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CAN TECHNICAL EDUCATION IN HIGH SCHOOL SMOOTH POSTSECONDARY TRANSITIONS FOR STUDENTS WITH DISABILITIES?

Eric Brunner
Shaun Dougherty
Stephen Ross

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Can Technical Education in High School Smooth Postsecondary Transitions for Students with Disabilities?

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ABSTRACT

Career Technical Education (CTE) programs have been proposed as a valuable strategy for supporting transition to independence among students with disabilities. We exploit a discontinuity created by admissions thresholds to estimate the causal impact of attending a CTE high school on the short- and long-term outcomes of students with disabilities. Our findings suggest attending CTE high schools has large positive effects on completing high school on time, employment, and earnings. Attending CTE schools also results in more time spent with non-disabled peers and higher 10th grade test scores. These results appear concentrated among male students, but the sample of female students is too small to support strong conclusions about outcomes. Notably, these estimated effects appear broad based over disability type, time spent with non-disabled peers in 8th grade, and previous academic performance.

Eric Brunner
Department of Public Policy
University of Connecticut
10 Prospect Street, 4th Floor
Hartford, CT 06103
eric.brunner1@gmail.com

Shaun Dougherty
Harvard University
shaun.dougherty@bc.edu

Stephen Ross
Department of Economics
University of Connecticut
341 Mansfield Road, Unit 1063
Storrs, CT 06269-1063
and NBER
stephen.l.ross@uconn.edu

A data appendix is available at http://www.nber.org/data-appendix/w32867

I. Introduction

A central emphasis for individuals with disabilities is creating a plan to support a successful transition from secondary education to adulthood (including postsecondary education and employment), and a path to independent living (Test et al. 2009; Flexar et al. 2011). Supporting transition to adulthood is critical to achieving independence for individuals with disabilities and reducing known concerns about social isolation and health disparities (Shandra 2018; Pettinicchio et al. 2022; Bixby 2023). These health and social disparities have known negative impacts on individuals with disabilities, their families, and also come at a broader social cost of providing additional public services. Prior research has also shown that early intervention and high-quality services for children and youth with disabilities can promote better outcomes in adulthood (Ryndak et al. 2012; Lovett et al. 2017). Notably, studies have documented improved outcomes for youth with disabilities participating in school to work programs including positive impacts on employment (Shandra and Hogan 2008), career development skills (Lindstrom et al. 2020), self-efficacy and self-determination (Sheftel et al. 2014), and autonomy (Shogren et al. 2016). Among the programs coordinated at the state and local level, career and technical education (CTE) is often included in education and transition plans for school-aged youth with disabilities.

In this paper, we examine the effect of attending a statewide, oversubscribed system of stand-alone CTE high schools on the short- and long-term outcomes of students with identified disabilities. CTE schools have been shown to have large effects on outcomes of non-disabled students (Dougherty 2018; Brunner et al. 2023). We employ a fuzzy discontinuity research design to address selection into CTE high schools on student unobservables exploiting admissions thresholds to compare students just above the admissions threshold to students just

below. We estimate the impact of being admitted to and attending one of these schools on high school graduation, test scores, college going, labor force participation, and post-high school earnings for students with identified disabilities. We follow students long enough to observe labor market outcomes five to ten years after expected high school graduation. Our data also contains critical information about disability type and share of time students with disabilities spend with their typically developing peers, which is important because prior research suggests the relationship between CTE participation and employment outcomes varies by type of disability (Daviso et al 2016; Lee et al 2016; Wagner et al. 2016; Wagner et al 2017).

For male students, we find that attending a CTE high school has a large positive impact on state test scores, on-time high school graduation, and post-high school earnings and employment. On-time graduation rates increase by over six percentage points, quarterly earnings increase by 25%, and students have almost three additional quarters with earnings; a 15% increase compared to an increase of 11% for typically developing peers (Brunner et al. 2023). Further, the quarterly earnings gains persist even when focusing on individuals aged 22 years or older. Finally, impact estimates for female students are generally insignificant. However, given the small size of the female sample we cannot rule out positive effects, and in fact we observe sizable positive point estimates for female applicants with disabilities for quarters with earnings and math test scores.

