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Disproportionality and Learning Disabilities: Parsing Apart Race, Socioeconomic Status, and Language

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Abstract

The disproportionate identification of learning disabilities among certain socio-demographic subgroups, typically groups who are already disadvantaged, is perceived as a persistent problem within the education system. The academic and social experiences of students who are misidentified with a learning disability may be severely restricted, while students with a learning disability who are never identified are less likely to receive the accommodations and modifications necessary to learn at their maximum potential. We use the Education Longitudinal Study of 2002 to describe national patterns in learning disability identification. Results indicate that socio-demographic characteristics are predictive of identification with a learning disability. While some conventional areas of disproportionality are confirmed (males and language minorities), differences in SES entirely account for African-American and Hispanic disproportionality. Discrepancy between the results of bivariate and multivariate analyses confirms the importance of employing multivariate multilevel models in investigation of disproportionality.

Keywords

Learning disabilities; disproportionality; diagnosis; race/ethnicity; language minority

Although federal guidelines for the identification of students with a learning disability are based on a medical model of diagnosis, disproportional identification of certain socio-demographic groups across the nation suggests that diagnoses may be operationalized through a social or functional perspective (Field, Jette, and Martin 2006). The fact that disproportional identification with a learning disability occurs among groups who are

already socially disadvantaged – racial/ethnic minorities, language minorities, students of low socioeconomic status (SES) – is of particular concern to both educators and researchers (Anderson 1997; Coutinho and Oswald 2005; Daniels 1998; Deshler, Lenz, Bulgren, Schumaker, David, Grossen, and Marquis 2004). Disproportionality raises concerns about the validity and reliability of the label "learning disabled" (Giovingo, Proctor, and Prevatt 2005), and/or suggests that placement in special education may function as a tool of discrimination (McDermott, Goldman, and Varenne 2006; Ong-Dean 2006; Reid and Knight 2006). Accurate diagnoses of learning disability are generally of interest in the hopes of facilitating a timely and appropriate response from the education system to the unique needs of students. We employ a large nationally representative dataset of both regular and special education high school students, The Education Longitudinal Study of 2002, to locate the groups of students that are disproportionately identified with learning disabilities once we account for systematic differences in background that are also correlated with identification.

Background

Who is Identified with a Learning Disability?

The proportion of American children aged 12 to 17 identified with a learning disability by their schools, in other words, those in receipt of special education services, increased from 6.0% to 6.9% from just 1993 to 2007 (OSEP 2007). Learning disability identifications are not distributed proportionately throughout the population. In 1993, males comprised 73% of the population identified with a learning disability (Anderson 1997). In contrast to all other racial/ethnic groups combined, American Indian/Alaska Native students were 1.8 times more likely and Hispanic students were 1.1 times more likely to receive special education services for specific learning disabilities (OSEP 2007). Although previous literature has tended to focus on the disproportional identification of black students with mental retardation and emotional disturbance (OSEP 2007; Skiba, Simmons, Ritter, Gibb, Rausch, Cuadrado, and Chung 2008), there is evidence to suggest that the gap between black and white students in rates of identification with a learning disability has increased since the 1970s, with blacks being increasingly more likely to be identified (Ong-Dean 2006). Asian students are at lower risk than white students of being in receipt of special education services for a learning disability (OSEP 2007). Ochoa et al. (1988) found that Limited English Proficient (LEP) students are disproportionately placed in classes for students with learning disabilities. Statistics like these raise concerns that students are identified with a learning disability according to characteristics unrelated to their cognitive processes.

Disproportionate identification with a learning disability is perceived to be one of the central problems within special education for several reasons: 1) students may be referred to special education in response to issues other than a learning disability, 2) the identification process may be inconsistent and/or inaccurate, 3) the disproportionately under-identified may not receive needed services. In recognition of issues like these, the 1997 reauthorization of the Individuals with Disabilities Education Act (IDEA) mandated that diagnoses of learning disability not be associated with "cultural factors," "environmental or economic disadvantage," or being of "Limited English proficiency," and also required the disaggregation of special education data by race/ethnicity (ERIC/OSEP 2000; OSEP 2007).

Appropriate reformation of policy and practice relies on identifying the student characteristics associated with disproportional identification, as well as the mechanisms whereby disproportionate identification occurs.

Roots of Disproportionality

The ever-evolving and, one might argue, subjective definitions of and criteria for learning disabilities may contribute to the disproportionate identification of various socio-demographic status groups. The literature provides a reasonable consensus that being learning disabled describes a student who has trouble learning, relative to his/her intelligence, but not as a result of some other condition or context; beyond this, though, a wide range of definitions and criteria describe learning disabilities more specifically than the federal category of 'Specific Learning Disability' (Algozzine and Ysseldyke 1986; Daniels 1998; Fletcher, Denton, and Francis 2005; Levine and Nourse 1998). For example, the Learning Disabilities Association of America differentiates between four types of learning disabilities: Input, Integration, Memory, and Output (LDA 2009); while the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders published by the American Psychiatric Association describes different types of learning disabilities: Reading Disorder (Dyslexia), Mathematics Disorder, Disorder of Written Expression, Expressive Language Disorder, Mixed Receptive-Expressive Language Disorder, and Phonological Disorder (DSM-IV 2000). With overlapping symptoms and manifestations, as well as inconsistent criteria, cultural, linguistic and/or gender differences may be misinterpreted as symptoms of a learning disability.

