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Minorities are Disproportionately Underrepresented in Special Education: Longitudinal Evidence Across Five Disability Conditions

Paul L. Morgan[1], **George Farkas**[2], **Marianne M. Hillemeier**[1], **Richard Mattison**[3], **Steve Maczuga**[1], **Hui Li**[1], and **Michael Cook**[1]

[1]Pennsylvania State University, University Park, PA

[2]University of California, Irvine, CA

[3]Pennsylvania State University, Hershey, PA

Abstract

We investigated whether and to what extent minority children attending elementary and middle schools in the U.S. are over- or under-identified as disabled and so disproportionately represented in special education. To address existing limitations in the field's knowledge base, we (a) analyzed multi-year longitudinal data, (b) used hazard modeling to estimate over-time dynamics of disability identification across five specific conditions, and (c) extensively corrected for child-, family-, and school-level potential confounding variables (e.g., child-level academic achievement and behavior, family-level socioeconomic status, school-level state location). Despite long-standing and on-going federal legislative and policy efforts to reduce minority over-representation in special education, our analyses indicated that this has not been occurring in the U.S. Instead, minority children are less likely than otherwise similar White, English-speaking children to be identified as disabled and so receive special education services. From kindergarten entry to at least the end of middle school, racial and ethnic minority children are less likely than otherwise similar White children to be identified as having (a) learning disabilities, (b) speech or language impairments, (c) intellectual disabilities, (d) health impairments, or (d) emotional disturbances. Language minority children are less likely to be identified as having (a) specific learning disabilities or (b) speech or language impairments.

Keywords

Minority disproportionate representation; racial and ethnic disparities; language minorities; hazard modeling; longitudinal

Racial, ethnic, and language minority schoolchildren in the U.S. have repeatedly been reported to be over-identified as disabled and so disproportionately over-represented in special education (e.g., Artiles, 2003; Dunn, 1968; Harry, Arnaiz, Klinger, & Sturges, 2008; Oswald, Coutinho, Best, & Singh, 1999; Sullivan & Bal, 2013). These findings have led to characterizations of special education as “discriminatory” (Skiba et al., 2005, p. 142), having

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"systemic bias" (Oswald, Coutinho, Best, & Nguyen, 2001, p. 361), constituting "a new legalized form of structural segregation and racism" (Blanchett, 2006, p. 25), and being "another manifestation of institutionalized racism" (Codrington & Fairchild, 2012, p. 6). Federal legislation and policies have been enacted to reduce minority disproportionate representation (MDR) in special education (e.g., Posney, 2007; U.S. Department of Education Office of Civil Rights, 2009). For example, the U.S. Congress observed that "more minority children continue to be served in special education than would be expected from the percentage of minority students in the general school population" (p. 118 of Statute 2651, Public Law 108-446).

Local educational agencies (LEA) are currently required to report to the U.S. Department of Education whether minority children are significantly over-represented in special education. If over-representation is observed, the LEA are required to allocate 15% of their Part B funds for early intervention services to children from minority groups being over-identified as disabled. The federal government is currently considering enacting further compliance monitoring policies (Government Accountability Office, 2013; U.S. Department of Education, 2014). Calls are also being made to strengthen existing monitoring policies (Skiba, Albrech, & Lorsen, 2013) including requiring LEAs to report any disproportionality instead of reporting disproportionality resulting only from incorrectly applied procedures or policies (Albrecht, Skiba, Losen, Chung, & Middelberg, 2012).

Contradictory explanations and evidence of minority disproportionate representation

Yet existing theoretical and empirical work is contradictory as to whether minority children in the U.S. are disproportionately represented in special education. Some mechanisms have been theorized to result in over-identification (e.g., Harry et al., 2008); others in under-identification (e.g., Coll, Crnic, Lamberty, & Waski, 1996; Hibel, Morgan, & Farkas, 2010). Some empirical studies find that minority children are over-identified as disabled (e.g., Oswald, et al., 1999; Sullivan & Bal, 2013). Others find that minority children are under-identified (e.g., Hibel et al., 2010; Morgan, Farkas, Hillemeier, & Maczuga, 2012; Morgan, Staff, Hillemeier, Farkas, & Maczuga, 2013; Shifrer, Muller, & Callahan, 2011; Sullivan, 2013) as well as less likely to be referred for services (Delgado & Scott, 2006). Below, we briefly survey this contradictory theoretical and empirical work. We then identify methodological and substantive limitations in the existing empirical studies to justify the current study.

Mechanisms theorized to result in racial, ethnic, and language minority children being over-represented in special education include cultural, linguistic, and racial bias. For example, minority children are believed to experience systemic prejudice that results in their abilities and behaviors being unjustifiably characterized as problematic and atypical (Coutinho & Oswald, 2000; Harry et al., 2008; Hays, Prosek, & McLeod, 2010; Lorsen & Orfield, 2002; O'Connor & Fernandez, 2006), resulting in segregation into special education (Blanchett, 2006; Reid & Knight, 2006).[1] Prior to possibly becoming sensitive to minority over-representation, teachers may have been more likely to refer minority students for special education (e.g., Hosp & Reschly, 2003), although early evidence of this tendency is also contradictory (Skiba et al., 2008; Tobias, Cole, Zibrin, & Bodlakova, 1982; Tobias, Zibrin, & Mennell, 1983). Schools have been theorized to use academic and behavioral standards aligned more with White, English-speaking, middle class privileged populations (Blanchett, Klingner, & Harry, 2009). Racial, ethnic, and language minority children may be less likely to meet these standards as a result of receiving lower quality educations provided at under-resourced schools (e.g., Peske & Haycock, 2006), and so more likely to be identified for special education. Minority children in the U.S. are also more likely to be exposed to biological and environmental factors in early childhood (e.g., fetal alcohol syndrome, low birthweight, lead exposure, poverty) that disproportionately increases their risk for impaired cognitive, academic, and behavioral functioning and disability (Anne E. Casey Foundation, 2014; Donovan & Cross, 2002; Mann, McCartney, & Park, 2007).

Consistent with mechanisms theorized to result in over-representation, Skiba et al.'s (2005) analyses of cross-sectional state-level data and statistical control for school- and district-level confounds indicated that Black and Hispanic children were over-represented in special education. This was the case for multiple disability conditions, including intellectual disability, emotional disturbance, speech/language impairment, and learning disability. Oswald et al.'s (1999) analyses of cross-sectional, nationally representative, and district-level data with statistical control for district-level educational, economic, and demographic confounds indicated that minorities were over-represented in special education. Minority children were over-identified as having intellectual disabilities and emotional disturbances. Sullivan and Bal's (2013) cross-sectional analyses of an urban school district and statistical control for child- and school-level potential confounds indicated that Black children were more likely to be identified for special education services. Follow-up analyses indicated that Black children were over-identified for learning disabilities, although they were no more likely than White children to be identified as having cognitive impairments, speech or language impairments, other health impairments, or emotional disturbances and were under-identified as having intellectual disabilities. Samson and Lesaux's (2009) analyses of a nationally representative, longitudinal dataset with statistical control for individual- and family-level potential confounds indicated that language minority children were over-represented in special education by third grade, although they were under-represented during both kindergarten and first grade. Sullivan and Bal (2013) also reported that Hispanic children were under-represented in special education.

Other mechanisms have been theorized to result in racial, ethnic, and language minority children being under-represented in special education (Hibel et al., 2010; Morgan et al., 2012; Rosenberg, Zhang, & Robinson, 2008; Samson & Lesaux, 2009), including socio-economic, linguistic, and/or cultural obstacles that constrain access by minority families to special education services (Danesco, 1997; Coll et al., 1996; Harry, 1992; O'Hara, 2003; Pena & Fiestas, 2009). Some minority families may prefer to rely on the social support of extended families to assist their children and so may not agree to evaluation requests for

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[1] This may be especially likely to occur for disability conditions (e.g., learning disabilities) relying on more subjective normative contrasts (Harry & Klinger, 2006), although evidence of variability in children' identification for these disabilities is sometimes limited (Hallahan, Keller, & Ball, 1986; Hallahan et al., 2007)

special education (Coll et al., 1996). Cultural factors may also result in some minority groups attributing their children's perceived lower academic behavioral functioning to systemic prejudice or other non-biological explanations (Danesco, 1997; Yeh, Forness, Ho, McCabe, & Hough, 2004; Yeh, Hough, McCabe, Lau, & Garland, 2004). The stigma associated with disability identification may further reduce a racial, ethnic, or language minority family's willingness to have their child identified as disabled (Hervey-Jumper, Dougan, & Franco, 2008; O'Hara, 2003; Zuckerman et al., 2014), particularly for conditions considered highly stigmatizing (e.g., intellectually disabled). Minority families may experience fewer interactions with pediatricians and other health professionals who often diagnose disorders (e.g., autism) during early childhood (Palfrey, Singer, Walker, & Butler, 1987). This may occur as a result of less access to health care (Flores & the Committee on Pediatric Research, 2010; Inkelas, Raghavan, Larson, Kuo, & Ortega, 2007) as well as language barriers (Flores & Tomany-Korman, 2008; Zuckerman et al., 2014). Children attending disadvantaged schools may also be less likely to be identified as displaying atypical academic or behavioral functioning (Delpit, 1995). For example, Hibel et al. (2010) theorized that minority children experience "frog pond" effects in regards to special education eligibility. Specifically, attending poorly resourced schools may result in referrals for special education only for those children displaying unusually low academic achievement or behavior relative to other, lower-performing children attending these same schools.

Consistent with mechanisms posited to result in under-representation, Hibel et al.'s analyses of a nationally representative sample followed from kindergarten entry to the end of fifth grade (2010) indicated that, following extensive statistical control, Black, Hispanic, and Asian children were less likely to receive special education services than otherwise similar White children. Follow up analyses indicated that minority children were less likely to be identified as having learning disabilities, speech or language impairments, and intellectual disabilities. Morgan et al.'s (2012) analyses of a population-based, longitudinal sample of preschool-aged children found that those who were Black or from homes where a language other than English was spoken were less likely than otherwise similar White children or those from English-speaking households to be identified as having developmental delays or disabilities. Shifrer et al.'s (2011) analyses of a nationally representative sample of high school students with statistical control for individual-, family-, and school-level potential confounds indicated that Blacks were less likely than otherwise similar Whites to be identified as having learning disabilities. Yeh et al.'s (2004) analyses of a large sample of children receiving mental health services with statistical control for child- and family-level factors indicated that Hispanic children were less likely to receive special education services as a result of being under-identified as having emotional disorders.

