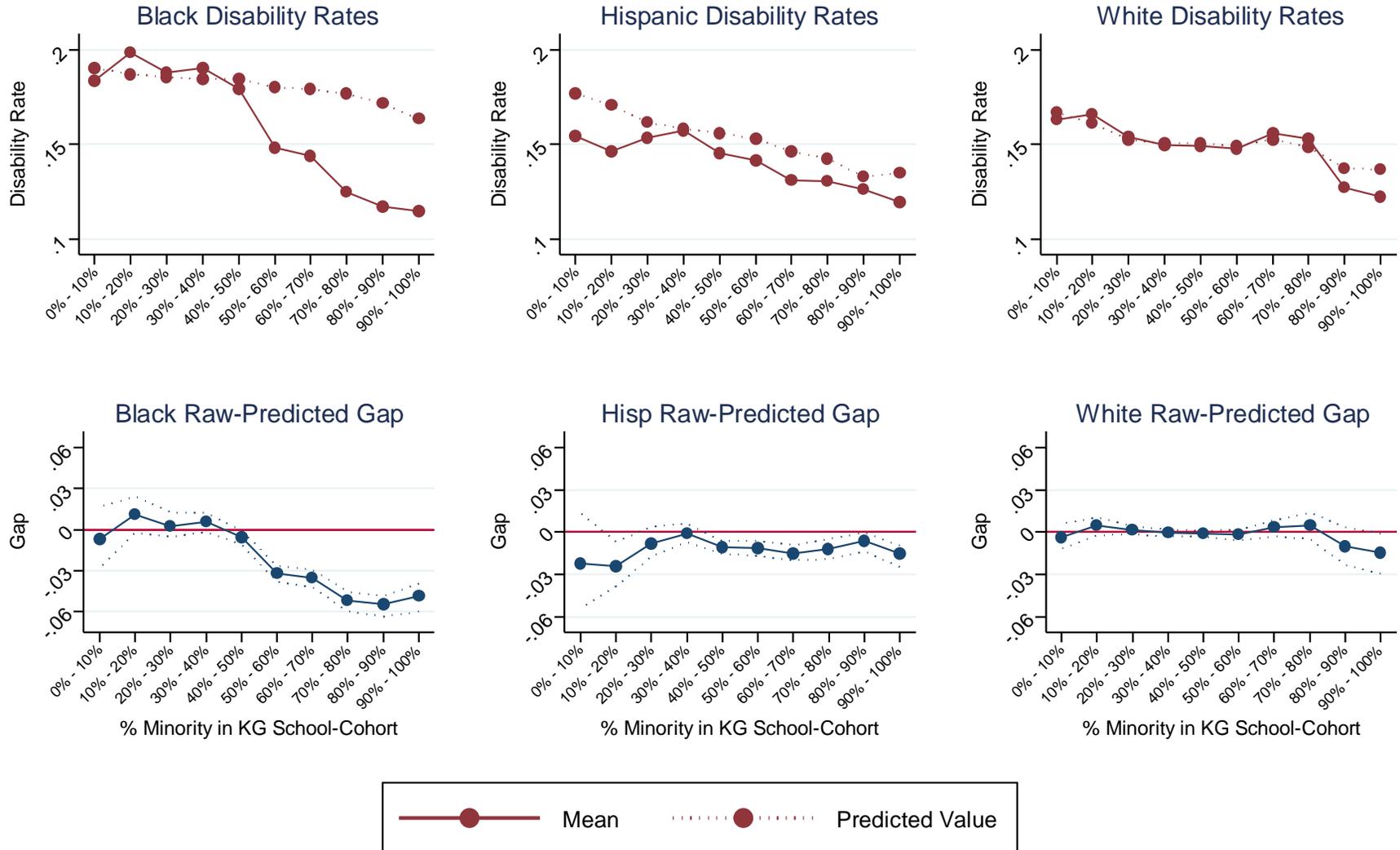
Panel A

Any Disability Rates and Identification Gaps by Residualized Percent FRL Eligible - Fourth Grade



