Teachers' Impact on the Wellbeing and Achievement of Students with Special Needs in the General Education Classroom

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ABSTRACT: Although it is well established that students with disabilities underperform academically relative to their nondisabled peers, the mechanism by which this gap emerges is unclear. Using the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K), and a sample size of N = 6,170, the present study assessed how reading, math, and science scores along with reading competence, math competence, and internalizing problems were impacted by teacher experience, support, and efficacy. Analyses were completed using longitudinal multilevel modeling from 3rd to 8th grade. The results demonstrated that students with an Individualized Education Plan (IEP) typically perform closer to their general education peers in both 3rd grade science and math than 3rd grade reading, but the gap between general and special education students widens more over time for reading and science than for math. In addition, students with an IEP were found to be less confident in their reading abilities than in math. Overall, teachers, do not mitigate the achievement gap between students with and without disabilities. These results provide a unique contribution to the field of special education and demonstrate that more research needs to be conducted in order to pinpoint the mechanisms in which children with special needs are lagging behind their nondisabled peers. *Keywords*: Special Education; Secondary Data Analysis; Teacher Experience; Teacher Support; Teacher Efficacy.

Introduction

Inclusive education is a model of classroom participation in which all children, regardless of disability status, participate and learn together while promoting academic and social-emotional growth. This model has been a goal of the U.S. educational system since the passing of the Individuals with Disabilities Education Act in 1997, and its reauthorization in 2004. Theoretically, by using the inclusive model of education, students with special needs would perform as similarly as possible to otherwise-comparable, nondisabled peers on academic tasks. Yet, this is not the case. Research has long demonstrated deficits in this area for students with special needs, even though it is unclear how or why these deficits occur and persist. To further explore these deficits, I investigated how academic outcomes for students with special needs are impacted by teacher experience, support, and efficacy.

Academic Performance

It is well established that students with disabilities underperform academically relative to their nondisabled peers. For instance, the Center on Education Policy noted a large difference in test scores between students with and without disabilities (Chudowsky & Chudowsky, 2009). Nationwide, the median percentage of 4th-grade students with disabilities scoring at proficiency was 41% for reading and 49% for mathematics. In contrast, 79% of students without disabilities scored at proficiency for both reading and mathematics. This achievement gap also seems to widen through middle school and

high school. The National Center for Education Statistics (2010) reported that only 10% of 12th-grade students with disabilities scored at or above proficiency in reading compared to 39% of students without disabilities, and 6% of students with disabilities scored at or above proficiency in math compared to 26% of students without disabilities. Overall, the data clearly show that special needs children increasingly lag behind their nondisabled peers in reading and math achievement.

Science achievement is a particularly important area of interest and has received nationwide attention with the growth of Science, Technology, Engineering, and Mathematics (STEM) fields. With the nation's commitment to improving science education, it is particularly important to ensure that students with disabilities also make appropriate growth in this area. Yet, students with disabilities underperform on science assessments relative to nondisabled peers. The National Center for Education Statistics (2011) conducted a science assessment graded on a scale of 0-300, with a score of 150 demonstrating average performance. While nondisabled students in 4th and 8th grade scored right around 150, students with disabilities in these grades had average scores of approximately 20-30 points lower than their nondisabled peers.

Though there is a plethora of research describing how students in the special education system have a long history of underperformance, it is equally important to consider students' own perceptions of their academic performance. Self-efficacy is defined as people's judgments about their ability to succeed, which is a critical component to academic success (Bandura, 1986). When a student has a high sense of self-efficacy, they tend to be more confident in their abilities and are therefore more likely to have positive learning outcomes. Jinks and Morgan (1996) found a positive correlation between students' grades and their sense of academic self-efficacy. Yet, students in special education have a low sense of self-efficacy, often attributing their underperformance to a stable, uncontrollable, and internal lack of ability that they are unable to improve no matter how hard they try (Linnenbrink & Pintrich, 2010). Similarly, Morgan, Farkas, and Wu (2012) found that poor readers are at greater risk of socio-emotional maladjustment. Their inability to meet the demands of the classroom leads to feelings of frustration, withdrawal, and social isolation. This is further emphasized in a study by Tur-Kaspa, Weisel, & Segev (1998) who found that students with disabilities experience significantly higher levels of loneliness. Because students receiving special education services are also more likely to be poor readers, they are at an increased risk of encountering socio-emotional difficulties. On a more positive note, research has revealed several ways in which teachers can promote student efficacy and socio-emotional adjustment. For example, teachers can provide emotional support and ask students about their lives to make children feel more comfortable and supported at school (Pianta, Hamre, & Stuhlman, 2003). They can also have other students model how to successfully complete a learning task (Artino, 2012). In all, self-efficacy clearly plays a vital role in academic success, and there are multiple ways in which teachers influence self-efficacy and socio-emotional adjustment.

Teacher Characteristics

Although the inclusive movement has made incredible gains over the past decade, the persistent gap between disabled and nondisabled students indicates that there is still room for improvement. Many factors contribute to a student's wellbeing and achievement, but research suggests that

teachers have the most influence (RAND Corporation, 2012). Therefore, it is extremely important to examine teachers' impact on students' academic outcomes. In particular, three areas to target are *1)* teacher experience, *2)* teacher efficacy, and *3)* teacher support. First, a teacher's previous experience working with children with special needs can greatly impact learning. The National Council for Accreditation of Teacher Education (NCATE) requires that all teachers meet standards for teaching children with special needs (Turner, 2003). The coursework requirements and standards vary by state, however, and often only mandate that teachers take one introductory special education course. Although this one course is better than nothing, it is simply not enough. A study by deBettencourt (1999) found that 39.6% of the teachers surveyed had taken only one course outlining instructional strategies for teaching students with special needs, and 41.5% had not taken any courses. Due to the lack of special education courses, these teachers reported that they were left with little to no information regarding methods to teach students with disabilities. Another study found that 78% of general education teachers reported needing but not receiving any type of in-service training. Reports concluded that teachers lacked confidence in adapting materials and curriculum, writing behavioral objectives, managing behavioral problems, using assistive technology, giving individual assistance to students, and developing Individualized Education Plans (IEP's, or legal documents that outline a specialized education program to meet the unique needs of children with disabilities) (Buell, Hallam, Gamel-McCormick, & Scheer, 1999).

Second, teacher's perceptions of their ability to teach students with disabilities represent another important avenue to target. Teacher efficacy is defined as the teacher's belief in his or her ability to effectively teach and promote student engagement and learning (Tschannen-Moran & Hoy, 2001). Teacher efficacy is important because it can affect the effort teachers put into teaching, their persistence in face of difficulties, and their ability to adapt to each individual child's needs. When a teacher has a high sense of efficacy, they tend to be more confident in their abilities, which increases student achievement, motivation, and student self-efficacy (Tschannen-Moran & Hoy, 2001). Yet, research suggests that many general educators do not feel confident in their abilities to teach students with disabilities, and thus have a low sense of efficacy in this domain. A qualitative interview study by Lohrmann and Bambara (2006) outlined some of the major uncertainties teachers have regarding their ability to educate and understand students with special needs. The teachers described feelings of fear, anxiety, and worry due to the fact that they did not feel confident in their abilities. More specifically, these teachers worried about whether or not inclusion would be successful, whether they would be able to meet the child's needs, if the child would disrupt the rest of the classroom, and how they would balance the students' needs while still paying attention to the class as a whole. A different study by Leyser, Zeiger, and Romi (2011) found that teachers who received adequate training scored significantly higher in regards to self-efficacy than those who had little to no training. Training builds self-efficacy by offering experiential situations where teachers can master new techniques before implementing them in the classroom. Teachers also reported higher self-efficacy when they had prior experience working with special needs children (Bray-Clark & Bates, 2003).

