Class Rank and Student Disability Classification*

Marie Hull† Hema Shah‡ Maria Zhu§

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Abstract

U.S. public schools play a central role in disability identification. We study how third-grade class rank affects subsequent disability classification using administrative data and variation in school-cohort achievement distributions to isolate rank from own achievement. Students in the lowest ventile are 3.9 percentage points more likely to be identified as having a disability relative to the median (10^{th} ventile). Students in the top ventile exhibit smaller but significant increases relative to the median as well. These findings are primarily driven by students learning disabilities and health conditions such as Attention-Deficit/Hyperactivity Disorder (ADHD). We also show that students with low rank are more likely to receive a testing accommodation in 4^{th} grade. Our findings shed light on the role of subjective factors in shaping disability diagnosis and testing accommodations.

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†Department of Economics, University of North Carolina at Greensboro. mchull2@uncg.edu

‡Department of Economics, Duke University. hema.shah@duke.edu

§Department of Economics, Syracuse University. mzhu33@syr.edu

1 Introduction

Fifteen percent of students enrolled in public schools in the U.S. receive special education or related services, and that proportion has been growing over time (National Center for Education Statistics, 2024). This population is also heterogeneous and includes students with a wide range of diagnoses, support needs, and potentials to meet traditional markers of academic progress. Multiple factors have contributed to the increase in students identified as having a disability at school, including reduced stigma, early intervention efforts, and updates to diagnostic manuals. These trends have sparked debates: While many applaud the reduction in stigma, increasing the size of the tent has caused tension between groups with different needs and led to discussions of the potential over- and under-diagnosis of some disabilities.

At the same time, changes in economic mobility have contributed to parental anxiety over their children's future. Parents report increased oversight of and time spent parenting their children (Office of the Surgeon General, 2024). Not only have the diagnostic criteria for some disabilities changed over time, but certain disability diagnoses are inherently subjective. With the increasing size and awareness of the population of children and youth with disabilities, there has been a movement to provide the appropriate support, which could include specialized instruction, testing accommodations, or more excused absences.

In this paper, we study an important factor that can influence disability identification: peer comparison. Specifically, we estimate the role of a student's test score relative to peers, conditional on the student's underlying test-based achievement, on the likelihood of being identified as having a disability at school. We find that students scoring in the lowest (1^{st}) ventile are 3.9 percentage points more likely to be identified as having a disability relative to the 3^{rd} ventile and 4.7 percentage points more likely relative to the median (10^{th} ventile), with both differences statistically significant at the 1% level. We also find that students scoring in the top ventiles have a smaller but statistically significant increase in their likelihood of being identified as having a disability relative to the median. Effects are driven primarily by classifications of learning disabilities and health impairments such as Attention-Deficit/Hyperactivity Disorder (ADHD), rather than classifications with more objective diagnostic criteria, such as speech impediments and hearing impairments. We posit that negative peer comparisons lead to an increased probability of disability identification for the lowest scoring students in a cohort. We explore several explanations for the increased probability of disability identification among higher scoring students in a cohort.

The data come from the universe of public school students in North Carolina

from 2009 to 2019. We compute each student's third-grade test score rank relative to peers in the same school and cohort. Third grade is the first year of standardized testing in North Carolina and a key point for disability identification as academic demands increase. Restricting to students not identified with a disability in third grade, we estimate the probability of classification in fourth grade as a function of third-grade rank ventiles, own test scores, student controls, fixed effects, and controls for the school test score distribution. Our approach follows Murphy and Weinhardt (2020) and Denning, Murphy, and Weinhardt (2023).

In addition to our findings on the effect of third grade class rank on fourth grade disability identification, we also explore related analyses of interest. We find a somewhat greater effect of third grade rank on disability classification measured in grades 5 through 8, suggesting that class rank effects increase over time. We also separately estimate the effects for each of the disability categories in our data. These results reveal that our main findings are driven by the identification of learning disabilities (the largest category), but that many disability categories contribute. We further find that students with low third grade rank are more likely to receive testing accommodations in fourth grade and that they are more likely to be missing a fourth grade test score.

This study contributes to a growing literature examining the effects of class rank on a range of outcomes. Most prior work has focused on educational and labor market consequences, generally finding that a higher ordinal rank (i.e., higher academic performance relative to peers) is associated with more favorable outcomes along these dimensions (Dadgar, 2026; Denning et al., 2023; Elsner & Isphording, 2017; Elsner, Isphording, & Zölitz, 2021; Murphy & Weinhardt, 2020). A smaller set of studies has examined non-cognitive outcomes. For example, Kiessling and Norris (2022) show that higher class rank improves mental health outcomes, while Elsner and Isphording (2018) find that higher rank reduces engagement in risky behaviors, including smoking, drinking, unprotected sex, and physical fighting.

The present study also joins a body of research documenting non-medical factors that contribute to disability diagnosis in students. For one, students who are young for their grade are more likely to be classified as having a disability (Dhuey & Lipscomb, 2010; Elder, 2010; Elder & Lubotsky, 2009; Evans, Morrill, & Parente, 2010; Layton et al., 2018; Whitely & et al., 2019). In our work, we include flexible controls for age to rule out the possibility that relative age effects are driving our class rank results. In addition, prior work has documented the effects of fiscal incentives (Cullen, 2003; Dhuey & Lipscomb, 2011; Greene & Winters, 2011; Morrill, 2018) and accountability pressures (Figlio & Getzler, 2002; Jacob, 2005), and others have explored the role of race, (Elder, Goddeeris, & Haider, 2021; Morgan, Staff, Hillemeier,

Farkas, & Maczuga, 2013; Shi, Eren, & Moulton, 2021), income (Ainsworth et al., 2026), and geography (National Center for Education Statistics, 2024) on disability classification.

Our study extends these literatures by providing evidence on the effects of ordinal rank on students' disability classification. Disability classification differs from previously studied outcomes in the class rank literature in that underlying disability status should not vary with peer performance. As a result, our findings shed light on the role of subjective factors, such as perceptions of students relative to their peers, in shaping the diagnosis and classification of disabilities. This setting is particularly important because students with disabilities experience substantially worse outcomes than their non-disabled peers, and accurate identification is a critical pathway for ensuring access to appropriate educational resources and supports.

2 Background

2.1 Disability policy in public education in the US

Disability policy in K–12 education in the United States is governed by three main laws, which are designed to ensure equal access to educational opportunities for students with disabilities. These laws, which were designed with equity and inclusion considerations in mind, are: The Individuals with Disabilities Act (IDEA), Section 504 of the Rehabilitation Act (Section 504), and Title II of the Americans with Disabilities Act (ADA) (ADA National Network, 2018).

The cornerstone of federal disability policy in K–12 education is IDEA, originally enacted in 1975 as the Education for All Handicapped Children Act (U.S. Department of Education, n.d.-a). IDEA established the legal right of children with disabilities to a free appropriate public education in the least restrictive environment. Under IDEA, eligible students are entitled to individualized educational programs (IEPs) that identify specific needs and articulate tailored services, including specialized instruction, related services (e.g., speech therapy, occupational therapy), and necessary accommodations (U.S. Department of Education, n.d.-a).

Concurrent with IDEA, Section 504 was enacted in 1973 and prohibits discrimination on the basis of disability by any program or activity receiving federal financial assistance, including public schools (U.S. Department of Education, n.d.-b). Section 504's broader definition of disability and civil rights orientation complements IDEA's entitlement-based structure by ensuring that students with disabilities who do not meet IDEA's categorical eligibility criteria still receive necessary accommodations and are protected from discriminatory practices (National Center for Learning

Disabilities, 2024). ADA, enacted in 1990, further extended civil rights protections, prohibiting disability discrimination in public entities and services, including all public schools. ADA reinforced the principles of access and nondiscrimination embedded in Section 504 and underlined the expectation that schools eliminate barriers to participation and learning (ADA National Network, 2018).

2.2 Disabilities evaluation in North Carolina public schools

The North Carolina State Board of Education provides guidance to determine whether a child meets the criteria for a disability under IDEA and to identify the nature and scope of the special education and related services required.[1] The state mandates that a comprehensive and individualized evaluation must be completed prior to any decision regarding a student's initial placement in a special education program. Eligibility determinations must be informed by multiple sources of data and may not be based on a single assessment or test score. Specifically:

> Evaluation procedures may include, but are not limited to, observations, interviews, progress monitoring data, behavior checklists, structured interactions, play assessment, adaptive and developmental scales, criterion-referenced and norm referenced instruments, clinical judgment, and tests of basic concepts or other techniques and procedures as deemed appropriate by the professional(s) conducting the evaluations. When eligibility for specific learning disability is being determined, evaluation data must include progress monitoring data.

Requests for disability evaluations can be made by parents, children, and local education agencies. Authorized evaluators for disabilities are qualified professionals in a disability area. Determination of disability is made jointly by qualified professionals and parents of a child. Importantly, the disability must adversely affect the student's educational performance and must require specialized instruction, not just accommodations. Districts have 90 days to conduct an evaluation and make an eligibility determination after the receipt of a written referral for an evaluation.

In North Carolina, school districts receive supplemental funding for each student with a disability up to a specified cap of allotted average daily membership. The additional funding has increased over time and was about $5,300 as of the 2023-24 fiscal year (North Carolina Department of Public Instruction, 2024). During the period covered by our data, the cap was 12.5% of allotted average daily membership,

[1] See: https://www.dpi.nc.gov/policies-governing-students-children-disabilities/download

though it is now 13%. The additional funding does not vary by the type of disability or the intensity of the student's needs. Needham and Houck (2019) estimate that across a 13-year period, on average 62% of North Carolina school districts were underfunded with respect to special education, meaning that their special education populations were larger than the cap. More recently, about 54% of traditional school districts exceed the funding cap (North Carolina Department of Public Instruction, 2024).