Extant empirical work's methodological and substantive limitations

Methodological factors may help explain these contradictory directional estimates. Studies of minority disproportionate representation have often failed to account for potential confounding factors prior to estimating minority children's risk of being identified as disabled (Donovan & Cross, 2002; MacMillian & Reschly, 1998). Examples of child-, family-, and school-level factors that might confound estimates of minority children's risk of disability identification include being born at very low birthweight (Grunau, Whitfield, & Davis, 2002), being raised in poverty (Blackburn, Spencer, & Read, 2013; Costello et al., 1996; Emerson, Einfeld, & Stancliffe, 2011), receiving lower quality (e.g., fewer language-based interactions) parenting and being raised in lower-resourced home environments (Altarac & Saroha, 2007; Costello et al., 1996), experiencing multiple risk factors (Myers & Pianta, 2008; Shaw, Owens, Giovannelli, & Winslow, 2001), and the state of residence (Wiley & Siperstein, 2011). Most of the extant studies have either not adjusted for these potentially confounding factors or have done so using school- or district-level averages (e.g., Oswald et al., 1999; Skiba et al., 2005; Sullivan, 2011; Talbott, Fleming, Karabotsos, & Dobria, 2011), thereby introducing substantial measurement error into the resulting directional estimates (Harwell & LeBeau, 2010).

The relatively fewer studies using extensive covariate adjustment consistently find that racial, ethnic, and language minority children are instead under-identified as disabled (e.g., Hibel et al., 2010; Morgan et al., 2012; Morgan et al., 2013; Shifrer et al., 2011; Yeh et al., 2004). Covariate adjustment has sometimes resulted in the estimates reversing direction from over- to under-representation (Hibel et al., 2010; Shifrer et al., 2011). Estimates reported by those educational researchers using extensive covariate adjustment for child-, family-, and school-level control variables are also consistent with estimates reported by public health researchers, who often use covariate adjustment when investigating disparities in disability identification and treatment (for a review, see Flores & the Committee on Pediatric Research, 2010). For example, children who are Black have been found to be less likely to be diagnosed with autism, learning disabilities, and attention-deficit/hyperactivity disorder (ADHD) following covariate adjustment for IQ, prior academic achievement and behavior, maternal education, and additional factors (e.g., Bussing, Zima, Gary, & Garvan, 2003; Mandell, Listerud, Levy, & Pinto-Martin, 2002; Morgan et al., 2013; Pastor & Reuben, 2005). Furthermore, those minorities who receive a diagnosis have been reported to be disproportionately less likely than otherwise similar White children to make use of empirically based treatments for their disorders (Morgan et al., 2013).

Additional methodological and substantive limitations characterize the extant empirical work. Very few studies have investigated MDR longitudinally (Hibel et al., 2010). Thus, the over-time dynamic of MDR and whether this dynamic is consistent with mechanisms theorized to result in over- or under-representation continues to be poorly understood (Hibel & Jasper, 2012). Yet the likelihood of disability identification is not a static, single-point-in-time event, but instead occurs over time as children age. The lack of longitudinal studies also limits statistical control for time-varying control variables (Finkel, 1995). Relatively few studies have estimated minority children's risk of disability identification across multiple conditions. Instead, the available studies typically report estimates of the children's risk of receiving special education services generally (e.g., Samson & Lesaux, 2009), or for only a single condition (e.g., Hibel & Jasper, 2012; Morgan et al., 2012; Yeh et al., 2004). Yet the directionality of MDR may vary across specific disability conditions (Donovan & Cross, 2002; Sullivan & Bal, 2013). It is also unclear whether and to what extent disproportionate representation across specific disability conditions differs between children who are racial or ethnic minorities and those who are language minorities. It may be that any observed disproportionate representation for language minority children is specific to language-related disorders (e.g., learning disabilities, speech or language impairments) as a result of the children's lower proficiency in English and the lack of availability and use of proper diagnostic assessments for these specific types of disorders (Figueroa & Newsome, 2006; Hibel & Jasper, 2012; Linan-Thompson, 2010). In contrast, socio-cultural factors might result in children who are racial or ethnic minorities experiencing disproportionality more generally across a wider range of disorders (Coll et al., 1996; Danesco, 1997; Harry, 1992; O'Hara, 2003). Primary school-aged who are language minorities have also been hypothesized to be initially under-identified as having disabilities, but then become over-identified as teachers begin attributing the children's lower achievement to factors other than limited English proficiency (Hibel & Jasper, 2012; Samson & Lesaux, 2009). Whether this dynamic is evident following extensive statistical control and whether it continues to occur throughout middle school has yet to be investigated (Samson & Lesaux, 2009). Collectively, these methodological and substantive limitations have resulted in substantial ambiguity as to whether racial, ethnic, and language minority children in the U.S. are over- or under-identified as disabled, including whether this disproportionality varies by disability condition. Establishing the directionality of minority disproportionate representation in special education would have far-reaching implications for U.S. educational policy, research, and practice. For example, finding that racial, ethnic, and language minority children in the U.S. are less likely than otherwise similar White, English-speaking children to be identified as disabled and so are comparatively under-represented in special education would suggest that federal legislation and policies currently designed to reduce minority over-representation in special education may be misdirected. These policies instead may be exacerbating educational inequities by limiting minority children's access to potentially beneficial services to which they may be legally entitled.

Study's purpose

We systematically investigated whether and to what extent racial, ethnic, or language minority children in the U.S. are over- or under-identified as disabled relative to otherwise similar White, English-speaking children as they attended elementary and middle schools. To address methodological and substantive limitations in the existing knowledge base, we (a) analyzed longitudinal data collected on a nationally representative sample followed from kindergarten entry to the end of middle school, (b) used hazard modeling to estimate over-time dynamics of disability identification across five specific conditions, and (c) extensively corrected for child-, family-, and school-level variables that might confound the directional estimates of disproportionality uniquely attributable to children's status as racial, ethnic, or language minorities. Collectively, these analyses should yield rigorously derived estimates of the likelihood that racial, ethnic, or language minority children in the U.S. are disproportionately over- or under-identified as having disabilities throughout elementary and middle school and so whether they are more or less likely to be receiving special education services than otherwise similar White, English-speaking children.

Method

Sample description

The study's sample included children participating in the Early Childhood Longitudinal Study-Kindergarten Cohort, 1998-1999 (ECLS-K) (Tourangeau, Le, Nord, & Sorongon, 2009). The ECLS-K is a nationally representative cohort of U.S. schoolchildren who entered kindergarten in the fall of 199-1998, and were then surveyed during the spring of kindergarten, fall and spring of 1st grade (with data from only a random subsample collected during the fall of kindergarten), and the springs of third, fifth, and eighth grade. Data were collected from children, parents, and teachers. Our hazard modeling analyzed data from a sample of 20,100 kindergarten children with complete information on race/ethnicity, gender, and age at the fall of kindergarten survey wave. Table 1 displays the means of the study's criterion and predictor variables. Additional detail regarding the ECLS-K's study design is available from the National Center for Education Statistics (NCES) (see http://nces.ed.gov/ecls/kindergarten.asp). Our analyses are weighted to produce results generalizable to the population of U.S. schoolchildren who entered kindergarten in 1998 and who continued through school until at least to the end of eighth grade.[2]

Variables of interest

Disability categories—

We identified students receiving special education services a result of having one of five Individuals with Disabilities Education Act (IDEA)-eligible disabilities. In kindergarten, first, third, fifth, or eighth grade, a child's special education teacher was asked “For which of the following disabilities did this student receive special education or related services this school year?” Response options included (a) “learning disability”; (b) “speech or language impairment”; (c) “mental retardation”; (d) “health impairment” (e.g., attention-deficit/hyperactivity disorder, Tourette's syndrome), and (e) “emotional disturbance.”[3] These five disability categories were the mostly frequently identified reasons why children were receiving special education services in the ECLS-K. The percentage of all children participating in the ECLS-K with these IDEA-eligible identified disabilities ranged from a high of 6.4% (speech or language impairment) to a low of 0.7% (intellectual disability)

Time-invariant measures—

Parents reported on their child's gender and race/ethnicity. We analyzed four racial and ethnic categories. These were (a) Hispanic, (b) non-Hispanic Black, (c) non-Hispanic White, and (d) other race/ethnicity (e.g., including Asian, American Indian, Alaskan Native). The mother's marital status was reported in fall kindergarten.

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[2] An anonymous reviewer asked us to validate the ECLS-K's identification rate of disabilities by examining those rates reported to the U.S. Department of Education by individual school districts. However, these rates are not directly comparable. This is because the ECLS-K identification rates are for a single cohort followed across multiple years as the children entered kindergarten until they completed eighth grade. In contrast, the rates published by the U.S. Department of Education are from kindergarten to twelfth grade in a specific year. Our examination indicated that these rates were generally consistent with one another when accounting for these sampling differences.

[3] Although the ECLS-K special education teacher surveys used the term “mental retardation,” we use the term “intellectual disability” to be consistent with current terminology. “Emotional disturbance” is the term used in federal legislation to refer to emotional/beahvioral disorders (http://idea.ed.gov/explore/view/p/,root,regs,300,A,300%252E8) .

The mother's age at the time of birth was calculated from the child's and mother's ages recorded at the date of interview in spring of kindergarten. We considered mothers as being younger mothers if they gave birth when they were 17 years old or younger. We considered mothers as being older mothers if they gave birth when they were 39 years old or older. Parents reported whether the child was born at low birth weight (i.e., less than 5 lbs.), and whether the child had health insurance. We used whether a language other than English was the language spoken during the ECLS-K home interview as an indicator of language minority status.[4] We also included the ECLS-K's multivariate measure of the family's socioeconomic status (SES). This included the mother's and father's education levels and occupations, along with household income. To allow for non-linear effects of SES, our analyses used dummy variables for SES quintiles. Dummy variables for the states of the children's schools were also included as controls. Sample members were drawn from almost all states. These time-invariant variables were measured during the spring of kindergarten.