Third, the support that teachers have in meeting the needs of students with

disabilities might have important implications for student learning. Research has demonstrated that teachers report having less support than they need to appropriately teach students with disabilities in the general education classroom. In one study by Wolery, Werts, Lisowski, Caldwell, and Snyder (1995), support was defined as having aides in the classroom and the ability to meet regularly with specialists. This study found that over half of teachers reported needing part-or full-time aides, but less than a third received them. In addition, over two-thirds of teachers reported needing regular meetings with specialists, yet only about half received them. Another study by Bunch, Lupart, and Brown (1997) found that teachers believed supports such as a lower student-to-pupil ratio and higher availability of educational assistants to be very pertinent to their teaching success. Teachers feared that having a child with special needs in their classroom could endanger the education of their other students, and this could be resolved by instituting smaller class sizes. Teachers also reported that education assistants were imperative and would help children thrive. Ultimately, every student is unique in his or her strengths and weaknesses, and could benefit from a teacher who is prepared to teach students with special needs. Improving teacher efficacy, support, and experience could therefore benefit all students, not just those in special education.

Thus, although research clearly shows that special needs students are lagging behind their peers in several domains, the mechanism by which this gap emerges remains unclear. Teachers could be an important contributor to this academic gap due to the vast influence they have on their students. In the present study, I examine whether the academic achievement, academic competence, and the presence of internalizing problems in children with special needs are related to *1)* teacher experience, *2)* teacher efficacy, and *3)* teacher support. Given available research, it remains empirically unclear why children with special needs are lagging behind their non-disabled peers. This study should offer further insight into potential mechanisms that may influence this divide.

Research Questions and Hypotheses

In this study I addressed the following questions:

1) To what extent does the academic achievement and self-efficacy of students with special needs differ from that of their non-disabled peers?
2) To what extent do teachers mitigate this achievement gap?

In line with previous research, I hypothesized that children with special needs would exhibit poorer academic outcomes, lower perceived academic self-efficacy, and higher internalizing problem behaviors than their typical peers. I believed that this would be compounded by teacher experience, support, and efficacy, such that special education students with less experienced, supported, and efficacious teachers will display even poorer outcomes. Furthermore, based on the plethora of research describing the persistent achievement gap between student with and without disabilities, I hypothesized that general education peers would also be influenced by teacher experience, support, and efficacy in the same manner, but would continue to outperform their special education peers.

Method

Participants

This study utilized the restricted-use file of the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99

(ECLS-K), sponsored by the National Center for Educational Statistics (NCES). The ECLS-K is a nationally representative study that followed approximately 21,000 students from kindergarten through eighth grade to examine child development, school readiness, and early school experiences. Data from the ECLS-K was collected using direct child assessments, parent interviews, teacher and school administrator questionnaires, student records, and school facility checklists. The dataset provides a diverse sample of socioeconomic and racial/ethnic backgrounds, and allows access to information on children's home environment, home educational activities, school environment, classroom environment, classroom curricula, and teacher qualifications. Per stipulations required by the Institute of Education Sciences when using restricted-use data, all reported sample and group sizes were rounded to the nearest 10.

The analytical sample was restricted to both general and special education students attending public schools and primarily placed in general education classrooms (N = 6,170). Of these students, 50.4% were female, 60.2% were White/Caucasian, 12.8% were Black/African American, 20.7% were Hispanic, and 6.22% were Asian, 18.5% from the Northeast, 25.2% from the Midwest, 35.3% from the South, and 21.1% from the West. The median income level at third grade ranged from $40,000-$50,000. Sample descriptive statistics are included in Table 1; all continuous variables were standardized to have a mean of zero.

Research Design

I used longitudinal multilevel modeling to assess how reading, math, and science scores, along with reading competence, math competence, and internalizing problems, were impacted by teacher experience, support, and efficacy. For each academic subject, I analyzed a two-level model, where level one corresponded to grade level (third, fifth, and eighth) and level two corresponded to student level demographics, teacher experience, support, and efficacy, and whether or not the child had an IEP. Model equations at each level are as follows:

$$\text{Level 1:} \quad Y_{ij} = \beta_{0j} + \beta_{1j}(GRADE_{ij}) + r_{ij}$$

Where Y_{ij} = outcome variable of interest for each level-1 unit *i* nested within level-2 unit *j*; β_{0j} = intercept for the *j*th level-2 unit; *GRADE* corresponds to third, fifth, and eighth grade timepoints nested within each *j*th level-2 unit; and r_{ij} = random error associated with the *i*th level-1 unit nested within the *j*th level-2 unit;

$$\text{Level 2:} \quad \beta_{0j} = \gamma_{00} + \gamma_{01}(DEMO_j) + \gamma_{02}(IEP_j) + \gamma_{03}(TEACHER_j) + \gamma_{04}(IEP * TEACHER_j) + U_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(DEMO_j) + \gamma_{12}(IEP_j) + \gamma_{13}(TEACHER_j) + \gamma_{14}(IEP * TEACHER_j) + U_{1j}$$

Where β_{0j} = intercept for the *j*th level-2 unit; β_{1j} = slope for the *j*th level-2 unit; γ_{00} = overall mean intercept adjusted for predictors; γ_{10} = overall mean intercept for the slope adjusted for predictors; *DEMO* = a vector capturing covariate adjustments made for sex, race/ethnicity, maternal education, family income, and school climate; *IEP* = an indicator of whether the student was in

general or special education; *TEACHER* = a vector capturing teacher experience, support, and efficacy; *IEP*TEACHER* = the interaction between each teacher variable and special education status; U_{0j} = random effects of the *j*th level-2 unit adjusted for predictors on the intercept; and U_{1j} = random effects of the *j*th level-2 unit adjusted for predictors on the slope.

Dependent Variables

Achievement. Reading, math, and science scores were measured in spring of third grade, spring of fifth grade, and spring of eighth grade using the Item Response Theory (IRT). IRT estimates performance by using patterns of correct and incorrect answers to measure proficiencies relative to grade level and tailor the test to the child's ability. This evaluation technique allows for the measurement of achievement over time, even though the assessments administered are not identical at each grade level. Each score is a non-integer probability of correct answers representing the number of items a child would have answered correctly if they completed all of the questions.

The third and fifth grade reading assessments measured phonemic awareness, single word decoding, vocabulary, and passage comprehension. Additionally, the 5th grade assessment included the ability to evaluate nonfiction texts. The 8th grade assessment tested advanced comprehension skills, including the ability to make connections with the text and evaluate literary devices. There were 154 questions in third grade with a possible score range of 42.42-148.95, 186 questions in fifth grade with a possible score range of 62.25-180.86, and 212 questions in eighth grade with a possible score range of 85.62-208.90.

The third and fifth grade mathematics assessments measured number sense, operations, and measurement. The eighth grade assessment included more difficult mathematical items such as spatial sense, geometry, algebra, probability, patterns, functions, data analysis, and statistics. In our sample, there were 123 questions in third grade with a possible score range of 31.21-120.42, 153 questions in fifth grade with a possible score range of 46.97-150.94, and 174 questions in eighth grade with a possible score range of 67.42-172.20.

The science assessment in third, fifth, and eighth grade tested two categories: *1)* conceptual understanding of scientific facts, and *2)* the ability to ask questions about the natural world, collect evidence, and explain the answers obtained. Children needed to understand the physical world, draw inferences, comprehend relationships, and engage with the scientific method. In our sample, there were 62 questions in third grade with a possible score range of 10.56-58.46, 92 questions in fifth grade with a possible score range of 17.91-87.58, and 111 questions in eighth grade with a possible score range of 30.02-107.90.

Perceived academic competence. I examined students' perceived competence in reading and math through questions used with permission from the Self-Description Questionnaire 1 (SDQ; Marsh, 1992), which was administered in third, fifth, and eighth grade. The SDQ assessed how children felt about their academic work, and included questions about grades, difficulty of work, and their interest and enjoyment in the subject. Two SDQ variables (one for reading, one for math) were graded on a 1 to 4 response scale (1= *not at all true*, 2 = *a little bit true*, 3 = *mostly true*, 4 = v*ery true*).