In addition to students meeting the criteria for a disability under IDEA, several other groups of students are eligible to receive accommodations on state-mandated standardized tests in North Carolina. These groups include students with a 504 plan who meet the criteria for a disability under Section 504, students with documented transitory impairments who do not meet the criteria for a disability under IDEA or section 504, and English Language Learner (ELL) students.[2]

3 Data

This paper uses data from the North Carolina Education Research Data Center, which contains information on the universe of public school students in North Carolina, provided by the North Carolina Department of Public Instruction (NC DPI). Key to our study, this data contain information on a student's disability status, as well as a coarse classification of the type of disability the student has. Disability status variables identify students whose IEP meets the criteria for disability status under IDEA. Additionally, we have student testing information data from end-of-grade (EOG) standardized tests, which contains information on students' performance on these tests, as well as their testing accommodation information. Testing accommodation variables identify students who qualify for accommodations on EOG tests due to meeting the criteria for disability status under IDEA, meeting the broader criteria for disability status under Section 504, having a transitory disability which does not qualify under IDEA and Section 504, or being an English Language Learner.

The sample includes 865,083 students enrolled in third grade for the first time between 2009 and 2019 who were not classified with a disability in third grade. Third grade is the first grade in which students take EOG tests, so this is also the first grade in which EOG tests have the potential to influence disability diagnoses.[3] We present summary statistics in Table 1. The first column presents means for the

[2]See: https://www.dpi.nc.gov/districts-schools/accountability-and-testing/testing-policy-and-operations/testing-students-disabilities

[3]Note: students do take other standardized tests, like the DIBELS test, in earlier grades.

sample of all third graders. The next two columns display means for students in our analytic sample of third graders without a disability) and excluded students. Students excluded from the analytic sample are more likely to be male, economically disadvantaged, Black, and Hispanic.

Table 1: Student Summary Statistics

	Full Sample Mean	No Disability in Grade 3 Mean	Disability in Grade 3 Mean
Female	0.492	0.512	0.324
Economically Disadvantaged	0.530	0.519	0.631
White	0.390	0.389	0.412
Black	0.194	0.192	0.213
Hispanic	0.133	0.136	0.112
Asian	0.0238	0.0255	0.00920
Native American	0.0101	0.00976	0.0131
Other Race	0.249	0.249	0.240
Age in Months at Start of Grade 3	103.4	103.0	106.2
Grade 4 EOG Math Accommodation	0.133	0.0751	0.662
Grade 4 EOG Reading Accommodation	0.117	0.0647	0.612
Absent from Grade 4 EOG Math Test	0.0190	0.0151	0.0530
Absent from Grade 4 EOG Reading Test	0.0222	0.0157	0.0779
Classified with Disability in Grade 4	0.112	0.0241	0.874
Learning Disability	0.0583	0.0151	0.431
Health Impairment	0.0234	0.00564	0.176
Speech Impediment	0.0435	0.0195	0.251
Autism	0.00703	0.000793	0.0609
Intellectual Disability	0.00424	0.000740	0.0343
Emotional Disability	0.00346	0.000809	0.0263
Hearing Impairment	0.00114	0.000125	0.00995
N	966684	865083	99992

From Table 1, 2.4% of students who were not classified with a disability in 3$^{\text{rd}}$ grade receive a disability classification in 4$^{\text{th}}$ grade. The most common disabilities in the data are learning disability, health impairment, and speech impediment.[4] About 8% of students who were not classified with a disability in 3$^{\text{rd}}$ grade receive an

[4] "Specific" learning disabilities include, but are not limited to, dyslexia and dyscalculia, and explicitly exclude developmental, emotional, and intellectual disabilities. NC DPI defines health impairment as "having limited strength, vitality or alertness, including a heightened alertness to environmental stimuli, that results in limited alertness with respect to the educational environment." Examples of such chronic or acute health problems include "asthma, attention deficit disorder or attention deficit hyperactivity disorder, diabetes, epilepsy, a heart condition, hemophilia, lead poisoning, leukemia, nephritis, rheumatic fever, sickle cell anemia, and Tourette's Syndrome." See: https://www.dpi.nc.gov/documents/publications/catalog/ec144-policies-governing-services/open

accommodation on the 4th grade math test (6% for the reading test), conditional on taking the test. Approximately 1.5% of students who were not classified with a disability in 3rd grade are absent from the 4th grade EOG test data despite being present in the 4th grade enrollment data, a noisy proxy for disability-based testing exemption.

The data includes both students with testing accommodations but no disability classification as well as students with a disability classification but no testing accommodations. Table 2 provides summary statistics on disability classification for students who have a testing accommodation in math or reading in 4th grade. Overall, about 60% of students who receive testing accommodations are classified with a disability in 4th grade, and 35% of students who receive accommodations have a learning disability in particular. We also see in our data that not all students with a disability receive accommodations: Seventy percent of students with a disability receive testing accommodations, compared with just 5% of students without a disability.

Table 2: Disability Classification and EOG Accommodation

	EOG Math Accommodation Mean	EOG Reading Accommodation Mean
Classified with Disability	0.603	0.613
Learning Disability	0.352	0.341
Health Impairment	0.143	0.155
Speech Impediment	0.0400	0.0411
Autism	0.0397	0.0442
Intellectual Disability	0.0212	0.0231
Emotional Disability	0.0196	0.0217
Hearing Impairment	0.00602	0.00643
Observations	111027	97546

4 Empirical strategy

4.1 Rank measurement

We construct student i's rank measure in a given subject s within their cohort c at a school j as their relative rank on a standardized test:

$$R_{ijsc} = \frac{Rank\ position - 1}{N_{jsc} - 1}, \tag{1}$$

where N_{jsc} is the total number of students in subject s in cohort c at school j. *Rank position* is the student's ordinal rank position relative to their peers in the cohort, with the student with highest test score in the school cohort having a *Rank position* value of N_{jsc} and the student with the lowest test score having a *Rank position* value of one. Thus, R_{ijsc} is uniformly distributed by construction and takes values between 0 and 1. When test scores are tied, all students sharing the same score are assigned the average rank calculated across students with that score within the same school–subject cohort.

4.2 Estimation

Our aim is to isolate the effects of class rank on disability classification by comparing outcomes across students who have comparable underlying achievement levels, as measured by test scores, but who have different class ranks due to idiosyncratic variation in the test score distributions across different school-grade cohorts in the data. Following the approach of Denning et al. (2023), we estimate the following specification to assess how class rank affects students' disability classification:

$$Y_{ijsc(t+x)} = \sum_{r=1, r\neq 10}^{20} \mathbb{I}_n(R_{ijsc} = r)\beta_r + \sum_{D=2}^{100} \sum_{v=1, v\neq 10}^{20} \mathbb{I}_n(T_{ijsc} = v)\mathbb{I}_d(d_s = D)\alpha_{nd} + \theta_{jsc} + \mathbf{X}_i'\gamma + \epsilon_{ijsct}, \quad (2)$$

where $Y_{ijsc(t+x)}$ takes the value one if 3$^{\text{rd}}$ grade student i in subject s at school j in cohort c in year t has a disability diagnosis x years later and zero otherwise. We regress this outcome on a student's rank within their cohort along with other covariates. Specifically, we include dummy variables for each rank ventile r, with a higher rank corresponding to higher academic achievement relative to peers. We omit the ventile corresponding to the median (the 10$^{\text{th}}$ ventile). Our coefficients of interest are β_r. Specifying the rank variable as ventiles allows us to capture potentially interesting nonlinearities in rank effects on disability classification.

In addition, we control for a student's own academic achievement since rank is correlated with academic achievement. The inclusion of this control variable ensures that we capture the true effects of class rank, rather than the effects of unobserved correlates of underlying disability status that may affect classification through achievement or the direct effects of academic achievement on disability classification. We capture academic achievement through performance on standardized tests since

this is the same metric we use to construct rank measures. In our preferred specification, we control for test scores T_{ijsc} as cohort-specific ventiles of performance, allowing for nonlinearities in the effect of achievement on disability classification. We furthermore allow for the effects of achievement to vary by the mean and variance of the school achievement distribution. Schools are put into groups, d_s, according to their decile of school mean achievement and decile of school variance of achievement, which may vary by subject, resulting in $D = 100$ distinct school distribution groups. In the next subsection, we explain our decision to use deciles of the the school mean and school variance of achievement to characterize the school achievement distribution.

Our specification includes school- and subject-specific cohort fixed effects, θ_{jsc}, to account for any peer influences reflected in the mean, variance, or higher-order moments of cohort characteristics. This set of fixed effects ensures that we are comparing outcomes of students who differ in rank but are exposed to similar classroom environments in terms of peer composition. Finally, we control for a vector of student characteristics, $\mathbf{X}_i'$, which includes information on race, gender, and economic disadvantage status. Our sample is restricted to students who are not classified with any disability in 3rd grade to ensure we are not picking up reverse causation in diagnoses affecting class rank.[5]

4.3 Identification

The key identifying assumption of our approach is that conditional on own underlying achievement, the school distribution of achievement, school-cohort fixed effects, and student characteristics, rank is not correlated with unobservable characteristics that also affect disability classification. We first assess the validity of this assumption using a set of balance tests to evaluate whether students with certain observable characteristics systematically attend schools with a certain test score distribution, termed "passive sorting" by Denning et al. (2023). In each balance test, we estimate a specification analogous to equation 2, replacing the outcome Y with a predetermined student demographic characteristic. Based on the results of these balance tests shown in Table 3, we choose to control for school-level achievement distributions in all empirical specifications using deciles of average achievement and achievement dispersion, rather than quartiles as in Denning et al. (2023). When we characterize the school-cohort distribution with deciles, our specification passes balance tests for five

[5]When evaluating student testing accommodation outcomes, we further restrict the sample to students who are not receiving testing accommodations in 3rd grade due to the substantial number of students who do not have a disability but do receive testing accommodations.

out of six predetermined characteristics.[6]

[6]We considered a number of quantiles more than ten but decided that the loss in statistical power would be too great.