Our paper makes several important contributions to the literature and the future of educational and disability related practice. First, prior research on the impact of CTE for students with disabilities has been forced to rely on observational study designs that can only control for observable differences between students that participate in CTE programs and those that do not (Theobald et al. 2019; Daviso et al. 2016; Lee et al. 2016; Wagner et al. 2016; Wagne et al.

2017; Dougherty et al. 2018). Our study provides the first quasi-experimental evidence of the causal impact of participation in CTE programs for students with identified disabilities, avoiding bias from selection on unobservables by exploiting admissions thresholds in a regression discontinuity framework. Second, our results represent impacts in a system of stand-alone CTE high schools operating at scale. Third, our study is one of the first to follow students long enough to observe labor market outcomes five to ten years after high school graduation, which is critical given the emphasis on transition to employment and independent living for students with disabilities.[1]

Fourth, a key contribution of this paper is our ability to observe not only disability category, but also a continuous measure of the share of time that students with Individualized Educational Plans (IEPs) spend with their typically developing peers. Notably, the positive effects of attending these CTE high schools are broad-based and experienced by: 1) students across a wide range prior academic performance; 2) students across a broad set of disability categories; and 3) students who in middle school had either an above or below average share of time spent with typically developing peers.

II. Study Setting

The Connecticut Technical Education and Career System (CTECS) is a statewide school district consisting of 16 high schools. All CTECS schools are oversubscribed for our entire sample period. Eighth graders can apply to these schools during the winter before 9th grade. Their middle school grades, test scores, attendance, and in later years an interest survey are used to create an overall application score. To ensure fair evaluation, information about whether a

[1] To our knowledge, Wagner et al. (2016) is the only other CTE study for students with disabilities that follows students longer than two to three years after high school.

student has an IEP and what type of identified disability they have are not included in the application process or scoring. Students can apply to up to four schools, but most students apply to one school that is located close to where they live. Individual schools then rank applicants in descending order based on their application score.

Because not all students who receive initial offers choose to enroll, some students who were not recipients of an initial offer end up being admitted. Students not admitted at their first-choice school have their application transferred to their second-choice school and could be admitted if space allows and their application score exceeds that school's threshold for admission. All students apply to schools in the same manner, but students with an identified disability are subject to an additional review prior to admission as part of a transition IEP meeting. However, neither imperfect compliance nor this additional level of review influences our estimates because our research design is based on comparing all students just above the relevant admissions threshold to students just below the threshold to capture an intent to treat effect.[2]

There are several mechanisms through which high school CTE might affect student outcomes, including engaging and interactive coursework, connections made between state graduation requirements and applied content, smaller student-teacher ratios, and opportunities for work-based learning. Furthermore, students with disabilities in the State of Connecticut are required to have a formal transition plan as part of their IEP beginning at age 14, and access to vocational rehabilitation services that are designed to build employment connections and skills, both of which have the potential to reinforce the CTE experience. For example, quality CTE

[2] Figure A1 presents the distribution of admission scores separately by whether a student has a documented disability or not, and a sizable share of the score distribution falls between the minimum and maximum adjusted admissions thresholds of 27 and 62. See Appendix B for more details.

pathways with clearly articulated experiences across a variety of programs of study have been shown to boost career aspirations (Brand et al. 2013). In addition, the work-based learning opportunities and apprenticeships available to CTE students provide valuable mentoring experiences which can enhance the educational and vocational development of students with identified disabilities (Daughtry et al. 2009).

III. Data and Sample

Our data includes 9 cohorts of applicants (from 2006 to 2014) to 16 CTE high schools in Connecticut and includes nearly 6,000 students with identified disabilities. We merge school application data with state student-level longitudinal administrative data, which includes National Student Clearinghouse records. These records are then merged with unemployment insurance (UI) records of earnings for individuals who are employed in the state of Connecticut in a job that is covered by the UI system. The application data contains the CTE high schools to which each student applied, the application score along with the individual score components, and whether the student received an admission letter. The state administrative data provides standard information on the school attended in each grade, 3rd- 8th and 11th grade test scores, high school graduation, all spells of college attendance, as well as whether a student is free and reduced-price lunch eligible, an English language learner, or has an identified disability. Further, for students with identified disabilities, the administrative data identifies the type of disability and the time spent with typically developing peers each year.