Time-varying measures—The frequencies of children's externalizing and self-regulatory behaviors were rated independently by their general education teachers in kindergarten, and first, third, and fifth grades, using the Social Rating Scale (SRS). The SRS is a modified version of the Social Skills Rating Scale (SSRS; Gresham & Elliott, 1990), a psychometrically validated behavioral measure. The test-retest correlation of the original SSRS was .85 (Gresham & Elliott, 1990). Correlational and factor analyses support the measure's construct validity (Feng & Cartledge, 1996; Furlong & Karno, 1995). NCES subsequently modified the SSRS (e.g., adding some items, expanding the response format a 3-point to a 4-point scale; NCES, 2005). Teachers used a frequency scale to rate how often children in their class displayed a particular social skill or behavior (i.e., 1 = *never*; 4 = *very often*). The *Externalizing Problem Behaviors* subscale measured the frequency of a child's acting-out behaviors, including how frequently the child argued with a teacher, fought, showed anger, acted impulsively, and disturbed the classroom. This subscale's reliabilities ranged from .86 to .89 across the survey waves. The *Approaches to Learning* subscale measured how frequently a child self-regulated and managed his or her behavior while completing classroom tasks. These self-regulatory behaviors included how well a child paid attention, kept belongings organized, worked independently, showed eagerness to learn new things, easily adapted to changes in routine, and persisted in completing tasks. This subscale's reliabilities ranged from .89 to .91 across the survey waves. We averaged the ratings if more than one teacher provided them in a given year. The SRS was not administered in eighth grade. To statistically control for the frequency of an eighth grade child's self-regulatory and externalizing problem behaviors, we imputed the two SRS subscale ratings obtained from the prior (i.e., 5th grade) survey wave. Prior work has

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[4] We used the non-English use during the home interview in our analyses to better identify language minorities. Unlike the English Language Learner (ELL) status variable available in the ECLS-K, which measures children's own low level of English proficiency as indicated by low scores on the Oral Language Development Scale (OLDS), the non-English language use variable helps to indicate whether the parents may themselves experience low levels of English proficiency. Parents may have lower English-speaking proficiencies than their children. This is important, as a parent's own low level of English proficiency may itself constitute a barrier to a child's disability identification. We also used this variable because it sampled a group about three to four times the size of the ELL status variable, resulting in greater statistical power when examining the relation between language minority status and disability identification. Further analyses indicated that 100% of those children who were identified as ELL through administration of the OLDS in kindergarten and first grade were also from households where the parent used non-English during the home interview.

established that elementary schoolchildren's behavioral functioning is stable over time (e.g., Lin et al., 2014; Shaw, Lacourse, & Nagin, 2005).

During each survey wave, children's academic achievement was estimated by averaging their scores from general measures of both their reading and mathematics achievement. Each of these two achievement tests was individually administered, untimed, and extensively psychometrically validated. Scores on the measures are relative to those of all other children participating in the ECLS-K. Item response theory (IRT) and routing procedures were used for both measures to maximize academic content coverage and to obtain scale scores specifically designed by NCES to be comparable across the ECLS-K's survey waves. The Reading Test evaluated a range of reading skills across time (e.g., sight word reading, decoding, vocabulary, reading comprehension). After first grade, the emphasis on basic reading skills was decreased, and greater emphasis was given to reading comprehension skills. All items were field-tested. Theta reliabilities for the kindergarten to eighth grade assessments ranged from .87 to .96 (NCES, 2009). As an indication of construct validity, the Reading Test scores of first grade students correlated at .85 or above with their scores on the Kaufman Test of Educational Achievement reading subtest (NCES, 2002). The Mathematics Test evaluated a wide range of skills over time (e.g., place value, ordinality, sequence, basis operations, measurement, fractions). Reliabilities of the Mathematics Test's theta scores are in the mid .90s for each of the assessment waves (NCES, 2009; Pollack et al. 2005). As with the Reading Test, there was little differential item functioning, nor was there evidence of floor or ceiling effects. We standardized scores on the time-varying measures for ease of interpretation.

Analytical method

We used discrete-time logit (hazard) regression models for event history analysis to identify factors predicting children's identification as disabled from kindergarten to eighth grade (Singer & Willet, 2003). Importantly, we estimated separate regressions for each of the five disability diagnoses under study. (Each of these is a dichotomous variable for diagnosed with the particular disability or not.) These diagnoses are mutually exclusive at each time point. These models estimated the hazard of a child being identified with the specific disability being examined, conditional upon not having been previously identified with this specific disability. Once identified, the child was censored from the sample for this specific disability condition, but not from the regressions for the other disability conditions. Thus, for example, if a child was diagnosed with speech or language impairment in first grade, then that child was censored from the subsequent speech or language impairment condition regressions in third, fifth, and eighth grade. However, the child may subsequently have been identified for another disability condition (e.g. learning disability, emotional disturbance) in the regressions for the other four disability conditions. Thus, children's risk for disability identification was fully modeled across the five disability conditions and time periods examined.

Hazard models are advantageous over models that predict disability identification at only a single time point. This is because hazard models more appropriately model disability identification as a dynamic, over-time process. These models measure the duration until diagnosis, thus allowing differential rates of diagnosis for different racial, ethnic, and language-use groups to be appropriately modeled. These models also allow for the use of time-varying covariates. Use of time-varying covariates better corrects for potentially confounding variables occurring at the same time that children were identified as disabled, thereby allowing for more closely matched White, English-speaking children when estimating the risk of being identified as disabled throughout elementary and middle school uniquely attributable to children's status as racial, ethnic, or language minorities.

We first prepared the data by using SAS 9.3 (SAS Institute Inc., Cary, NC), and then converted the data file to Stata using version SE 12.1 (Stata-Corp, College Station, TX). We then modeled the data using the STATA add-on procedure “dthaz”. We estimated two hazard models for each of the study's five specific disability conditions. For Model 1, we included only race or ethnicity and time as predictors for the specific disability condition. Using time as a predictor allowed us to model the probability of receiving special education services for each of the disability conditions from kindergarten entry to the end of eighth grade. Model 1 results show the relative frequency of disability diagnosis for children from the racial and ethnic groups before these relative frequencies are adjusted for covariates, such as individual child-level academic achievement or behavioral functioning or family-level SES, which may be associated with disability diagnosis and on which the groups of children differ. In Model 2, we then included additional individual child-, family-, and school-level covariates measured in kindergarten, as well as time-varying measures of children's behavioral and academic functioning measured from kindergarten to eighth grade for each specific disability condition. This relatively large number of control variables was necessary so that our directional estimates of the likelihood of disability identification uniquely attributable to children's status as racial, ethnic, and language minorities were adjusted so as to make the children as otherwise similar as possible. We reported these estimates as odds ratios (*OR*s). Odds are the ratio of the probability that an event occurs to the probability that it does not. For our estimates of disparities in children's disability identification, the odds ratio is (a) the odds that one particular group (e.g., children who are Black) will experience vs. not experience an event (e.g., being identified as having learning disabilities) vs. (b) the odds of another group (e.g., children who are White) will experiences vs. not experience the same event (see Szumilas, 2010, for a brief primer). Odds coefficients of 1.0 indicate no effect of the predictor variable on the outcome. Odds above 1.0 indicate a positive effect; those below 1.0 a negative effect.

Results

Table 2 shows weighted estimates from the discrete-time logit regression modeling of disability identification for each of the five specific conditions. Model 1's results vary considerably and do not yield any evidence that racial and ethnic minority children are statistically significantly over-identified as having disabilities. Instead, and prior to extensive covariate adjustment, Model 1's results indicate that racial and ethnic minorities are under-identified as having speech or language impairments as well as health impairments.

Model 2 extensively adjusts for potentially confounding factors, including family-level SES and individual child-level academic achievement and behavioral functioning. Doing so indicates that racial and ethnic minority children are less likely than otherwise similar White children to be identified as having disabilities, and these results are statistically significant. For example, Black children are 58% (covariate adjusted *OR* = .42), 63% (covariate adjusted *OR* = .37), 57% (covariate adjusted *OR* = .43), and 77% (covariate adjusted *OR* = .23) less likely than otherwise similar White children to be identified as having learning disabilities, speech or language impairments, intellectual disabilities, and health impairments, respectively. Black children are 64% (covariate adjusted *OR* = .36) less likely to be identified as having emotional disturbances than otherwise similar White children.

Hispanic children are 29% (covariate adjusted *OR* = .71) less likely than White children to be identified as having learning disabilities, 33% (covariate adjusted *OR* = .67) less likely to be identified as having speech or language impairments, and 73% (covariate adjusted *OR* = .27) less likely to be identified as having health impairments. These results indicate that Hispanic children are identified with disabilities more frequently than Black children, but significantly less often than otherwise similar White children. Model 2's results also indicate that language minorities are 28% (1 - .72) and 40% (1 - .60) less likely than otherwise similar children from English-speaking households to be identified as having learning disabilities or speech or language impairments, respectively. However, these children are not significantly more or less likely than other children to be identified as having intellectual disabilities, health impairments, or emotional disturbances.

Model 2's results also indicate that factors other than children's status as racial, ethnic, or language minorities are associated with their risk of disability identification. Children from families without health insurance are less likely to be identified as having speech or language impairments. Particularly notable as well is that higher academic achievement and greater behavioral self-regulation consistently lower children's likelihood of being identified as disabled. More frequent externalizing problem behaviors decrease children's likelihood of being identified as having learning disabilities or speech or language impairments. These behaviors increase children's likelihood of being identified as having health impairments or emotional disturbances. Collectively, the findings suggest that U.S. schools are likely to identify children as disabled on the basis of their academic achievement, behavioral self-regulation, and externalizing problem behaviors.

Figures 1 and 2 display the hazard and survival functions, respectively, of each of the specific disability conditions.[5] The hazard functions plot the probabilities of being identified for the specific disability condition for the particular time period for those children who have not yet been identified with the specific condition. The survival curves measure, at each time period, the percent of children who have not as yet been identified with the specific disability condition. Thus, for example, for two groups of 1000 otherwise similar White and Black children who begin in kindergarten, approximately 99% will be estimated not to have been diagnosed with a learning disability by the spring of first grade. In contrast, 96.7% of the Black children but 94.9% of the White children will have survived not being diagnosed as having learning disabilities by the end of eighth grade.

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[5] Vertical scaling of these figures vary by disability condition. This is due to variability in the prevalence rates of the five disability conditions.

These estimates are adjusted for each condition's Model 2 control variables. Figure 1 shows that young children's likelihood of being identified as having learning disabilities steadily increases and then peaks in fifth grade, after which point they begin to decline. In contrast, children's likelihood of being identified as having speech or language impairments declines steadily over time. Intellectual disabilities display no discernable over-time pattern. Children's likelihood of being identified as having health impairments or emotional disturbances increases over time. Some of these rates are very small as a result of relatively low prevalence of the disabilities in the general population of U.S. schoolchildren. Yet the estimated rates also continue to indicate that, after extensive covariate adjustment, Hispanic and Black children are less likely than White children to be identified with disabilities while attending elementary and middle schools in the U.S.

Discussion

Contrary to federal legislative and policy efforts to reduce minority disproportionate representation in special education, our study failed to find any evidence that racial, ethnic, or language minority children in the U.S. are being disproportionately over-represented in special education. This lack of over-representation was evident both prior to and following extensive covariate adjustment. Instead, results from our analyses of longitudinal and nationally representative data consistently indicate that racial, ethnic, and language minority schoolchildren in the U.S. are less likely than otherwise similar White, English-speaking schoolchildren to be identified as disabled and so are comparatively *under*-represented in special education. Minority children's under-representation was evident across the entire elementary and middle school time periods. Racial and ethnic minority children in the U.S. are less likely to receive special education services as a result of being identified as having learning disabilities, speech or language impairments, intellectual disabilities, other health impairments, or emotional disturbances. Language minority children are less likely to be identified as having learning disabilities or speech or language impairments. Our estimates of minority disproportionate under-representation were extensively corrected for potential confounding variables, including individual child-level academic achievement and behavioral functioning as well as family-level SES.