Internalizing problems. Lastly, I utilized the SDQ Sad/Lonely/Anxious scale, found in third, fifth, and eighth grade. The scale included items about internalizing problem behaviors such as feeling sad, lonely, ashamed of mistakes, feeling frustrated, and being worried about school

and friendships. This variable was graded on a Likert-type scale with 1 being "*not at all true*" and 4 being "*very true*."

Predictors of Interest

First, school office staff were asked to indicate whether each child had an IEP on record at school. If the child did not have an IEP on file, I considered them to be in general education. Next, using the Spring 3rd-Grade Teacher Questionnaire, I examined general education teachers' experience, perceptions of support, and self-efficacy in teaching a student with special needs. First, I created a teacher experience variable that included *1)* highest level of education received (ranging from a high school diploma/GED to a doctorate); *2)* number of college special education courses completed (ranging from zero to more than six); *3)* number of years teaching (ranging from zero to 49); and *4)* number of years taught at grade level (ranging from zero to 39). All variables were z-scored (which constrains the variable to have a mean of zero and standard deviation of one), summed, and then z-scored again.

Second, I formulated the Teacher Support variable by z-scoring and summing *1)* number of paid aides in the classroom; *2)* how often teachers meet with the special education teacher to discuss a plan for children with disabilities in the class (ranging from 1=*never* to 6=*daily*); *3)* number of students in the class; and *4)* whether the school administration encourages and supports their staff (ranging from 1= *strongly disagree* to 5=*strongly agree*). After these four variables were summed, they were z-scored again.

Third, I looked at two variables defining efficacy found in the Teacher Questionnaire, which had Likert-type responses ranging from *strongly agree* to *strongly disagree*. The first statement, "I am adequately trained to teach the children with disabilities who are in my class" was z-scored and included to measure teacher efficacy, because it assesses an individual teacher's internal beliefs about teaching students with special needs. The second statement, "inclusion of children with disabilities in my class has worked well," was z-scored and included to measure inclusion efficacy, which arguably represents a broader belief about the overall efficacy of inclusion.

Covariate Adjustment

In order to obtain unbiased estimates, it is important to statistically control for factors that may influence our outcome variables and/or predictors of interest. To this end, several covariates were included in the analytical model. First, data from the Special Education Teacher Questionnaire B included time-varying information on whether primary placement was in a general education classroom in third, fifth, and eighth grade. If students were not primarily placed in general education at each of these timepoints, they were excluded from analysis. Time-invariant variables (i.e. variables that remain the same over all time points) were measured at kindergarten, and included sex and race (White, Black, Hispanic, and Asian). I also captured socioeconomic status with the use of two time-invariant variables measured at third grade. The first was maternal level of education (ranging from less than high school to a doctoral or professional degree), and the second was family income (ranging from less than $25,000 to above $200,000). Both of these variables were z-scored.

Lastly, to capture information about children's schools that could influence teachers' reports of efficacy or support, I created a composite variable measuring school climate from 7 Likert-type questions found in the spring third, fifth, and eighth grade Teacher Questionnaire B. Questions

assessed to what extent *1)* staff members demonstrate school spirit; *2)* the level of child misbehavior interferes with teaching (reverse-coded); *3)* students are not capable of learning the material (reverse-coded); *4)* teachers feel accepted and respected by colleagues; *5)* teachers are continually learning and seeking new ideas; *6)* paperwork interferes with teaching (reverse-coded); and *7)* parents of schoolchildren are supportive of school staff. All seven variables were summed and then z-scored.

Missing Data

Proportions of missing data for each variable are represented in Table 1. Most variables were found to be missing at random (MAR). Missing data were imputed in Stata/SE 14.0 using multivariate chained-equations (MICE), which replaces missing values with multiple sets of stimulated values in order to complete the data (Rubin, 1978; Schenker & Taylor, 1996; Van Buuren & Groothuis-Oudshoorn, 2011). Historically, imputations in the realm of social sciences have been conducted with m = 3 to 5 imputed datasets (Spratt et al., 2010), but current research has shown that decreasing m imputed datasets can reduce power and increase errors (Graham, Olchowski, & Gilreath, 2007). In addition, some researchers have suggested imputing at least as many datasets as the highest fraction of missing information (FMI) (Allison, 2012; White, Royston, Wood, 2011; Graham, Olchowski, & Gilreath, 2007). Following these recommendations, I imputed m = 60 datasets. The dependent variables reading, math, and science were not imputed.

Normality and Weighting

The ECLS-K dataset is designed to be nationally representative with the application of weights to adjust for disproportionate sampling and survey nonresponse. There were no issues with normality per Flora and Curran's (2004) rules for significant departures from normality in large samples (e.g., skew > 3, kurtosis > 8).

Results

Data were analyzed using a multilevel mixed-effects linear regression in Stata/SE 14.0. Analyses occurred in four steps: *1)* empty two-level model with random intercepts and fixed slopes; *2)* two-level model with demographic predictors at level 2; *3)* two-level model with demographic predictors and IEP at level 2; and *4)* two-level model with demographic predictors, IEP, and teacher characteristics at Level 2. The addition of teacher variables at Level 2 did not appear to significantly explain variance from the prior models (Table 2 and 3). Much of the variability within children was described by the addition of covariates. Full results for the final models (4) for each outcome variable are displayed in Tables 2 and 3.

Academic Achievement. In 3rd grade, students with an IEP scored 0.32 standard deviations (which translates to a difference of about 5.60 points) lower on the reading assessment than students without an IEP (SE = 0.04), but there was no significant difference in growth over time between students with and without disabilities (Std. B = 0.01, SE = 0.01). Students with more supported teachers had significantly lower reading scores in 3rd grade than students with less supported teachers, but this effect was small in magnitude (Std. B = 0.04, SE = 0.02). In addition, teacher support did not impact reading performance over time (Std. B = -0.00, SE = 0.00), nor did it differentially impact students receiving special education compared to nondisabled peers. Furthermore, teacher experience and efficacy had no impact on student reading scores (regardless of special education

status), either initially or over time. Results controlling for teacher characteristics are graphically represented in Figure 1.

Regarding math achievement, in 3rd grade students with an IEP scored 0.14 standard deviations (which translates to a difference of about 1.51 points) lower than students without an IEP (SE = 0.03). In addition, students with an IEP had slower math growth (-1.16 points) between 3rd and 8th grade, but again, this had a very small effect size (Std. B = -0.02, SE = 0.01) (Figure 2). Teacher experience, support, and efficacy had no impact on students' math scores initially or over time, regardless of special education status.

Finally, in 3rd grade students with an IEP scored approximately 0.14 standard deviations (which translates to a difference of about 0.27 points, SE = 0.03), less on the science assessment than students without an IEP, and had slower growth over time (Std. B = -0.04, SE = 0.01) (Figure 3). Teacher support and efficacy did not differentially predict science achievement for students with or without an IEP, and did not affect growth over time. However, students with more experienced teachers had slightly slower growth over time, though this effect size was remarkably close to zero (Std. B = -0.01, SE = 0.00) relative to students with less experienced teachers, but there was no differential effect of teacher experience on students with an IEP.

Academic Competency. Students with an IEP reported feeling less interested and competent in reading at 3rd grade, scoring 0.13 standard deviations less (which translates to a difference of about 0.08 points, SE = 0.06), but their growth over time was no different than those without an IEP. In contrast, students with an IEP were no more or less confident in their math abilities than general education students at any time point. Teacher experience, support, and efficacy did not make a difference in either reading or math competence for students with or without an IEP, and did not affect their growth over time. Results are graphically displayed in Figures 4 and 5.