Finally, the UI data contains information on quarterly earnings for every quarter an individual is employed in a UI covered job and spans the first quarter of 2006 through the first quarter of 2022, though results are robust to dropping earnings data post the first quarter of 2020 (i.e. during the COVID-19 pandemic). Our labor market sample is constructed allowing for five

years to graduate from high school and two quarters to enter the labor market, implying we examine earnings starting with the first quarter of the calendar year following a five-year anticipated May graduation. This structure implies that the number of potential quarters in the labor market data varies by cohort. Consequently, all our models include school-by-cohort fixed effects so that we are essentially estimating separate models for each cohort and application school.

From the full list of applicants, we create a sample of all students with an identified disability who apply to Connecticut CTE high schools and create one observation for each school to which a student applied. Table A1 presents descriptive statistics for students with disabilities for the state overall, our sample of CTECS applicants, and the subsample of applicants who fall within the bandwidth for our regression discontinuity analysis. Students with disabilities that apply to CTECS are more likely to be students of color, eligible for free or reduced-price meals and less likely to meet key proficiency levels on 8th grade standardized test scores. We also observe selection based on the type of disability with a higher share of applicants with a learning disability (51.7% vs. 44.8%) and substantially lower share of applicants with disabilities falling into our "Lower Incidence" disability category, which includes emotional disturbance, intellectual disability, autism and traumatic brain injury, 15.2% versus 23.5% statewide. Note that emotional disturbance represents over 80% of the students in this category.[3] See Appendix B for additional detail on the construction and composition of the analytic sample.

[3] This feature of our sample composition over disability type is comparable to samples of CTE participating students in Massachusetts (Dougherty 2018), Oregon (Doren et al. 2011) and the National Longitudinal Transition Study-2 (Lee et al 2016; Wagner et al. 2016; Wagner et al 2017), as well as participants in a school to work program in the U.S. Pacific northwest (Lindstrom et al. 2020).

IV. Methods

The oversubscribed nature of the schools, as well as the admissions process of admitting students in rank order based on admissions criteria creates the conditions for a natural experiment in which we can apply a fuzzy regression discontinuity research design. Following Brunner et al. (2023), for all students regardless of disability status, we identify an admissions threshold associated with a discrete jump in the probability that a student receives an offer of admission for each school and application cohort. Specifically, we estimate separate models of the probability of receiving an admission letter by CTE high school and application year using the full sample of applicants with different candidate admissions thresholds and identify the threshold for a given school and year as the threshold that yields the largest discontinuity in the probability of being admitted. We then create a centered score by subtracting each school and year threshold value from each student's application score. Next, we select the sample of students with an identified disability and with an application score within 16 points of the admissions threshold for each CTE high school and application year. As shown in Table A7, results are robust to narrowing the 16-point bandwidth.

We then use the thresholds to estimate a first-stage model for the likelihood that a student receives an admission letter and attends a CTECS school controlling for school-by-application year fixed effects and 8th grade sending town fixed effects. We use the results of this first-stage model to estimate instrumental variable models for student short- and long-term outcomes. Estimates from our IV models represent the Treatment on the Treated, where the Intent to Treat estimates are scaled up by the increase at the threshold in the share of students attending a CTECS school. Standard errors are two-way clustered at the application school by application cohort and 8th grade sending town. To address concerns about manipulation, all models are

estimated using a donut hole approach where we drop observations exactly at the threshold (though results are robust to not dropping those observations).

We test for sample balance over the threshold, a requirement for valid application of our analytic approach, by estimating a regression discontinuity model using student characteristics as the dependent variable and demonstrating that no discontinuity exists in those characteristics at the threshold. The characteristics include race, ethnicity, whether free and reduced-price lunch eligible, whether an English language learner, 7th grade test scores, time with typically developing peers in 8th grade, type of disability in 8th grade, and school-level pupil-teacher ratio, and 6th grade average test scores for sending middle schools. As shown in Tables A17 (full sample) and A18 (labor market sample), all the estimated coefficients tend to be small in magnitude and statistically insignificant for both male (top panel) and female (bottom panel) applicants indicating that all observables vary smoothly across the discontinuity, despite the large discontinuities in observed outcomes that we discuss below. For a more detailed and technical description of our research methodology see Appendix C.