Limitations

Our study has several limitations. We are unable to report whether and to what extent minority under-representation in special education continues to occur throughout high school. Data collection from the ECLS-K sample ended at the end of eighth grade. We analyzed a single cohort of U.S. schoolchildren. Consequently, we are unable to report on the extent to which federal policies (e.g., the Reading Excellent Act, No Child Left Behind Act) introduced across this same time period may have resulted in changes in disability identification rates. We were unable to report whether minority under-representation occurs across other types of IDEA-eligible conditions (e.g., autism, hearing or vision impairments) due to their very low prevalence and resulting extremely small sample sizes in the ECLS-K dataset. Our use of a parent's decision to speak a language other than English during the kindergarten home interviews as a proxy for the child's language minority status may not have included all children who were language minorities. Our study does not allow us to identify the specific mechanisms resulting in the observed disparities. In-depth qualitative studies that identify the mechanisms potentially responsible for minority under-representation are needed, including those that systematically interview minority families and school personnel as to the disability identification process (e.g., Skiba et al., 2008; Zuckerman et al., 2014). Although we controlled for many potential confounding variables, it is possible that unmeasured factors (e.g., IQ, genetic disorders, parenting quality, the home environment) may have contributed to the lower risk we attributed to children's racial, ethnic, and language minority status. However, our inclusion of time-varying measures of academic achievement and behavioral functioning should have helped control for unmeasured factors that may have also contributed to children's disability identification. This is because these unmeasured factors should also be strongly correlated with children's academic achievement and behavioral functioning. Consistent with prior work (e.g., Flores, Olson, Tomany-Korman, 2005; Hibel et al., 2010; Shifrer et al., 2011), we interpret our findings as evidence of minority under-representation in special education. Our findings might instead be interpreted as indicating that White, English-speaking children are over-identified as having disabilities. However, the extant empirical work does not indicate that non-minority children are more likely to display disability-related symptomatology, which might indicate that they are more likely to have disabilities. Instead, prior work reports that minorities are more likely to display disability-related symptomatology and yet, despite this, remain less likely to be identified as disabled, possibly as a result of racial, language, and cultural factors (e.g., Flores and the Committee for Pediatric Research, 2010; Miller, Nigg, & Miller, 2009; Morgan et al., 2012). Our study was designed to evaluate children's likelihood of disability identification and not whether children so identified benefited from the special education services subsequently provided. It is presently unclear whether naturally delivered special education services are effective (Hanushek, Kain, & Rivkin, 2002; Morgan, Frisco, Farkas, & Hibel, 2010), although there is extensive evidence that researcher-designed interventions implemented with fidelity result in large gains in academic and behavioral functioning by children with disabilities (e.g., Gage, Lewis, & Stichter, 2012; Gersten et al., 2009; Morgan, Sideridis, & Hua, 2012; Swanson & Hoskyn, 1998).

Study's Contributions and Implications

Long-standing and on-going federal legislation and policymaking has attempted to reduce minority disproportionate over-representation in special education. This is because, to date, the extant educational research has largely reported that minority children are more likely to be identified as having disabilities. This has led to characterizations of special education as “discriminatory” (Skiba et al., 2005, p. 142), maintaining “a new legalized form of structural segregation and racism” (Blanchett, 2006, p. 25), and constituting “institutionalized racism” (Codrington & Fairchild, 2102, p. 6). Yet, and despite these characterizations, our analyses of a longitudinal sample of U.S. schoolchildren followed from kindergarten entry to the end of middle school failed to yield any evidence of minority over-representation in special education. Instead, and consistent with those few studies by educational researchers employing extensive covariate adjustment for individual student, family-, and school-level variables (e.g., Hibel et al., 2010; Morgan et al., 2012; Shifrer et al., 2011), as well as with studies by public health researchers who have also used extensive covariate adjustment (Bussing et al., 2003; Flores and the Committee for Pediatric Research, 2010; Mandell et al., 2002), our study's analyses indicated that minority children are under-identified as having disabilities and so are less likely to be receiving special education services than otherwise similar White, English-speaking children in the U.S. This study's findings are not consistent with characterizations of special education as racist or discriminatory due to predispositions to label racial, ethnic, or language minority children as disabled in order to segregate them in classrooms separate from their White, English-speaking classmates. Nor are they consistent with long-standing and on-going federal legislation and policies designed to reduce minority over-representation in special education.

Our findings contribute to the field's understanding of minority disproportionate representation, and so should inform future actions by researchers, practitioners, and policymakers. For researchers, our findings are consistent with mechanisms theorized to result in minority under-representation in special education. These mechanisms include (a) socio-economic, linguistic, and/or cultural obstacles resulting in minority families being less likely than White families to make use of special education services (Danesco, 1997; Coll et al., 1996; Harry, 1992; O'Hara, 2003; Pena & Fiestas, 2009), (b) an aversion by minority families to the stigma associated with disability identification (Hervey-Jumper et al., 2008; O'Hara, 2003; Zuckerman et al., 2014), (c) fewer interactions with professionals due to lower health care access (Flores & the Committee on Pediatric Research, 2010; Inkelas et al., 2007) and language barriers (Flores & Tomany-Korman, 2008; Zuckerman et al., 2014), and (d) “frog-pond” effects in which high-minority schools, which also tend to be under-funded and -resourced and so lower-performing (Peske & Haycock, 2006), are less likely than higher-performing schools to identify otherwise identically performing as disabled in order to avoid the burden of being required to provide special education services to an overly high percentage of their students (Hibel et al., 2010).

Our findings also extend the field's knowledge base by establishing that, although lower health care access and non-English use are each predictive of a lower likelihood of disability identification, neither factor fully explains the under-identification attributable to children's status as racial, ethnic, or language minorities (Zuckerman et al., 2014). Our results also suggest that future investigations of minority disproportionate representation are likely to report biased estimates of minority disproportionate representation if they fail to account for the strong potential confounding variables of individual child-level academic achievement and behavioral functioning. These factors, as well as other socio-demographic characteristics (e.g., age, gender) are both consistently and uniquely related to U.S. schoolchildren's likelihood of being identified as disabled. Prior research has reported that the directionality of disproportionate representation varies depending on the type of disability condition under investigation, although these studies have often not accounted for individual child-level academic achievement and behavioral functioning (Donovan & Cross, 2002; Skiba et al, 2005; Sullivan, 2011; Sullivan & Bal, 2013). Those studies adjusting for individual- and family-level as well as school-level potential confounds consistently indicate the minority children are under-represented in special education, with this under-representation evident both generally and for specific disability conditions, and both prior to and following school entry (Hibel et al., 2010; Morgan et al., 2012; Shifrer et al., 2011). Our results indicate that racial and ethnic minority children who are otherwise similar to White children are consistently less likely to be identified as disabled whether the specific condition being investigated is learning disabilities, speech or language impairments, intellectual disabilities, other health impairments, or emotional disturbances. Our study extends this prior work by establishing that the under-representation is evident across multiple disability conditions and over time when examined in the same cohort followed from the beginning of elementary school to the end of middle school. Thus, and consistent with mechanisms suggesting that socio-cultural factors may collectively result in barriers to access to services (Danesco, 1997; Coll et al., 1996; Harry, 1992; O'Hara, 2003), our findings suggest that racial and ethnic minority children experience under-representation across time and for a wide range of disability conditions.

In contrast, our findings indicate that language minority children's under-representation is specific to the language-related disorders of learning disabilities and speech language impairments, possibly as a result of these children's lower proficiency in English as well as a lack of availability and use of proper diagnostic assessments for these types of disorders with non-English speakers (Figueroa & Newsome, 2006; Hibel & Jasper, 2012 Linan-Thompson, 2010). Elementary schoolchildren who are language minorities have also been hypothesized to follow a specific over-time dynamic of disproportionate representation, in which they are initially under-identified as having disabilities, but then begin to be over-identified as teachers begin attributing the children's lower achievement to factors other than limited English proficiency (Hibel & Jasper, 2012; Samson & Lesaux, 2009). Yet, and possibly due to our use of a wider set of covariates, we find no evidence of this dynamic. Instead, we find that, following extensive statistical control including for individual-level behavioral functioning, language minority children continue to be under-identified for learning disabilities and speech or language impairments throughout elementary and middle school.

Our findings support policies and practices that result in increased use by practitioners of culturally and linguistically sensitive special education evaluation methods. Doing so may be necessary to ensure that special education eligibility procedures do not result in unwarranted over-representation of White, English-speaking children. This over-representation may result from teachers, school psychologists, and other professionals being differentially responsive to White, English-speaking parents. Pediatricians have already been reported to be more likely to solicit developmental concerns about children from White parents (Guerrero et al., 2011), as well as to be more likely to employ empirically validated treatments with White children (Morgan et al., 2013). From a social justice standpoint, if special education's eligibility procedures are being disproportionately responsive to children from White, English-speaking families, then children from racial, ethnic, or language minority families may not be experiencing the same access to potentially beneficial special education services for which they are legally entitled. This in turn may maintain or exacerbate the nation's long-standing educational inequalities, including achievement gaps. Minority children's lack of treatment for undiagnosed disorders and disabilities has been hypothesized to at least partially account for these achievement gaps (Basch, 2011). Educational professionals should be attentive to cultural and language barriers that might keep minority children from being appropriately evaluated and identified for disabilities. Use of interpreters as well as appropriately translated written materials may assist with this process (Brotanek, Rocha, & Flores, 2008). Due process pamphlets describing disability eligibility procedures are often written in less accessible language, particularly by parents of lower SES backgrounds (Fitzgerald & Watkins, 2006) who are more likely to be minorities (U.S. Census Bureau, 2012). School-to-community outreach programs may be another possible method of addressing cultural and linguistic barriers to disability identification and treatment. Such outreach programs have helped reduce racial and ethnic disparities in children's health and health care access (Flores, 2009; Madsen, Thompson, Adkins, & Crawford, 2013).

For policy-makers, our results suggest that current federal educational legislation and policymaking designed to minimize over-identification of minorities in special education may be misdirected (Government Accountability Office, 2013; U.S. Department of Education, 2014), including the re-allocation of Part B funding to early intervening services designed to reduce minority over-representation in special education. Our analyses of a nationally representative and multi-year dataset failed to yield any evidence that minority over-representation is currently occurring. Instead, we consistently found that racial, ethnic, and language minority schoolchildren are under-identified as having disabilities and so are under-represented in special education as they attend elementary and middle schools in the U.S. Consequently, federal legislation and policies may be inadvertently exacerbating educational inequities by reducing access to special education services for eligible schoolchildren who are racial, ethnic, or language minorities. Federal legislation and policies that lower cultural and language barriers resulting in these racial, ethnic, and language disparities may be necessary to ensure that all U.S. schoolchildren with disabilities are provided with the special education services for which they are legally entitled.