Panel B

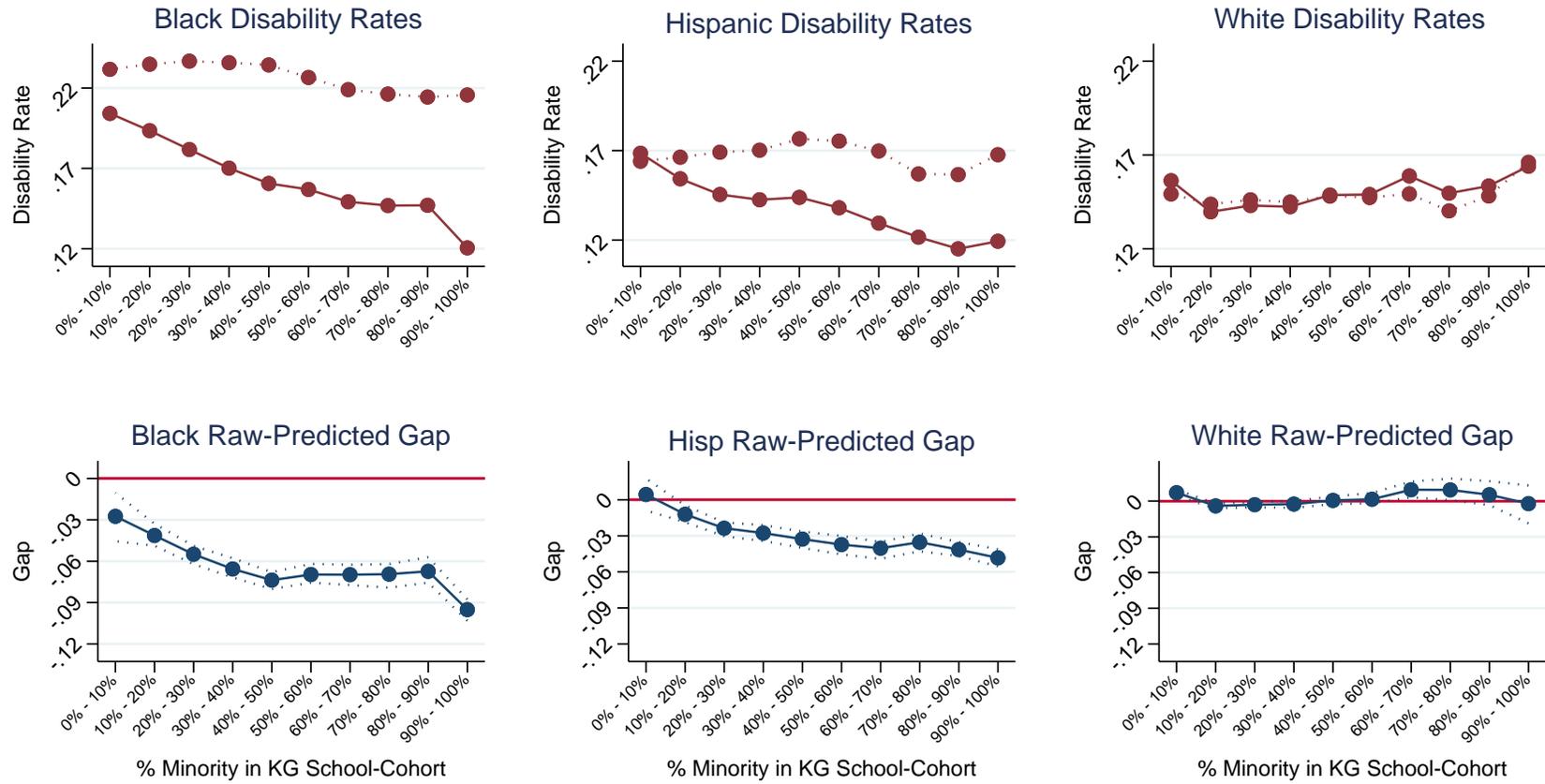
Any Disability Rates and Identification Gaps by Residualized Racial Composition - Fourth Grade



The solid lines in the top panel show the average identification rates by student race across the residualized free/reduced price lunch eligibility share (left panel) or the residualized minority share (right panel) in the student's Kindergarten cohort. The dotted line provides the predicted values from a regression restricted to white students of residualized identification rates on the variables included in equation (1) in the text. The bottom panels shows the results of the Blinder-Oaxaca decomposition by plotting the difference between the solid and dotted line in the top panels. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 12

Any Disability Rates and Identification Gaps by Racial Composition Fourth Grade Conditional on Third Grade Individual and School Deciles of FCAT scores

