Class Rank and Student Disability Classification*

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Abstract

U.S. public schools play a central role in identifying student disabilities. Using administrative data, we examine how third-grade class rank affects subsequent disability classification, leveraging variation in school-cohort achievement distributions to isolate rank from students' own achievement. Students in the lowest ventile are 3.8 percentage points more likely to be classified as having a disability than students at the median (10^{th} ventile). Students at ventiles above the median exhibit smaller but statistically significant estimated increases relative to the median as well. These patterns are driven primarily by classifications of learning disabilities and health conditions such as Attention-Deficit/Hyperactivity Disorder (ADHD). We further document that low-ranked students are more likely to receive a testing accommodation in fourth grade. Together, these findings highlight the role of subjective factors in shaping disability diagnoses and the allocation of testing accommodations.

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1 Introduction

In the U.S., 15 percent of students enrolled in public schools receive special education or related services, a share that has grown steadily over time (National Center for Education Statistics, 2024). This population is heterogeneous, encompassing students with a wide range of diagnoses, support needs, and capacities to meet traditional benchmarks of academic progress. Several factors have contributed to the rise in school-identified disabilities, including reduced stigma, expanded early intervention efforts, and revisions to diagnostic criteria. While the percentage of K–12 students nationwide receiving testing accommodations is unknown, anecdotal reports suggest that it has increased over time. These trends have prompted debate: while many welcome the decline in stigma, the broadening of eligibility has generated tension among groups with differing needs and raised concerns about the potential over- and under-diagnosis of specific conditions. It has also fueled concerns over misallocation of testing accommodations, including underprovision for some students and inefficient or inappropriate use of limited educational resources for others.

In this paper, we study an important factor shaping disability identification: peer comparisons. A student's grade-level classmates are a natural reference group for parents, teachers, and others, as they seek to assess whether a student should receive a disability classification or testing accommodations. Because diagnosing a disability is subjective, a student's performance relative to peers can affect whether they are identified as having one. We examine how a student's academic standing relative to peers, holding absolute achievement fixed, relates to the likelihood of being classified as having a disability, as well as whether this relationship differs between disabilities with more versus less subjective diagnostic criteria.

To do so, 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 classified as having a disability at school. Our data cover the universe of public school students in North Carolina from 2009 to 2019. For each student, we compute a 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 critical juncture for disability identification, as academic demands intensify. Restricting the sample 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, controlling for own test scores, student characteristics, school-cohort fixed effects, and features of the school test score distribution. Our approach follows Denning, Murphy, and Weinhardt (2023).

We find that students in the bottom three ventiles are all more likely to be

identified as having a disability than students at the median. Specifically, students in the lowest (1^{st}) ventile are 2.7 percentage points more likely to be identified as having a disability than students in the 3^{rd} ventile and 3.8 percentage points more likely than those at the median (10^{th} ventile). These effect sizes represent 114% and 157% increases, respectively, relative to the baseline likelihood of being newly classified with a disability in fourth grade. Students scoring at ventiles above the median also exhibit smaller but statistically significant estimated increases in identification relative to the median. Both effects at the top and bottom of the distribution are driven primarily by classifications of learning disabilities and health impairments such as Attention-Deficit/Hyperactivity Disorder (ADHD), rather than by classifications based on more objective diagnostic criteria, such as speech and hearing impairments. We interpret the pattern at the bottom of the distribution as evidence that negative peer comparisons increase the probability of disability identification for the lowest-scoring students in a cohort, and we examine several potential explanations for the elevated identification rates among higher-scoring students.

Beyond our main results on third-grade class rank and fourth-grade disability identification, we conduct several related analyses. We find somewhat larger effects of third-grade rank on disability classification measured in grades 5-8. This could reflect channels such as time lags in disability diagnoses, compounding effects over time, or the effects of longer exposure to rank effects if rank is fairly persistent over time. We also find that students with low third-grade rank are more likely to receive testing accommodations in fourth grade and more likely to have a missing fourth-grade test score, suggesting disability-related exemption from test-taking. They are also more likely to be placed in a resource classroom.[1] We present suggestive evidence supporting teachers as a relevant actor for observed class rank effects. We find almost no evidence of effect heterogeneity across observed student characteristics, and our results are robust to alternative specifications. Moreover, we show that any non-rank-preserving measurement error would, if anything, bias our estimates downward.

Our paper contributes to a growing body of research documenting non-medical factors that shape disability diagnosis in students. One strand of research finds that students who are young for their grade are more likely to be classified as having a disability (Dhuey & Lipscomb, 2010; Elder, 2010; Evans, Morrill, & Parente, 2010; Layton, Barnett, Hicks, & Jena, 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. Other work has examined the role of fiscal incentives (Cullen,

[1]We also investigate the effect of class rank on receipt of a 504 plan and separate classroom placement. Our estimated effects are not statistically significant but we also note that these events are relatively rare.

2003; Dhuey & Lipscomb, 2011; Morrill, 2018; Winters & Greene, 2011), accountability pressures (Figlio & Getzler, 2006; Jacob, 2005), race (Elder, Figlio, Imberman, & Persico, 2021; Morgan et al., 2015; Shi et al., 2021), income (Ainsworth et al., 2026), geography (National Center for Education Statistics, 2024), and school type (Imberman & Johnson, 2025) in disability classification. We extend this literature by proposing peer comparison as a distinct mechanism: the achievement of a student's school-cohort peers shapes whether they are identified as having a disability, holding fixed their own achievement as well as relative achievement (i.e., distance from the school's mean) through individual test score controls and school achievement distribution controls, respectively.

This study also contributes to a growing literature on the effects of rank on a range of outcomes. Most prior work has focused on the effect of class rank on educational and labor market outcomes, generally finding that a higher ordinal rank (i.e., higher academic performance relative to peers) is associated with more favorable outcomes (Chang, Padilla-Romo, & Peluffo, 2026; Dadgar, 2026; Denning et al., 2023; Dhuey, Payne, & Smith, 2025; Elsner & Isphording, 2017; Elsner, Isphording, & Zölitz, 2021; R. Murphy & Weinhardt, 2020).[2] A smaller set of studies has examined the effect of class rank on health outcomes. Kiessling and Norris (2022) show that higher class rank improves mental health, while Elsner and Isphording (2018) find that higher class rank reduces engagement in risky behaviors, including smoking, drinking, unprotected sex, and physical fighting. A contemporaneous body of work studies how workplace rank, measured by relative earnings within the firm, affects health. Lavetti, Hong, Holmes, and Logan (2024) find that, holding absolute income constant, being paid more relative to coworkers reduces morbidity, and Nabors and Lavetti (2026) document a similar effect on maternal morbidity. We contribute to this literature in two ways. First, we examine a previously unstudied outcome—formal disability identification—which lies at the intersection of the educational and health domains. Second, we show that rank effects appear not only in self-reported behaviors and well-being but also in institutional classifications that carry lasting consequences for students.

The study most closely related to ours is Larivière (2025), a contemporaneous working paper that examines the effect of class rank on learning disability and mental health diagnoses using administrative data from British Columbia. The paper finds elevated diagnosis rates among the lowest-ranked students, while we find effects throughout most of the distribution below the median, as well as at higher ranks relative to the median. The two studies are complementary but distinct, as the policy and information environments differ across the two settings. The test

[2]See also the review article Delaney and Devereux (2022).

scores in Larivière (2025) are from a low-stakes exam while the standardized tests in North Carolina are high stakes. Notably, North Carolina families receive reports with their child's continuous score alongside school, district, and state averages, while British Columbia families receive only categorical feedback with no information on performance relative to peers, which has implications for both the mechanisms at play and the interpretation of the results. While both settings had accountability systems in place, North Carolina's system carried higher stakes and potentially created incentives to manipulate disability classification.

Our study extends the above literatures by providing evidence on the effect of ordinal rank on disability classification. Unlike outcomes previously studied in the class rank literature, underlying disability prevalence should not, in principle, vary with peer performance. Our findings thus illuminate the role of subjective factors, such as perceptions of students relative to their peers, in shaping disability diagnosis and classification.

This setting is particularly consequential because students with disabilities experience substantially worse outcomes than their non-disabled peers (Hanushek, Kain, & Rivkin, 2002; Schwartz, Hopkins, & Stiefel, 2021). Accurate identification is a critical pathway to receiving appropriate educational resources and supports, especially in light of research documenting that receiving special education services benefits marginal students (Ballis & Heath, 2021; Coffey et al., 2026). Notably, these findings shed light on how schools allocate scarce educational resources. Because classification serves as the first step to receiving testing accommodations and IEPs, a classification rule that responds to a student's rank, holding own achievement fixed, allocates those resources in part on the basis of cohort composition rather than need. Two students with identical underlying needs may receive different supports simply because they sit in different peer distributions, a form of mistargeting that arises regardless of whether classification is on net too high or too low.

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 federal laws, which are designed to ensure equal access to educational opportunities for students with disabilities. These laws are: The Individuals with Disabilities Education 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 specify 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 has a broader definition of disability and civil rights orientation and 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 through a 504 plan and are protected from discriminatory practices (National Center for Learning Disabilities, 2024). The ADA, enacted in 1990, further extended civil rights protections, prohibiting disability discrimination in public entities and services, including all public schools. The ADA reinforced the principles of access and nondiscrimination outlined in Section 504 and underlined the expectation that schools eliminate barriers to participation and learning (ADA National Network, 2018).

2.2 Policies concerning students with disabilities 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.[3] 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-

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

> 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 are qualified professionals in a disability area. The 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 perform an evaluation and make an eligibility determination after receiving 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, 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 have disability rates that 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.[4]

2.3 Accountability and students with disabilities

We summarize relevant accountability policies and pressures for students in North Carolina during our sample period and describe the resulting incentives. Since the

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

focus of this paper is not on accountability policies and pressures, we provide a brief overview. These policies do not affect the validity of our identification strategy, but understanding them helps provide context around bigger picture incentives surrounding student disability classification during the sample period.

At the beginning of our sample period, North Carolina public schools operated under No Child Left Behind (NCLB) and North Carolina's ABCs accountability program. Under previous accountability regimes, including the ABCs, the test scores of students with disabilities did not count towards accountability metrics, and these students were often not even tested. Under NCLB, schools needed almost all students with disabilities to contribute test scores, and they were held accountable for the performance of that subgroup, in addition to their overall population of students. Schools that did not meet their accountability targets faced increasing sanctions, up to a restructuring of the school.

In a working paper, Prenovitz (2017) lays out two incentives related to disability classification that were created by NCLB and examines the evidence for each. First, schools had an incentive to target "bubble" students. For students close to the threshold of passing, a disability classification could provide extra services or accommodations that might help the school achieve adequate progress for its overall population or for an important subgroup. Prenovitz (2017) finds evidence for this phenomenon among "bubble" students in reading but not in math. Second, schools faced an incentive to select their special education population so that it met its subgroup test score target. She finds that previously passing students were more likely to be classified as having a disability when their school faced higher accountability pressure for the students with disabilities subgroup. The evidence for this behavior was stronger for reading and weaker for math.

In the remainder of our sample period, there were two more accountability regimes, but the incentives discussed above stayed in place to varying extents. North Carolina received an NCLB waiver in the 2012-2013 school year. The pressure of escalating sanctions was removed, but near-universal testing requirements and subgroup-level reporting remained in place. Thus, both incentives identified in Prenovitz (2017) remained but in a weaker state. In 2013, school performance grades were introduced in North Carolina, but subgroup performance did not contribute to a school's grade. Consequently, the "bubble" student incentive was reinforced, but this legislation did not affect the incentive to select the students with disabilities population. The Every Student Succeeds Act (ESSA) took effect in the 2017-18 school year. In its ESSA plan, North Carolina included students with disabilities as a subgroup for accountability. Both incentives from Prenovitz (2017) were in place, but like the NCLB-waiver period, the consequences were softer.