Disproportionality is also attributed to variation in, and even inaccurate, methods of referral, assessment and diagnosis. Before the introduction of Response to Intervention (RTI) in 2004 (our data precede this), three basic models were employed to diagnose learning disabilities: the ability-achievement discrepancy, low achievement, and intra-individual discrepancy models. The classic model of diagnosis, the ability-achievement discrepancy model, aligns with the archetypal notion of learning disabilities. Once a student is identified as exhibiting low achievement, without a discernible outside factor (behavior, family background, etc.), a "specific degree of difference between intellectual ability and performance" must be documented to classify that student with a learning disability (LDA 2009). This model came under criticism when it was suggested that the group of students identified with a learning disability by the discrepancy model was not distinct from those designated as simply low-achieving (Fletcher, Denton, and Francis 2005; Shinn 2007); others, though, maintain that the two groups of students are distinct (Fuchs, Fuchs, Karns, Hamlett, Katzaroff, and Dutka 1997; Kavale, Fuchs, and Scruggs 1994).

The low-achievement model, in which any student unexpectedly performing below a certain threshold can be identified with a learning disability, has been widely criticized for its tendency to over-identify; it is also criticized for 1) not identifying whether a child's low achievement is commensurate with his/her ability, and 2) for not facilitating the identification of high ability students with learning difficulties and average achievement (Fletcher, Denton, and Francis 2005; Giovingo, Proctor, and Prevatt 2005; Meyen 1989). The third model, the intra-individual discrepancy model, compares specific cognitive

measures of individual students; an uneven profile (strengths in some areas and weakness in others) suggests a learning disability, while a flat profile is an indicator of "expected underachievement." This final model is also criticized for over-identifying students (Fletcher, Denton, and Francis 2005; Giovingo, Proctor, and Prevatt 2005). While inconsistent diagnosis methods are undesirable in general, current referral and diagnosis methods may capture various cultural and/or status characteristics rather than the sorts of learning difficulties they are intended to measure.

The Case of Racial/Ethnic Minorities

Many researchers are concerned that disproportionate identification of racial/ethnic minorities with learning disabilities is part of the long history of racism and stratification within education (Patton 1998; Skiba et al. 2008). Some attribute disproportionality to blatant educator racism (Anderson 1997; Skiba et al. 2008). An institutional perspective portrays disproportionality as the rejection of minority cultures by the dominant culture (Patton 1998), or the use of the disability label as an instrument of disadvantage (Reid and Knight 2006). However, little empirical research exists to substantiate such claims. For example, Reid and Knight (2006) describe disproportionality as a result of the "historical legacies of racism, classism, sexism, and ableism" (p. 21), which contradicts the fact that males, rather than females, are disproportionately identified with learning disabilities.

Alternatively, it is possible that disproportionate identification by race/ethnicity results from current methods of assessment. The lower average achievement levels of racial/ethnic minorities may leave them more vulnerable to identification with a learning disability, particularly within the low achievement model of diagnosis (Meyen 1989). In addition to criticisms that IQ tests are culturally biased (Skiba et al. 2008), identification with the discrepancy model has been shown to vary depending on the type of IQ and/or achievement assessments used, as well as the methodology for determining the discrepancy (Clampit and Silver 1990; McLeskey, Waldron, and Wornhoff 1990). McLeskey et al. (1990) demonstrated that using a regression-based, versus a standard-score based, procedure actually resulted in proportionate identification of learning disability among a sample of African-American and white students. The variability in diagnostic models across schools may underlie disproportionate identification of racial/ethnic minorities, who are more likely to attend high-poverty schools (Skiba et al. 2008). Thus, cultural differences and lower average achievement levels may leave racial/ethnic minorities at greater risk of identification through current diagnostic methods, or disproportionate identification may result from systematic differences in the methods of identification experienced by racial/ethnic minorities

Although previous research in the field of special education has tended to emphasize the potential that racism underlies the over-identification of racial/ethnic minorities, it is possible that these are valid diagnoses resulting from the greater likelihood of racial/ethnic minorities to have low SES (Blair and Scott 2002; Daniels 1998; MacMillan and Reschly 1998; O'Connor and Fernandez 2006; Skiba et al. 2008). A multidisciplinary report released in 2000 by the National Research Council and Institute of Medicine of the National Academies concludes that early experiences influence brain development; culture influences

early development through child-rearing beliefs and practices; and that the brain can actually be harmed by poor nutrition, health or chronic stress (Shonkoff and Phillips 2000). Similarly, DSM-IV (2000) explicitly links cognitive disorders and environmental factors, associating Mixed Receptive-Expressive Language Disorder with Environmental Deprivation in one example. Although some studies have made the theoretical connection between race and SES, a major contribution of this study to the disproportionality literature is the *analytic* consideration of race and SES in conjunction.