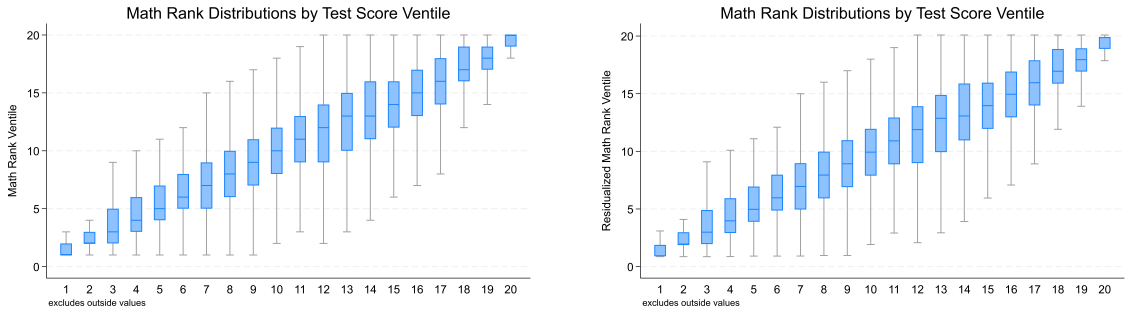
Table 3: Balance Test

	(1) Economically Disadvantaged	(2) Male	(3) White	(4) Asian	(5) Black	(6) Hispanic
	A. Controlling for School Quartiles of Mean × School Quartiles of Variance					
Math Rank	0.00260***	0.0000697	-0.00397***	-0.000220	0.000873	0.00295***
	(0.000713)	(0.000629)	(0.000627)	(0.000562)	(0.000673)	(0.000528)
	B. Controlling for School Deciles of Mean × School Deciles of Variance					
Math Rank	-0.0000356	0.000629	-0.00120*	-0.000167	-0.000717	0.00151***
	(0.000684)	(0.000687)	(0.000617)	(0.000521)	(0.000641)	(0.000499)
Observations	998203	998203	998203	998203	998203	998203

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

As a practical matter, there also needs to be enough variation in rank conditional on test scores for us to identify the effects of class rank on disability classification. In Figure 1, we present box plots of student rank ventile but student's own test score ventile. Panel A shows that there is substantial variation in class rank ventile for almost all ventiles of own math score. For example, we observe that a student with a math test score at the 20th percentile of the statewide test score distribution could fall into the 2nd, 3rd, 4th, or 5th ventile of the same student's school-cohort test score distribution. More relevant for our analysis is variation in rank left after the inclusion of controls. Panel B demonstrates that substantial variation in rank remains after residualizing class rank on school achievement distribution covariates. We note that variation in rank is limited at both the high and low tails of the achievement distribution. Thus, we take care in our results discussion to compare rank coefficients where there is sufficient overlapping variation to make the comparison valid.



(a) Unconditional Variation

(b) Residual Variation

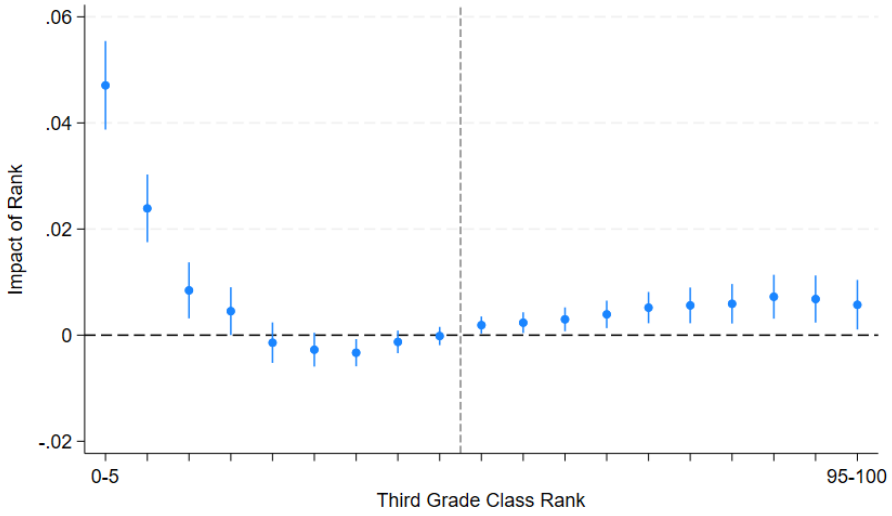
Figure 1: Identifying Variation

5 Results

5.1 Main Results

We first analyze the effect of 3rd grade class rank on being newly classified with any disability in 4th grade. The rank coefficients and their corresponding 95% confidence intervals are shown in Figure 2. We only discuss results using math test scores to define class rank, but reading rank results are similar and provided in Appendix A. Relative to the median (percentiles 45-50), students in the bottom ventile (percentiles 0-5) are 4.7 percentage points more likely to be classified as having any disability. Relative to the 3rd ventile, the difference is 3.9 percentage points and remains statistically significant at the 1% level. For context, 2.4% of students enter into disability status in 4th grade in our analytic sample of students without a disability classification in 3rd grade. Thus, having low class rank substantially increases the likelihood of a new disability classification relative to the mean.

Figure 2: Impact of Third Grade Math Class Rank on 4th Grade Disability Classification



We also find small but statistically significant effects of having high class rank. At the top ventile (percentiles 95-100), students are 0.57 percentage points more likely to be newly classified as having a disability relative to the median. Relative to the 3rd highest ventile, the difference is less than 1 percentage point and is not statistically significant at the 10% level. Different phenomena could drive this finding.

One potential explanation is that some parents of high-achieving students seek a disability classification for testing accommodations or other special services. Another possibility is that some students appear to perform poorly in the classroom but then score very well compared to peers on end-of-the-year standardized tests. This discrepancy could spur parents or school employees to seek an evaluation of the student for a disability.

We next investigate whether class rank affects the likelihood that a student is missing a 4^{th} grade math score but is present in the 4^{th} grade data, and we plot the results in Figure 3. Relative to the median (percentiles 45-50), students in the bottom ventiles are more likely to be absent from the 4^{th} grade EOG testing data, which may be driven by excused testing absences due to disability status. Results for 4^{th} grade math testing accommodations are in Figure 4. Conditional on being present in the 4^{th} grade EOG testing data, students in the bottom ventiles are more likely to receive testing accommodations. Students in the top ventiles are not significantly more likely to be absent from the testing data or receive testing accommodations.

Figure 3: Impact of Third Grade Math Class Rank on 4^{th} Grade EOG Math Test Absence

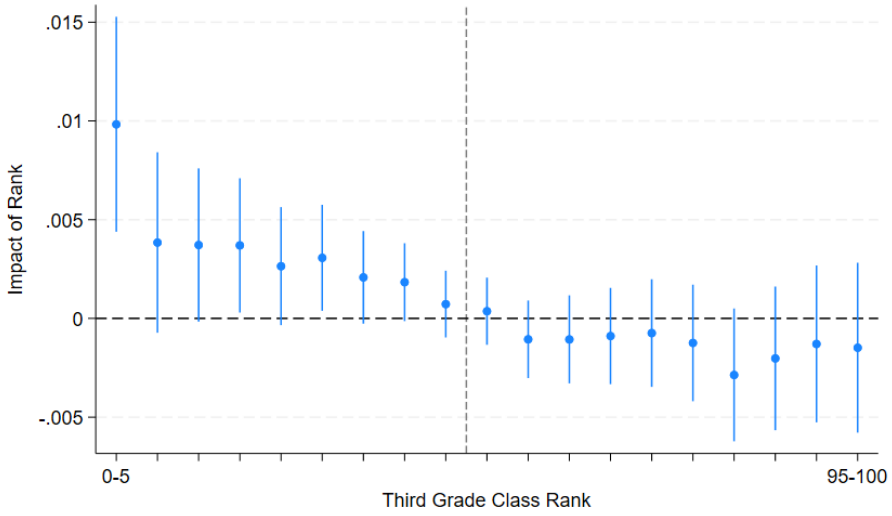
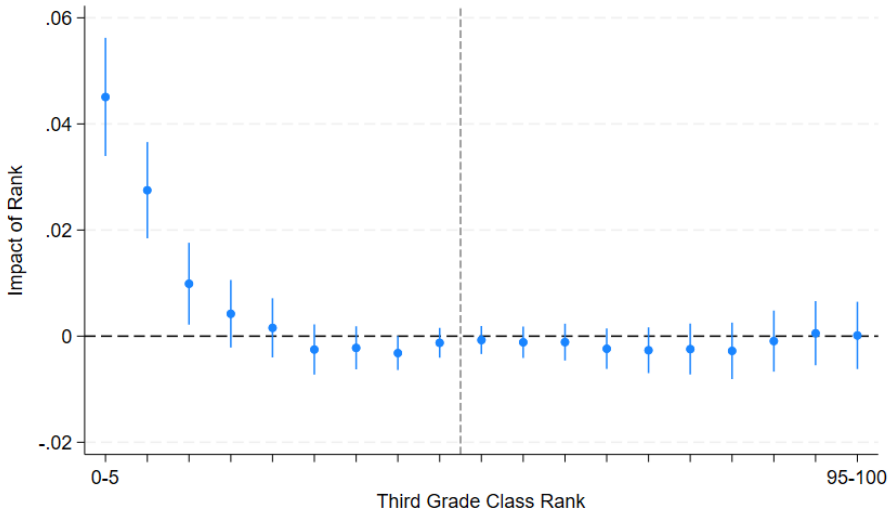


Figure 4: Impact of Third Grade Math Class Rank on 4th Grade EOG Math Test Accommodation



Finally, we examine specific types of disabilities. We find positive effects of low class rank on the diagnosis of learning disabilities (e.g., dyslexia) and health impairments (e.g., ADHD), the two most common disability categories, along with less common disabilities including mild intellectual disability, moderate intellectual disability, and emotional disability. We find significant positive effects of high class rank only for the diagnosis of health impairments, which is consistent with clinical evidence that ADHD is observed across the full distribution of cognitive ability (Association, 2013). For speech impediment, autism, and hearing impairment, we find no statistically significant effects across the class rank ventiles, but statistical power is an issue since these disabilities are rare. Thus, we find evidence that the impacts of class rank could be driven by disabilities with more subjective diagnostic criteria.