3 Conceptual framework

Disability identification in schools is not a purely objective, medical determination. It is a discretionary, multi-stage process: a child must first be noticed as struggling, then referred for evaluation, and finally assessed against diagnostic criteria. For many of the most common conditions, these criteria leave considerable room for professional and parental judgment. At each stage, the people involved evaluate a child not in isolation but against a reference group, and the most salient reference group is the child's own grade-level classmates. Consequently, two children with identical underlying disability statuses and absolute achievement may be perceived very differently depending on the composition of their peers. For example, a student who stands out as low-performing in a high-achieving cohort may appear unremarkable in a lower-achieving one. In addition, a student's rank relative to peers may affect that student's own self-concept and behaviors, which could in turn affect a disability assessment. This opens a wedge between a child's true disability status, which should not depend on the achievement of classmates, and the probability that a disability is formally identified, which may depend on classmates. This divergence is important to understand, given that disability classification affects access to services, prescription of medications, classroom placement, stigma, and resource costs. This section develops why class rank could drive such a gap, and for whom.

The focus of this study is on students who are on the margin of disability identification or receipt of a testing accommodation, for whom a negative or positive peer comparison could tip the decision. For these students, rank can operate through two channels. The first is informational: rank shapes which children are noticed, flagged, and referred. The second is incentive-based: the actors who initiate and adjudicate classification have interests that may push toward or away from a disability classification, and many of these interests are themselves rank-dependent. We discuss each set of actors through both lenses.

First, students themselves may alter their own behavior or self-concept in response to their relative rank. Other studies have established that mental health, perceived learning ability, and risk-taking behaviors respond to class rank (Elsner & Isphording, 2018; Kiessling & Norris, 2022; Larivière, 2025). If a student can tell that their academic performance is worse (or better) than peers, that student may respond by changing their effort level or becoming more (or less) likely to misbehave. Any behavioral or learning manifestations could affect other actors' perceptions of the student's disability status.

Parents and caretakers are the second set of actors. Families want their children to receive services and supports to enhance their well-being and success at school,

though some worry about stigma, lowered expectations, or time spent away from peers, and others lack the time or bandwidth to pursue identification when the perceived benefits are uncertain. In our context in North Carolina, parents receive an individual student report that gives information on how their student performed on end-of-year standardized tests (see Appendix Figure F1). In addition to the student's scale score, the report includes the average scale score for the school, the district, and the state. While it is unlikely that parents observe their child's class rank directly, they know how different their child's scale score is from the school average, which is mechanically correlated with class (school-cohort) rank. Additionally, they may gain a sense of class rank through conversations with teachers or other parents, or they may form their own opinion through direct observation of their child interacting with peers. A child who appears to lag the local reference group may prompt parents to seek an evaluation, even holding absolute achievement fixed.

Teachers represent a third set of actors with influence over disability classification. Like parents, they may seek appropriate services for students. A natural reference point for any student is the other students in the grade they are teaching, so rank again shapes who is flagged. They also face incentives: a regular classroom teacher's job may require less effort if low-performing, disruptive, or higher-needs students are removed for part of the day, or if disability-related supports help reduce classroom disruption by facilitating student participation. Although test scores played only a limited role in teacher employment decisions during our sample period, they could still affect a teacher's reputation; thus, a teacher might benefit from exempting low-performing students from testing or securing extra time and other supports to raise scores. Special education teachers and related staff have more mixed incentives: their roles are justified by serving students with disabilities, but their work grows more difficult as caseloads rise.

Fourth, school administrators, such as principals, are most directly influenced by accountability pressures. Here, the incentive channel is explicitly rank-dependent, pushing in different directions across the class rank distribution. As discussed in Section 2.3, they may have an incentive to classify "bubble" students as having a disability to give them extra supports to meet proficiency thresholds on standardized tests. Peer comparisons can shape which students are perceived as near-proficient with malleable performance. School administrators may also seek to classify relatively high-performing students as having disabilities to help the students-with-disabilities subgroup meet its target, while discouraging low-performing students from pursuing classification. District leaders, by contrast, attend to enrollment relative to the disability funding cap: above the cap, an additional classification brings a federal mandate to provide services but no funding, while below it the supplemental funding

may exceed or fall short of the cost of the student's IEP. Such soft quotas give relative rank a further role in determining which students are recommended for assessment.

Finally, some parties are unlikely to be swayed by peer comparisons, which aids interpretation. Outside the school system, professionals such as doctors, therapists and other health specialists, and even lawyers, may be brought in to help with a disability determination. Since these professionals likely have limited exposure to a student's school-cohort peers, they are unlikely to respond to peer comparisons. A student's grade-level classmates and their families may have an interest as well. Like teachers, they may desire that students with higher needs are removed from the classroom so that more attention can be focused on the other students in the class. They may also resent specialized services and testing accommodations provided to the child's peers, especially when perceived as marginal, on the grounds that they confer advantages allowing some students to get ahead without comparable need. Although these families may be sensitive to peer comparisons, we do not expect them to influence the determination of a disability or the receipt of accommodations.

Taken together, these channels imply that multiple sources could lead to class rank effects on disability classification, holding constant underlying achievement. In the next two sections, we introduce the data and empirical strategy that we use to assess this relationship.

4 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). We focus on students in third grade between 2009 and 2018.[5] Key to our study, the data contain information on a student's disability status, as well as a coarse classification of the type of disability the student has.[6] Disability status variables identify students who have an IEP and thus meet the criteria for disability status under IDEA. Additionally, we have student testing information data from end-of-grade (EOG) standardized tests, which contain 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

[5]Our main outcome is disability classification in the subsequent year, which is why we focus on third graders through 2018 even though we have data through 2019.

[6]Disability status is drawn from Masterbuild data files, which are collected at the end of the academic year around the time of end-of-grade testing and include one record per student beginning in third grade.

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 or Section 504, or being an English Language Learner. Finally, we have data on 504 plan receipt and "classroom setting" status, which records the proportion of the instructional day that a student with an IEP spends in general education classrooms with non-disabled peers.[7] Following standard IDEA definitions, we group students into regular (greater than 80% of the day in general education), resource (40–79%), and separate (less than 40%) settings.

We present summary statistics in Table 1. The first column presents means for the sample of all third grade EOG test-takers. The next two columns display means for students in our analytic sample of third graders without a disability (the sample of interest for most analyses) and with a disability (excluded from sample), respectively. Students excluded from the analytic sample are more likely to be male, economically disadvantaged, White, and Black, and less likely to be Hispanic.

From Table 1, 11.4% of all fourth graders are classified with a disability, and 2.4% of students who were not classified with a disability in third grade receive a disability classification in fourth grade.[8] The most common disabilities in the data are learning disability, health impairment, and speech impediment.[9] Over 7% of students who were not classified with a disability in third grade receive an accommodation on their fourth grade math test (6.6% for the reading test), conditional on taking the test. Almost 1% of students who were not classified with a disability in third grade are absent from the fourth-grade EOG test data despite being present in the fourth-grade enrollment data, a noisy proxy for disability-based testing exemption.

The data include both students with testing accommodations but no disability classification and students with a disability classification but no testing accommo-

[7] Classroom setting variables are drawn from Exceptionality data files, which include one record per student receiving special education and related services. 504 plan variables are drawn from Masterbuild data files and are available 2009-2013 only.

[8] In Appendix Table A1, we present statistics on disability prevalence by grade and show that the likelihood of receiving a new disability classification in third grade is similar to that of other early elementary grades.

[9] "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

Table 1: Student Summary Statistics

	Full Sample Mean	No Disability in Grade 3 Mean	Disability in Grade 3 Mean
Female	0.493	0.512	0.326
Economically Disadvantaged (EDS)	0.525	0.513	0.627
Limited English Proficiency (LEP)	0.110	0.111	0.105
White	0.505	0.504	0.527
Black	0.247	0.245	0.268
Hispanic	0.161	0.165	0.134
Asian	0.0295	0.0316	0.0118
Native American	0.0142	0.0139	0.0169
Other Race	0.0432	0.0411	0.0423
Age in Months At Start of Grade 3	103.4	103.0	106.2
Academically or Intellectually Gifted	0.144	0.156	0.0398
Grade 4 EOG Math Accommodation	0.135	0.0744	0.679
Grade 4 EOG Reading Accommodation	0.122	0.0657	0.638
Absent from Grade 4 EOG Math Test	0.0129	0.00926	0.0431
Absent from Grade 4 EOG Reading Test	0.0157	0.00985	0.0653
IEP in Grade 4	0.112	0.0233	0.865
504 Plan in Grade 4	0.00881	0.00924	0.00484
Regular Classroom in Grade 4	0.977	0.996	0.813
Resource Classroom in Grade 4	0.0185	0.00314	0.149
Separate Classroom in Grade 4	0.00406	0.000346	0.0355
Separate School in Grade 4	0.000156	0.0000274	0.00125
Classified with Disability in Grade 4	0.114	0.0238	0.879
Learning Disability	0.0561	0.0140	0.414
Health Impairment	0.0226	0.00520	0.171
Speech Impediment	0.0187	0.00253	0.156
Autism	0.00684	0.000600	0.0598
Intellectual Disability	0.00437	0.000694	0.0357
Emotional Disability	0.00307	0.000679	0.0233
Hearing Impairment	0.00105	0.0000642	0.00939
Multiple Disabilities	0.000118	0.0000116	0.00100
N	1,063,762	950,181	111,448

Observations are at the student level for third grade EOG test-takers between 2009-2018. 504 plan only available from 2009-2013.

dations. Table 2 provides summary statistics on disability classification for students who have a testing accommodation in math or reading in fourth grade. Overall, about 60% of students who receive testing accommodations are classified with a disability in fourth 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: almost 70% of students with a disability receive

testing accommodations, compared with just 7% of students without a disability.

Table 2: Disability Classification and EOG Accommodation

	Math Accommodation in Grade 4 Mean	Reading Accommodation in Grade 4 Mean
Classified with Disability	0.616	0.624
Learning Disability	0.352	0.342
Health Impairment	0.142	0.152
Speech Impediment	0.0274	0.0284
Autism	0.0405	0.0443
Intellectual Disability	0.0235	0.0253
Emotional Disability	0.0180	0.0196
Hearing Impairment	0.00575	0.00602
N	126,502	113,744

Observations are at the student level for third grade students between 2009-2018. The sample in column (1) consists of students who have an EOG math accommodation in fourth grade, and the sample in column (2) consists of students who have an EOG reading accommodation in fourth grade.

5 Empirical strategy

5.1 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 their EOG standardized test in that subject:

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

where N_{jsc} is the total number of students in subject s in cohort c at school j. $RankPosition_{ijsc}$ 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 $RankPosition$ value of N_{jsc} and the student with the lowest test score having a $RankPosition$ value of 1. 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.

5.2 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:

$$Y_{ijsc(t+x)} = \sum_{r=1, r\neq 10}^{20} \mathbb{I}_r(R_{ijsc} = r)\beta_r + \sum_{d=2}^{100} \sum_{v=1, v\neq 10}^{20} \mathbb{I}_v(T_{ijsc} = v)\mathbb{I}_d(D_s = d)\alpha_{vd} + \theta_{jsc} + \mathbf{X}'_{it}\gamma + \epsilon_{ijsct}, \quad (2)$$

where $Y_{ijsc(t+x)}$ takes the value one if third-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^{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 also allow the effects of achievement to vary by the mean and variance of the school achievement distribution. As discussed in Denning et al. (2023), this strategy accounts for passive sorting of students that could lead students of certain achievement levels to be more likely to attend a school with a higher variance in test scores. Schools are put into groups, D_s, according to their decile of school mean achievement interacted with their decile of school variance of achievement, which may vary by subject s, resulting in 100 distinct school distribution groups. In the next subsec-

tion, we explain our decision to use deciles of the school mean and school variance of achievement to characterize the school achievement distribution.