The Case of Language Minorities

Language minorities may be at risk of disproportional identification because of the complications presented by distinguishing between limited English proficiency and a learning disability. In a review of 21 'English language learners' identified with a learning disability by their school, it was determined that ten seemed to be experiencing learning difficulties for reasons other than disability (Wilkinson, Ortiz, Robertson, and Kushner 2006). Likewise, Artiles et al. (2005) found that students with limited proficiency in both their first language and English had the highest rates of overrepresentation among Hispanics in classes for students with learning disabilities across the grade levels. It is difficult to gauge rates and levels of "normal second language acquisition," and a lack of English proficiency is sometimes interpreted as limited intelligence or a disability (Klingner, Artiles, and Barletta 2006; Klingner and Harry 2006). Language minorities are also impacted by the lack of proper assessment in their native language (Artiles, Rueda, Salazar, and Higareda 2005; Klingner and Harry 2006). The correlation between limited English proficiency and relatively low levels of academic achievement further complicates the appropriate identification of language minority students with learning disabilities.

Samson and Lesaux (2009) used the nationally representative dataset ECLS-K to determine that language minority students are identified later and in higher proportions than their native-English-speaking peers, being underrepresented in special education in kindergarten and first grade, but overrepresented by the 3rd grade. This study suggests that the risk of identification with a learning disability may vary depending on when the student started attending school in the U.S., and official recognition as a language minority. Non-native English speakers who are not recognized by the school or their teacher as being limited in English proficiency, or those who appear to have achieved fluency in English (social proficiency) but still struggle with academic proficiency, may be most at risk of being misdiagnosed with a learning disability.

The Case of Males

Although dramatic disproportionality in identification by gender exists, it receives relatively little academic attention. The paucity of research interest in gender disparities may be due in part to evidence that biological differences may make boys more prone to learning disabilities, or girls better equipped to compensate for them (Anderson 1997). Although the gender gap narrowed from 1976 to 2000-2001, evidence of state and regional variation in male disproportionality remains; males are from 1.7 to 2.7 times more likely to be identified than females depending on the state, and the gender gap is slightly greater in the South (Coutinho and Oswald 2005). Although the gender gap in identification and variation across

states was greater for serious emotional disturbance than for learning disabilities (Coutinho and Oswald 2005), this regional disparity suggests that there are non-biological factors that contribute to the disproportional identification of males with learning disabilities. Anderson (1997) theorizes that, historically, male overrepresentation has resulted in definitions of learning disability that are based on male norms, such that the "good" behavior of girls leads to their under-identification. Meyen (1989) notes that the low achievement model likely contributes to the overrepresentation of males, as males tend to achieve at relatively lower levels than females. Although the measures available to us do not allow us to determine if genetic differences contribute to the disproportional identification of males, it is clear that it is important to consider the role of gender in our analysis.

In this study, we employ multivariate, multilevel modeling with national data to consider the influence of several characteristics of a student simultaneously on being identified with a learning disability. Incorporating a range of socio-demographic measures, we examine 1) What patterns of identification emerge among a large sample of U.S. high school students?, and 2) To what extent are these patterns explained by SES and/or other background characteristics?

Data and Methods

The Education Longitudinal Study of 2002 (ELS) is a nationally representative dataset of approximately 16,000 students in 750 schools. We employ student-level measures from the base year wave of student, administrator and parent surveys; the students were in the 10th grade during the base year (2002). As evident by the dearth of studies that use large datasets to study learning disabilities, it is difficult to find data with both measures of disability and socio-demographic characteristics (Ong-Dean 2006). In contrast to ELS, the federal datasets which focus specifically on special education do not include peers who are not identified with a learning disability as a base of comparison.

Dependent Variable

We utilize the variable indicating whether the student is identified with a learning disability by their school in the 10th grade[1]. An Individualized Education Plan (IEP) is enacted when students are identified as eligible for special education services, and the school's designation indicates specifically whether the student has an IEP for a Specific Learning Disability. Although a range of learning disabilities exists, all are encompassed within one of the thirteen federal categories under which a student is qualified as eligible for special education services: "Specific Learning Disability."

For reasons that are unclear, schools did not report on the IEP status of 7,314 of the students in the sample. With the knowledge that students in ELS are clustered within schools, we were able to determine that 351 of the schools indicated the IEP status of all of the students

[1]"Specific learning disabilities"; is also an optional response to a question on the base year parent survey: "In your opinion, which of these disabilities does your tenth grader have?" We use only the school-report because there was a lack of consistency between the two measures, and it is not clear whether the parent-report is based on a diagnosis by a psychologist nor whether the student has been identified by the school with disability. There are no other measures of having been identified with a learning disability in the database.

sampled from their school, 196 schools reported on some of the students sampled, and 204 schools reported on none of the students sampled. By comparing school-level distributions, we found that, despite differences in reporting, there were comparable percentages of students identified as having an IEP and identified with a learning disability in the two sets of schools that reported on, 1) *all* of their students and 2) *some* of their students. Concluding that the schools that reported on some of their students had for the most part simply only reported when students did have an IEP, we were able to impute that the school had not identified the student with a learning disability for the 1,788 students who did not have an IEP report at those schools. After excluding the 4,213 students attending schools that did not report the IEP status of any of their students, we achieve an analytic sample of 10,847 students within 546 high schools. Although the proportion of schools that are high-minority and high-poverty within the analytic sample and the sample of excluded schools are similar, we cannot claim with confidence that our analytic sample is nationally representative.