Internalizing Problems. Students with an IEP reported more internalizing problems in 3rd grade (Std. B = 0.27, SE= 0.05), but these problems decreased more over time than they did for students in general education (a finding that could potentially showcase a positive effect of special education services) (Figure 6). Moreover, teacher experience, support, and efficacy did not impact internalizing problems for students with or without an IEP, and did not affect growth over time.

Discussion

The purpose of this study was to assess how reading, math, and science scores, along with reading competence, math competence, and internalizing problems, were impacted by teacher experience, support, and efficacy. Overall, students with an IEP typically perform closer to their general education peers in both 3rd grade science and math than 3rd grade reading, but the gap between general and special education students widens more over time for reading and science than for math. In addition, students with an IEP were found to be less confident in their reading abilities than their math abilities, relative to their general education peers.

I expected to find that children with special needs would exhibit poorer academic outcomes than their typical peers, and that this gap would be at least partially explained by teacher characteristics such as perceptions of classroom support, efficacy, and experience working with special needs students. Consistent with prior research, the results of this study demonstrated that students with an IEP initially scored lower on academic assessments and grew less over time. Interestingly, however, it does not

appear that this gap is explained by teacher experience, support, or efficacy. While students with more supported teachers had significantly lower reading scores in 3rd grade than students with less supported teachers, the effect was small in magnitude. It is possible that students who are already reading lower at third grade are selected into classes that offer more support. In addition, self-reported reading and math competence and internalizing behaviors were not impacted by these teacher variables.

Limitations and Future Directions

These findings should be robust due to the nature of the ECLS-K dataset, which is a large and nationally representative sample. Nevertheless, this study still has several limitations. First, the ECLS-K dataset is over 19 years old and therefore could be considered outdated. Future research should consider replicating these analyses with the ECLS-K:2011 dataset, which is currently undergoing data collection. Second, researchers have a plethora of variables at their disposal when conducting secondary data analysis, but they are unable to tailor data collection to suit their particular research questions and precisely capture certain constructs of interest. It is quite possible that the teacher variables used here are insufficient to answer these specific research questions. Some variables were also unavailable in the 8th grade wave, in part due to students having more than one primary teacher in middle school. Future research should carefully design and select measures that are more appropriate to research questions such as these as well as consider using the value-added model (e.g., see Hanushek & Rivkin, 2010).

The value-added model could be used with more success because measuring these teacher characteristics at one timepoint may not be sufficient to capture the true impact that teachers have on their students. Since the ECLS-K dataset was not collected yearly, this approach was not utilized. In addition, data collection for the ECLS-K ended at 8th grade. It would be beneficial to analyze whether differences in academic achievement, academic competence, and presence of internalizing behaviors arise throughout high school when material gets increasingly difficult. Finally, it would have been ideal to analyze a three-level model of time nested within students, nested within teachers. Because students were randomly sampled from all kindergartners attending each ECLS-K school and then followed longitudinally, the study design did not sample classrooms. Therefore, there was no teacher weight, and students were not equally distributed among teachers by the third-grade year. Though I first attempted to analyze a three-level model, I encountered convergence problems due to these issues, and so I reverted to a two-level model to obtain the most robust estimates possible.

Other potential mechanisms for this achievement gap include the amount of time a child physically spends in the general education classroom, academic and/or behavioral expectations for children with special needs, inadequate funding for highly individualized special education resources and services, and/or overall school quality and composition. Future research should assess these constructs in order to assess their impact on student achievement and efficacy.

Conclusion

In this study, I hoped to offer fresh insight into why children with special needs underperform relative to general education students, given that it remains empirically unclear why this occurs and how it might be remediated. The results of this study suggest that certain teacher characteristics, although integral to the education system, do not

appear to mitigate the achievement gap between students with and without disabilities when measured at the third-grade year. These results provide a unique contribution to the field of special education and demonstrate that more research needs to be conducted in order to pinpoint the mechanisms causing children with special needs to lag behind their nondisabled peers.

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Table 1

Descriptive Information for Variables of Interest

	% Missing	Mean (SD)	%	Skewness	Kurtosis
Dependent Variables					
Reading					
Third	1.26	108.59 (19.55)		-0.50	2.82
Fifth	0.61	139.74 (22.20)		-0.50	2.77
Eighth	1.85	168.72 (27.45)		-0.85	3.00
Math					
Third	1.12	85.98 (17.20)		-0.45	2.42
Fifth	0.64	115.00 (20.62)		-0.72	3.01
Eighth	1.38	141.20 (21.52)		-0.79	3.08
Science					
Third	1.18	34.70 (9.91)		-0.14	2.35
Fifth	0.66	58.42 (14.22)		-0.51	2.60
Eighth	1.18	84.15 (15.87)		-0.90	3.39
Perceived Reading Competence					
Third	1.01	3.29 (0.63)		-1.00	3.47
Fifth	0.61	3.01 (0.72)		-0.44	2.32
Eighth	1.79	2.51 (0.75)		0.09	2.30
Perceived Math Competence					
Third	1.01	3.18 (0.75)		-0.88	2.95
Fifth	0.61	2.95 (0.76)		-0.47	2.35
Eighth	1.76	2.62 (0.89)		-0.09	1.96
Internalizing Problem Behaviors					
Third	1.01	2.18 (0.73)		0.38	2.37
Fifth	0.61	2.03 (0.63)		0.61	2.87
Eighth	1.76	2.03 (0.55)		0.53	3.17
Covariates					
Gender	0.00			0.02	1.00
Female			50.04		
Race	0.09			1.39	4.14
White			62.70		
Black			13.33		
Hispanic			21.31		
Asian			2.67		
IEP on File	17.16		9.87	2.80	8.85
Maternal Education	9.65			0.23	2.70
High School Diploma or Less			40.41		
Vocational/Tech or Some			35.95		

College					
Bachelors Degree			15.14		
Some Graduate Degree			8.50		
Family Income	7.56			-0.54	2.22
Under $25,000			23.60		
$25,000-$40,000			20.70		
Above $75,000			25.70		
School Climate	18.76	-0.10 (0.97)		-0.36	3.17
Teacher Level Characteristics					
Teacher Experience	26.21	0.08 (1.00)		0.33	2.49
Teacher Efficacy	18.03	0.03 (1.02)		-0.22	2.29
Inclusion Efficacy	18.92	0.00 (1.04)		-0.22	2.89
Teacher Support	42.65	0.00 (0.93)		0.13	4.40