Our specification also 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, $\mathbf{X}'_{it}$, which includes information on race, gender, economic disadvantage status (EDS), limited English proficiency (LEP), and age in months in September of third grade. Our sample is restricted to students who are not classified with any disability in third grade to ensure we are not picking up reverse causation in diagnoses affecting class rank.[10] We cluster standard errors at the school level.

5.3 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 which set of school achievement distribution controls better accounts for passive sorting by conducting the balance tests suggested in Denning et al. (2023). In each balance test, we estimate a specification analogous to Equation 2, replacing the outcome Y with a predetermined student characteristic. Based on the results of these balance tests for our data, 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 the large majority of observed predetermined characteristics.[11]

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. Figure 1 displays box plots of student rank ventile by student 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 the interquartile range

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

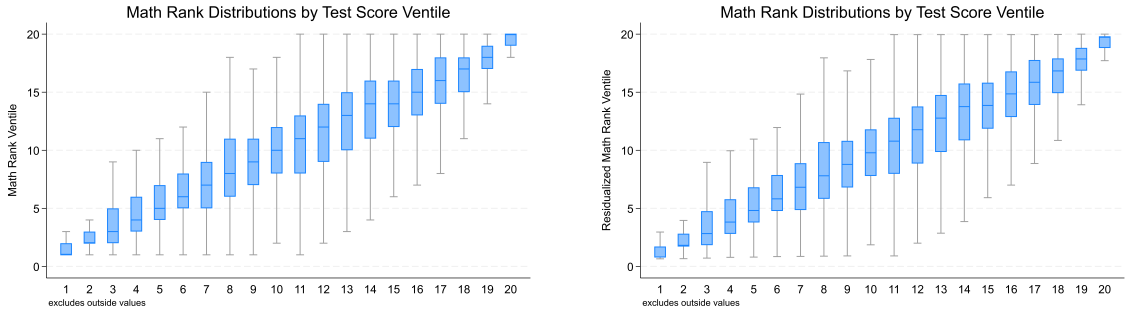
[11] We considered a number of quantiles more than ten but decided that the loss in statistical power would be too great.

Table 3: Balance Test

	(1) EDS	(2) Male	(3) White	(4) Asian	(5) Black	(6) Hispanic	(7) LEP
A. Controlling for Quartiles of School Mean × Quartiles of School Variance							
Math Rank	0.00216***	-0.000144	-0.00348***	-0.000263	0.00143**	0.00226***	0.00111**
	(0.000698)	(0.000613)	(0.000609)	(0.000547)	(0.000657)	(0.000504)	(0.000487)
B. Controlling for Deciles of School Mean × Deciles of School Variance							
Math Rank	-0.000373	0.0000180	-0.00102*	-0.000138	-0.000119	0.000921**	0.0000770
	(0.000658)	(0.000663)	(0.000584)	(0.000516)	(0.000624)	(0.000459)	(0.000433)
N	1110473	1110473	1110473	1110473	1110473	1110473	1104180
Math Achievement Controls	Y	Y	Y	Y	Y	Y	Y

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are in parentheses and clustered at the school level. Each cell corresponds to a separate regression, with the outcome variable corresponding to the column label. The independent variable is the student's ordinal math rank within their cohort.

(IQR) of rank ventiles of students with a math test score at the 4th ventile (20th percentile) of the statewide test score distribution overlaps with the IQR of rank ventiles of students in the 2nd, 3rd, 4th, 5th, 6th, and 7th ventiles of school-cohort test score distribution. More relevant for our analysis is variation in rank when we compare students in similarly achieving classrooms. Panel B demonstrates that substantial variation in rank remains after residualizing class rank on school achievement distribution fixed effects. We note that variation in rank is limited at both the high and low tails of the achievement distribution. Thus, in addition to discussing estimates relative to the median, we also compare effects for the bottom ventile with the 3rd lowest ventile, and effects for the top ventile with the 3rd highest ventile.



(A) Unconditional Variation

(B) Residual Variation

Figure 1: Identifying Variation

The figures display box plots of third grade students' math rank ventiles by math test score ventiles. The variation in Panel B is conditional on school achievement distribution fixed effects.

6 Results

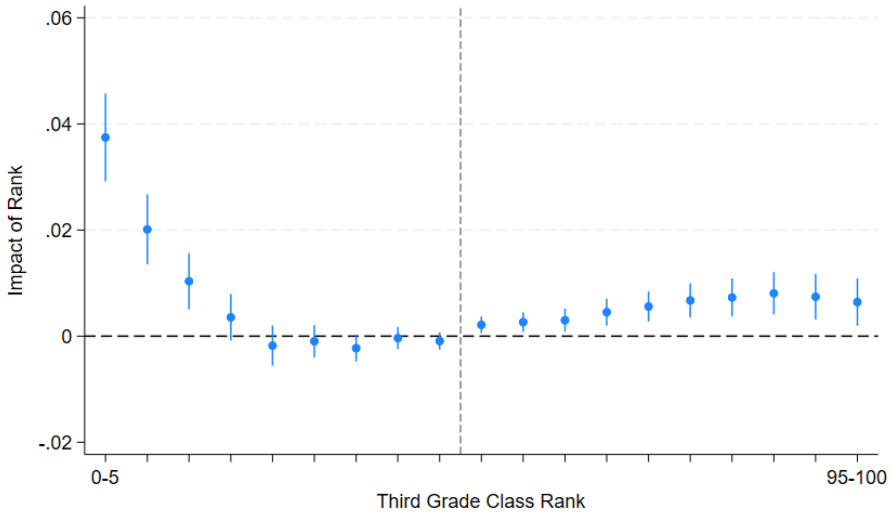
6.1 Main Results

We first analyze the effect of third-grade class rank on the likelihood of being newly classified with any disability in fourth grade. The rank coefficients and their corresponding 95% confidence intervals are presented in Figure 2. We focus on results using math subject test scores to define class rank; results based on reading scores are similar and reported in Appendix C.

We estimate that students scoring in the bottom three ventiles of their third-grade school-cohort are statistically more likely to have a new disability classification in fourth grade compared to students scoring at the median. Specifically, those in the bottom ventile (percentiles 0–5) are 3.8 percentage points more likely to be newly classified with a disability relative to students near the median (percentiles 45–50). Compared to students in the 3$^{\text{rd}}$ ventile, this difference is 2.7 percentage points and remains statistically significant at the 1% level. For context, among students who enter third grade without a disability classification, 2.4% are classified with a disability in fourth grade. Consequently, these effect sizes imply 157% and 114% increases, respectively, relative to the baseline. Compared to the overall fourth-grade disability prevalence of 11.4%, they represent increases of 33% and 24%, respectively. Thus, these estimates indicate that low class rank substantially increases the likelihood of a new disability classification relative to the baseline rate.

We also find small but statistically significant estimated effects of having a class rank above the median on disability classification. For ventiles 11-20, effect sizes relative to the 10$^{\text{th}}$ ventile range between 0.2 and 0.8 percentage points, or 9% to 34% increases relative to the baseline prevalence, and all are estimated to be statistically significant relative to the 10$^{\text{th}}$ ventile. At the top ventile (percentiles 95-100), students are 0.64 percentage points more likely to be newly classified as having a disability relative to the median. Relative to the 3$^{\text{rd}}$ highest ventile, the difference is less than 0.1 percentage points and is not statistically significant at the 10% level. Different phenomena could drive this finding. One potential explanation is that some parents of these 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-grade standardized tests. This discrepancy could spur parents or school employees to seek an evaluation of the student for a disability. Third, students whose achievement is high relative to their peers may receive more attention from teachers, leading to individualized recommendations for services. Fourth, accountability pressures discussed

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



The figure displays estimation results looking at the effects of third grade math class rank on whether a student is classified as having a disability in fourth grade. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

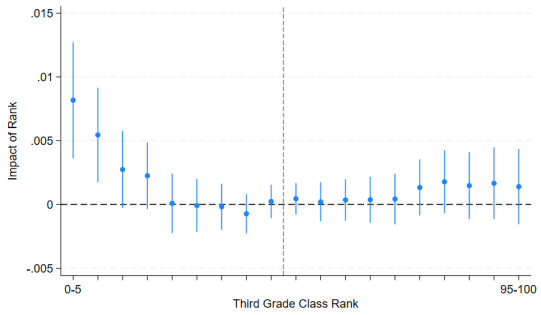
in Section 2.3 could lead school administrators to seek a disability classification, either to target "bubble" students or to improve the likelihood that the students with disabilities subgroup meets accountability benchmarks.

We next investigate whether class rank affects the likelihood that a student is missing a fourth-grade math score but is present in the fourth-grade enrollment data, which serves as a noisy proxy for disability-based testing exemption. We plot the results in Panel A of Figure 3. Relative to the median (percentiles 45-50), students in the bottom ventiles are more likely to be absent from the fourth-grade EOG testing data, suggesting an increase in excused testing absences due to disability status. Results for fourth grade math testing accommodations are in Panel B of Figure 3. For this analysis, we switch the sample restriction to students who did not have a disability classification or a math testing accommodation in third grade; thus, we capture the effect of receiving a new testing accommodation in fourth grade. Conditional on being present in the fourth-grade EOG testing data, students in the bottom ventile are 3.8 percentage points more likely to receive math testing accommodations relative to students at the median. Among students who enter third grade without a disability classification or math testing accommodation, 3.4% receive a math testing accommodation in fourth grade. Consequently, being in the bottom ventile increases fourth-grade math testing accommodation receipt by 112% relative to the baseline. Students in the above-median ventiles are not significantly more likely to be absent from the testing data or receive testing accommodations. This suggests that the increased propensity for students in higher ventiles to receive disability diagnoses relative to peers at the median is not driven by competitive families seeking to give their child an advantage through testing accommodations.

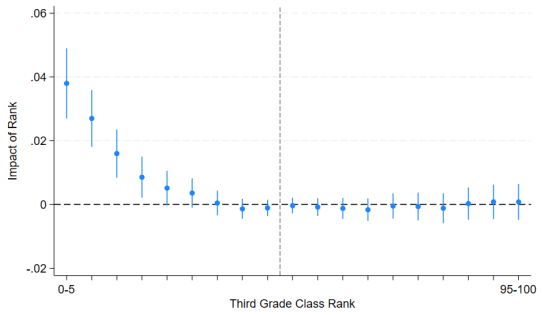
Our final outcomes of interest are students' classroom placement and receipt of a 504 plan in fourth grade, shown in Figure 4.[12] Relative to the median (percentiles 45-50), students in the bottom ventiles are more likely to be placed in a resource classroom setting in fourth grade, defined as spending 40–79% of the instructional day in general education classrooms with non-disabled peers. We find no statistically significant effects of class rank on separate classroom placement, defined as spending less than 40% of the day in general education classrooms, although estimates are imprecise due to the low prevalence of separate classroom placement. We also find no statistically significant estimated effects of class rank on 504 plan receipt, another rare outcome in our sample.

Finally, we examine effects of rank on specific types of disability diagnoses in

[12]Since our binary measure of disability classification (shown in Figure 2) is, by construction, equivalent to IEP receipt, we do not separately estimate effects on IEP receipt.