Independent Variables

In order to locate patterns of disproportional identification of learning disability, our primary independent variables include the conventional predictors of disproportionality: gender, race/ethnicity, language status, and SES. In addition to considering these predictors simultaneously, we include clusters of variables that express more specific aspects of SES, academic history, and language-immigration history in an attempt to either explain existing associations or detect other related factors that predict identification. Since the actual learning disability diagnosis may have occurred before the 10^{th} grade, we were careful to select time invariant or retrospective measures that were not likely to be a result of having been identified with a learning disability. Weighted descriptive statistics for all student-level variables are presented in Table 1 at the beginning of the results section. Mean and mode imputation was used to account for missing values on all independent variables except for race and gender; imputation flags were included in all multivariate models.

Basic Measures of and Covariates of SES—Two distinct basic measures of SES – highest parental education level and family income – were used rather than a composite measure since each component may contribute differentially to identification with a learning disability. Students with parents who completed high school or less and students with parents who have a BA, MA, or PhD are compared to students whose parents completed some college. Family income is measured with a scale that ranges from 1 to 13 (‘None’ to ‘$200,001 or more’). To enrich our exploration of the association between SES and identification with a learning disability, we also include various available correlates of SES: family structure, number of siblings, cognitive family resources, material family resources, and the student's early academic history. The cognitive family resources indicator is an index, ranging from 0 to 5, summing the presence of the following items in the student's home: daily newspaper, magazine, computer, internet access, and fifty books or more. The material family resources indicator is an index, ranging from 0 to 5, summing the presence of these items in the student's home: DVD player, electric dishwasher, clothes dryer, fax machine, and student has own room. The student's early academic history is described by two dichotomous variables indicating whether the student participated in preschool or Head Start, experiences that are associated with SES.

Academic History—Because of a potential correlation between grade retention and identification with a learning disability, and the greater likelihood of low SES students to be held back, we include four dummies indicating whether the student repeated one or more grades during early elementary (K-2), late elementary (3-5), middle/high school (6-10). A control for age is also included. We are intentionally parsimonious in our inclusion of measures of academic experiences and outcomes, because these may be the result rather than the cause of identification with a learning disability.

Language-Immigration History—Since a student report of being a non-native English speaker does not capture the great variation in English proficiency among students and across their years of schooling, we attempt to expand on this measure with an assortment of other language status and immigration history indicators. First, we include a scale that summarizes the student's report of 10^{th} grade English proficiency in order to attempt to capture the progression of language proficiency over the life course. This scale ranges from 0 (most English proficient) to 12 (least English proficient) and was coded to 0 for native English speakers. The scale is the sum of non-native English speaker's responses to the following four questions on how well (0 = Very well, 1 = Well, 2 = Not well, and 3 = Not at all) they do the following: “Understand spoken English,” “Speak English,” “Read English,” and “Write English.” In addition, we include a dummy variable indicating whether the student reported having ever been in an English as a Second Language (ESL) program; since more recent immigrants were more likely to report having been in ESL than students who started school in the United States during the elementary years, we suspect the presence of some measurement error particularly for students who may have forgotten or been unaware that they participated in ESL during their early schooling.

To complete the language history, we include an additional dummy variable indicating whether the parent who completed the parent survey is a non-native English speaker. This variable may capture students who reported being a native English speaker but grew up in a non-English-speaking household. Parent language skills may also tap different mechanisms than student language skills, since parents with less English proficiency may have more difficulty acting as an advocate for their child within the school system. Lastly, to capture the most relevant aspect of the immigration experience insofar as identification with a learning disability, we include three dummies to compare students who started school in the United States between grades 1-2, 3-5, or 6-10 to students who started in kindergarten or were not immigrants at all. While these measures are not holistic expressions of the early academic experiences of language minorities, they do allow us to consider important aspects of the intersection between being a language minority and being identified with a learning disability.

Analytic Plan

In an attempt to replicate much of the previous research on disproportionality, we begin with a bivariate analysis of patterns in identification with a learning disability by race/ethnicity, language status, and gender (bivariate analyses consider only one characteristic of the student at a time). Next, we conduct multivariate analyses which simultaneously consider multiple characteristics of the student. In addition to providing a contrast to the results from

the bivariate analysis, the results from the multivariate analyses will illuminate which characteristics are still predictive of identification once we account for other characteristics of the student. Our multivariate analyses consist of a series of nested hierarchical logistic regression models (conducted with HLM6 software) predicting identification with a learning disability in the 10th grade; hierarchical models account for students being clustered in schools. All independent variables are centered around the grand mean, and models are weighted with a student-level weight. Laplace estimates are reported since these estimates are more robust and accurate for logistic regression modeling within HLM (Raudenbush, Yang, and Yosef 2000). Our first model re-estimates gender and racial/ethnic differences in identification. We then proceed into a series of nested models with the addition of basic measures of SES in Model 2, the covariates of SES in Model 3, measures of academic history in Model 4, and, finally, indicators of language status and immigration history in Models 5 and 6. These models will illuminate the characteristics of students that drive disproportionality.