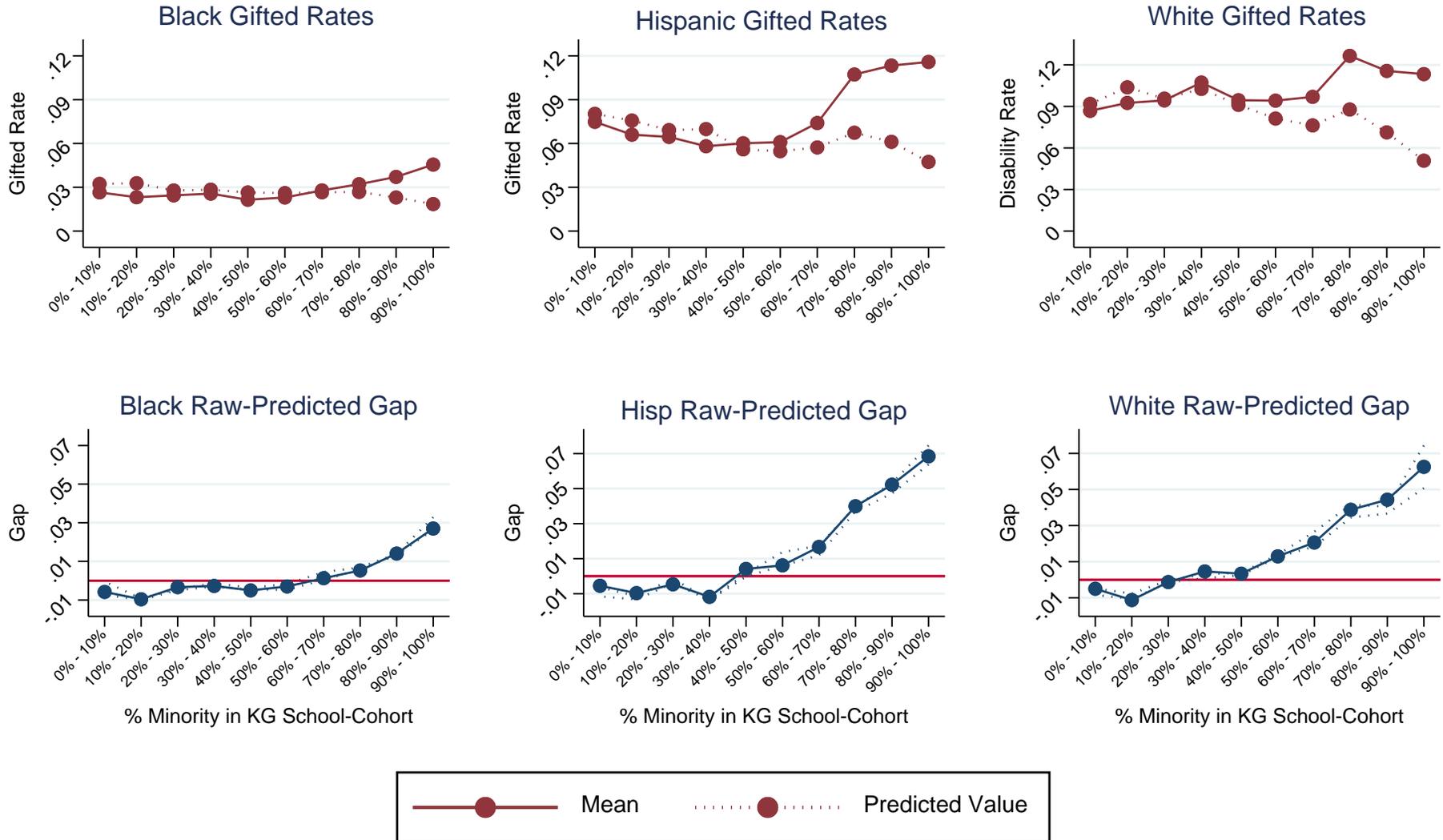


Confidence intervals derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort) of the Blinder-Oaxaca Decomposition.

The solid line in the top panel shows the raw average identification rates by student race and 10 percentage point bins of black/Hispanic share in the student's Kindergarten cohort. The dotted line provides the predicted values from a regression restricted to white students of identification rates on the variables included in equation (1) in the text, as well as individual and school-level deciles of FCAT reading and mathematics scores. The bottom panels shows the results of the Blinder-Oaxaca decomposition by plotting the difference between the solid and dotted line in the top panels. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.

Figure 13

Gifted Rates and Identification Gaps by Racial Composition Fourth Grade Conditional on Third Grade Individual and School Deciles of FCAT scores



The solid line in the top panel shows the raw average gifted rates by student race and 10 percentage point bins of black/Hispanic share in the student's Kindergarten cohort. The dotted line provides the predicted values from a regression restricted to white students of gifted rates on the variables included in equation (1) in the text, as well as individual and school-level deciles of FCAT reading and mathematics scores. The bottom panels shows the results of the Blinder-Oaxaca decomposition by plotting the difference between the solid and dotted line in the top panels. Confidence intervals are derived using the 2.5th and 97.5th percentiles of the distribution of estimated gaps from 100 bootstrap replications (resampled at district-cohort level) of the Blinder-Oaxaca decomposition.