(A) Impact of Third Grade Math Class Rank on 4th Grade EOG Math Test Absence



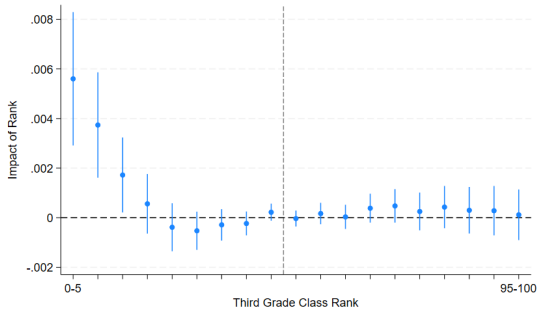
(B) Impact of Third Grade Math Class Rank on 4th Grade EOG Math Test Accommodation

Figure 3: Fourth Grade Testing Presence and Accommodations

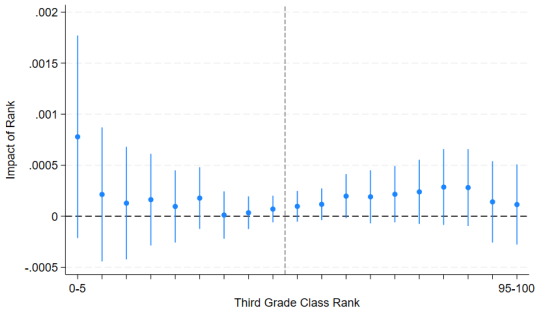
Panel A displays estimation results looking at the effects of third grade math class rank on fourth grade EOG math test absence. Panel B displays estimation results looking at the effects of third grade math class rank on whether a student receives a fourth grade EOG math test accommodation. The omitted ventile is the 10th ventile in both panels. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

Figure 5.[13] 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 and emotional disability. The effect sizes are substantial relative to baseline prevalence. For example, students in the bottom ventile relative to the median are 2.0 percentage points more likely, or 145% relative to the mean, to have a new learning disability. Relative to the 3rd lowest ventile, students scoring in the bottom ventile are 1.4 percentage points, or 98% of the mean, more likely to receive a learning disability classification. We find statistically significant positive estimated effects of high class rank only for learning disability and health impairment. For speech impediment, autism, and hearing impairment, we find no statistically significant estimated effects across the class rank ventiles, but statistical power is an issue since these disabilities are rare. Overall, we find evidence that the impacts of class rank could be driven by disabilities with more subjective diagnostic criteria.

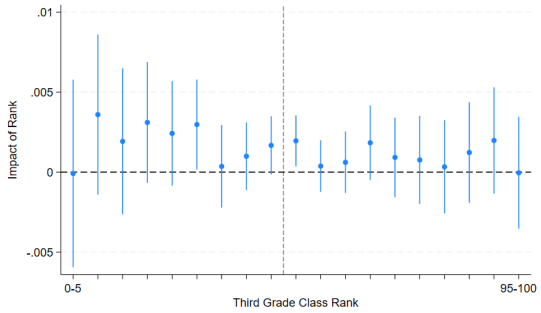
[13]Diagnosis categories are represented across panels from most prevalent to least prevalent in our data.



(A) Impact of Third Grade Math Class Rank on 4th Grade Resource Class Placement



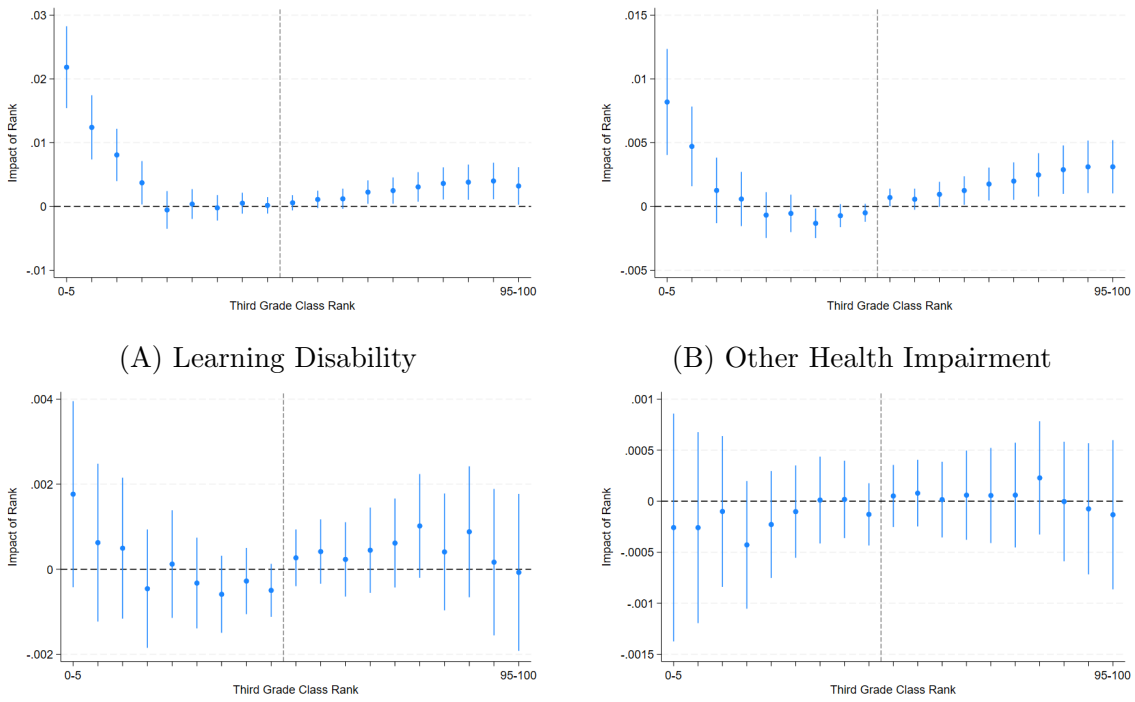
(B) Impact of Third Grade Math Class Rank on 4th Grade Separate Classroom Placement



(C) Impact of Third Grade Math Class Rank on 4th Grade 504 Plan Receipt

Figure 4: Fourth Grade Classroom Setting and 504 Plan Receipt

Panel A displays estimation results looking at the effects of third grade math class rank on fourth grade resource classroom placement. Panel B displays estimation results looking at the effects of third grade math class rank on fourth grade separate classroom placement. Panel C displays estimation results looking at the effects of third grade math class rank on fourth grade 504 plan receipt. The omitted ventile is the 10th ventile in both panels. 95% confidence intervals are displayed. Standard errors are clustered at the school level.



(A) Learning Disability

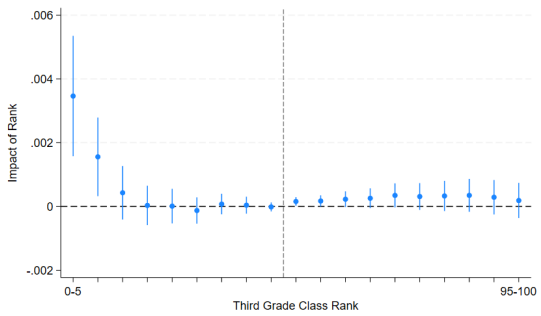
(B) Other Health Impairment

(C) Speech Impediment

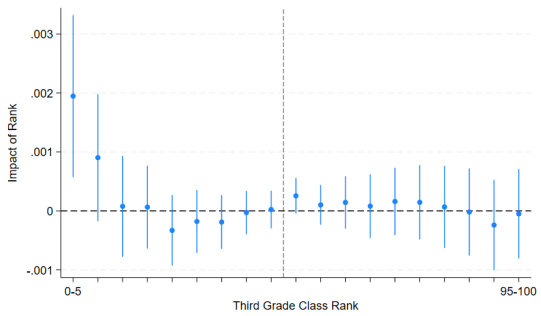
(D) Autism

Figure 5: Impact of Third Grade Math Class Rank on Fourth Grade Disability Disability Classification by Disability Type

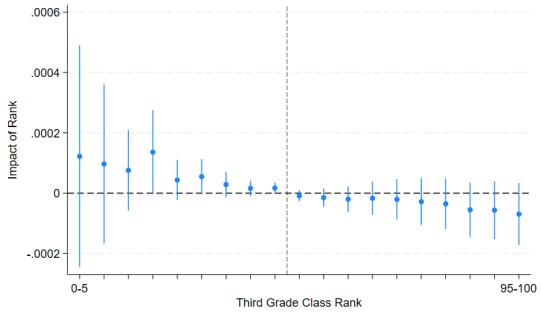
Panels display estimation results looking at the effects of third grade math class rank on whether a student is classified as having a specific disability type in fourth grade. The omitted ventile is the 10th ventile in all panels. 95% confidence intervals are displayed. Standard errors are clustered at the school level.



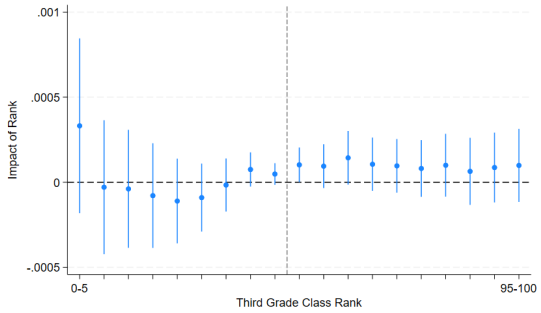
(E) Mild Intellectual Disability



(F) Emotional Disability



(G) Moderate Intellectual Disability



(H) Hearing Impairment

Figure 5: Impact of Third Grade Math Class Rank on Fourth Grade Disability Disability Classification by Disability Type

Panels display estimation results looking at the effects of third grade math class rank on whether a student is classified as having a specific disability type in fourth grade. The omitted ventile is the 10th ventile in all panels. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

Mechanisms

Our results could be driven by multiple actors, as laid out in Section 3. Teachers evaluate students against the local reference group, so rank may influence who they perceive to be struggling and subsequently who they refer for evaluation. They also face workload and reputational incentives that may push in the same direction. Administrators face competing incentives and may also use a local reference group to try and classify students in line with incentives. Parents may observe how their child's score compares to the school average and also form impressions through conversations and direct observation, and these impressions may lead them to seek an evaluation for a child who appears to lag peers, even holding absolute achievement fixed. Finally, students themselves may respond to low relative standing by altering effort or behavior in ways that affect how others perceive their disability status. The concentration of effects among disabilities with more subjective diagnostic criteria is consistent with a story in which discretionary judgment plays a role. These channels are not mutually exclusive, and it is outside the scope of our design to isolate the role of a single actor.

One piece of suggestive evidence points to teachers as a likely relevant actor. In Appendix E, we examine how class rank relates to teachers' subjective assessments of student proficiency. Teachers' assessments are recorded around the time of end-of-grade testing but before teachers observe students' test results.[14] We estimate a similar specification to that of our main analysis in Equation 2, replacing the outcome variable with third-grade teachers' assessments of students instead of a disability diagnosis indicator. As shown in Figure E1, our results indicate that teachers' subjective assessments increase monotonically with rank, even though we control for a student's underlying test-based achievement. In other words, holding own achievement fixed, students near the bottom of their cohort receive substantially lower ratings than students at the median, and those near the top receive substantially higher ones. These findings indicate that teachers' perceptions of students are influenced by their standing relative to classmates, rather than being purely a function of absolute performance. They are also consistent with an analysis in Larivière (2025) showing that the effect of class rank on learning disability is qualitatively similar after conditioning on feedback categories provided to parents. We emphasize that our evidence is suggestive: definitively partitioning the role of different actors in generating class rank effects on disability classification lies beyond the scope of this paper, and we leave it to future work.

[14] More details about the nature of these assessments can be found in Appendix E.

6.2 Heterogeneity

We next explore whether there is heterogeneity in the effects of class rank by student characteristics. In our sample, economically disadvantaged, Black, and male students are classified with a disability at higher rates than their counterparts, suggesting these groups may face different thresholds for referral and evaluation. More broadly, there has been active debate on disparities in disability identification. For example, Morgan et al. (2015) find that racial- and ethnic-minority children are less likely than white children to be identified as disabled and that language-minority children are also less likely to be identified as having certain disabilities. Adding to the discussion, Elder et al. (2021) find that Black and Hispanic students are overidentified with disabilities relative to observably similar White students in some settings and underidentified in others. These debates are present across other student characteristics and include arguments concerning the true underlying disability prevalence (e.g., whether disability is objectively more common for males than females) as well as the propensity for identification given true disability status.[15] Within the class rank literature, there has been mixed evidence on whether class rank effects vary by gender and some evidence that effects are stronger for minority and economically disadvantaged students (Delaney & Devereux, 2022; Denning et al., 2023; Elsner et al., 2021; R. Murphy & Weinhardt, 2020). In two studies most closely related to ours, Larivière (2025) and Kiessling and Norris (2022) find little evidence of heterogeneity along observed dimensions.