Table 2

Influence of Teacher Characteristics on Academic Achievement

	Reading				Math				Science			
	Model 1 (*n* = 6,263)		**Model 2** (*n* = 6,173)		**Model 1** (*n* = 6,263)		**Model 2** (*n* = 6,171)		**Model 1** (*n* = 6,266)		**Model 2** (*n* = 6,173)	
	***B* (SE)**	***p***	***B* (SE)**	***p***	***B* (SE)**	***p***	***B* (SE)**	***p***	***B* (SE)**	***p***	***B* (SE)**	***p***
Fixed Effects												
Effects on Intercept												
Constant	0.35 (0.2)	0.000	0.35 (0.02)	0.000	0.17 (0.02)	0.000	0.17 (0.02)	0.000	0.22 (0.02)	0.000	0.22 (0.02)	0.000
Grade	- 0.03 (0.0)	0.000	-0.03(0.00)	0.000	-0.17(0.0)	0.000	-0.02 (0.03)	0.000	-0.02(0.00)	0.000	-0.02(0.00)	0.000
Gender	-0.14(0.03)	0.000	-0.14(0.03)	0.000	0.23 (0.03)	0.000	0.23 (0.03)	0.000	0.27(0.03)	0.000	0.27 (0.03)	0.000
Race/Ethnicity												
Black (2)	-0.51(0.05)	0.000	-0.50(0.05)	0.000	-0.68(0.05)	0.000	-0.68(0.05)	0.000	-0.81(0.04)	0.000	-0.80(0.04)	0.000
Hispanic (3)	-0.39(0.04)	0.000	-0.38(0.04)	0.000	-0.30(0.04)	0.000	-0.30 (0.04)	0.000	-0.57(0.04)	0.000	-0.56(0.04)	0.000
Asian (5)	-0.10(0.05)	0.104	-0.09(0.05)	0.091	0.06 (0.05)	0.238	0.05 (0.05)	0.330	-0.28(0.01)	0.000	-0.28(0.06)	0.000
Maternal Education	0.27 (0.02)	0.000	0.27 (0.0)	0.000	0.29 (0.02)	0.000	0.29 (0.02)	0.000	0.28 (0.01)	0.000	0.28 (0.02)	0.000
Income	0.09 (0.01)	0.000	0.08 (0.01)	0.000	0.05 (0.01)	0.000	0.05 (0.05)	0.000	0.10 (0.01)	0.000	0.09 (0.01)	0.000
School Climate	0.01 (0.01)	0.201	0.01 (0.01)	0.411	-0.07(0.01)	0.457	-0.07 (0.01)	0.446	0.00 (0.01)	0.992	-0.00(0.01)	0.873
IEP	-0.33(0.04)	0.000	-0.32(0.04)	0.000	-0.15(0.03)	0.000	-0.14 (0.03)	0.000	-0.15(0.03)	0.000	-0.14(0.03)	0.000
Teacher Experience			0.03 (0.02)	0.086			-0.01 (0.02)	0.566			0.02 (0.02)	0.138
Teacher Support			0.04 (0.02)	0.038			0.03 (0.02)	0.114			0.0 (0.0)	0.132
Teacher Efficacy			-0.00(0.02)	0.923			0.00 (0.02)	0.987			0.00 (0.02)	0.999
Inclusion Efficacy			0.00 (0.02)	0.936			-0.02 (0.02)	0.373			0.01 (0.02)	0.634
IEP*Experience			0.04 (0.04)	0.282			-0.01 (0.03)	0.827			-0.01(0.04)	0.815
IEP*Support			-0.02(0.05)	0.737			-0.03 (0.03)	0.344			-0.03(0.04)	0.403

IEP*Tch. Efficacy			-0.01(0.05)	0.761			0.01 (0.04)	0.748			0.01 (0.04)	0.782
IEP*Inc. Efficacy			-0.02(0.04)	0.681			0.01 (0.03)	0.815			-0.02(0.04)	0.664
Effects on Slope												
Grade*Gender	-0.00(0.00)	0.385	-0.00(0.00)	0.342	-0.19(0.00)	0.000	-0.02 (0.04)	0.000	-0.01(0.00)	0.005	-0.01(0.00)	0.004
Grade*Race/Ethnic.												
Black (2)	-0.02(0.01)	0.008	-0.02(0.01)	0.006	-0.06(0.01)	0.368	-0.01 (0.01)	0.380	-0.02(0.01)	0.069	-0.02(0.01)	0.048
Hispanic (3)	0.02 (0.01)	0.023	0.01 (0.01)	0.033	0.02 (0.01)	0.003	0.02 (0.01)	0.004	0.04 (0.01)	0.000	0.04 (0.01)	0.000
Asian (5)	0.03 (0.01)	0.002	0.03 (0.01)	0.004	0.03 (0.01)	0.000	0.03 (0.01)	0.000	0.05 (0.01)	0.000	0.05 (0.01)	0.000
Grade*MaternalEd.	0.00 (0.00)	0.121	0.01 (0.00)	0.085	0.00 (0.00)	0.092	0.00 (0.00)	0.089	-0.00(0.00)	0.573	-0.00(0.00)	0.600
Grade*Income	0.00 (0.00)	0.690	0.00 (0.00)	0.630	-0.00(0.00)	0.941	-0.01 (0.00)	0.827	-0.00(0.00)	0.774	-0.00(0.00)	0.767
Grade*SchoolClim.	0.00 (0.00)	0.549	0.00 (0.00)	0.387	0.01 (0.00)	0.005	0.01 0(0.0)	0.006	0.01 (0.00)	0.024	0.01 (0.00)	0.023
Grade*IEP	0.01 (0.01)	0.288	0.01 (0.01)	0.286	-0.02(0.01)	0.030	-0.02 (0.01)	0.029	-0.04(0.01)	0.001	-0.04(0.01)	0.000
Grade*Experience			-0.00(0.00)	0.328			-0.00 (0.00)	0.511			-0.01(0.00)	0.018
Grade*Support			-0.00(0.00)	0.624			-0.00 (0.00)	0.465			-0.00(0.00)	0.768
Grade*Tch.Effic.			-0.00(0.00)	0.635			0.00 (0.00)	0.802			0.00 (0.00)	0.399
Grade*Inc. Effic.			-0.00(0.00)	0.822			0.00 (0.00)	0.635			-0.00(0.00)	0.386
IEP*Grade*Exp.			-0.01(0.01)	0.272			0.01 (0.01)	0.524			0.01 (0.01)	0.549
IEP*Grade*Supp.			-0.01(0.01)	0.330			0.01 (0.01)	0.432			0.01 (0.01)	0.154
IEP*Grade*T. Eff			0.00 (0.02)	0.976			-0.02 (0.01)	0.112			-0.00(0.01)	0.743
IEP*Grade*I.			0.01 (0.02)	0.555			-0.00 (0.01)	0.699			-0.00(0.	0.988

Eff						01)
Random Effects						
Var(Constant)	0.48 (0.00)	0.48 (0.00)	0.55 (0.00)	0.55 (0.00)	0.45 (0.00)	0.45 (0.00)
Var(Residual)	0.21 (0.00)	0.21 (0.00)	0.15 (0.00)	0.15 (0.00)	0.20 (0.00)	0.20 (0.00)
Model Fit						
AIC	75060.61	74382.11	71053.02	70344.77	64966.58	64341.35
BIC	75214.71	74659.15	71207.14	70621.82	65120.71	64618.42

Table 3

Influence of Teacher Characteristics on Competencies and Internalizing Behaviors

	Reading Competence				**Math Competence**				**Internalizing Problems**			
	Model 1 (*n* = 6,263)		**Model 2** (*n* = 6,173)		**Model 1** (*n* = 6,264)		**Model 2** (*n* = 6,17)		**Model 1** (*n* = 6, 263)		**Model 2** (*n* = 6,173)	
	***B* (SE)**	***p***	***B* (SE)**	***p***	***B* (SE)**	***p***	***B* (SE)**	***p***	***B* (SE)**	***p***	***B* (SE)**	***p***
Fixed Effects												
Effects on Intercept												
Constant	0.13 (0.03)	0.000	0.13 (0.03)	0.000	-0.13(0.02)	0.000	-0.13(0.03)	0.000	-0.20(0.02)	0.000	-0.20(0.02)	0.00
Grade	0.01 (0.01)	0.057	0.01 (0.01)	0.044	0.02(0.01)	0.005	0.02 (0.01)	0.007	0.05 (0.01)	0.000	0.05 (0.01)	0.00
Gender	-0.25(0.03)	0.000	-0.25(0.03)	0.000	0.21(0.03)	0.000	0.21 (0.03)	0.000	0.02 (0.03)	0.438	0.01 (0.03)	0.501
Race/Ethnicity												
Black (2)	0.13 (0.05)	0.015	0.14 (0.05)	0.009	0.20 (0.05)	0.000	0.19 (0.05)	0.000	0.42 (0.05)	0.000	0.41 (0.05)	0.000
Hispanic (3)	0.12 (0.04)	0.011	0.12 (0.05)	0.007	0.15 (0.04)	0.000	0.15 (0.04)	0.001	0.31 (0.04)	0.000	0.30 (0.04)	0.000
Asian (5)	0.09 (0.07)	0.189	0.09 (0.07)	0.157	0.19 (0.08)	0.012	0.19 (0.08)	0.014	0.02 (0.05)	0.646	0.03 (0.05)	0.621
Maternal Education	0.04 (0.02)	0.056	0.04 (0.02)	0.048	0.02 (0.02)	0.372	0.17 (0.19)	0.360	-0.14(0.17)	0.000	-0.14(0.02)	0.000
Income	0.01 (0.02)	0.596	0.01 (0.02)	0.632	-0.01(0.02)	0.738	-0.01(0.02)	0.778	-0.14(0.02)	0.000	-0.14(0.02)	0.000
School Climate	0.00 (0.02)	0.983	0.00 (0.02)	0.998	-0.00(0.05)	0.922	0.00 (0.02)	0.932	-0.03(0.01)	0.018	-0.03(0.01)	0.025
IEP	-0.12 (0.05)	0.015	-0.13 (0.6)	0.022	0.01 (0.05)	0.779	0.02 (0.05)	0.645	0.27 (0.05)	0.000	0.27 (0.05)	0.000
Teacher Experience			0.02 (0.02)	0.427			-0.01(0.02)	0.639			-0.00(0.02)	0.807