V. Results

Figure 1 (Table A2) shows the first-stage effect of being above the admission threshold. All models include controls for the student attributes listed in Table 1. For the full sample, being above the admission threshold leads to an 87 percent increase in the likelihood of receiving an admissions letter and a 66 percent increase in the likelihood of attending one of the 16 CTECS high schools. We observe similar impacts for male and female students and for students that are observed in the labor market data (Table A4).

Figure A2 presents the reduced form intent-to-treat (ITT) graphs of being above the admission threshold for our key outcomes for both male and female students, the former

constitute nearly 75% of our sample. For male students there is clear evidence of a jump in on-time high school graduation and the log of quarterly earnings on the right side of the admission threshold but little evidence of a jump in college attendance. In contrast, for female students, there is minimal evidence of a discontinuity at the admission threshold on these three outcomes.

Table 1 presents instrumental variable, treatment-on-the-treated (TOT), estimates for our main outcomes based on a 16-point bandwidth. For male students, attending a CTE high school is associated with a 6 percentage-point increase in on-time high school graduation and no discernible effect on college participation. In terms of labor market outcomes, male students attending a CTE school experience a 45% increase in total earnings (represented as the estimate for log of total earnings), almost three additional quarters in paid employment, and 25% higher quarterly earnings, which increases to 30% higher earnings when we restrict the sample to only quarters worked while age 22 or older.[4] The very large increase in quarters employed and the increase in quarterly earnings at older ages are clear points of contrast with estimates for non-disabled students (Brunner et al. 2023). Finally, in column 3, we examine if treatment affects whether the individual is observed in the labor market and find no evidence of selection into our labor market sample.

In contrast, for female students, none of the estimates are statistically significant. However, it is important to note that we have limited power to detect effects for the female subsample because only 27% of applicants with disabilities are female. Most notably, the TOT estimate for quarters with earnings in the female subsample is sizable at over 2 additional quarters of work or a 12% increase over the control group mean.

[4] Note that average quarterly earnings are calculated only for quarters with observed earnings in order to separate the likelihood of having quarters with earnings from earnings observed when employed.

We also conduct a series of robustness tests. Estimates are nearly identical in specifications without controls (see Table A6), as is expected if our RD models mimic a randomized experiment. Results are also robust to selecting narrower bandwidths (Table A7), and falsification tests do not detect any relationship between outcomes and being above fake thresholds set either 16 or 20 points above or 16 points below the actual score threshold (Table A8). We also show that higher earnings are not driven by spending less time in school (Table A5).

In Figure 2 (Table A9), we complement our estimates of the impact of CTE attendance by examining possible mechanisms behind our findings for male applicants. Figure 2 presents point estimates with 95% confidence intervals for the impact of attending a CTE high school on discipline, time spent with typically developing peers, and state standardized test score outcomes. Students with identified disabilities that attended a CTE high school were slightly more likely to be suspended in high school (5-10pp), but suspensions were primarily in-school, without any higher likelihood of being expelled. Students attending a CTE school also spent a substantially larger share of their time with typically developing peers (12pp), and had higher math and reading scores than otherwise similar students who applied but were not admitted to a CTE high school. Further, these higher test scores arise even though admission to a CTE high school leads to higher test taking rates (as shown by being less likely to have missing 10^{th} grade test scores).

These estimates suggest that CTE high schools in Connecticut may have had stricter enforcement of school discipline policies but were more inclusive of students with identified disabilities and produced substantially better outcomes on required state tests of math and reading. These mechanisms are theorized to help explain the better graduation and workforce

outcomes we observe for these students. Being included in mainstream settings, having enforced behavioral expectations, and better opportunities to develop core general skills could also explain the large positive impacts on our more distal outcomes.

Table A10 presents estimates for female students. Time spent with non-disabled peers is highly significant with an effect size about two percentage points smaller than the male subsample, but also a control group mean that is two points higher, consistent with very high levels of immersion in mainstream learning for both male and female students. For all other intermediate outcomes, estimates are relatively noisy. However, we observe sizable point estimates consistent with higher math test scores and higher rates of in-school suspension similar to male students, and so given the imprecision of our estimates we cannot rule out positive effects for female students.