Figure 6 presents results looking at the effects of class rank by observed student characteristics. Panel A shows estimates of the effects of class rank on disability classification separately for economically disadvantaged and non-economically disadvantaged students, and our estimates indicate class rank effects are very similar between both groups. When we split the sample by race (Panel B), we find that effects between White and Black students are not meaningfully different, and the same is true when we split the sample by gender (Panel E). Panel C looks at the effects of class rank separately for students who are classified as academically gifted compared to counterparts who are not. We do not report estimates for the lowest class rank ventiles since there are very few students at these ventiles who are classified as gifted. This analysis could potentially shed light on factors that drive the positive impacts of above-median class ranks on disability. However, we also do not find evidence for heterogeneity in class rank by gifted status. Finally, Panel D

[15] See, for example, Ainsworth et al. (2026); Shifrer, Muller, and Callahan (2011); Sullivan and Bal (2013). For English learner status, see M. Murphy and Johnson (2023) and the works cited therein.

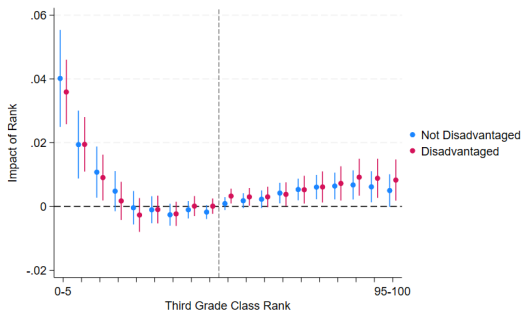
analyzes the effects separately by English proficiency status. We generally do not find evidence that the effects of class rank on disability classification differ by this characteristic, but we also note that the confidence intervals for estimates from the LEP sample are relatively wide.

6.3 Longer-Run Effects

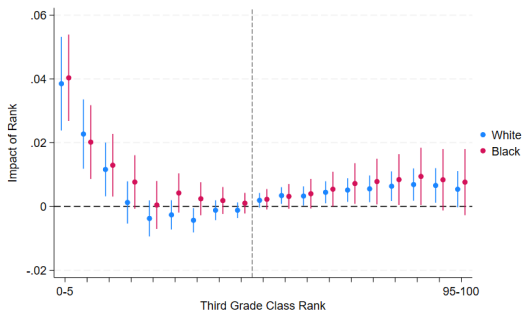
In our primary specification, we look at the effects of third-grade class rank on fourth-grade disability classification. In this section, we look at effects of third-grade class rank on later-year disability classifications as well. Results in Figure 7 indicate that the effect of low class rank on disability classification grows as students progress through school. That is, the impact of low third-grade class rank on eighth-grade disability classification is larger than the impact on fourth-grade disability classification. The largest incremental effects of third-grade rank on disability classification occur in fourth and fifth grades. These findings are present for students in the lowest four ventiles, compared to students in the median ventile. The effects of class rank do not meaningfully vary across grades when looking across other ventiles.

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 the formal disability classification that we observe 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. Anecdotally, the evaluation process sometimes takes longer than the time limit if staff resources are low. 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. Their behavior or effort may deteriorate due to changes in self-perception caused by low class rank. Relatedly, class rank may be fairly persistent over time, which leads to rank effects in later grades reflecting rank effects over several years. 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.[16] 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. Disentangling these mechanisms would be a fruitful direction for future research.

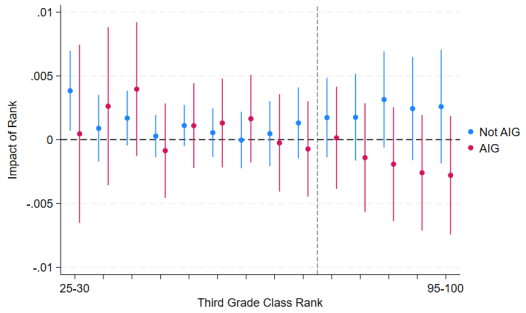
[16]Under IDEA, students must be reevaluated every three years, though this requirement is waived if parents and the school agree that a reevaluation is not necessary.



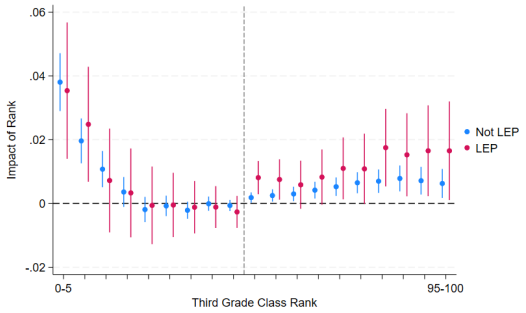
(A) Heterogeneity by Socioeconomic Status



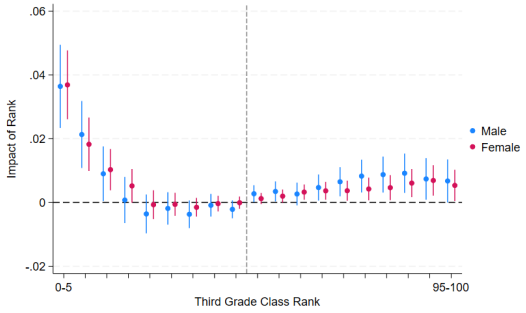
(B) Heterogeneity by Race



(C) Heterogeneity by Gifted Classification



(D) Heterogeneity by English Proficiency

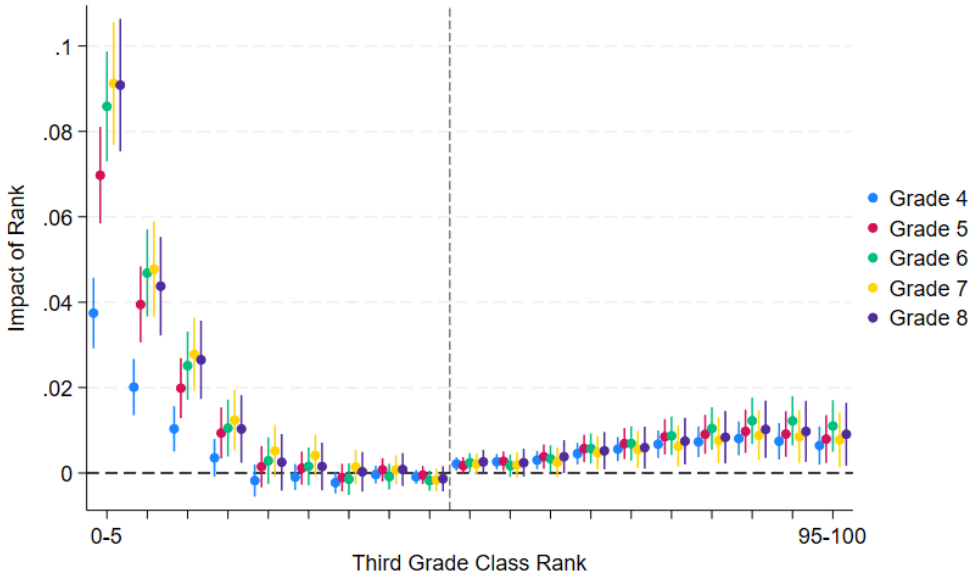


(E) Heterogeneity by Gender

Figure 6: Impact of Third Grade Math Class Rank on Fourth Grade Disability Classification: Heterogeneity Analyses

Figures display estimation results looking at the effects of third-grade math class rank on fourth-grade disability classification. The omitted ventile is the 10th ventile in all panels. Ventiles 1–5 are omitted from Panel C due to the small number of gifted students in the lowest-ranked ventiles. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

Figure 7: Impact of Third Grade Math Class Rank on Disability Classification by Grade



The figure displays estimation results looking at the effects of third grade math class rank on whether a student is classified as having a disability in the various grades labeled in the legend. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level. Outcome availability declines by grade: grade 5 is missing for the 2018 cohort; grade 6 for 2017–2018; grade 7 for 2016–2018; and grade 8 for 2015–2018.

6.4 Robustness

We subject our main findings to several robustness checks, presented in Appendix B. The first potential concern is that, following the literature, we define class rank as a student's position within a school-cohort rather than within a classroom. We do this for multiple reasons. One key reason is that classroom assignment is often endogenous, and thus within-classroom rank may be correlated with unobservable characteristics driving disability classification. School-cohort rankings are coarser but provide a more plausibly exogenous reference group. Another reason is that classroom-level analyses are limited by small class sizes and the low prevalence of disability within individual classrooms, which provides limited statistical power for identification, especially in the presence of the rich controls we include in our preferred specification. We conduct two robustness checks to assess whether our findings are driven by cross-classroom differences, such as variation in teacher effectiveness, that may shape students' relative rank within a school-cohort. First, we re-estimate our main specification for school-cohorts with fewer than 30 students, with results shown in Figure B1. Given state class-size limits, these cohorts likely consist of a single classroom per grade, substantially reducing the scope for cross-classroom variation. The estimated effects are less precise but qualitatively similar to our main results. Second, we match students with their third grade math and English teachers and classrooms, construct class rank as a student's position within a classroom, and estimate the effects of within-classroom rank on disability classification. Results, shown in Appendix D along with more detail on the teacher matching and estimation procedures, indicate that estimated classroom rank effects are smaller than school-cohort rank effect estimates. However, balance tests indicate sorting into classrooms on economic disadvantage, race, and English proficiency; thus, classroom rank effects may be biased.

Second, our preferred specification controls for school-level achievement distributions using deciles of average achievement and achievement dispersion, rather than the quartiles used in Denning et al. (2023). Our use of deciles is motivated by our findings in balance test analyses in Table 3. As a robustness check, Figure B2 shows that results are similar when we instead group schools by quartiles of school mean and variance.

Third, we also assess the robustness of our results to less flexible assumptions about the functional form of the relationship between student achievement and disability classification. Our controls for cohort-specific test score ventiles in the preferred specification is highly flexible, since each cohort contains roughly 50 distinct test scores, but Figure B3 shows that controlling for own achievement using deciles or quartiles instead produces qualitatively similar results.

Finally, following R. Murphy and Weinhardt (2020) and Denning et al. (2023), we use a simulation exercise to show that non-rank-preserving measurement error in test scores would bias our estimates downward, making our results comparatively conservative. Figure B4 presents estimates of the effect of third-grade class rank on fourth-grade disability classification when class rank is measured with error. We add normally distributed and uniformly distributed measurement error to third grade EOG test scores, with mean zero and standard deviation equal to 10%, 20%, and 30% of the standard deviation of achievement, and then recalculate class rank. The resulting estimates are smaller in magnitude than our main results and decline as the standard deviation of measurement error increases, suggesting that additive measurement error in test scores would bias our estimated effects toward zero.

7 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. Because true underlying disability status should not depend on the achievement of one's peers, these results speak to the role of subjective judgment in a process that is often treated as objective and medical. The effect is largest and most consistent at the bottom of the distribution: negative peer comparisons relative to the median roughly double the likelihood of a new disability classification in the following grade, although we also detect smaller positive effects at class ranks above the median. The effects appear to be driven by disability categories with more subjective diagnostic criteria.

These patterns carry consequences well beyond the classification. A disability designation provides access to services, influences classroom placement, shapes the receipt of medication, exposes students to potential stigma, and may come with resources that schools must devote to a child. That the same student would be more or less likely to receive this designation depending on the happenstance of their cohort points to a wedge between the needs a classification is meant to capture and the comparisons that in practice help determine it. This wedge matters in both directions: recent evidence that special education meaningfully improves outcomes for marginal students implies that peer-driven under-identification can deny real benefits, while peer-driven over-identification can misallocate scarce resources and attach lasting labels to students who do not need them.