Results

We begin with a summary of the bivariate descriptions of the conventional markers of disproportionality to benchmark with previous research. We then contrast these results with findings from a multivariate analysis to emphasize the importance of employing multivariate modeling in order to account for systematic variation in background characteristics. The results section will conclude with a more expansive exploration of the individual- and school-level socio-demographic characteristics that are significantly associated with identification with a learning disability.

Conventional Markers of Disproportionality: Bivariate Analysis

The descriptive statistics in Table 1 replicate the sort of bivariate analysis commonly used to examine disproportionality (Anderson 1997; Artiles, Rueda, Salazar, and Higareda 2005; OSEP 2007). Of our analytic sample, 6% are identified with a learning disability as indicated by an IEP, which corresponds with findings from federal reports (OSEP 2007). Males are disproportionately identified, representing 50% of our analytic sample but 66% of those identified with a learning disability. Similarly, non-native English speakers comprise 12% of the analytic sample but 15% of those identified with a learning disability. Lastly, according to our bivariate analyses, African-Americans, Hispanics and students of an “other race” are also disproportionately identified with learning disabilities. Our findings are similar to past research on disproportionality when we employ bivariate analyses.

Conventional Markers of Disproportionality: Multivariate Analyses

Racial/Ethnic Minorities—Table 2 presents odds ratios from hierarchical logistic regression models predicting having an IEP for a learning disability in the 10th grade. In Model 1, we use only gender and race/ethnicity to predict being identified. Consistent with the bivariate analysis and general perceptions, the odds of identification with a learning disability are 1.43 times greater for African-Americans and 1.49 times greater for Hispanics compared to whites (the reference category), controlling for gender (Model 1). The odds are also 1.56 times greater for Native Americans and 1.42 times greater for students of any other

race (Model 1); the former effect is not significant and the latter is only marginally so, but this may be due to the smaller numbers of these students in our analytic sample (n=99 and n=511 respectively). In contrast, the odds of identification for an Asian student are 49% [100(Exp(B) – 1)%] lower than those of a white student of the same gender (Model 1).

Strikingly, all of the significant race/ethnicity effects are explained once we account for the systematic differences in SES between these groups by including controls for highest parental education level and family income (Model 2). The one exception is that the odds of being identified for an Asian student are 54% lower than for a white of comparable SES. In fact, once we account for other covariates of SES and academic and language-immigration history, the odds of identification for a African-American student are significantly lower (28%) than a white student of comparable background (Model 5). Taking account of all systematic differences in background characteristics, there are no significant race differences in the odds of identification except for Asian students' lower odds (Model 6). Overall, while the bivariate results suggested that race was a key predictor of disproportionality in the identification of learning disabilities, the multivariate analyses illuminate that disproportionate identification is actually being driven by differences in SES, a correlate of race in the U.S. In addition to making evident the importance of accounting for systematic differences between socio-demographic status groups by employing multivariate analyses, this distinction between race and SES is also very important for both policy implications and future research.

Language Minorities—Language status and immigration history are also important considerations for understanding the associations between identification, race/ethnicity, and SES. Counter to the bivariate results, being a non-native English speaker is not significantly associated with increased odds of identification with a learning disability once socio-demographic characteristics are considered (Model 5). In contrast, the odds of identification for a student who reported having ever participated in ESL are 1.55 times higher than for a student who reported otherwise, net of all other controls (Model 5). It is unclear why ESL placement should be associated with identification with a learning disability. It is important to note that we cannot assume temporal order insofar as placement in ESL versus placement in special education. Assuming students placed in ESL struggled with English proficiency at some point in their school career, and that exit from ESL is not always an indication of English proficiency (Callahan 2005), it is probable that their linguistic struggles may have been mistaken at some point by educators as a learning disability. Alternatively, ESL placement may limit learning opportunities for the student (Callahan, Wilkinson, and Muller 2010; Callahan, Wilkinson, Muller, and Frisco 2009), resulting in lower achievement that is later interpreted as a learning disability. It is also possible that placement in ESL brought the student to the attention of educators in the school, thus increasing the odds of dual identification. And finally, schools with a stronger infrastructure may have well-developed ESL *and* special education programs which, intentionally or not, feed into one another. Lastly, the odds of identification for a student whose parent's native language is not English is 57% lower than counterparts, net of all controls (Model 5).

In contrast to students who started in U.S. schools by kindergarten, the odds of identification are 96% less for students who started in U.S. schools between grades 6 and 10, net of all

controls. This again suggests a tension between being identified as LEP and the student's learning difficulties being attributed to a learning disability. A lack of English proficiency may be more evident to educators for a recent immigrant than for a language minority student born in the U.S., or one who immigrated at a young age. Additionally, students who entered the U.S. school system at a later age have simply not experienced the same degree of exposure to risk of identification with a learning disability. In Model 6, having been in ESL remains a significant positive predictor and having a non-native-English-speaking parent remains a significant negative predictor of identification. Additionally, once we account for the recent immigrant's lesser likelihood of identification, lack of current English proficiency becomes a significant predictor, increasing the odds of identification by 11% for every one-unit increase on the scale of limited proficiency. Overall, net of all controls, significant positive predictors of identification include having ever been in ESL or currently lacking in English proficiency, while having a parent who is not a native English speaker or having started in U.S. schools anytime after the early elementary grades persist as significant negative predictors.