Teacher Support			0.01 (0.02)	0.810			-0.01(0.02)	0.594			-0.02(0.02)	0.383
Teacher Efficacy			-0.01(0.02)	0.511			-0.01(0.02)	0.741			0.02 (0.02)	0.273
Inclusion Efficacy			0.01 (0.02)	0.640			0.01 (0.02)	0.769			-0.01(0.02)	0.708
IEP*Experience			0.03 (0.06)	0.577			-0.02(0.06)	0.763			0.02 (0.05)	0.713
IEP*Support			-0.08(0.07)	0.205			-0.04(0.06)	0.494			0.02 (0.05)	0.714
IEP*Tch. Efficacy			-0.01(0.06)	0.882			0.01 (0.07)	0.843			-0.04(0.06)	0.495
IEP*Inc. Efficacy			0.01 (0.07)	0.845			-0.04(0.07)	0.591			-0.03(0.06)	0.636
Effects on Slope												
Grade*Gender	-0.03 (0.01)	0.000	-0.03(0.01)	0.000	-0.02(0.01)	0.007	-0.02(0.01)	0.008			-0.05(0.01)	0.000
Grade*Race/Ethnic.												
Black (2)	0.01 (0.01)	0.353	0.01 (0.01)	0.386	-0.02(0.01)	0.091	-0.02(0.01)	0.096	-0.09(0.01)	0.000	-0.09(0.01)	0.000
Hispanic (3)	-0.04 (0.01)	0.004	-0.03(0.01)	0.005	-0.05(0.01)	0.000	-0.05(0.01)	0.000	-0.03(0.01)	0.013	-0.03(0.01)	0.013
Asian (5)	0.03 (0.02)	0.058	0.03 (0.02)	0.056	0.00 (0.02)	0.847	0.00 (0.02)	0.848	0.01 (0.02)	0.424	0.01 (0.02)	0.486
Grade*MaternalEd.	0.02 (0.01)	0.000	0.02 (0.01)	0.000	0.01 (0.00)	0.060	0.01 (0.00)	0.058	0.02 (0.00)	0.001	0.02 (0.00)	0.001
Grade*Income	0.01 (0.01)	0.107	0.01 (0.01)	0.092	0.01 (0.01)	0.029	0.01 (0.01)	0.043	0.02 (0.01)	0.001	0.02 (0.01)	0.002
Grade*School Clim.	0.01 (0.01)	0.254	0.01 (0.01)	0.249	0.01 (0.01)	0.288	0.00 (0.01)	0.365	0.00 (0.00)	0.281	0.00 (0.00)	0.289
Grade*IEP	-0.01 (0.02)	0.508	-0.01(0.02)	0.498	-0.02(0.02)	0.165	-0.02(0.02)	0.119	-0.04(0.02)	0.011	-0.04(0.02)	0.014
Grade*Experience			-0.00(0.01)	0.422			0.00 (0.00)	0.593			-0.00(0.00)	0.978
Grade*Support			0.00 (0.01)	0.632			0.00 (0.01)	0.664			0.00 (0.01)	0.820
Grade*Tch.Eff			0.00 (0.01)	0.990			-0.01(0.	0.357			-0.00(0.	0.545

ic.				01)		00)	
Grade*Inc.		-0.00(0.01)	0.787	0.00(0.01)	0.602	-0.00(0.00)	0.882
IEP*Grade*Exp.		0.01(0.02)	0.500	-0.01(0.02)	0.645	-0.03(0.02)	0.102
IEP*Grade*Support		0.02(0.02)	0.384	0.02(0.02)	0.364	-0.01(0.02)	0.670
IEP*Grade*T.Eff		-0.00(0.02)	0.869	-0.00(0.02)	0.955	0.02(0.02)	0.206
IEP*Grade*I.Eff		-0.01(0.02)	0.623	-0.00(0.02)	0.958	0.00(0.02)	0.963
Random Effects							
Var(Constant)	0.33(0.00)	0.33(0.00)		0.37(0.00)	0.37(0.00)	0.30(0.00)	0.29(0.00)
Var(Residual)	0.62(0.00)	0.62(0.00)		0.63(0.00)	0.63(0.00)	0.61(0.00)	0.66(0.00)
Model Fit							
AIC	17679.98	17515.49		20467.29	20288.37	15566.02	15458.47
BIC	17834.08	17792.54		20621.39	20565.42	15720.13	15735.53