We take no stand on whether students with disabilities are on net over- or under-identified, nor on whether any particular student should receive accommodations. We instead note that the determination should not depend on the composition of

a student's peers. This concern is heightened by the institutional setting. North Carolina caps the supplemental funding districts receive per identified student, so that once a district exceeds the cap, it must provide mandated services with no additional support, sharpening the stakes of every classification decision and the incentives surrounding it. More broadly, the salience of local reference groups for parents, teachers, and administrators suggests that the mechanisms we document are unlikely to be unique to this state.

Our findings connect two literatures that have largely developed in parallel: work on the long-run effects of ordinal rank on academic, labor-market, and health outcomes, and work on the non-medical determinants of disability diagnosis. We contribute a previously unstudied outcome—formal disability identification at school—that sits at the intersection of the educational and health domains, and we show that rank effects appear not only in behavior and self-reported well-being but also in consequential institutional classifications. A natural direction for future research is to examine whether comparable peer-comparison effects shape diagnosis and the allocation of accommodations in other educational systems and in adult settings such as the workplace.

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Appendix

A Descriptive Statistics

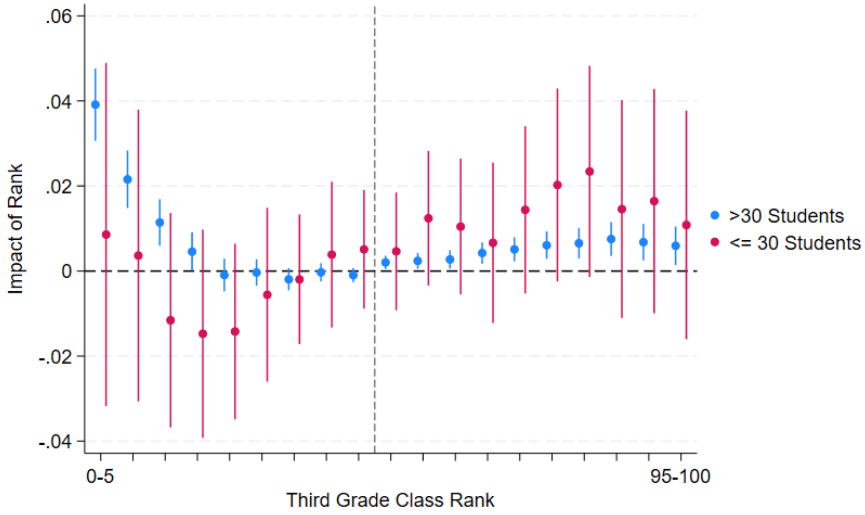
Table A1: Disability Prevalence and New Diagnoses by Grade Level

	Any Disability	Learning Disability	Health Impairment	Speech Impediment	Autism
Kindergarten	0.0929				
Grade 1	0.1056				
Grade 2	0.1149				
Grade 3	0.1241	0.0513	0.0217	0.0458	0.0114
Grade 4	0.1306	0.0623	0.0264	0.0355	0.0113
Grade 5	0.1312	0.0675	0.0292	0.0250	0.0112
Grade 6	0.1278	0.0691	0.0309	0.0162	0.0106
Grade 7	0.1243	0.0676	0.0315	0.0093	0.0101
Grade 8	0.1205	0.0652	0.0311	0.0046	0.0099
Grade 9	0.1190	0.0668	0.0337	0.0025	0.0087
Grade 10	0.1010	0.0564	0.0283	0.0013	0.0082
Grade 11	0.0923	0.0493	0.0248	0.0008	0.0086
Grade 12	0.0905	0.0463	0.0231	0.0005	0.0104
Panel B: New Diagnoses					
Kindergarten	0.0332				
Grade 1	0.0337				
Grade 2	0.0337				
Grade 3	0.0332	0.0428	0.0171	0.0040	0.00113
Grade 4	0.0285	0.0151	0.00628	0.00235	0.00103
Grade 5	0.0208	0.0100	0.00472	0.00112	0.00082
Grade 6	0.0153	0.00628	0.00357	0.00049	0.00073
Grade 7	0.0120	0.00379	0.00275	0.00025	0.00057
Grade 8	0.0112	0.00337	0.00226	0.00015	0.00049
Grade 9	0.0124	0.00309	0.00216	0.00007	0.00042
Grade 10	0.0089	0.00182	0.00128	0.00005	0.00026
Grade 11	0.0087	0.00121	0.00080	0.00004	0.00017
Grade 12	0.0082	0.00075	0.00046	0.00002	0.00012

Observations are at the student level for all students between 2009-2018.
Specific disability diagnoses are available from Masterbuild data files beginning in grade 3.
Binary disability status variables are available from Exceptionality data files beginning in kindergarten.
Exceptionality data files include only students with disabilities.
Course Membership data files are used to define total student enrollment and binary disability shares.

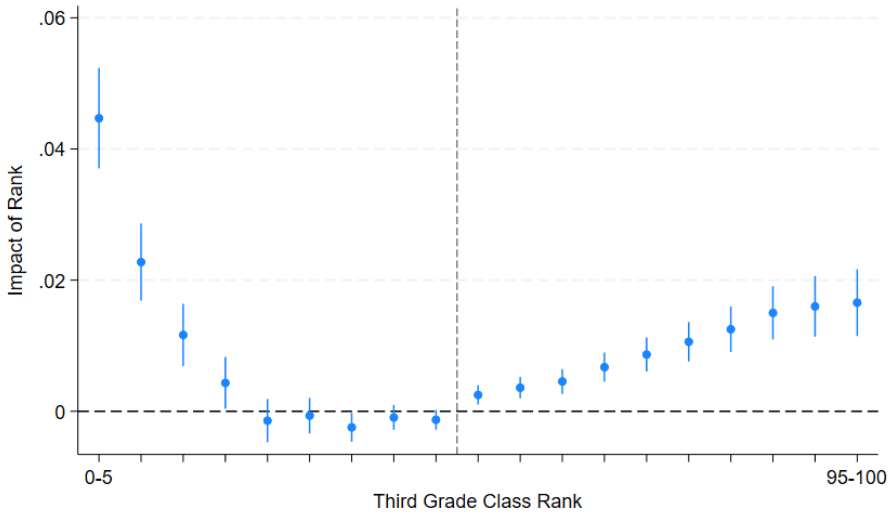
B Robustness checks

Figure B1: Impact of Third Grade Math Class Rank on 4th Grade Disability Classification by School-Cohort Size



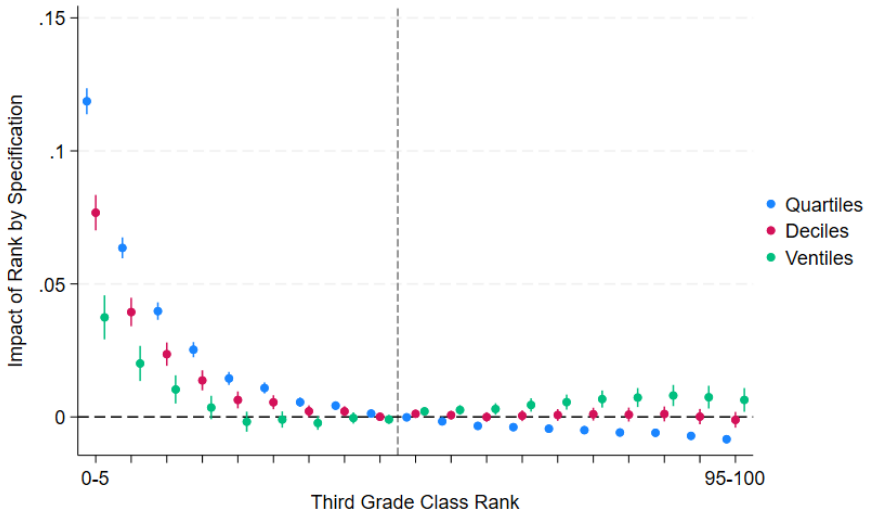
The figure displays estimation results looking at the effects of third grade math class rank on whether a student is classified as having a disability in fourth grade. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

Figure B2: Impact of Third Grade Math Class Rank on 4th Grade Disability Classification with School Distribution Quartile Controls

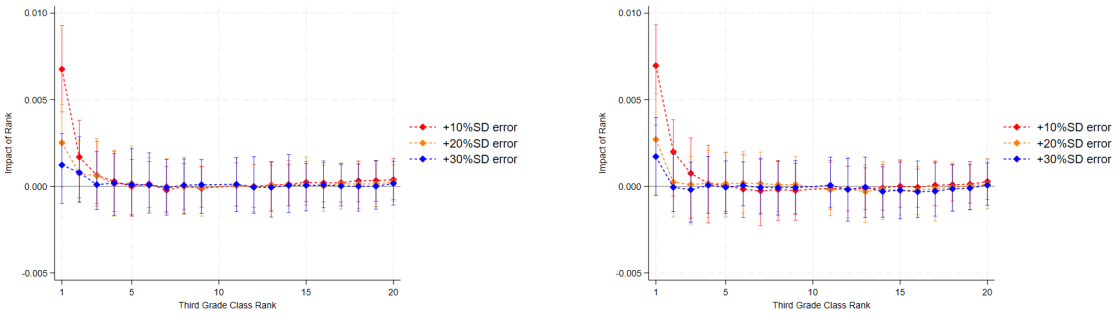


The figure displays estimation results looking at the effects of third grade math class rank on whether a student is classified as having a disability in fourth grade. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

Figure B3: Impact of Third Grade Math Class Rank on 4th Grade Disability Classification with Alternate Test Score Control Functional Forms



The figure displays estimation results looking at the effects of third grade math class rank on whether a student is classified as having a disability in fourth grade. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level.



(A) Normal Distribution (B) Uniform Distribution

Figure B4: Measurement Error Simulation

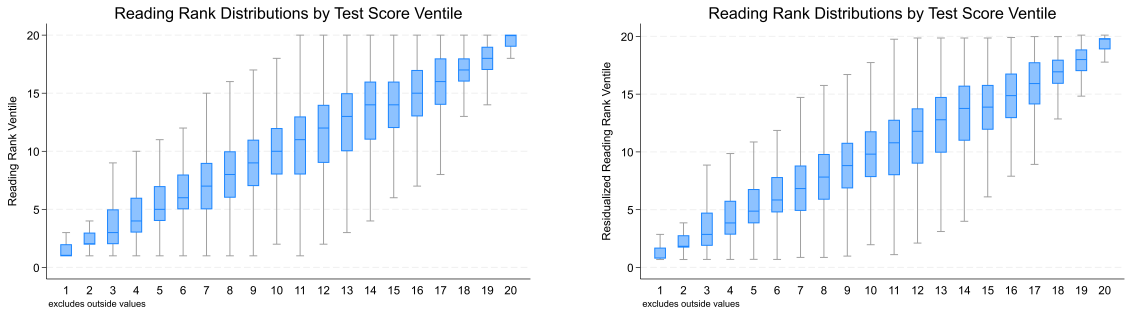
The figures display results looking at the effects of third grade math class rank on whether a student is classified as having a disability in fourth grade, adding normally and uniformly distributed measurement error with zero mean and standard deviation equivalent to 10%, 20%, and 30% of the standard deviation of third grade math EOG scores before calculating class rank.

C Reading Rank Results

Table C1: Balance Test

	(1) EDS	(2) Male	(3) White	(4) Asian	(5) Black	(6) Hispanic	(7) LEP
A. Controlling for Quartiles of School Mean × Quartiles of School Variance							
Reading Rank	0.00223***	-0.00199***	-0.00247***	-0.000655**	0.00207***	0.00132**	0.00101*
	(0.000686)	(0.000618)	(0.000643)	(0.000334)	(0.000579)	(0.000601)	(0.000552)
B. Controlling for Deciles of School Mean × Deciles of School Variance							
Reading Rank	-0.000726	-0.00201***	-0.000309	-0.000508*	0.000690	0.000252	-0.000193
	(0.000635)	(0.000668)	(0.000603)	(0.000305)	(0.000555)	(0.000528)	(0.000460)
N	1,106,744	1,106,744	1,106,744	1,106,744	1,106,744	1,106,744	1,103,801

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are in parentheses and clustered at the school level. Each cell corresponds to a separate regression, with the outcome variable corresponding to the column label. The independent variable is the student's ordinal reading rank within their cohort.