Other Socio-demographic Predictors of Identification

We conclude our analysis with an examination of other significant predictors of identification. Net of all controls, the odds of a male student being identified with a learning disability are almost double that of a comparable female (1.85 times greater net of all controls). In contrast to highest parental education level, which is rendered insignificant once measures of covariates of SES and academic history are held constant, family income is consistently negatively associated with identification. Net of all controls, the odds of a student's identification increase by 6% with each additional sibling, and decrease by 11% for every one-unit increase in cognitive resources present in the household (Model 6). Grade retention and being older than peers in the 10^{th} grade are significantly associated with increased odds of identification with a learning disability. Likewise, the odds of identification are 52% higher for students who participated in Head Start than they are for a comparable student who did not, net of all controls. In addition to the support authorized by the *Handicapped Children's Early Education Assistance Act* of 1968 (PL 90-538) and the *Economic Opportunities Amendments* of 1972 (PL 92-424) for increased Head Start enrollment for young children with disabilities (OSEP n.d.), The Early Childhood Learning & Knowledge Center, a division of the U.S. Department of Health and Human Services, specifically describes the process for identifying three-, four-, and five-year olds in Head Start with learning disabilities (ECLKC 2009). The persistent significant associations between identification and these characteristics suggest that identification with a learning disability is not socially neutral, but rather related to structural features of the education system and students' academic histories.

Discussion

Overall, the major findings of this study are that: 1) the disproportionate identification of African-American and Hispanic students with learning disabilities is accounted for by the lower average SES of these racial/ethnic subgroups, 2) identification with a learning disability is associated with a student's sex, socio-demographic (non-cognitive)

characteristics, and academic history, and 3) aspects of being a language minority appear to play a role in a student's likelihood of identification with a learning disability. The fact that identification with a learning disability is correlated with socio-demographic characteristics suggests that identification of learning problems may reflect social differences rather than learning differences, and the solution to some “biological” issues may lie in addressing social problems, such as socioeconomic inequality or the way that socioeconomic inequality is reproduced in schools. As researchers in psychology and medicine work towards more comprehensive understandings of what constitutes a learning disability, attempts are being made at the federal, state, district and school levels to standardize the process of identifying children with disability. The first major finding, regarding the confounding role of SES in the disproportionate identification of racial/ethnic minorities, exemplifies an important subsidiary conclusion of this study: multivariate, multilevel modeling of national data that includes student-level measures of identification, SES, other socio-demographic characteristics, and academic history is essential. Furthermore, while medical evidence exists to suggest linkages between childhood poverty and difficulties with learning, no research exists indicating that language minorities should have a higher prevalence of learning disabilities. Poor and inappropriate diagnostic procedures and/or discrimination may play a role in the disproportionate identification of certain students.

While some racial/ethnic minorities may in fact experience learning disability identification due to cultural misunderstanding or direct discrimination, our results suggest that the overrepresentation of racial/ethnic minorities is entirely explained by their lower average socioeconomic status (as a group). Previous research confirms that resources in the home during early childhood positively contribute to the development of both cognitive and learning ability (Shonkoff and Phillips 2000). Negative perceptions of disproportionality are based on an assumption that learning disabilities *should* be proportionately distributed throughout the population, but the fact is that other medical conditions, such as cardiovascular disease (Galobardes, Smith, and Lynch 2006; Karlamangla, Singer, Williams, Schwartz, Matthews, Kiefe, and Seeman 2005), arthritis and diabetes (Blackwell, Hayward, and Crimmins 2001), are disproportionately distributed according to socio-demographic characteristics. Furthermore, MacMillan and Reschly (1998) point out that African-Americans are disproportionately represented in intervention programs (e.g., Head Start, Chapter 1, Follow Through), just as they are overrepresented in special education programs. Attempts to limit disproportionality may in fact result in the denial of services to students who need them (Hallahan 1992; MacMillan and Reschly 1998). Rather than attempting to achieve proportionate diagnoses, future research should consider the reformation of procedures and policy to address the underlying factors and mechanisms that contribute to ‘disproportionality’ (Hallahan 1992; MacMillan and Reschly 1998; Rueda and Windmueller 2006), such as alleviating poverty and providing the resources that build learning ability to children who may not have them at home.

Accordingly, the disjunction between the findings from bivariate and multivariate analyses of disproportionality (that differences in SES underlie the disproportionate identification of racial/ethnic minorities) highlights the necessity of employing sophisticated methods that account for systematic differences between status groups. Bivariate analyses, in contrast to

multivariate analyses, depend on the implicit assumption that the average backgrounds of different groups of people are similar and unrelated to the outcome of interest. Research focusing solely on bivariate analyses inadvertently neglects a myriad of possible explanatory factors, and ultimately may result in misguided directions for future research and policy-making.