We next examine whether these positive effects are heterogeneous by splitting the sample and estimating reduced form models. Here we focus on male students, given the noisy estimates arising with the female subsample. In Figure 3 (Table A11), we test for heterogeneity based on a student's type of disability, which we divided into four broad categories: physical or health impairments, ADD or ADHD, learning disability, and lower incidence disabilities, where the lower incidence category is primarily students with emotional disturbances (over 80%). Figure 3 presents the difference between the estimates for all other types of disabilities and the largest type, learning disability. For ease of presentation, quarters with earnings estimates are divided by 10 so that a two-quarter difference in the effect of attending a CTE high school is represented by 0.2. None of the differences across subgroups in the reduced-form estimates are statistically different for any of the outcomes considered, and overall there is no consistent pattern in terms of differences in the magnitude of estimates across samples. For example, we observe a negative

difference for on time high school graduation arising for physical/health impairment, consistent with a zero point estimate for the disability type, while this disability classification has very similar point estimates to learning disability in the labor market. At the same time, we acknowledge the lack of labor market gains in terms of point estimates for our lower incidence disabilities subsample. The difference estimates for this subsample relative to learning disability are sizable and negative for both quarterly earnings and quarters with earnings, but very noisily estimated due to the small sample size. Therefore, we cannot determine whether CTE high schools were providing a labor market benefit for students in this disability category.

Second, we split the sample into students who spent more than 90% of their time in mainstreamed settings (approximately the sample median) in 8th grade and those who spent less than 90%. For our regression sample, the mean time spent with non-disabled peers in the above median sample is 97.0% of time with a standard deviation of only 2.8, while for the below median sample the mean is 74.1% with a standard deviation of 22.1. Notably, these statistics are nearly identical when we restrict the sample to applicants above the admissions threshold. In Figure 4 (Table A12) we present the difference between the estimates for the below and above 90% of time with non-disabled peers subsamples for quarters with earnings, quarterly earnings, and on-time graduation from high school. None of the estimates for below and above median time spent with typically developing peers are statistically different from each other. Further, while the quarters with earnings estimate for below median is less than the estimate for above median, as illustrated by a negative point estimate in the figure, the estimates for quarterly earnings and on time graduate for below median are larger so there is no consistent pattern, suggesting these differences are likely due to estimation error. Therefore, students with disabilities in our below median subsample were able to successfully transition to near universal

integration with non-disabled peers upon admission to CTE high schools in Connecticut, even though on average those students had 23 percentage points less time spent with non-disabled peers in 8th grade compared to the above median subsample.

Finally, we test for heterogeneity based on admission threshold scores to examine how broad-based our core results are over prior academic performance. We first separate the sample of male students into terciles based on admission threshold scores that are adjusted to a maximum score value of 100 and create indicators for each tercile. Note that this adjustment is only used for selecting the tercile subsamples, not the regression analyses. The thresholds contained in each tercile differ substantially with mean thresholds of 39.7, 48.2, and 55.3 in the bottom, middle and top terciles respectively. Notably, as shown in Table A13, the distributions of students over type of disability and time spent with non-disabled peers are relatively stable across the terciles. We then interact the three tercile indicators with the above the admissions threshold (offer) indicator and re-estimate our main reduced-form models replacing the offer indicator with the three interactions between the admission threshold terciles and offer. As shown in Table A14, effects for on-time high school graduation and quarters with earnings appear to be concentrated in the lower terciles. We observe virtually no differences across terciles for the estimates on quarterly earnings. Although we cannot statistically reject that the estimates are the same across terciles, we can conclude that any heterogeneity would imply larger effects for students with weaker pre-treatment academic performance.

In the remainder of Table A12, we present reduced-form estimates for free or reduced-price lunch eligible students (panel c), students not eligible for free or reduced-price lunch (panel d), black and Hispanic students (panel e) and all students other than black and Hispanic students

(panel f). In general, there is once again little evidence of heterogeneity based on these student attributes with no estimates being statistically significant at the 5% level.