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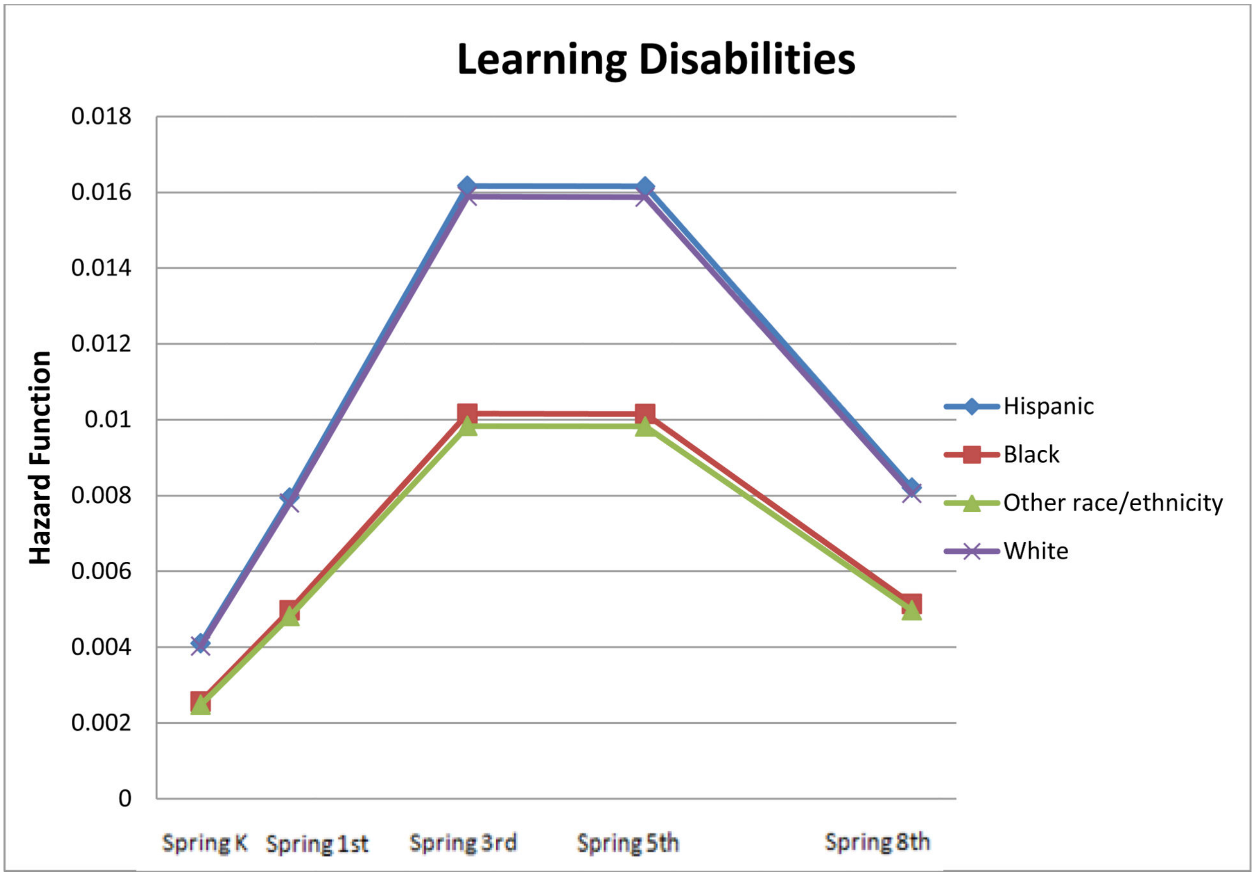
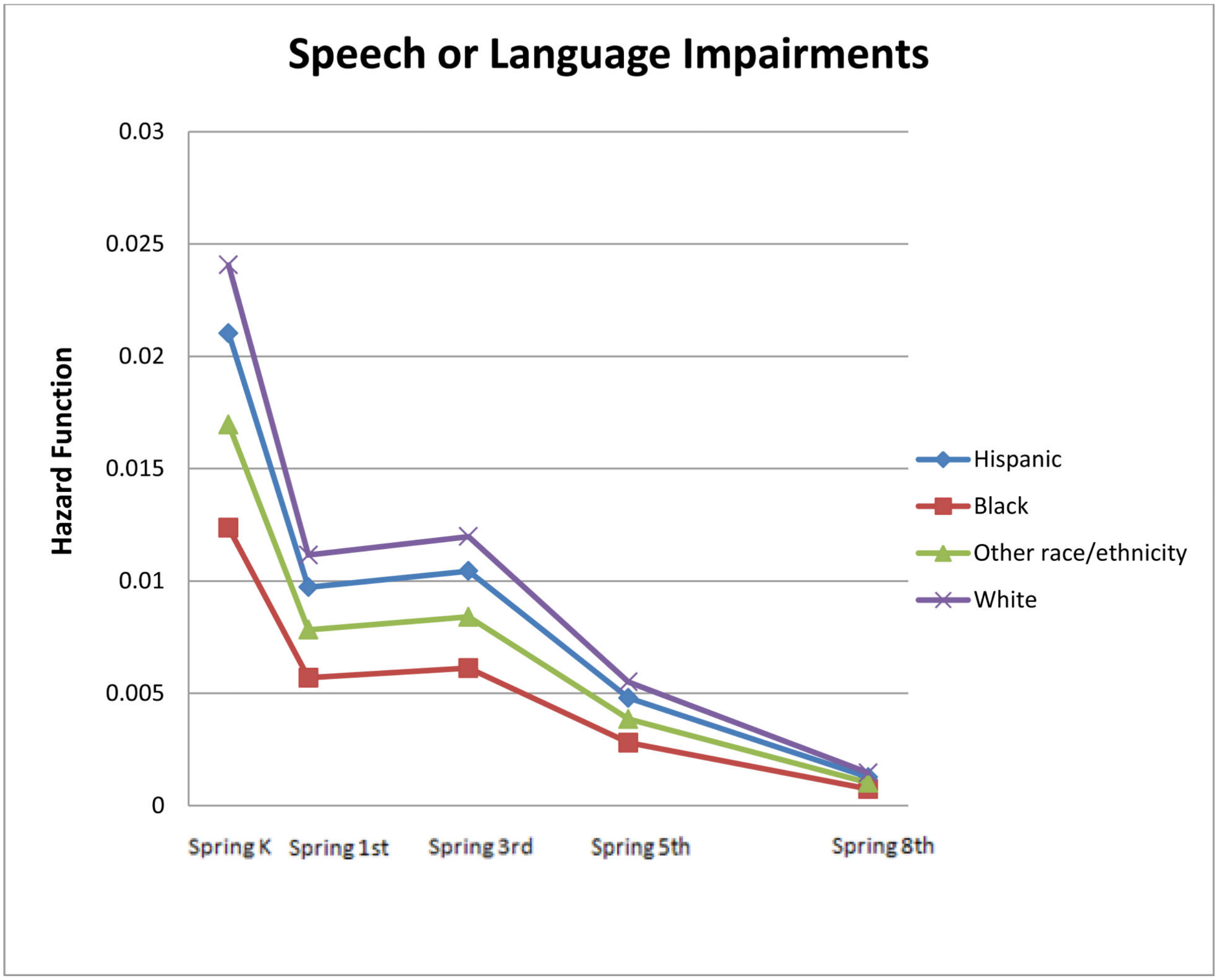
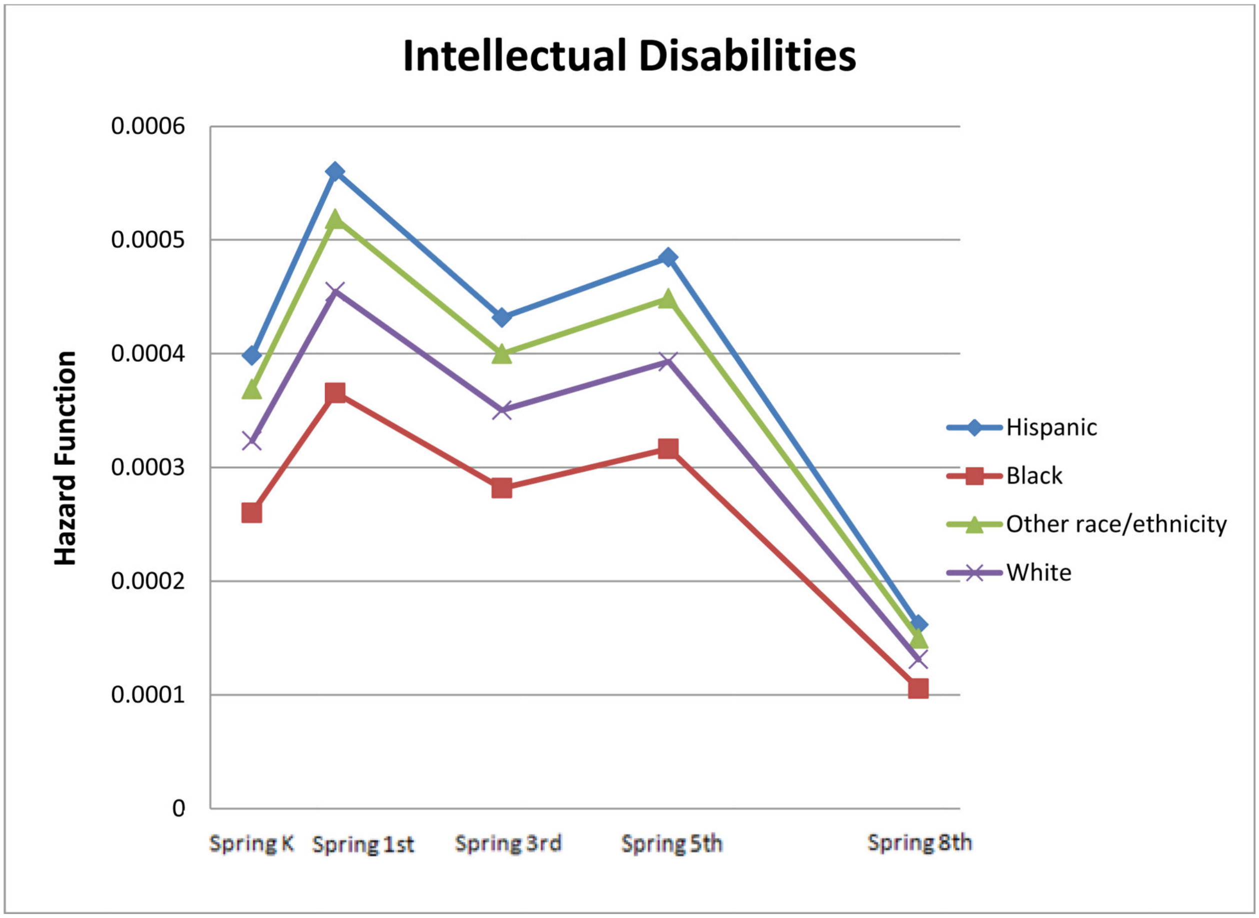
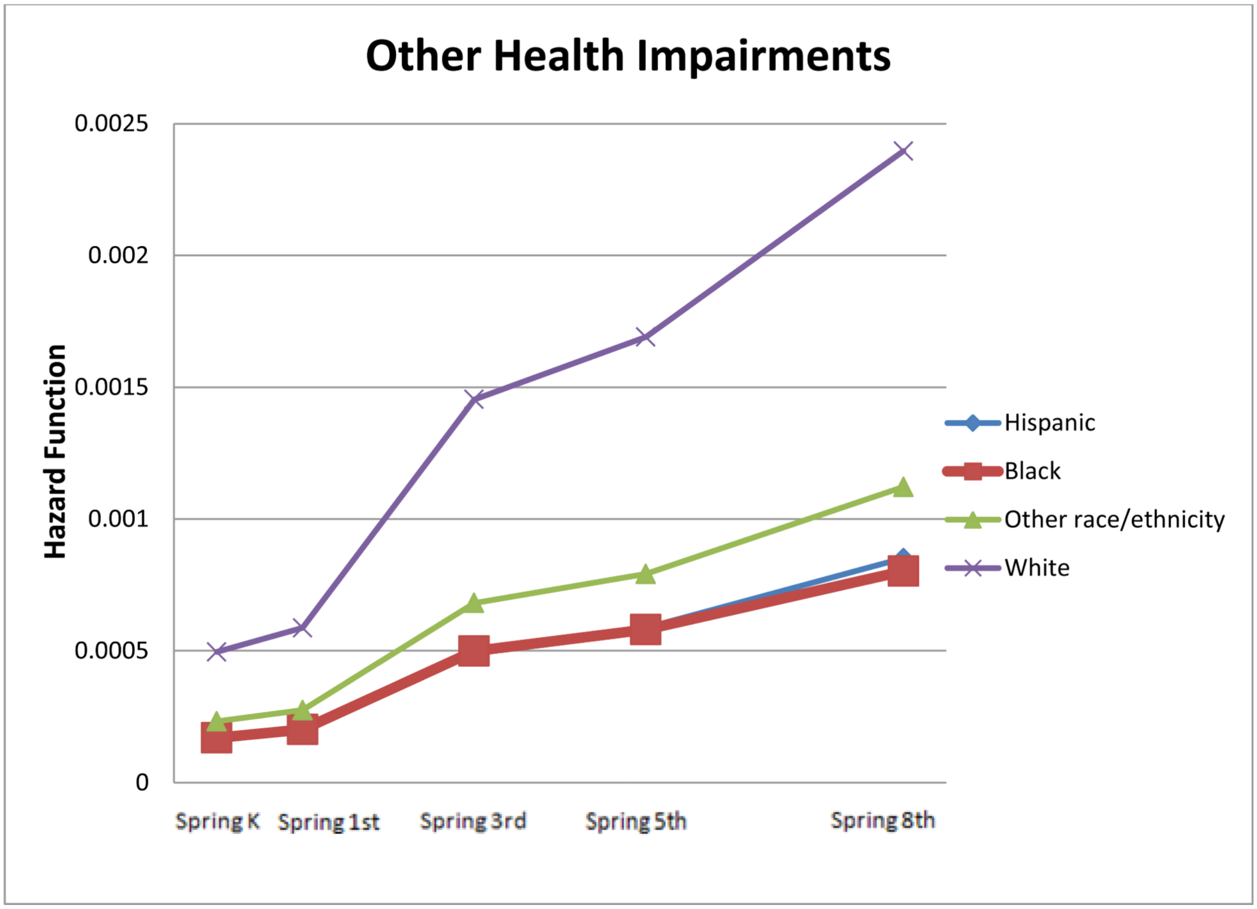