It is important to note, however, that our findings confirm the disproportionate representation of language minorities, at least for those who have ever been in ESL or who report a lack of English proficiency in the 10th grade. Not only do federal regulations specify that neither cultural differences nor limited English proficiency should be associated with identification with a learning disability, but differences in SES or family background fail to account for the disproportionate representation of these students. With current diagnostic methods, it can be difficult to distinguish between a lack of English language proficiency and a learning disability (Artiles, Rueda, Salazar, and Higareda 2005; Klingner and Harry 2006). The finding that participation in ESL is significantly associated with disproportionate identification, though, suggests the role of specific structural mechanisms within schools as well. It is argued that data from a multitude of sources must be incorporated to more accurately identify language minority students with a learning disability (Rueda and Windmueller 2006; Wilkinson, Ortiz, Robertson, and Kushner 2006).

Although the use of a dataset like ELS is a strength of this study – large and nationally representative of students receiving both special and regular education – some inherent limitations merit discussion. Our results would be bolstered by a more nuanced measure of the type of learning disability. In addition, a large number of schools did not report IEP status for any students. While our results do suggest the role of socio-demographic factors in learning disability identification, due to data constraints, we cannot thoroughly illuminate the mechanisms whereby this may occur. For example, although SES is significantly associated with identification with a learning disability, it is unclear whether this is due to environmental or prenatal factors, both of which affect childhood development (Natriello, McDill, and Pallas 1990; Shonkoff and Phillips 2000), or the way that schools treat students depending on their socioeconomic background. It is also important to keep in mind that this study focuses on a subgroup of students identified with learning disabilities, since it is likely that there were students in our sample who were identified in elementary school but then exited from special education before the 10^{th} grade; furthermore, the disproportionate identification evident by the 10^{th} grade may in part be a function of certain status groups being more likely to be exited from special education earlier on. Despite these limitations, by utilizing a large national dataset and employing sophisticated research methods, our findings present a substantial contribution to research on disproportionality.

An attempt to address variable and inaccurate diagnostic practices occurred with the 2004 reauthorization of IDEA, via a specific “disproportionality amendment” and the incorporation of a new choice of diagnostic model, Response to Intervention (RTI) (Bradley, Danielson, and Doolittle 2007; Harris-Murri, King, and Rostenberg 2006; Shinn 2007). While both a criticism and a supplement for the three more traditional models – the ability-achievement discrepancy, low achievement, and intra-individual discrepancy– a specific intent of RTI is to reduce disproportionality. Bradley et al. (2007) describe the three tiers of

RTI as 1) the receipt of research-based instruction by all students, 2) observation of all students for response to instruction, and 3) “individualized and intensive interventions and services” for those students who need it. RTI is thought to better account for “interpersonal and institutional factors” affecting the student and to improve practices on a school-wide basis (Bradley, Danielson, and Doolittle 2007; Harris-Murri, King, and Rostenberg 2006). Despite the issuance of an IDEA regulatory guide in 2006, the process of RTI is still somewhat ambiguous and its effect has not been thoroughly researched (Bradley, Danielson, and Doolittle 2007). Data from ELS, however, were collected prior to the implementation of RTI; consequently, our findings must be interpreted separately from the RTI approach to identification.

In all, the findings from this study suggest exciting new possibilities and questions for studying special education research and policy. Future research should explore the mechanisms that contribute to disproportionate identification of low SES and male students with the goal of either addressing root causes or of improving potential responses. Furthermore, it is important to determine the processes within our education system that contribute to disproportionate identification of some language minorities.

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Table 1
Descriptive Statistics by Identification with a Learning Disability

	Weighted Mean or Proportion (SD)	
	Not LD	LD
Race/Ethnicity and Gender		
Male	0.50	0.66
Race:		
White	0.64	0.60
Black	0.13	0.14
Hispanic	0.15	0.17
Asian	0.03	0.02
American Indian/Alaska Native	0.01	0.01
Other Race[#]	0.04	0.06
Basic Measures of SES		
Highest parental education level:		
High school degree or less	0.26	0.35
Some college	0.38	0.39
Bachelor's degree or higher	0.36	0.26
Family income	9.04	8.30
	(2.31)	(2.59)
Covariates of SES		
Bio mother and bio father in household	0.58	0.48
Siblings	2.04	2.31
Cognitive resources in household	4.08	4.02
	(1.21)	(1.39)
Material resources in household	4.27	4.24
	(1.26)	(1.43)
Participated in Head Start	0.13	0.20
Participated in preschool	0.68	0.67
Academic History		
Age	15.88	16.14
Repeated 1 or more grades between:		
K and 2nd grade	0.05	0.21
3rd and 5th grade	0.01	0.05
6th and 8th grade	0.01	0.03
9th and 10th grade	0.02	0.02
Language-Immigration History		
Not a native English speaker	0.12	0.15
Lack of current English proficiency	0.17	0.30