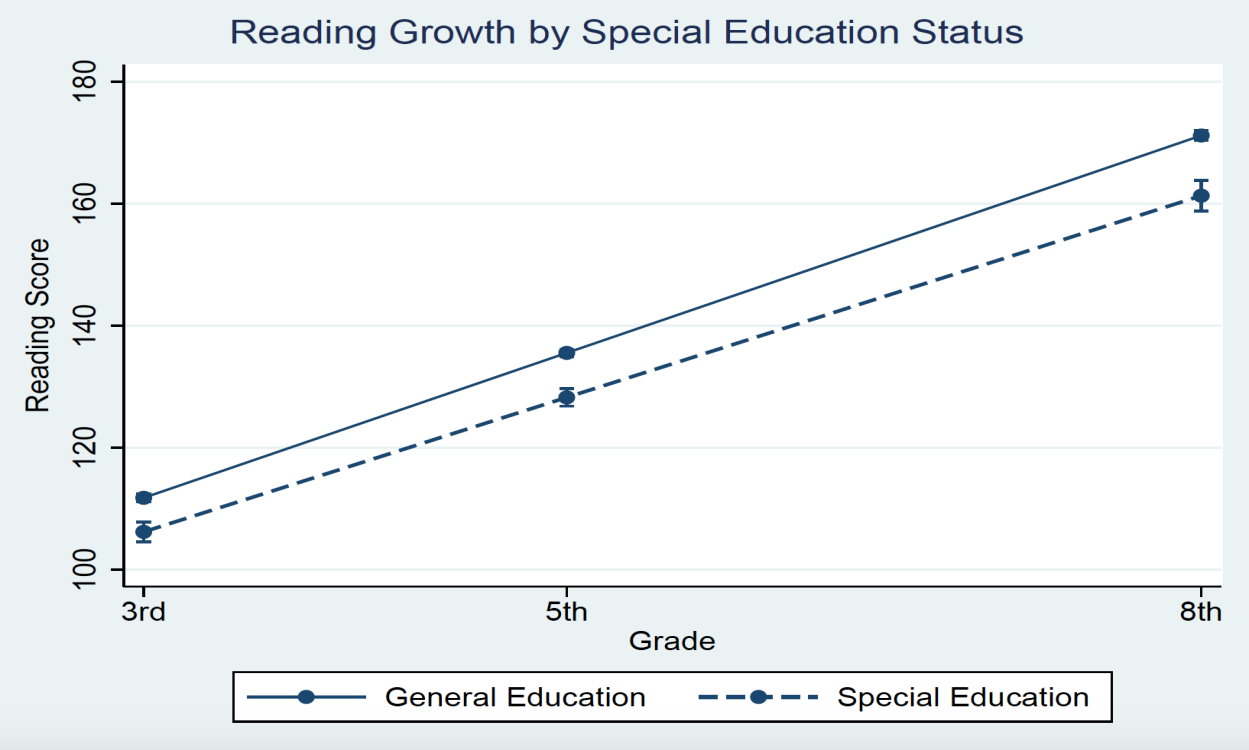

Figure 1: Reading Growth by Special Education Status

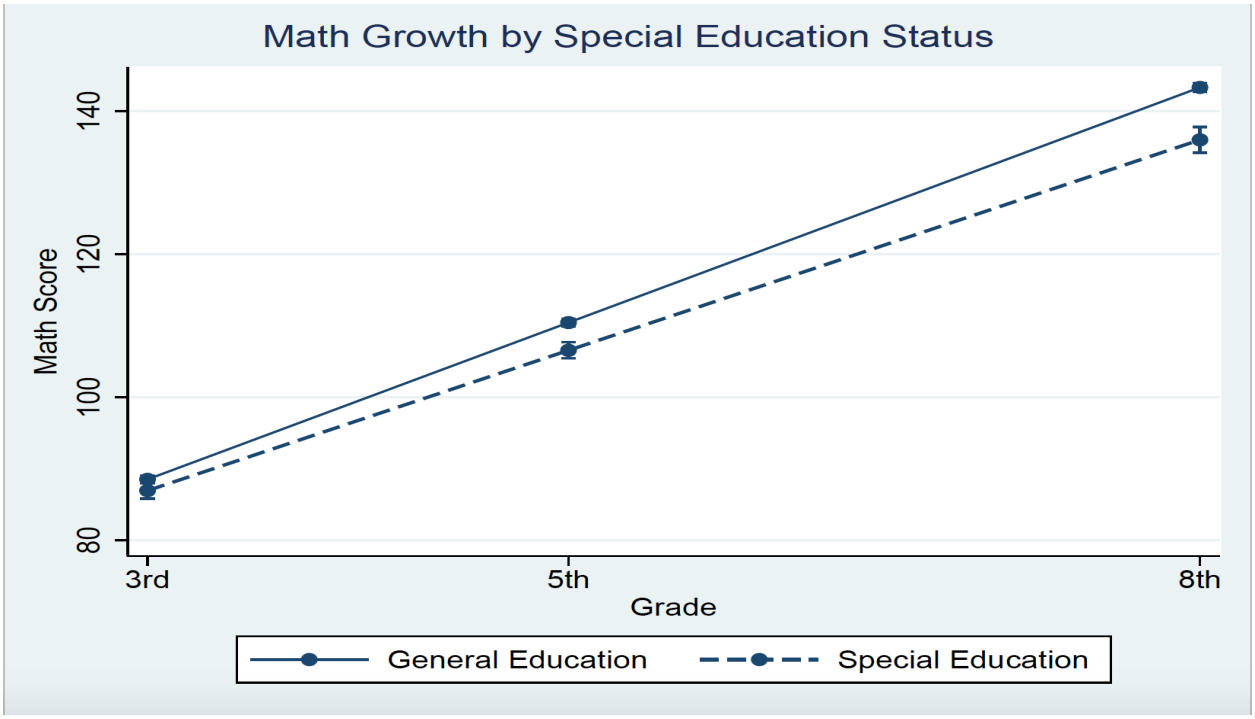

Figure 2: Math Growth by Special Education Status

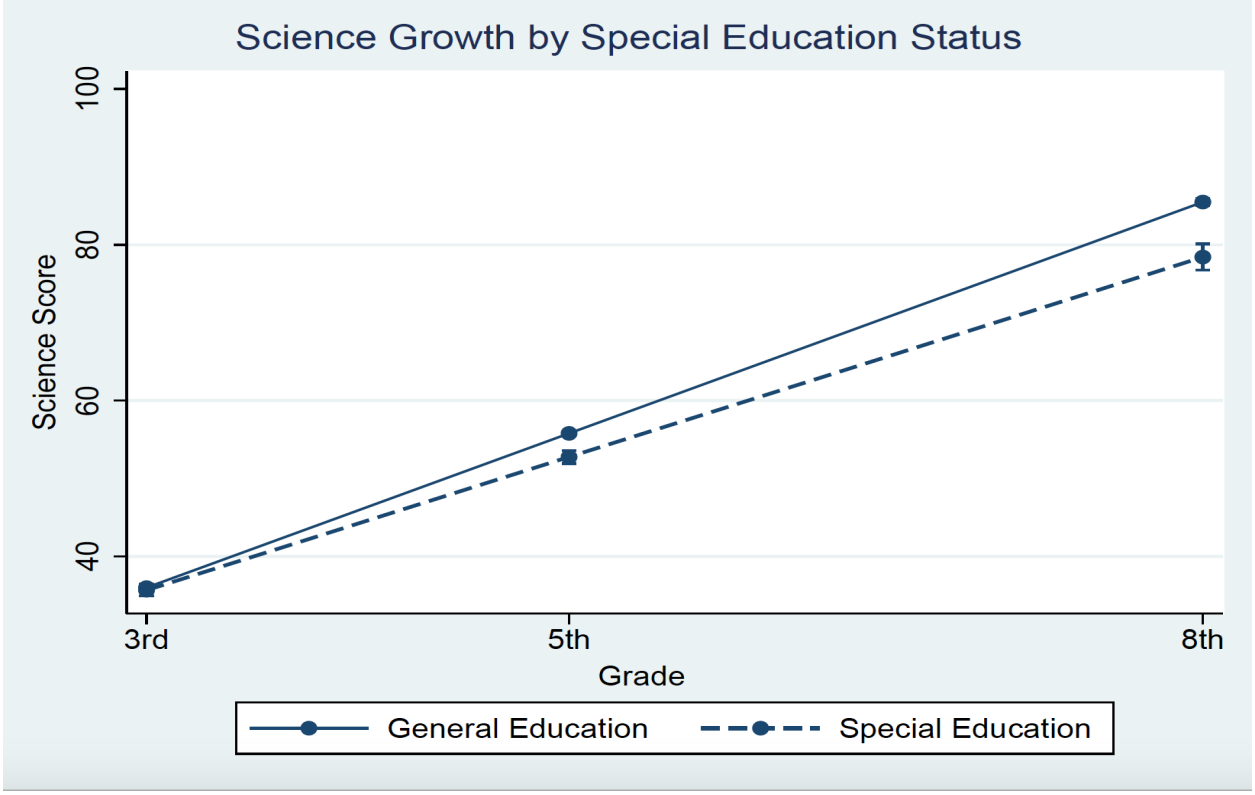

Figure 3: Science Growth by Special Education Status