VI. Discussion

In this paper we provide some of the first quasi-experimental evidence (i.e. robust to selection on unobservables) on the efficacy of attending a CTE high school for students with disabilities. For male students we find robust evidence that attending a CTE high school leads to large and statistically significant increases in on-time high school graduation, quarterly earnings, quarters with earnings, and high school test scores. Our finding of improved earnings among young-adult males is particularly important given that nationwide, adults with disabilities experience poverty at twice the rate of their otherwise similar peers (Rabren et al. 2014, Goodman et al. 2020). Furthermore, we find improved outcomes for students with disabilities across a diverse sample of students with disabilities as measured by type of disability, time spent with non-disabled peers, and academic performance in middle school. Notably, point estimates suggest that any heterogeneity over prior academic performance would imply larger effects for students with lower prior performance.

Our lack of findings for female applicants is consistent with several related literatures. As observed in the literature on intersectionality, gender gaps are substantially larger for students with disabilities suggesting that female students with disabilities face additional barriers in the labor market, which might limit their benefit from participation in CTE (Blackorby and Wagner 1999; Maroto et al. 2019). Further, the literature on CTE for non-disabled students has often found that effects are concentrated among male, rather than female students, especially for programs focused on career pathways rather than college readiness (Brunner et al 2023; Page 2012; Bertrand et al. 2021). Similarly, for students with disabilities, career counselling and

school to work programs for disabled students have also been shown to be heavily influenced by gender stereotypes (Blackorby 1993; Powers et al. 2005; Powers et al. 2008). At the same time, we must acknowledge that we have limited power to detect positive effects for female students with disabilities and that we observe sizable point estimates for quarters of work, math test scores, and likelihood of in-school suspensions that are in the same direction as our results for male students. Nevertheless, it is notable that male and female students with disabilities attending CTE high schools were successfully able to transition to a completely immersive educational environment and perform academically at comparable or even superior levels to students attending traditional high schools.

Notably, a parallel literature on the experiences of youth with disabilities at the point of transition to adulthood highlights limits and obstacles facing these students. Youth with disabilities appear to experience less social contact, and what social contact they do experience is disproportionately in the context of their immediate family (Wikle and Shandra 2023). The increased exposure to typically developing peers in CTE high schools and the smoothing of the transition to the workforce for students in those schools may help reduce such social isolation and expand the context for their own social inclusion and benefit. Relatedly, family involvement appears to be crucial to postschool transition (Hirano et al. 2018). The focus in CTE high schools on creating work-based learning and out-of-school learning experiences, as well as the support for student agency in choosing CTE pathways early in high school, may serve to create mechanisms to involve families in the education and transition process beyond what is typical experienced in comprehensive high schools.

Critically, our estimates are generated in an educational setting that is relatively unique across the U.S. educational system. Nonetheless, schools like Connecticut's CTE high schools

also exist in Massachusetts, New York, New Jersey, and similar models may be expanding as the PTECH model of schooling grows nationally (Dixon and Rosen 2022). Further, we believe that documenting the sizable positive effects of stand-alone CTE educational experiences is very important and illustrates a model that could be adopted in other states and potentially improve outcomes for both disabled and non-disabled students who have interests in CTE education. In fact, the lack of labor market effects eight years after graduation from high school found in prior studies (Wagner et al. 2016) is suggestive that the less intensive treatment provided by CTE courses in traditional high schools is not sufficient to have the same long-lasting effects that we observe for CTE dedicated high schools. The CTE focused high schools in Connecticut are only modestly more expensive than traditional high schools in Connecticut (Brunner et al. 2023), and those additional costs may in fact be less than the savings in special education expenditures that arise when students attending these CTE high schools are completely mainstreamed. Therefore, our research points strongly to a model that could be adopted more broadly and be very effective for students with identified disabilities.