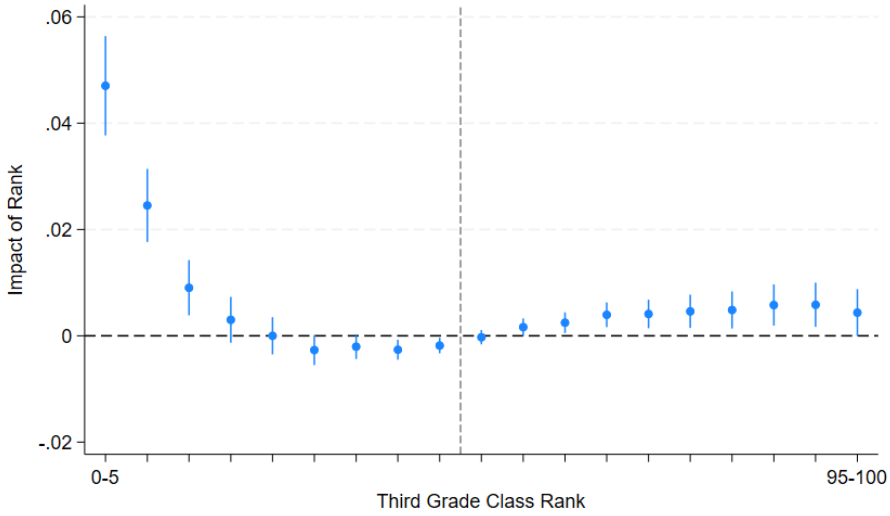
(A) Unconditional Variation

(B) Residual Variation

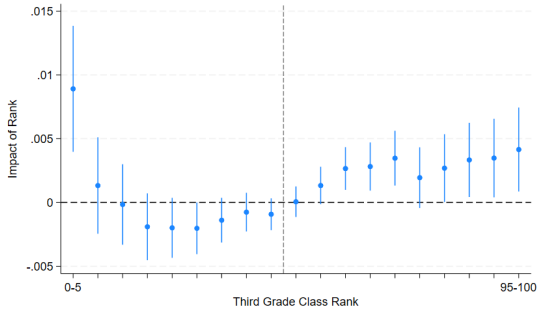
Figure C1: Identifying Variation

The figures display box plots of third grade students' reading rank ventiles by reading test score ventiles. The variation in Panel B is conditional on school achievement distribution fixed effects.

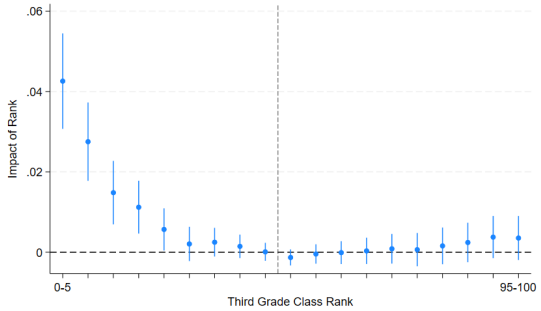
Figure C2: Impact of Third Grade Reading Class Rank on 4th Grade Disability Classification



The figure displays estimation results looking at the effects of third grade reading class rank on whether a student is classified as having a disability in fourth grade. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level.



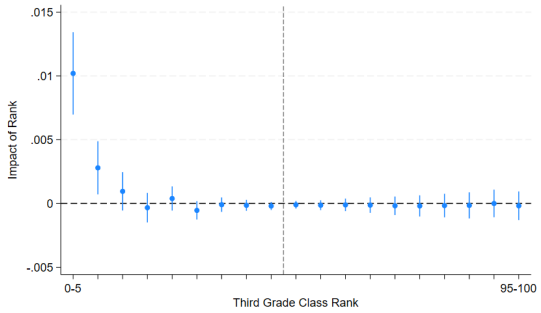
(A) Impact of Third Grade Reading Class Rank on 4th Grade EOG Reading Test Absence



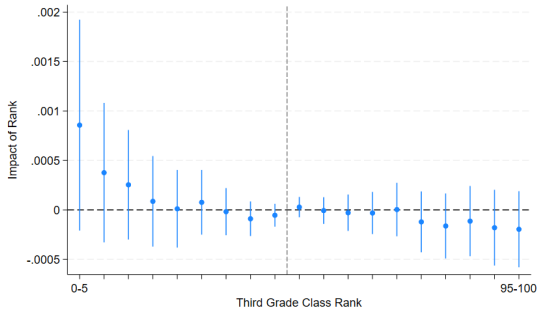
(B) Impact of Third Grade Reading Class Rank on 4th Grade EOG Reading Test Accommodation

Figure C3: Fourth Grade Testing Presence and Accommodations

Panel A displays estimation results looking at the effects of third grade reading class rank on fourth grade EOG reading test absence. Panel B displays estimation results looking at the effects of third grade reading class rank on whether a student receives a fourth grade EOG reading test accommodation. The omitted ventile is the 10th ventile in both panels. 95% confidence intervals are displayed. Standard errors are clustered at the school level.



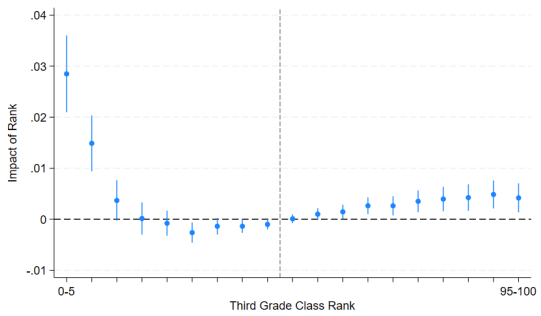
(A) Impact of Third Grade Reading Class Rank on 4th Grade Resource Class Placement



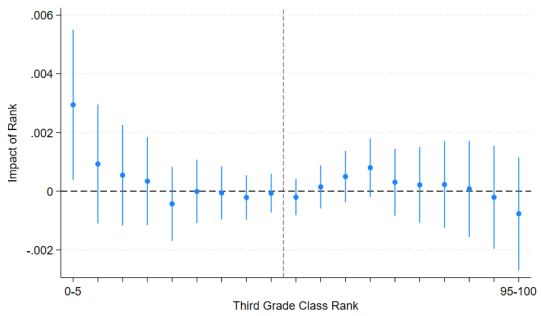
(B) Impact of Third Grade Reading Class Rank on 4th Grade Separate Classroom Placement

Figure C4: Fourth Grade Classroom Setting

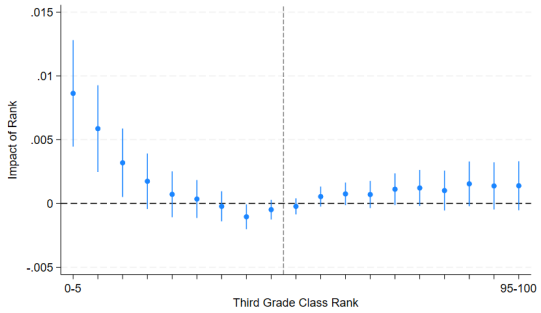
Panel A displays estimation results looking at the effects of third grade reading class rank on fourth grade resource classroom placement. Panel B displays estimation results looking at the effects of third grade reading class rank on fourth grade separate classroom placement. The omitted ventile is the 10th ventile in both panels. 95% confidence intervals are displayed. Standard errors are clustered at the school level.



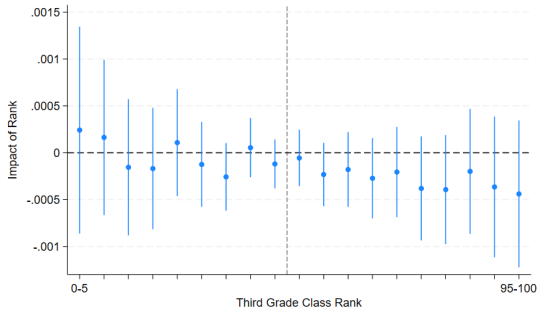
(A) Learning Disability



(B) Speech Impediment



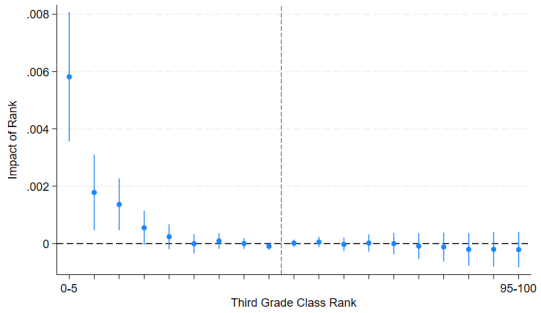
(C) Other Health Impairment



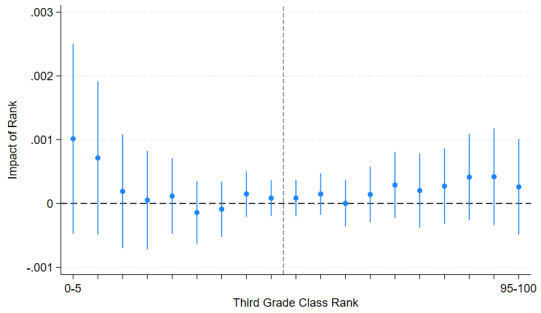
(D) Autism

Figure C5: Impact of Third Grade Reading Class Rank on Fourth Grade Disability Classification by Disability Type

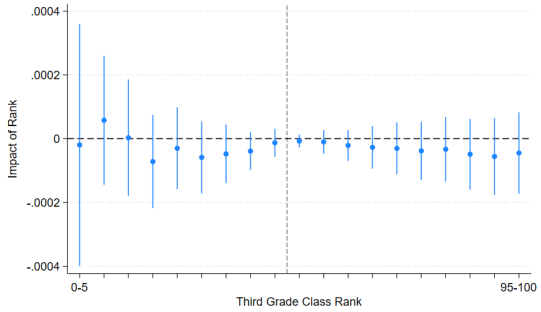
Panels display estimation results looking at the effects of third grade reading class rank on whether a student is classified as having a specific disability type in fourth grade. The omitted ventile is the 10th ventile in all panels. 95% confidence intervals are displayed. Standard errors are clustered at the school level.



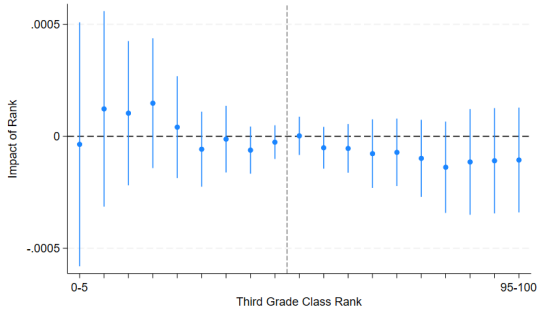
(E) Mild Intellectual Disability



(F) Emotional Disability



(G) Moderate Intellectual Disability

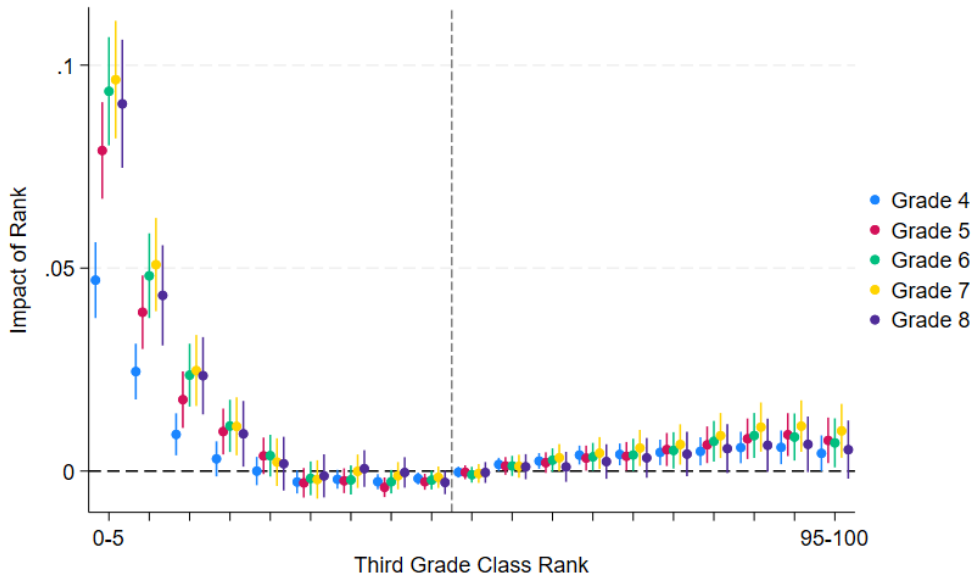


(H) Hearing Impairment

Figure C5: Impact of Third Grade Reading Class Rank on Fourth-Grade Disability Classification by Disability Type

Panels display estimation results looking at the effects of third grade reading class rank on whether a student is classified as having a specific disability type in fourth grade. The omitted ventile is the 10th ventile in all panels. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

Figure C6: Impact of Third Grade Reading Class Rank on Disability Classification by Grade



The figure displays estimation results looking at the effects of third grade reading class rank on whether a student is classified as having a disability in the various grades labeled in the legend. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level. Outcome availability declines by grade: grade 5 is missing for the 2018 cohort; grade 6 for 2017–2018; grade 7 for 2016–2018; and grade 8 for 2015–2018.