Figure 5: Impact of Third Grade Math Class Rank on 4th Grade Learning Disability Classification

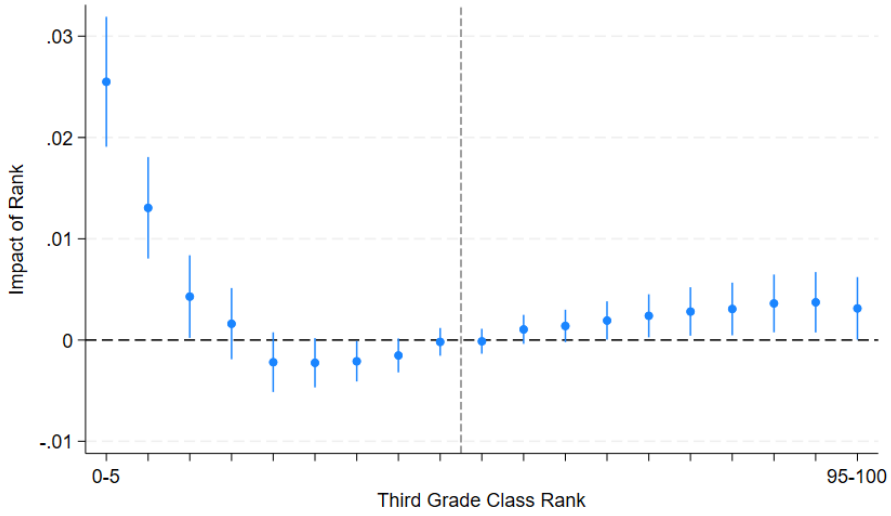


Figure 6: Impact of Third Grade Math Class Rank on 4th Grade Speech Impediment Classification

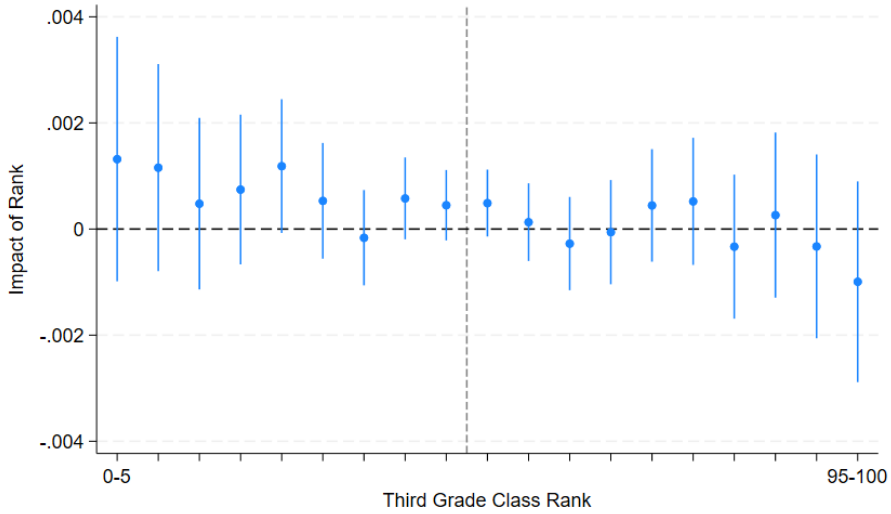


Figure 7: Impact of Third Grade Math Class Rank on 4th Grade Other Health Impairment Classification

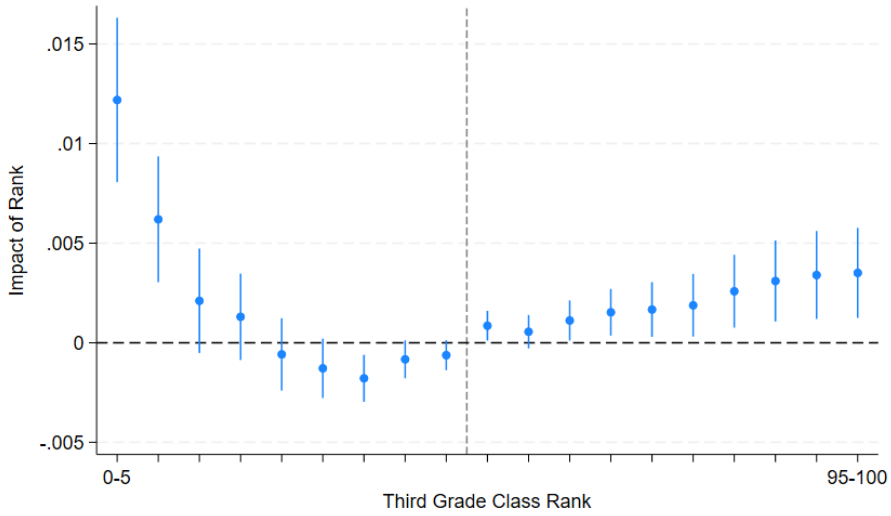


Figure 8: Impact of Third Grade Math Class Rank on 4th Grade Autism Classification

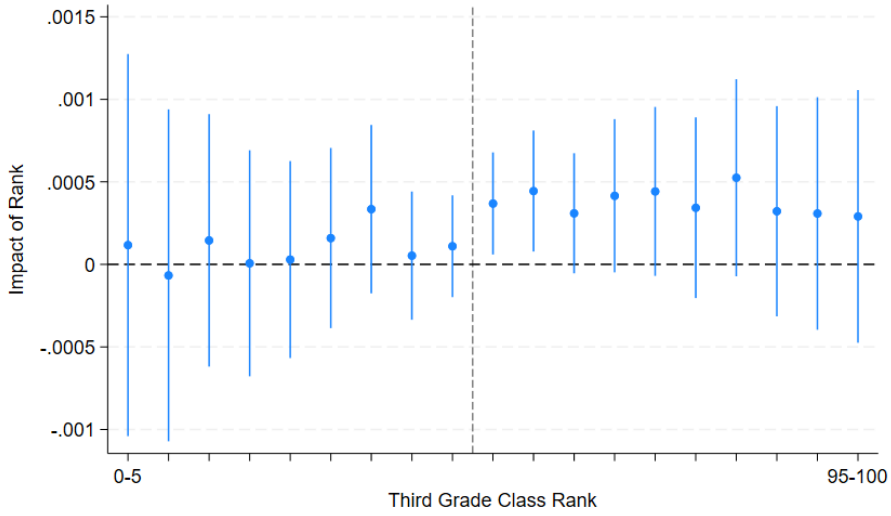


Figure 9: Impact of Third Grade Math Class Rank on 4th Grade Mild Intellectual Disability Classification

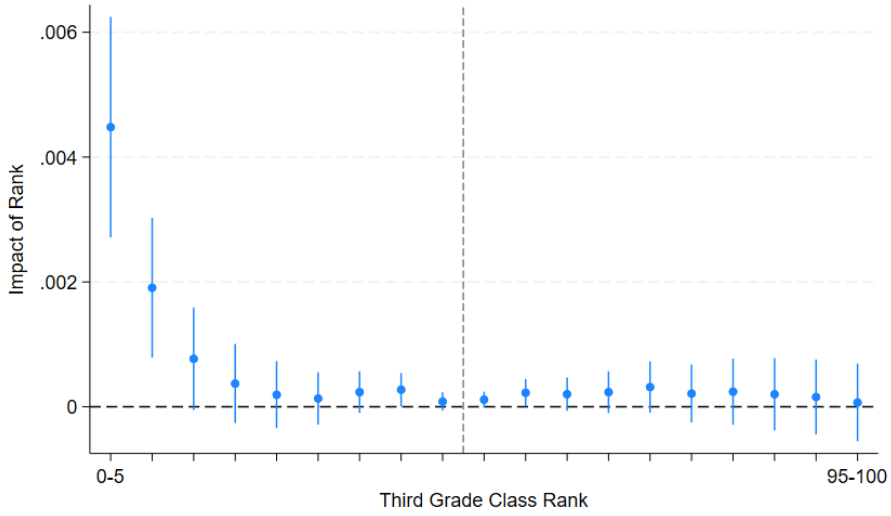


Figure 10: Impact of Third Grade Math Class Rank on 4th Grade Emotional Disability Classification

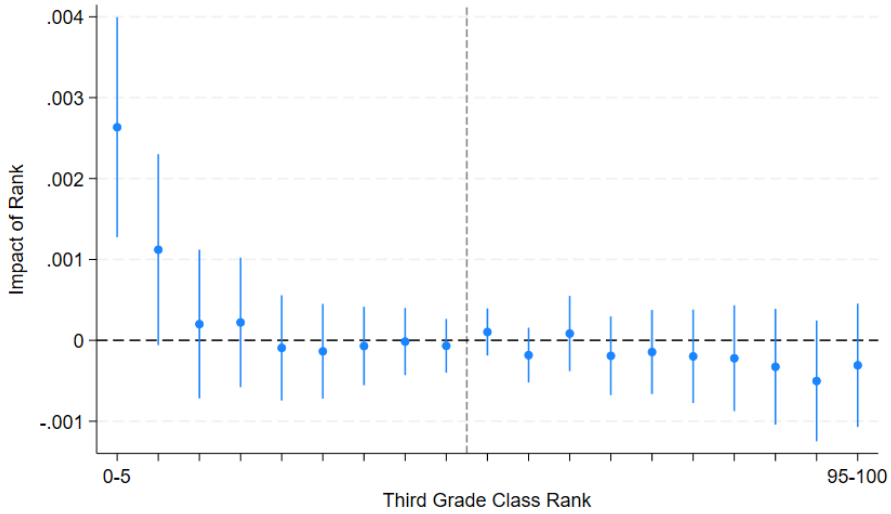


Figure 11: Impact of Third Grade Math Class Rank on 4th Grade Moderate Intellectual Disability Classification