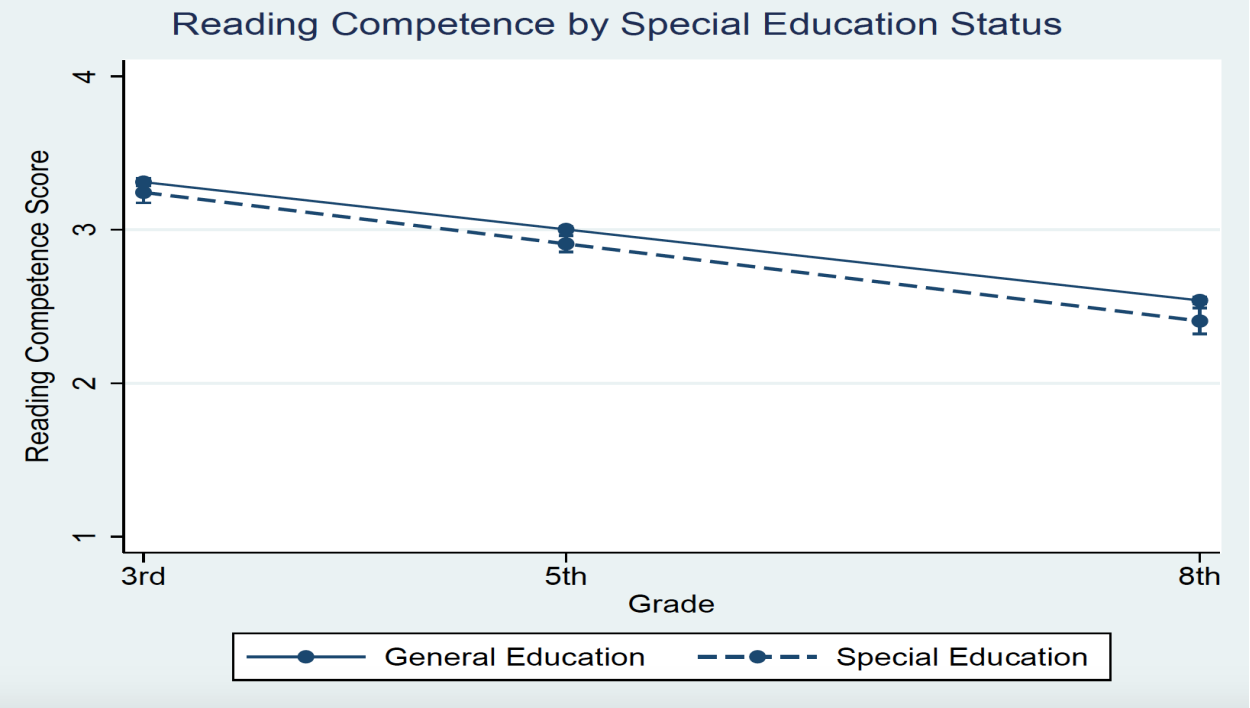

Figure 4: Reading Competence by Special Education Status

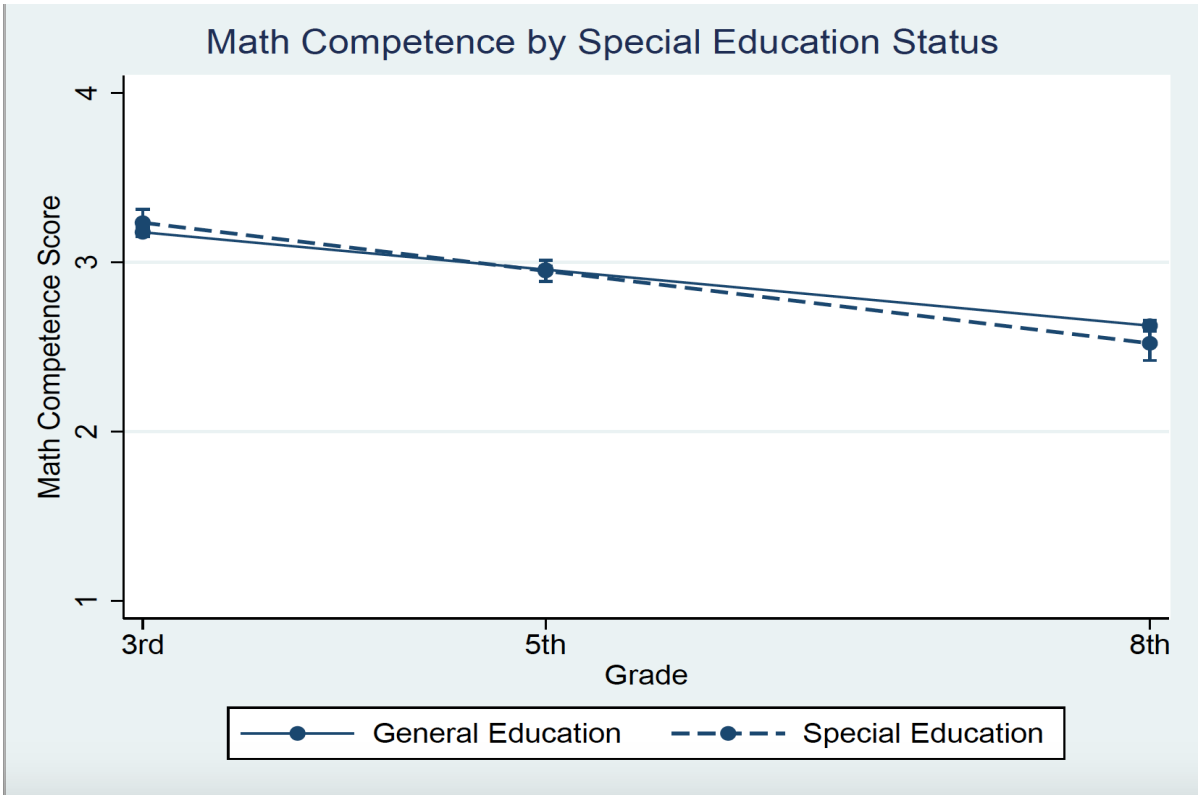

Figure 5: Math Competence by Special Education Status

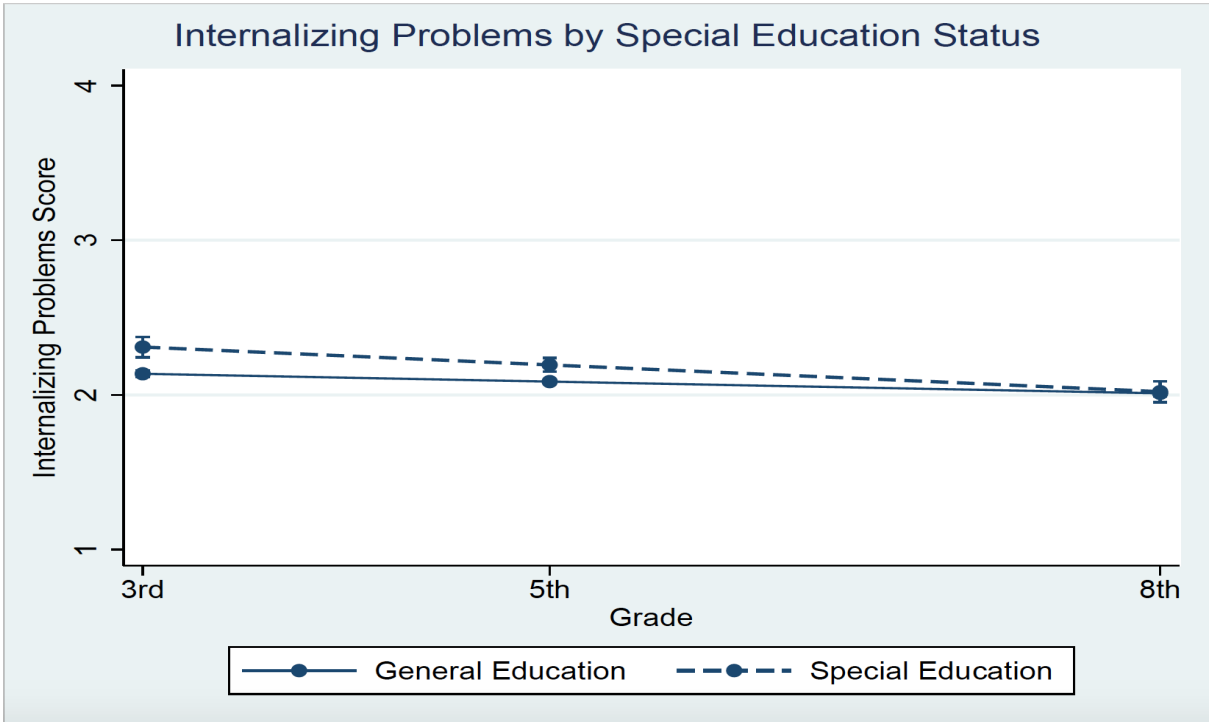

Figure 6: Internalizing Problems by Special Education Status