	Weighted Mean or Proportion (SD)	
	Not LD	LD
Ever been in an ESL program	0.07	0.12
Parent non-native English speaker	0.10	0.07
Started US School:		
In Kindergarten	0.96	0.98
Between 1st and 3rd Grades	0.01	0.01
Between 4th and 6th Grades	0.01	0.00
Between 7th and 10th Grades	0.02	0.00
N (Students)	10,264	583

[#]'More than one race' or 'Native Hawaii/Pacific Islander'

Table 2

Odds Ratios from Hierarchical Logistic Regression Models Predicting Having Been Identified With a Learning Disability

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Exp(B)	(SE)		Exp(B)	(SE)		Exp(B)	(SE)		Exp(B)	(SE)		Exp(B)	(SE)		Exp(B)	(SE)	
Race/Ethnicity and Gender																		
Male	2.14	(0.09)	***	2.18	(0.10)	***	2.02	(0.10)	***	1.87	(0.10)	***	1.87	(0.11)	***	1.85	(0.11)	***
Race:																		
White (ref)	–			–			–			–			–			–		
Black	1.43	(0.13)	**	1.12	(0.13)		0.77	(0.14)	+	0.75	(0.15)	+	0.72	(0.16)	*	0.73	(0.16)	+
Hispanic	1.49	(0.14)	**	1.15	(0.14)		0.91	(0.14)		0.94	(0.15)		1.13	(0.16)		1.12	(0.17)	
Asian	0.51	(0.22)	**	0.46	(0.22)	***	0.39	(0.22)	***	0.42	(0.23)	***	0.47	(0.26)	**	0.45	(0.27)	**
American Indian/Alaska Native	1.56	(0.40)		1.27	(0.39)		0.99	(0.39)		1.03	(0.44)		1.03	(0.45)		1.00	(0.46)	
Other Race[#]	1.42	(0.19)	+	1.30	(0.19)		1.15	(0.20)		1.17	(0.21)		1.20	(0.21)		1.20	(0.21)	
Basic Measures of SES																		
Family income				0.89	(0.02)	***	0.92	(0.02)	***	0.94	(0.02)	**	0.94	(0.02)	**	0.93	(0.02)	**
Highest parental education level:																		
High school degree or less				1.17	(0.10)		1.10	(0.11)		1.05	(0.11)		1.06	(0.11)		1.05	(0.11)	
Some college (ref)				–			–			–			–			–		
Bachelor's degree or higher				0.76	(0.12)	*	0.82	(0.12)	+	0.84	(0.12)		0.86	(0.13)		0.87	(0.13)	
Covariates of SES																		
Bio mom and bio dad in household							0.91	(0.10)		0.93	(0.10)		0.95	(0.11)		0.95	(0.11)	
Siblings							1.09	(0.03)	**	1.06	(0.03)	+	1.07	(0.03)	+	1.06	(0.03)	+
Material resources in household							1.02	(0.05)		1.02	(0.05)		1.02	(0.05)		1.02	(0.05)	
Cognitive resources in household							0.87	(0.05)	**	0.90	(0.05)	*	0.89	(0.05)	*	0.89	(0.05)	*
Participated in Head Start							1.60	(0.13)	***	1.58	(0.13)	***	1.58	(0.14)	***	1.52	(0.14)	**
Participated in preschool							1.01	(0.11)		1.07	(0.11)		1.03	(0.11)		1.02	(0.12)	
Academic History																		
Age										1.24	(0.08)	**	1.22	(0.08)	**	1.23	(0.08)	**
Repeated 1 or more grades between:																		
K and 2nd grade										4.37	(0.13)	***	4.16	(0.13)	***	4.05	(0.14)	***
3rd and 5th grade										2.46	(0.25)	***	2.55	(0.26)	***	2.65	(0.26)	***

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Exp(B)	**(SE)**		**Exp(B)**	**(SE)**		**Exp(B)**	**(SE)**		**Exp(B)**	**(SE)**		**Exp(B)**	**(SE)**		**Exp(B)**	**(SE)**	
6th and 10th grade										1.30	(0.24)		1.30	(0.24)		1.36	(0.25)	
Language-Immigration History																		
Not a native English speaker													1.08	(0.18)		1.09	(0.18)	
Lack of current English proficiency													1.06	(0.05)		1.11	(0.05)	*
Ever been in an ESL program													1.55	(0.15)	**	1.71	(0.15)	***
Parent non-native English speaker													0.43	(0.22)	***	0.54	(0.23)	**
Started US School:																		
In Kindergarten (ref)																–		
Between 1st and 2nd Grades																1.12	(0.48)	
Between 3rd and 5th Grades																0.40	(0.70)	
Between 6th and 10th Grades																0.04	(1.27)	*
N (Students used of 10847 total)	10426			10426			10426			10426			10426			10426		
N (Schools used of 546 total)	546			546			546			546			546			546		
Variance Components: School-Level (INTRCPT1)	0.367	(SD) (0.606)	***	0.380	(SD) (0.616)	***	0.401	(SD) (0.634)	***	0.408	(SD) (0.639)	***	0.394	(SD) (0.628)	***	0.405	(SD) (0.636)	***

#'More than one race' or 'Native Hawaii/Pacific Islander'

*p < 0.05

**p < 0.01

***p < 0.001

+p < 0.10