Learning Disabilities
Hazard Function
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Spring K
Spring 1st
Spring 3rd
Spring 5th
Spring 8th
Hispanic
Black
Other race/ethnicity
White


Speech or Language Impairments
Hazard Function
0.03
0.025
0.02
0.015
0.01
0.005
0
Spring K
Spring 1st
Spring 3rd
Spring 5th
Spring 8th
Hispanic
Black
Other race/ethnicity
White


Intellectual Disabilities
Hazard Function
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
Spring K
Spring 1st
Spring 3rd
Spring 5th
Spring 8th
Hispanic
Black
Other race/ethnicity
White


Other Health Impairments
Hazard Function
0.0025
0.002
0.0015
0.001
0.0005
0
Spring K
Spring 1st
Spring 3rd
Spring 5th
Spring 8th
Hispanic
Black
Other race/ethnicity
White

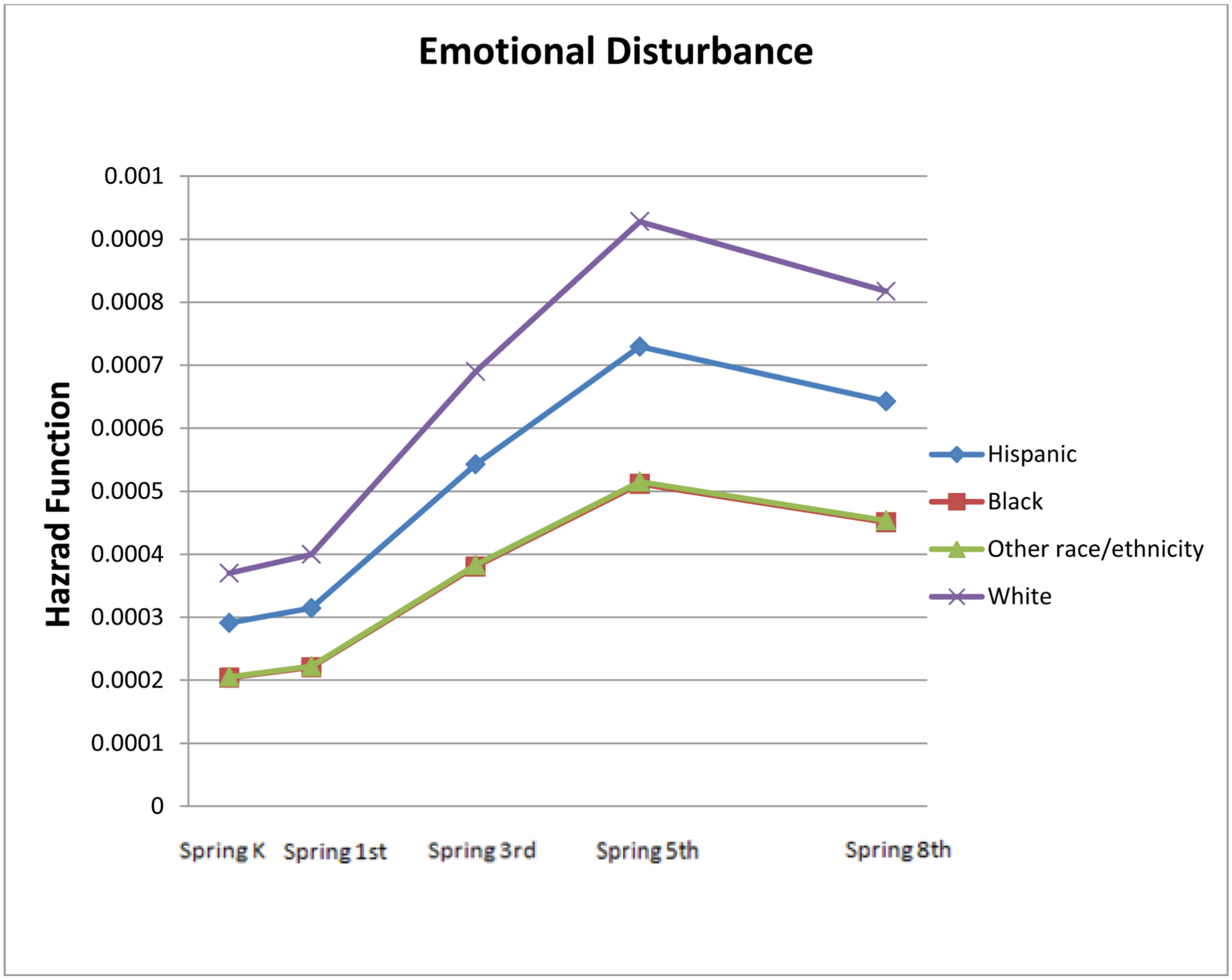
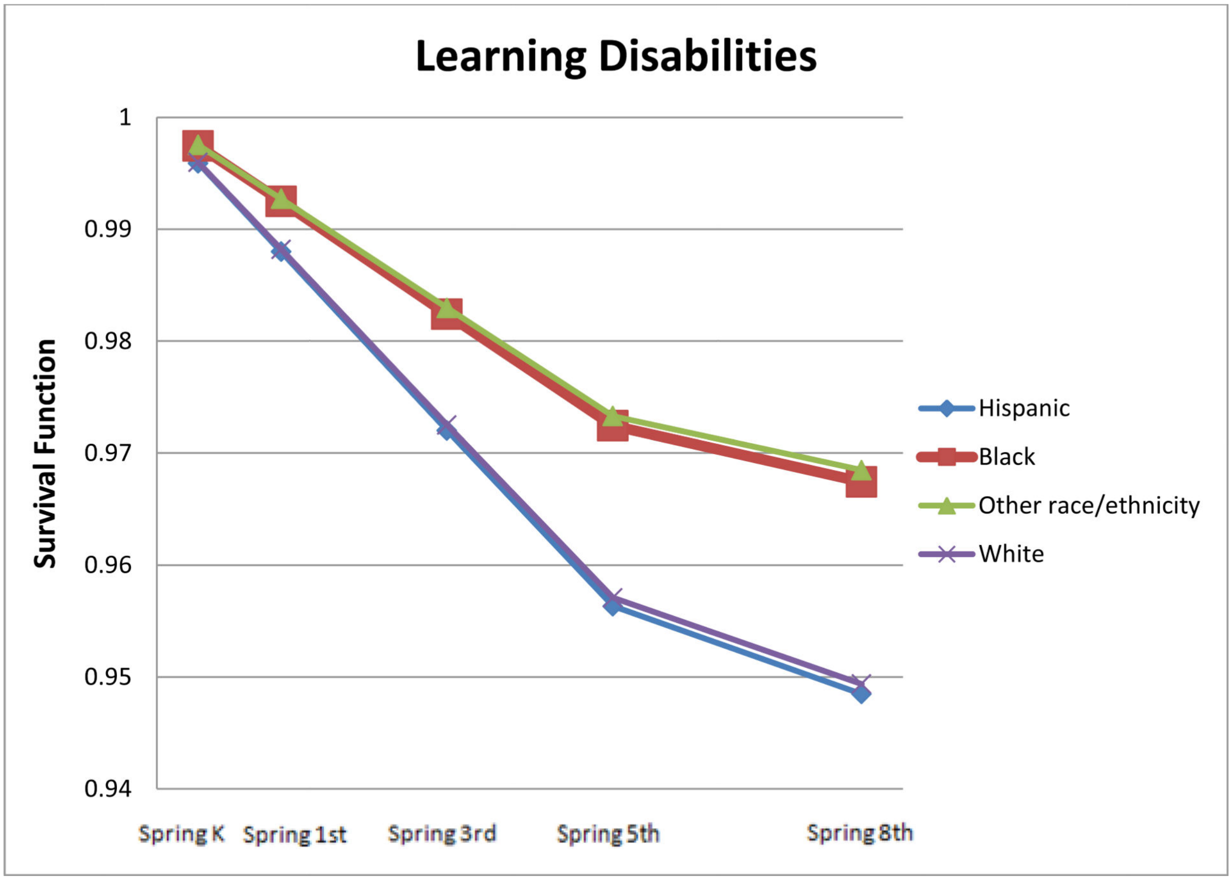
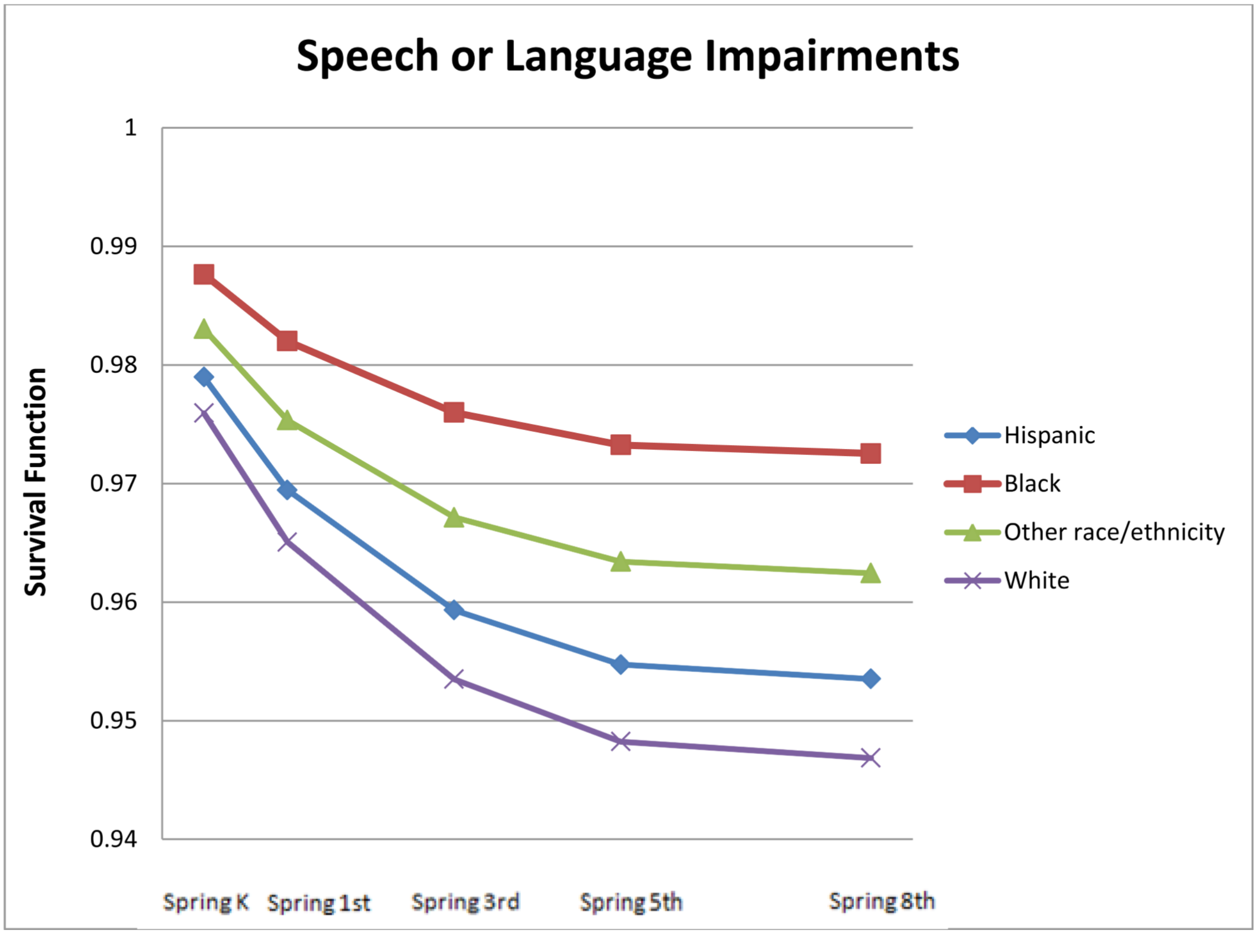
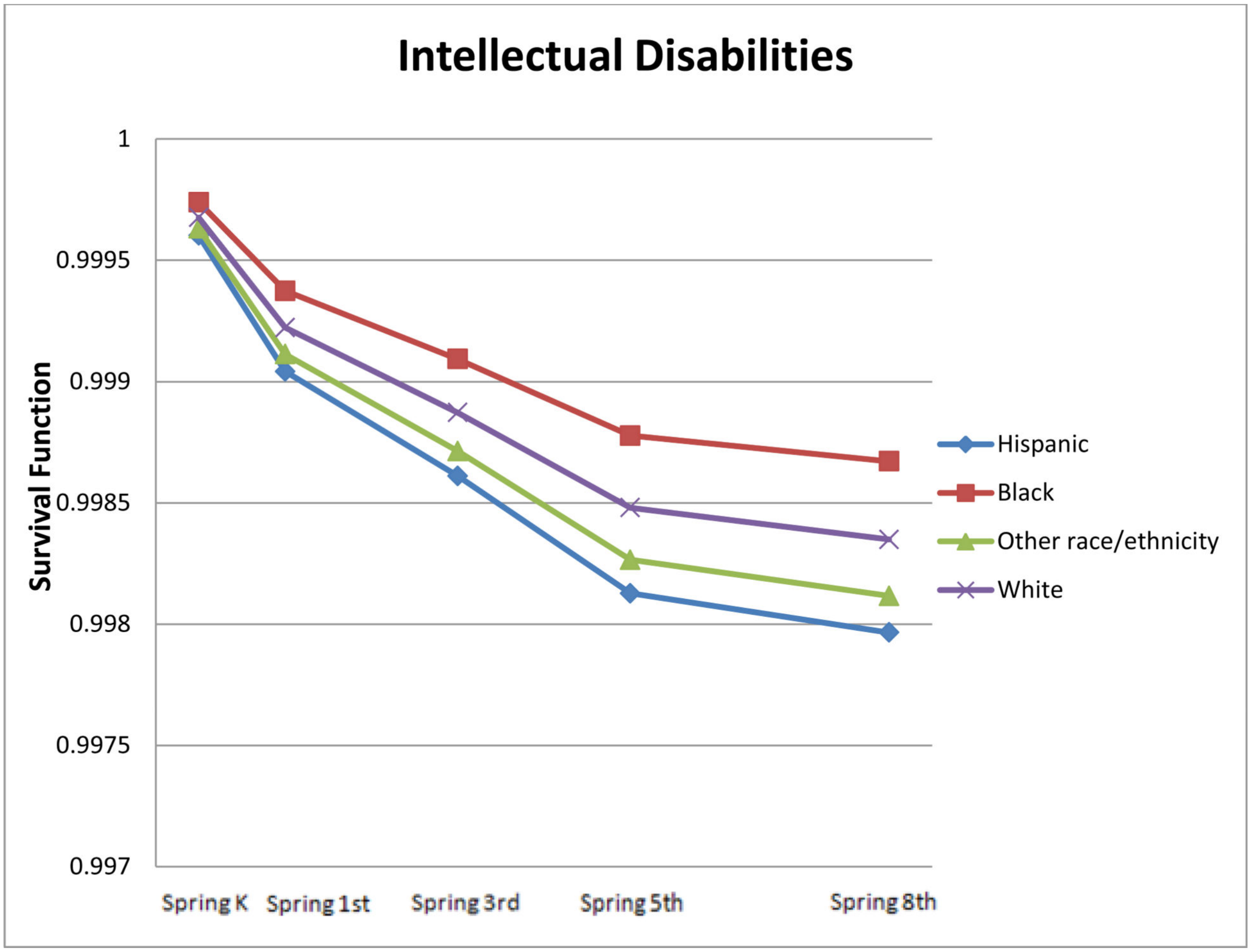
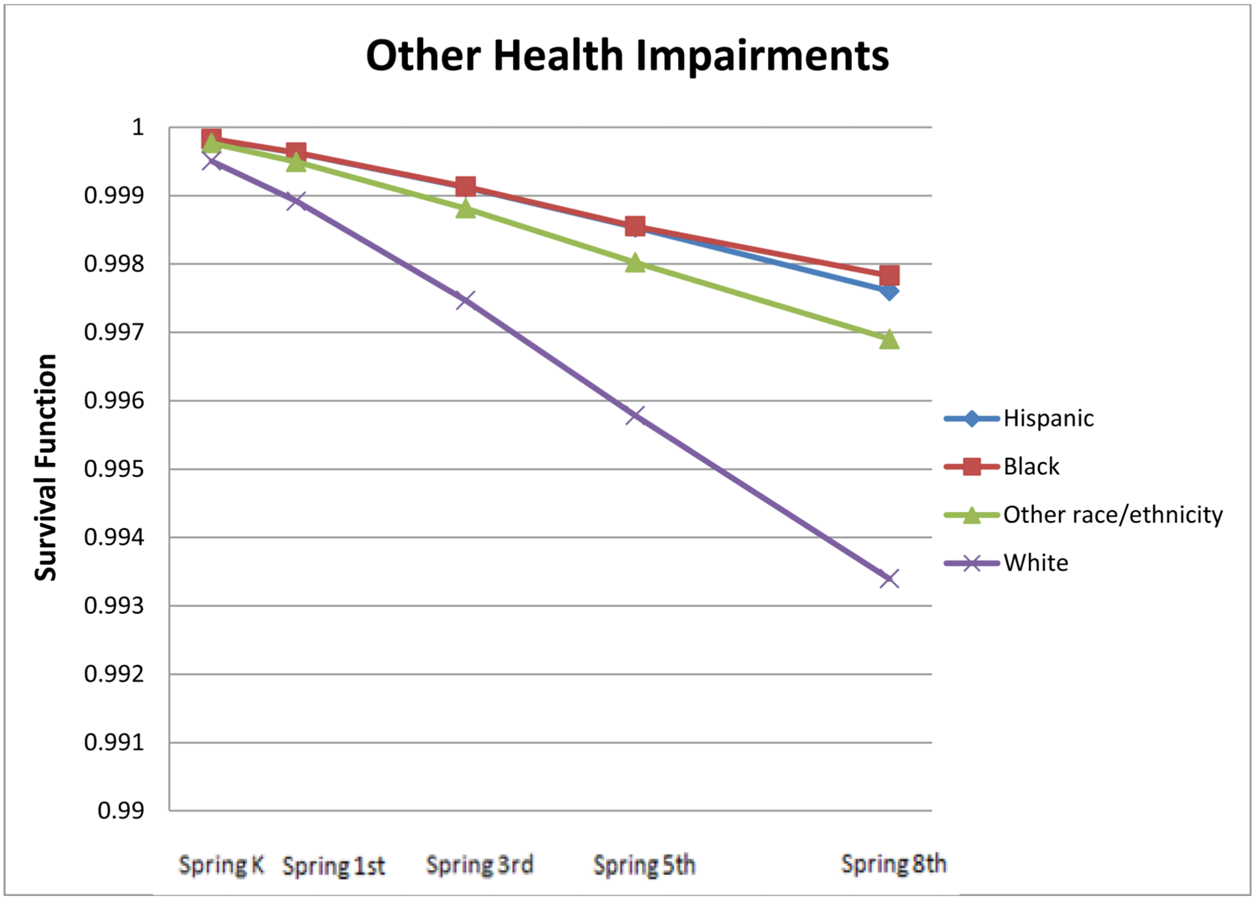