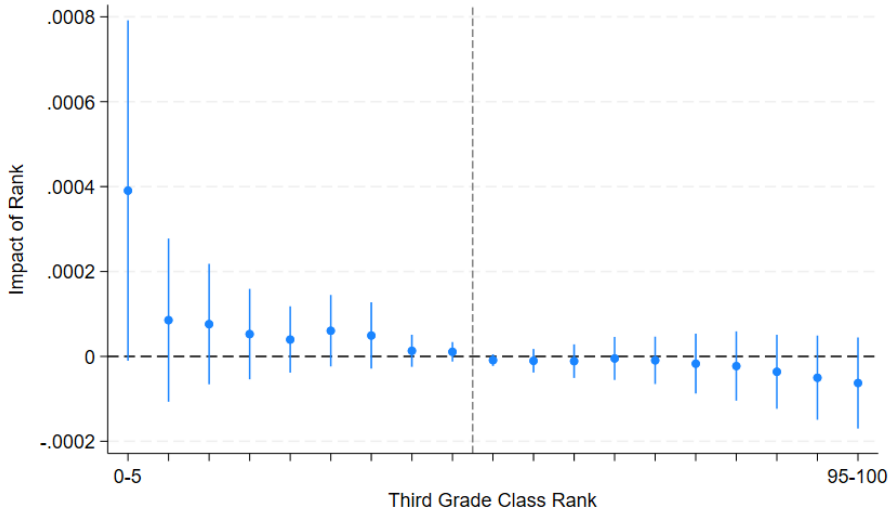
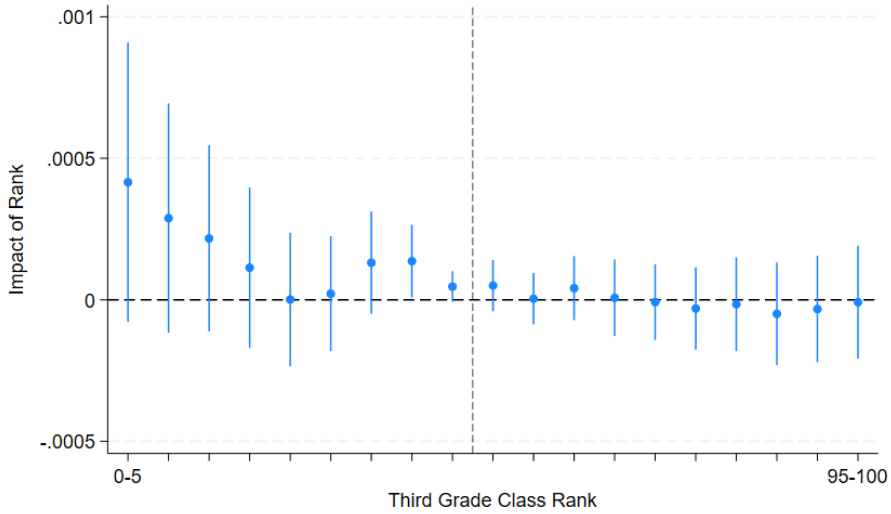


Figure 12: Impact of Third Grade Math Class Rank on 4th Grade Hearing Impairment Classification



5.2 Heterogeneity

We explore whether there is heterogeneity in the effects of class rank by student characteristics and find little evidence for it across observed dimensions. There are no statistically significant differences in the effects of class rank on disability classification by economically disadvantaged status. We also study heterogeneity by prior gifted classification, finding that the impacts of class rank on disability classification are primarily driven by students who were not previously identified as academically gifted. Both heterogeneity analyses are inconsistent with the hypothesis that high-income families or families of high-achieving students pursue disability classifications strategically to gain additional support, resources, or accommodations. Additionally, we find no statistically significant differences in the effects of class rank on disability classification by gender, despite the fact that boys are substantially more likely than girls to receive a disability diagnosis. Future work will examine the effects of within-gender class rank to understand whether rank effects are driven by within-gender comparisons.

Figure 13: Heterogeneity by Socioeconomic Status

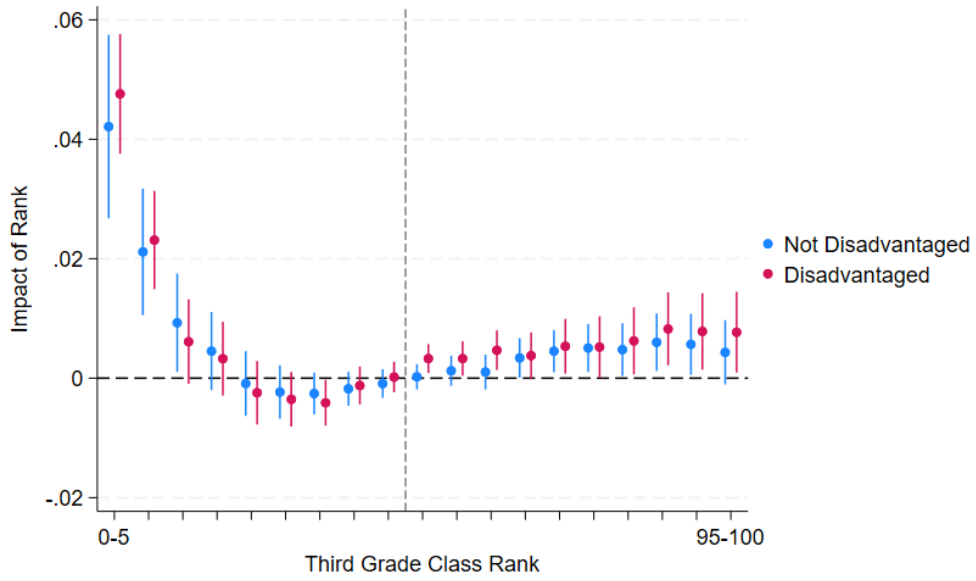


Figure 14: Heterogeneity by Gifted Classification

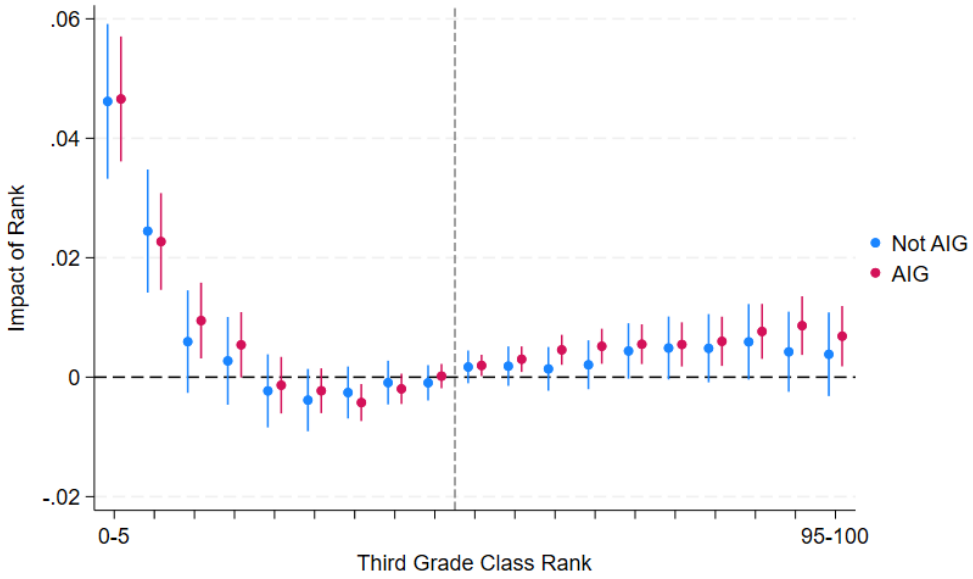
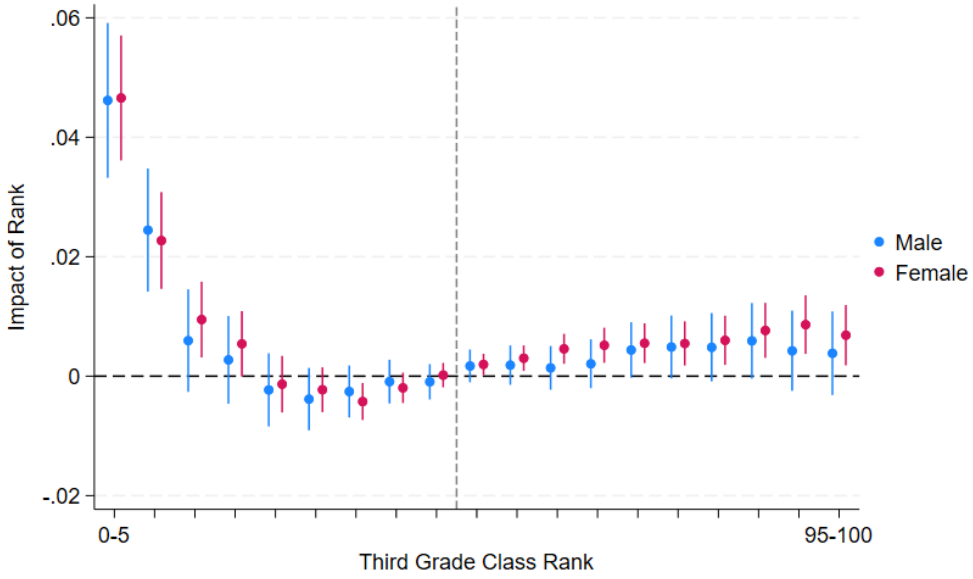


Figure 15: Heterogeneity by Gender

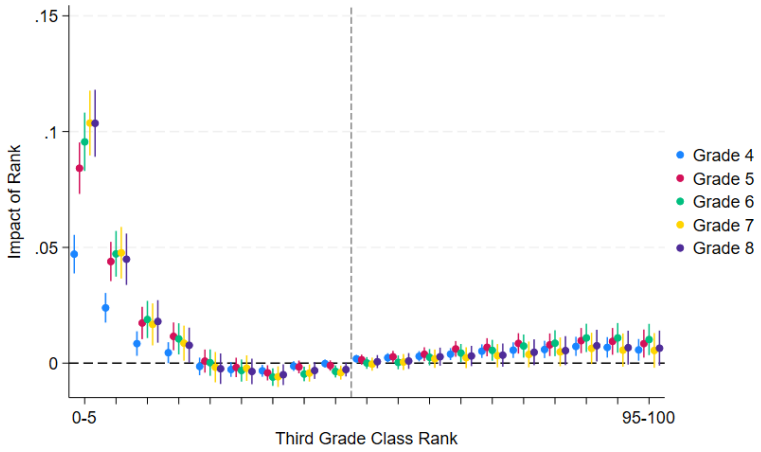


5.3 Long-Run Effects

The effect of low class rank on disability classification grows as student progress through school. That is, the impact of low 3rd grade class rank on 8th grade disability classification is larger than the impact on 4th grade disability classification. The largest effects of 3rd grade rank on disability classification occur in 4th grade and 5th grade. The effect of high class rank does not meaningfully change across the grade at which disability is measured.