D Within-Classroom Rank Effects

We match students with their third-grade math classrooms using course membership rosters. We define a classroom as the combination of course code, school, semester, section, and teacher. Analogously to our main specification, we estimate the following specification to assess how within-math classroom rank affects students' disability classification:[17]

$$Y_{iksc(t+x)} = \sum_{r=1,r\neq 10}^{20} \mathbb{I}_n(R_{iksc} = r)\beta_r + \sum_{D=2}^{100}\sum_{v=1,v\neq 10}^{20} \mathbb{I}_n(T_{iksc} = v)\mathbb{I}_d(d_s = D)\alpha_{vd} + \theta_{ksc} + \mathbf{X}'_{it}\gamma + \epsilon_{iksct}, \quad (3)$$

where $Y_{iksc(t+x)}$ takes the value one if third-grade student i in subject s, classroom k, and cohort c in year t has a disability diagnosis x years later and zero otherwise.

This specification differs from our main specification, shown in Equation (2), in two ways. First, we replace school-subject-cohort fixed effects, θ_{jsc}, with classroom-subject-cohort fixed effects, θ_{ksc}. Second, we replace school-cohort achievement distribution controls with classroom-cohort distribution controls. Specifically, we allow the effects of achievement to vary by the mean and variance of the classroom-level achievement distribution. Classrooms are put into groups, d_s, according to their decile of classroom mean achievement interacted with their decile of classroom variance of achievement, which may vary by subject s, resulting in $D = 100$ distinct classroom distribution groups. Because many teachers are observed in only one school and teach only one third grade classroom per year, teacher and school fixed effects are not separately identified from classroom-subject-cohort fixed effects and are therefore not included in our specification.

Analogously to Table 3, we test for passive sorting into classrooms by conducting the balance tests suggested in Denning et al. (2023). In each balance test, we estimate a specification analogous to Equation 3, replacing the outcome Y with a predetermined student characteristic. Results, shown in Table D1, suggest that sorting into classrooms on observable student characteristics persists even when comparing classrooms with similar achievement distributions, as measured by quartiles or deciles of classroom average achievement and classroom achievement dispersion.

Estimated impacts of third-grade within-classroom rank on the likelihood of being newly classified with any disability in fourth grade are shown in Figure D1. Estimated

[17] Results are qualitatively similar for reading.

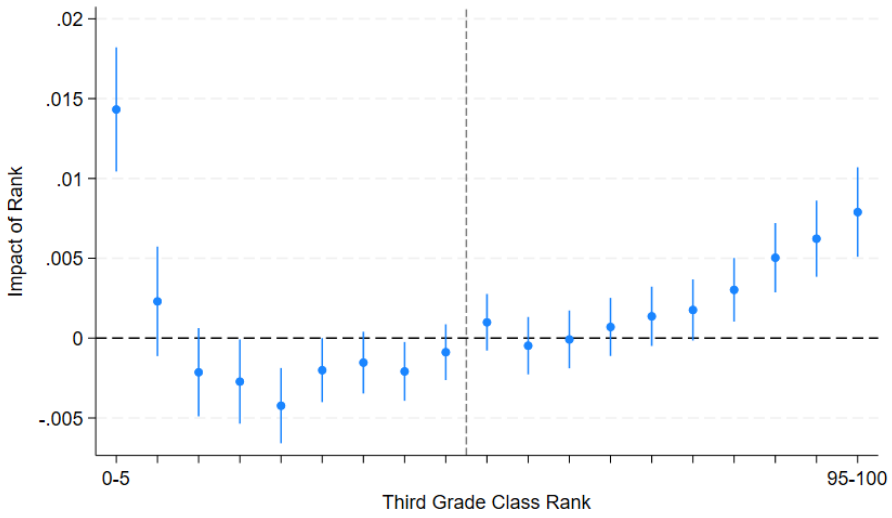
classroom rank effects are qualitatively similar but smaller in magnitude than school-cohort rank effects.

Table D1: Balance Test

	(1) EDS	(2) Male	(3) White	(4) Asian	(5) Black	(6) Hispanic	(7) LEP
A. Controlling for Quartiles of Classroom Mean × Quartiles of Classroom Variance							
Math Rank	0.00207***	0.000553**	-0.00152***	0.0000540	0.000205	0.00128***	0.00101***
	(0.000321)	(0.000219)	(0.000287)	(0.000142)	(0.000270)	(0.000242)	(0.000223)
B. Controlling for Deciles of Classroom Mean × Deciles of Classroom Variance							
Math Rank	0.00142***	0.000498**	-0.00144***	0.0000477	0.000176	0.00124***	0.000937***
	(0.000308)	(0.000250)	(0.000283)	(0.000135)	(0.000252)	(0.000239)	(0.000217)
N	946813	946813	946813	946813	946813	946813	941756
Math Achievement Controls	Y	Y	Y	Y	Y	Y	Y

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are in parentheses and clustered at the school level. Each cell corresponds to a separate regression, with the outcome variable corresponding to the column label. The independent variable is the student's ordinal math rank within their classroom.

Figure D1: Impact of Third Grade Math Classroom Rank on 4th Grade Disability Classification



The figure displays estimation results looking at the effects of third grade within-classroom math class rank on whether a student is classified as having a disability in fourth grade. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

E Rank Effects on Teacher Assessments

This analysis focuses on students in third grade from 2009-2012 due to unavailability of teacher assessment data for other cohorts. Teacher assessments of student achievement are available in end-of-grade testing data files and are collected around the time end-of-grade tests are administered but before teachers learn students' test results. Teachers evaluate students' proficiency in math and reading on a discrete scale of 1 to 4. An evaluation at level 3 or above indicates grade-level proficiency or higher in the subject being assessed.[18]

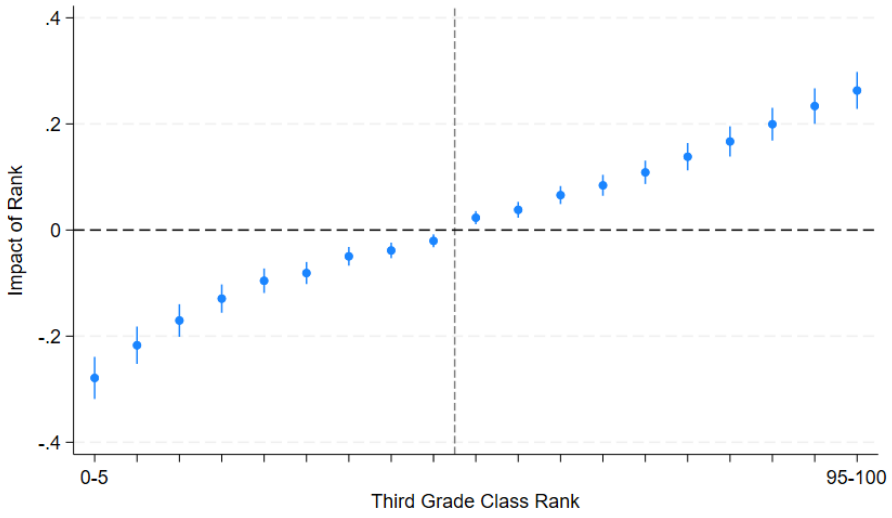
Using our main specification shown in Equation (2), we assess how third-grade school-cohort rank affects third-grade math teachers' assessment of their students' math achievement.[19,20] Estimates are shown in Figure E1. Teacher assessments increase monotonically with students' school-cohort rank. Relative to students at the median, students at the bottom of the rank distribution receive substantially lower teacher assessments, while students at the top receive substantially higher assessments. This pattern suggests that teachers' subjective perceptions of students' achievement vary systematically with ordinal rank, providing a potential mechanism through which rank may affect disability classification if teachers are more likely to refer students whom they perceive as struggling academically for evaluation.

[18] Seventy-five percent of students without a disability in third grade receive an evaluation of level 3 or above in math.

[19] Results are qualitatively similar for reading.

[20] Teacher assessments may differ systematically across teachers in ways that are correlated with students' school-cohort ranks. Ideally, we would include teacher fixed effects to account for such differences. However, many teachers in our sample teach in only a single school, making teacher effects difficult to distinguish from the school-subject-cohort fixed effects included in Equation (2).

Figure E1: Impact of Third-Grade Math Classroom Rank on Third-Grade Teacher Assessment



The figure displays estimation results looking at the effects of third grade within-classroom math class rank on teachers' subjective assessments of students' achievement. The omitted ventile is the 10th ventile. 95% confidence intervals are displayed. Standard errors are clustered at the school level.

F Institutional Background

In North Carolina, parents receive an individual student report that gives information on how their student performed on end-of-year standardized tests. An example report is shown in Figure F1. In addition to the student's scale score, the report includes the average scale score for the school, the district, and the state.

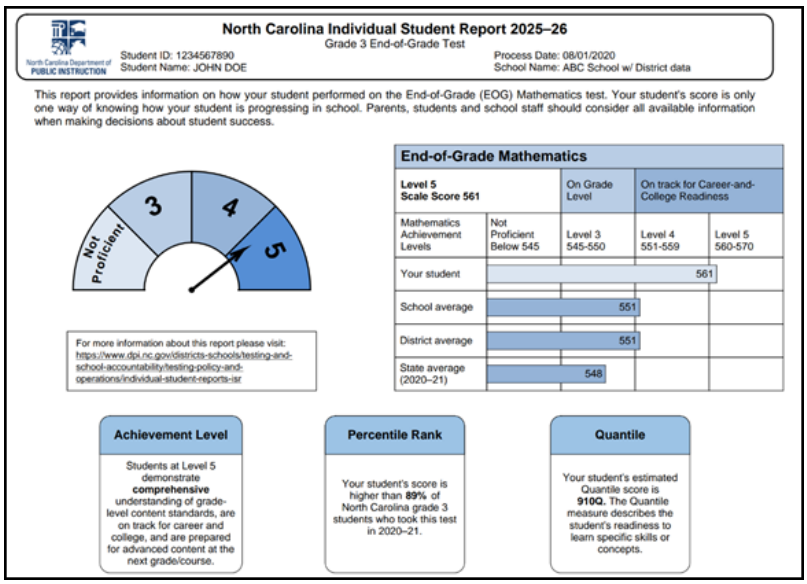


Figure F1: Individual Student Report Card

Source: https://www.dpi.nc.gov/districts-schools/accountability-and-testing/testing-policy-and-operations/individual-student-reports-isr