Figure 1. Plots of covariate-adjusted hazard functions of disability conditions by race/ethnicity


Learning Disabilities
Survival Function
1
0.99
0.98
0.97
0.96
0.95
0.94
Spring K
Spring 1st
Spring 3rd
Spring 5th
Spring 8th
Hispanic
Black
Other race/ethnicity
White


Speech or Language Impairments
Survival Function
1
0.99
0.98
0.97
0.96
0.95
0.94
Spring K
Spring 1st
Spring 3rd
Spring 5th
Spring 8th
Hispanic
Black
Other race/ethnicity
White


Intellectual Disabilities
Survival Function
1
0.9995
0.999
0.9985
0.998
0.9975
0.997
Spring K
Spring 1st
Spring 3rd
Spring 5th
Spring 8th
Hispanic
Black
Other race/ethnicity
White


Other Health Impairments
Survival Function
1
0.999
0.998
0.997
0.996
0.995
0.994
0.993
0.992
0.991
0.99
Spring K
Spring 1st
Spring 3rd
Spring 5th
Spring 8th
Hispanic
Black
Other race/ethnicity
White

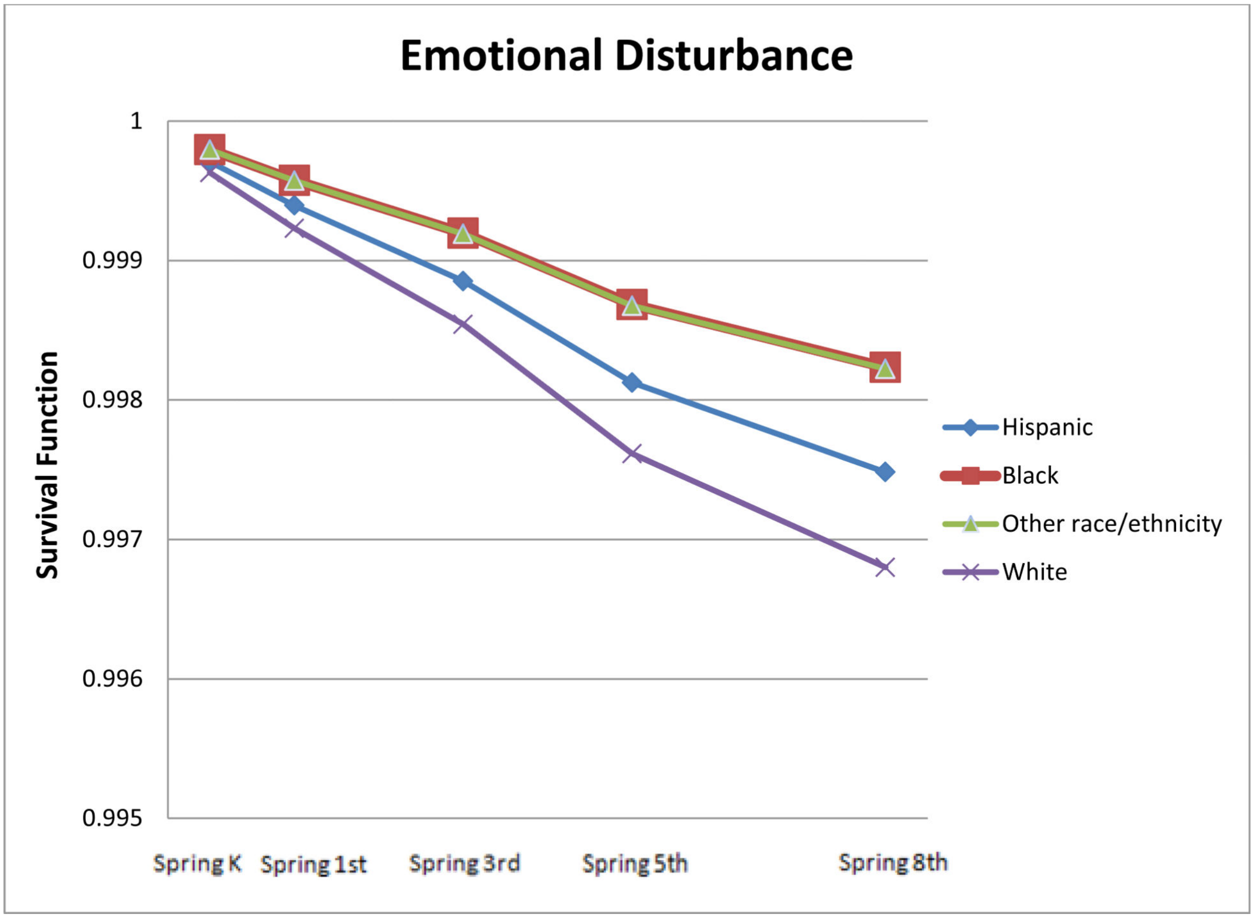


Figure 2. Plots of covariate-adjusted survival functions of disability conditions by race/ethnicity

Table 1

Descriptive statistics for selected variables (weighted), N = 20,100

	Percentage or M	SD
Child is White, non-Hispanic	59.6 %	
Child is Black, non-Hispanic	14.7 %	
Child is Hispanic	18.7 %	
Child is Other Race/Ethnicity	7.0 %	
Child is Male	51.2 %	
Child Age, in months, fall Kindergarten	68.5	4.4
Mother Not Married, fall Kindergarten	30.7 %	
Child Born at Low Birthweight	4.0 %	
Mother younger than 18 at child's birth	5.6 %	
Mother older than 38 at child's birth	4.2 %	
Lowest SES Quintile, fall Kindergarten	18.0 %	
Second Lowest SES Quintile, fall Kindergarten	19.6 %	
Middle SES Quintile, fall Kindergarten	20.7 %	
Second Highest SES Quintile, fall Kindergarten	20.7 %	
Highest SES Quintile, fall Kindergarten	21.1 %	
Child has no Health Insurance, fall Kindergarten	9.2 %	
Parent Interviewed in Non-English, fall Kindergarten	7.4 %	
Average Standardized Test Scores, fall Kindergarten	-0.01	0.98

Note: N is rounded to the nearest 20 as per NCES data security rules.

Table 2

Discrete-time logistic regression models (adjusted odds ratios) of IEP categories

	Learning Disabilities 6.3 %		Speech or Language Impairments 6.4 %		Intellectual Disabilities 0.7 %		Other Health Impairment 1.0 %		Emotional Disturbance 0.7 %	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Race/Ethnicity (vs. White)										
Hispanic	1.05	0.71 ***	0.80 **	0.67 **	0.79	0.77	0.31 ***	0.27 **	0.64	0.64
Black	0.86	0.42 ***	0.83 *	0.37 ***	1.49	0.43 *	0.71	0.23 ***	1.17	0.36 **
Other	0.86	0.64 **	0.71 ***	0.69 *	1.07	1.38	0.56 *	0.51	0.77	0.52
Male		1.43 ***		1.50 ***		0.91		1.25		2.75 ***
Child's age		1.49 ***		1.46 ***		1.92 ***		1.27 ***		1.34 ***
Mother not married (vs. mother married)		0.96		1.02		1.09		1.41		1.94 **
Low birthweight (vs. not low birthweight)		0.97		1.17		0.66		1.06		1.15
Younger mother (vs. mother's age 18-38)		0.94		1.02		0.46		1.05		0.96
Older mother (vs. mother's age 18-38)		1.08		1.03		1.27		1.28		0.82
SES (vs. highest SES quintile)										
Lowest SES quintile		0.89		1.15		1.76		0.48 *		2.03
Second lowest SES quintile		0.99		0.97		2.23		0.54 *		2.33
Middle SES quintile		0.94		0.94		0.49		0.46 *		2.08
Second highest SES quintile		0.82		0.98		1.61		0.96		2.26
No health insurance (vs. have health insurance)		0.94		0.68 **		0.36		0.71		1.37
Non-English is language of interview		0.72 *		0.60 **		0.31		0.88		0.14
Time-Varying Predictors										
Externalizing problem behaviors (*Z* score)		0.88 ***		0.86 ***		0.77		1.26 **		2.05 ***
Learning-related behaviors (*Z* score)		0.61 ***		0.73 ***		0.48 ***		0.57 ***		0.65 **
Academic achievement (*Z* score average)		0.23 ***		0.37 ***		0.03 ***		0.43 ***		0.57 ***
Grade Level (vs. spring of kindergarten)										

	Learning Disabilities 6.3 %		Speech or Language Impairments 6.4 %		Intellectual Disabilities 0.7 %		Other Health Impairment 1.0 %		Emotional Disturbance 0.7 %	
	Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Spring 1st	1.66 ***	2.08 ***	0.42 ***	0.46 ***	0.90	2.03 *	0.84	1.24	0.80	1.07
Spring 3rd	3.34 ***	4.63 ***	0.44 ***	0.51 ***	0.88	1.61	2.27 **	3.04 **	1.60	2.06 *
Spring 5th	3.45 ***	5.05 ***	0.22 ***	0.24 ***	0.76	2.34 *	2.54 ***	3.74 ***	1.96 *	2.81 **
Spring 8th	1.81 ***	2.61 ***	0.07 ***	0.06 ***	0.29 ***	0.92	3.29 ***	5.58 ***	1.71	2.42 *

Note:. SES=Socioeconomic status;

[*] $p < .05$;

[**] $p < .01$,

[***] $p < .001$. Weighted data. Dummy variables for the state of the children's schools were included as controls in all regressions.