Several mechanisms may explain why the effects of low class rank on disability classification grow over time. First, it may take time for students to obtain a formal disability classification that appears in administrative data. There is a time limit on the disability evaluation once the process begins, but it could take time for parents or school employees to formally start the process. Second, students with low class rank may continue to perform poorly in subsequent grades for a variety of reasons, such as stigma, lowered teacher expectations, or negative peer dynamics, eventually leading to disability classification several years later. This mechanism is consistent with explanations discussed in Denning et al. (2023). Third, students with low class rank may be placed in different classrooms in later grades, and students assigned to special education settings may be less likely to exit disability classification once identified. Finally, some students with low class rank may not initially meet the criteria for disability classification but could be flagged for future monitoring and later meet diagnostic thresholds. Future work will explore these hypotheses.

Figure 16: Impact of Third Grade Math Class Rank on Disability Classification by Grade



5.4 Robustness

We plan to explore the robustness of our results to alternative samples and specifications, such as more flexibly controlling for age and constructing the rank variable by gender.

6 Conclusion

In this paper, we establish that students' class rank relative to peers influences the likelihood they are classified as having a disability as well as the likelihood of receiving a testing accommodation. The effect of class rank is largest and most consistent for the lowest ranks, but we also estimate small effects of higher ranks on disability classification. The effects of the lowest class ranks are large relative to the baseline rate: Negative peer comparisons relative to the median student double the likelihood that a student is classified as having a disability in the next grade. The effects appear to be driven by disability categories with more subjective diagnostic criteria.

Our study highlights the need for more objectivity in classifying students as disabled at school. In our North Carolina context, funding for students with disabilities is limited. Once a school district reaches the funding cap, the district receives no further supplemental funding for students with disabilities even though it is mandated to provide services. We take no stand on whether there is under- or over-identification of students with disabilities but note that both could exist. We similarly do not take a stand on whether certain students should or should not receive testing accommodations. Our work highlights that the happenstance of a student's peer group at school influences whether that student is later classified as having a disability and whether they receive a standardized testing accommodation. In this way, our work is connected to prior literature on the effect of class rank on academic outcomes and on the effect of non-medical factors on disability diagnosis and classification.

References

ADA National Network. (2018). *Disability Rights Laws in Public Primary and Secondary Education: How Do They Relate?* ADA National Network. Retrieved 2026-02-02, from https://adata.org/factsheet/disability-rights-laws-public-primary-and-secondary-education-how-do-they-relate

Ainsworth, N. J., Cleveland, C., Clark, L. R., Hibel, J., Brummet, Q., Saultz, A., ... others (2026). *School-based disability identification varies by student family income* (EdWorkingPaper No. 26-1374). doi: 10.26300/dpwm-2673

Association, A. P. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Cullen, J. B. (2003). The impact of school choice on student outcomes: Evidence from the texas open enrollment program. *Journal of Public Economics*, *87*(9–10), 1967–1989.

Dadgar, I. (2026, February). The effect of ordinal rank in school on educational achievement and income in Sweden. *Economics of Education Review*, *110*, 102737. Retrieved 2026-01-10, from https://linkinghub.elsevier.com/retrieve/pii/S0272775725001177 doi: 10.1016/j.econedurev.2025.102737

Denning, J. T., Murphy, R., & Weinhardt, F. (2023, November). Class Rank and Long-Run Outcomes. *Review of Economics and Statistics*, *105*(6), 1426–1441. Retrieved 2026-01-10, from https://direct.mit.edu/rest/article/105/6/1426/107656/Class-Rank-and-Long-Run-Outcomes doi: 10.1162/rest_a_01125

Dhuey, E., & Lipscomb, S. (2010). Special education and the timing of school enrollment. *Education Finance and Policy*, *5*(3), 308–346.

Dhuey, E., & Lipscomb, S. (2011). School accountability and the distribution of student achievement. *Economics of Education Review*, *30*(3), 595–605.

Elder, T. E. (2010). The importance of relative standards in adhd diagnoses: Evidence based on birth timing. *Journal of Health Economics*, *29*(5), 641–656.

Elder, T. E., Goddeeris, J., & Haider, S. (2021). Special education identification across race and ethnicity: Trends and explanations. *Economics of Education Review*, *80*, 102066.

Elder, T. E., & Lubotsky, D. H. (2009). Kindergarten entrance age and children's achievement: Impacts of state policies, family background, and peers. *Journal of Human Resources*, *44*(3), 641–683.

Elsner, B., & Isphording, I. E. (2017). A Big Fish in a Small Pond: Ability Rank and Human Capital Investment. *Journal of Labor Economics*, *35*(3).

Elsner, B., & Isphording, I. E. (2018). Rank, Sex, Drugs, and Crime. *Journal of*

Human Resources, *53*(2), 356–381. Retrieved 2026-01-10, from http://jhr.uwpress.org/lookup/doi/10.3368/jhr.53.2.0716-8080R doi: 10.3368/jhr.53.2.0716-8080R

Elsner, B., Isphording, I. E., & Zölitz, U. (2021, November). Achievement Rank Affects Performance and Major Choices in College. *The Economic Journal*, *131*(640), 3182–3206. Retrieved 2026-01-10, from https://academic.oup.com/ej/article/131/640/3182/6255432 doi: 10.1093/ej/ueab034

Evans, W. N., Morrill, M. S., & Parente, S. T. (2010). The identification of disability: The role of parental, school, and policy factors. *Economics of Education Review*, *29*(5), 638–648.

Figlio, D. N., & Getzler, L. S. (2002). Accountability, ability, and disability: Gaming the system? *NBER Working Paper No. 9307*.

Greene, J. P., & Winters, M. A. (2011). Public school accountability and the distribution of student achievement. *Education Finance and Policy*, *6*(3), 369–393.

Jacob, B. A. (2005). Accountability, incentives, and behavior: The impact of high-stakes testing in the chicago public schools. *Journal of Public Economics*, *89*(5–6), 761–796.

Kiessling, L., & Norris, J. (2022, December). The Long-Run Effects of Peers on Mental Health. *The Economic Journal*, *133*(649), 281–322. Retrieved 2026-01-10, from https://academic.oup.com/ej/article/133/649/281/6632959 doi: 10.1093/ej/ueac039

Layton, T. J., et al. (2018). Special education funding and the identification of students with disabilities. *American Economic Journal: Economic Policy*, *10*(3), 250–281.

Morgan, P. L., Staff, J., Hillemeier, M. M., Farkas, G., & Maczuga, S. (2013). Racial and ethnic disparities in adhd diagnosis and treatment. *Pediatrics*, *132*(1), 85–93.

Morrill, M. S. (2018). Accountability and special education: Evidence from school districts. *Economics of Education Review*, *65*, 1–15.

Murphy, R., & Weinhardt, F. (2020, November). Top of the Class: The Importance of Ordinal Rank. *The Review of Economic Studies*, *87*(6), 2777–2826. Retrieved 2026-01-10, from https://academic.oup.com/restud/article/87/6/2777/5831842 doi: 10.1093/restud/rdaa020

National Center for Education Statistics. (2024). *Digest of education statistics: Students with disabilities.* (U.S. Department of Education, Institute of Education Sciences)

National Center for Learning Disabilities. (2024). *Individuals with Disabilities Edu-*

cation Act (Tech. Rep.). National Center for Learning Disabilities. Retrieved from https://ncld.org/wp-content/uploads/2024/05/240502-Learn-the-Law-Individuals-with-Disabilities-Education-Act.pdf

Needham, C., & Houck, E. A. (2019). The inequities of special education funding in North Carolina. *Journal of Education Finance*, *45*(1), 1–22.

North Carolina Department of Public Instruction. (2024). *Report to the North Carolina General Assembly: Weighted funding for exceptional children students* (Legislative Report). North Carolina Department of Public Instruction. Retrieved from https://www.ncleg.gov/Files/Library/agency/dpi17403.pdf (SL 2023-134, Section 7.7)

Office of the Surgeon General. (2024). *Parents Under Pressure: The US Surgeon General's Advisory on the Mental Health & Well-Being of Parents* (Tech. Rep.). U.S. Department of Health and Human Services.

Shi, Y., Eren, O., & Moulton, J. (2021). The geography of disability identification in U.S. schools. *Education Finance and Policy*, *16*(2), 310–341.

U.S. Department of Education. (n.d.-a). *About IDEA*. U.S. Department of Education. Retrieved 2026-02-02, from https://sites.ed.gov/idea/about-idea/

U.S. Department of Education. (n.d.-b). *Frequently Asked Questions: Section 504 Free Appropriate Public Education (FAPE)*. U.S. Department of Education. Retrieved 2026-02-02, from http://www.ed.gov/laws-and-policy/civil-rights-laws/disability-discrimination/frequently-asked-questions-section-504-free-appropriate-public-education-fape

Whitely, M., & et al. (2019). Relative age and attention-deficit/hyperactivity disorder: A nationwide danish study. *Journal of Child Psychology and Psychiatry*, *60*(9), 1026–1036.

Appendix

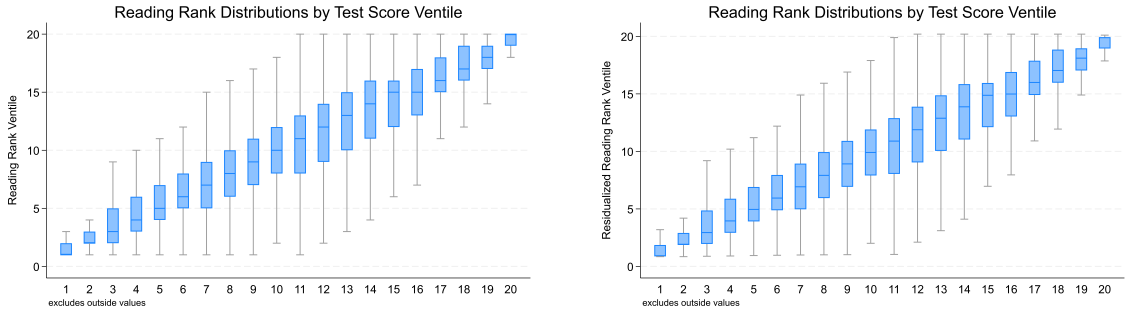
A Reading Rank Results

Table A1: Balance Test

	(1) Economically Disadvantaged	(2) Male	(3) White	(4) Asian	(5) Black	(6) Hispanic
	A. Controlling for School Quartiles of Mean × School Quartiles of Variance					
Reading Rank	0.00255***	-0.00131**	-0.00274***	-0.000523	0.00165***	0.00160***
	(0.000698)	(0.000653)	(0.000659)	(0.000324)	(0.000571)	(0.000608)
	B. Controlling for School Deciles of Mean × School Deciles of Variance					
Reading Rank	-0.000614	-0.00174**	-0.000595	-0.000540*	0.000860	0.000251
	(0.000654)	(0.000706)	(0.000620)	(0.000306)	(0.000563)	(0.000540)
Observations	995071	995071	995071	995071	995071	995071

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$



(a) Unconditional Variation

(b) Residual Variation

Figure A1: Identifying Variation

Figure A2: Impact of Third Grade Reading Class Rank on 4th Grade Disability Classification

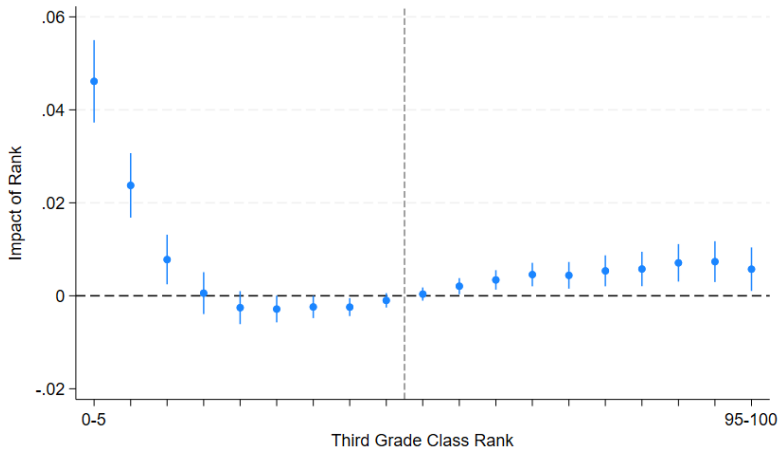


Figure A3: Impact of Third Grade Reading Class Rank on 4th Grade EOG Reading Test Absence

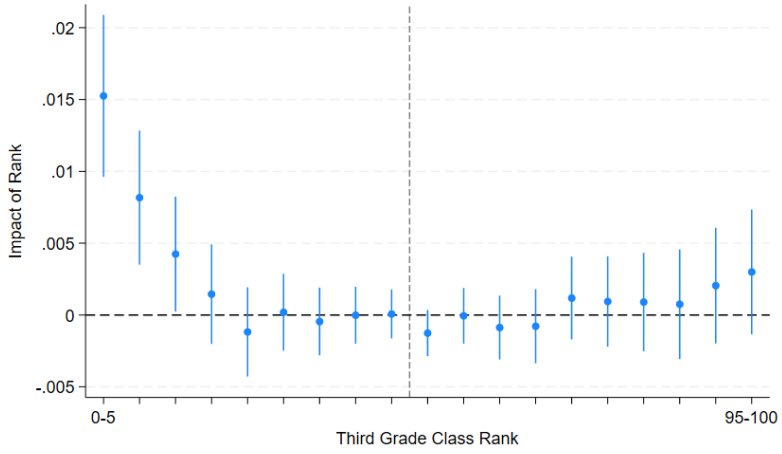


Figure A4: Impact of Third Grade Reading Class Rank on 4th Grade EOG Reading Test Accommodation

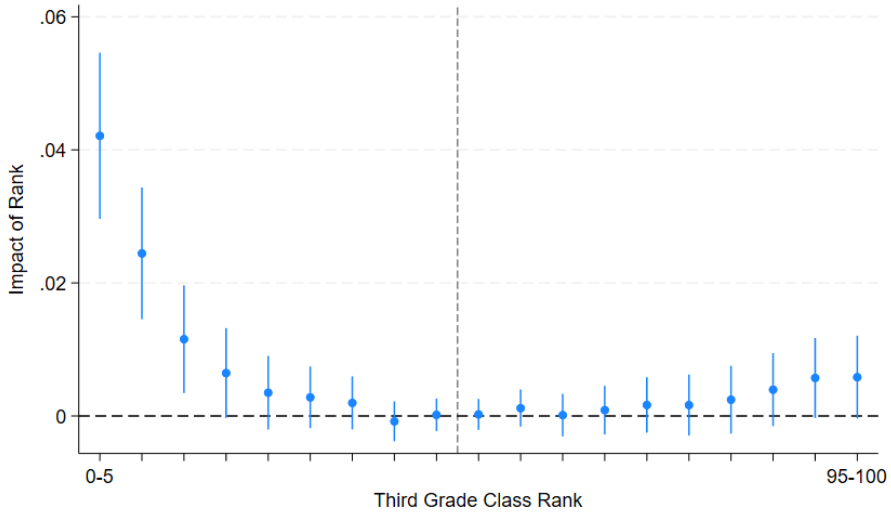


Figure A5: Impact of Third Grade Reading Class Rank on 4th Grade Learning Disability Classification

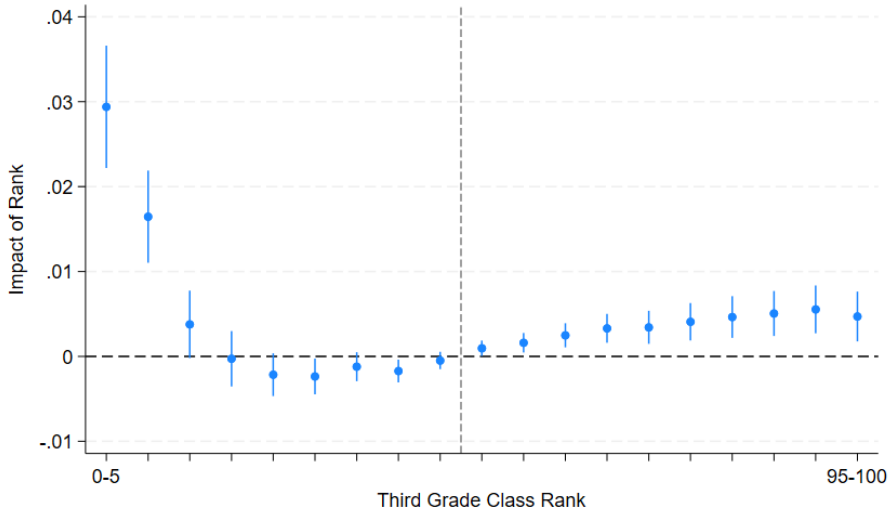


Figure A6: Impact of Third Grade Reading Class Rank on 4th Grade Speech Impediment Classification

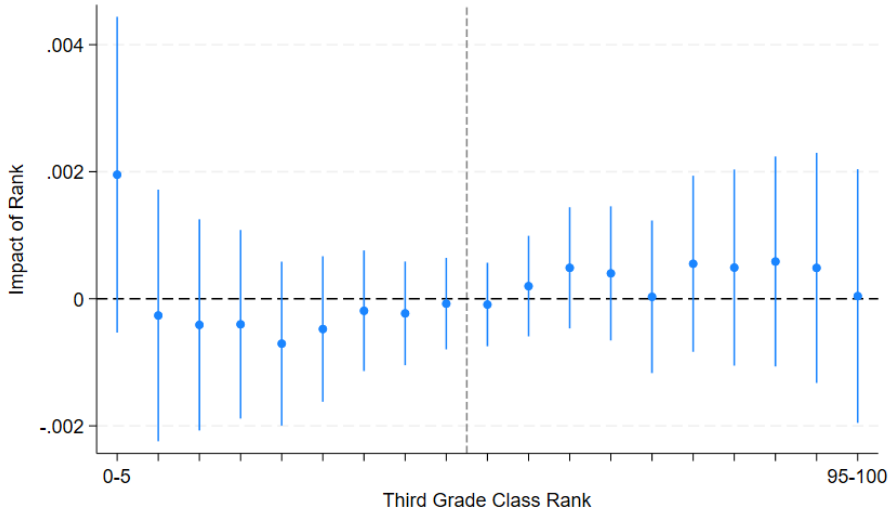


Figure A7: Impact of Third Grade Reading Class Rank on 4th Grade Other Health Impairment Classification

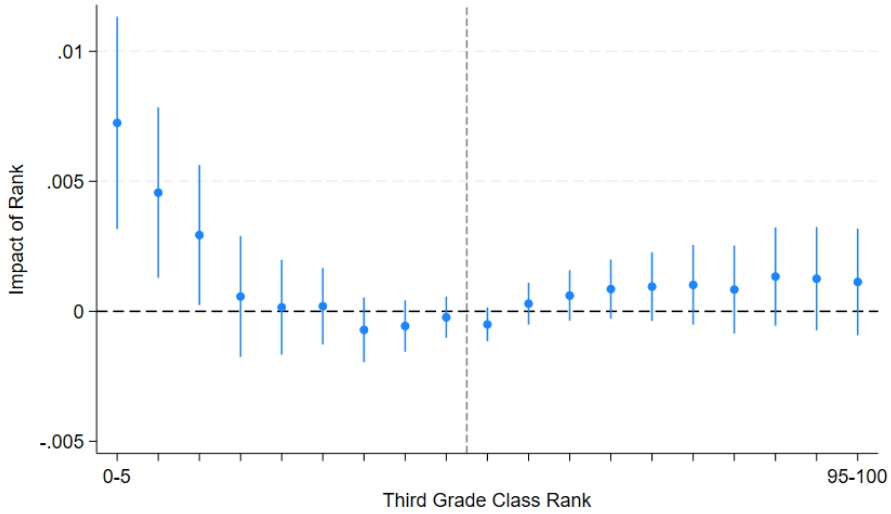


Figure A8: Impact of Third Grade Reading Class Rank on 4th Grade Autism Classification

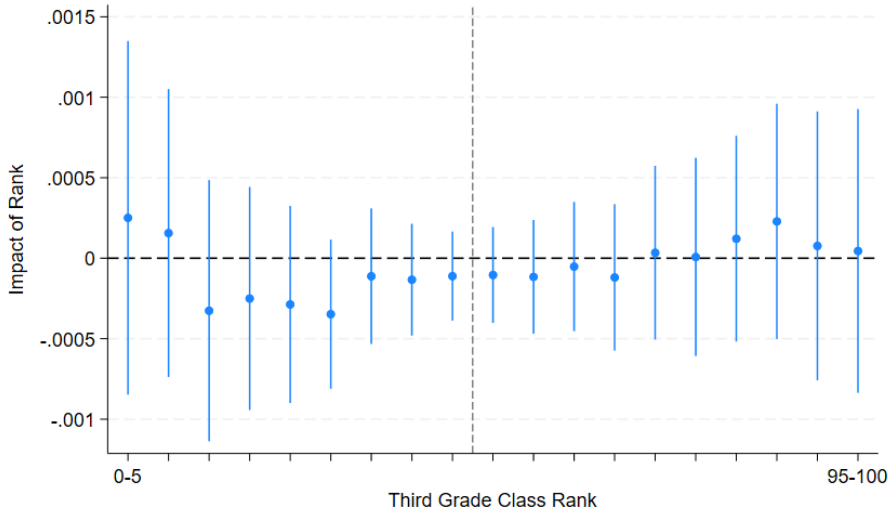


Figure A9: Impact of Third Grade Reading Class Rank on 4th Grade Mild Intellectual Disability Classification

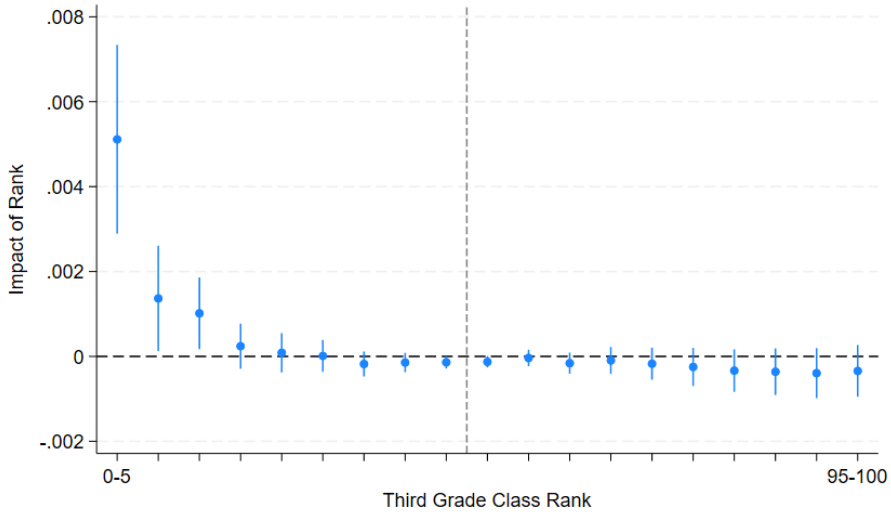


Figure A10: Impact of Third Grade Reading Class Rank on 4th Grade Emotional Disability Classification

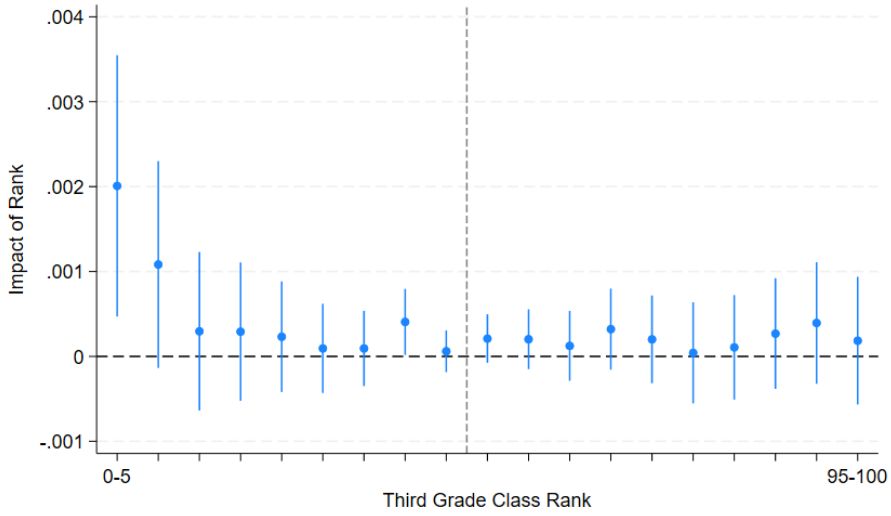


Figure A11: Impact of Third Grade Reading Class Rank on 4th Grade Moderate Intellectual Disability Classification

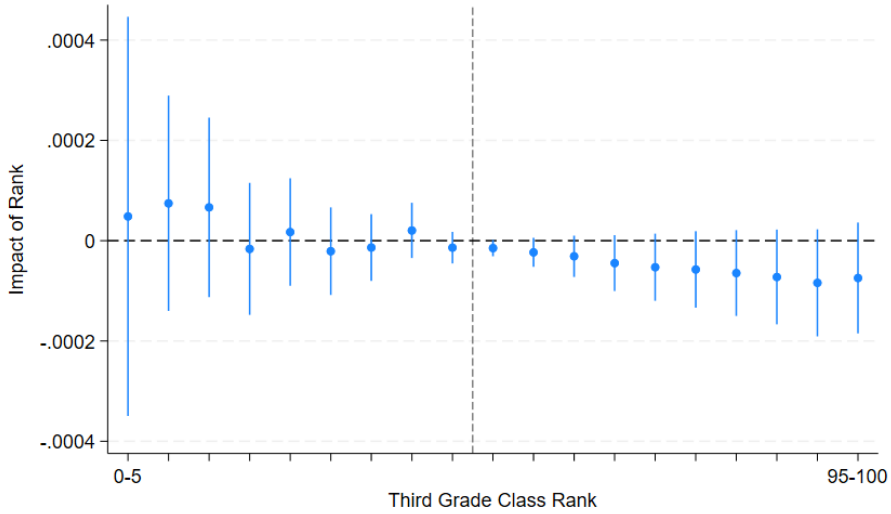


Figure A12: Impact of Third Grade Reading Class Rank on 4th Grade Hearing Impairment Classification

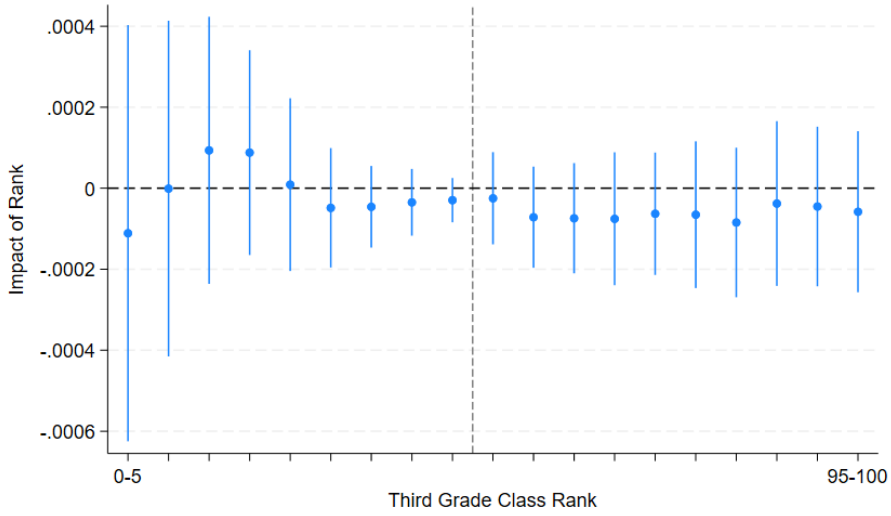


Figure A13: Impact of Third Grade Reading Class Rank on Disability Classification by Grade