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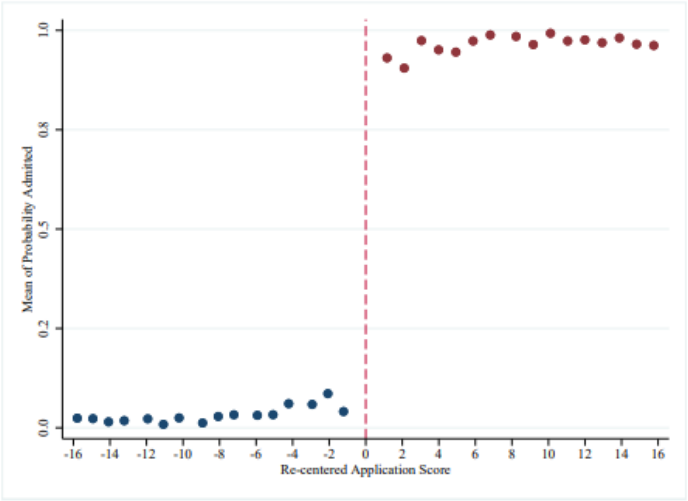
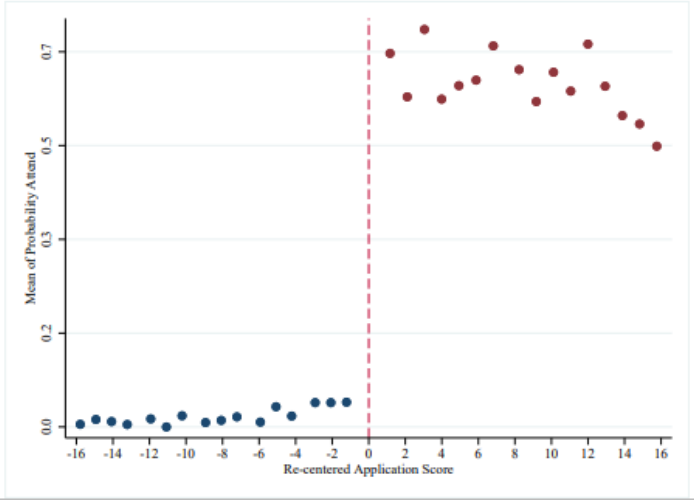
Figure 1: First-Stage Discontinuity in Admission and Attendance

Panel A: Probability of Being Admitted to a CTHSS School Full Sample

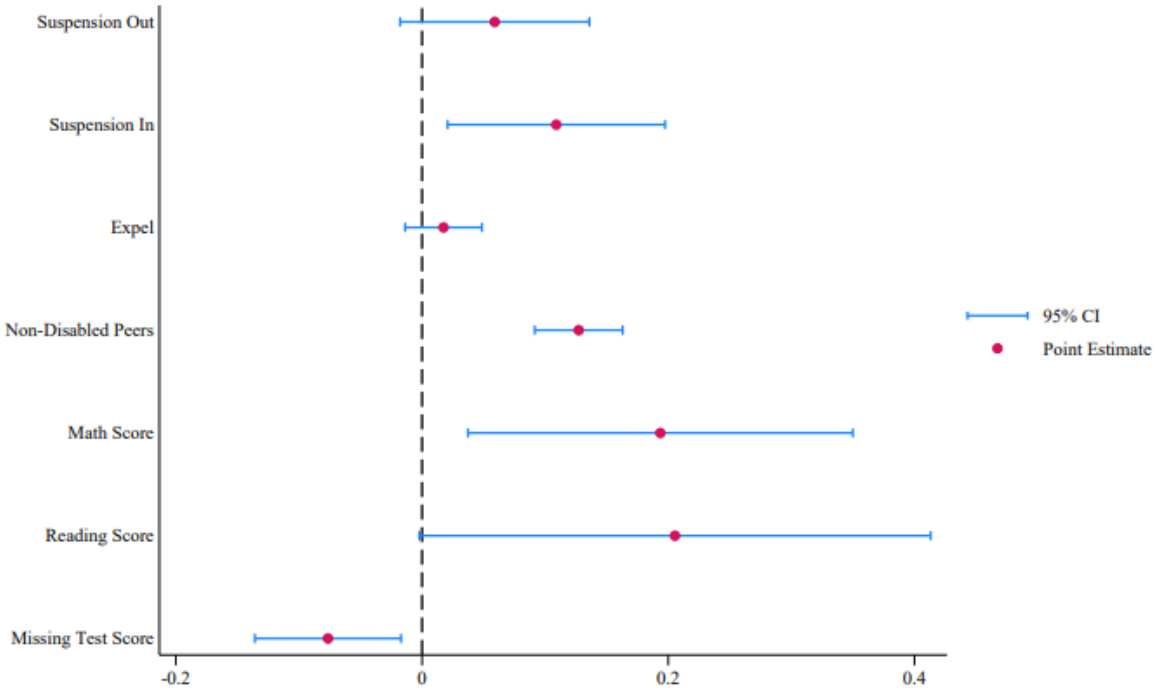


Panel B: Probability of Attending Full Sample



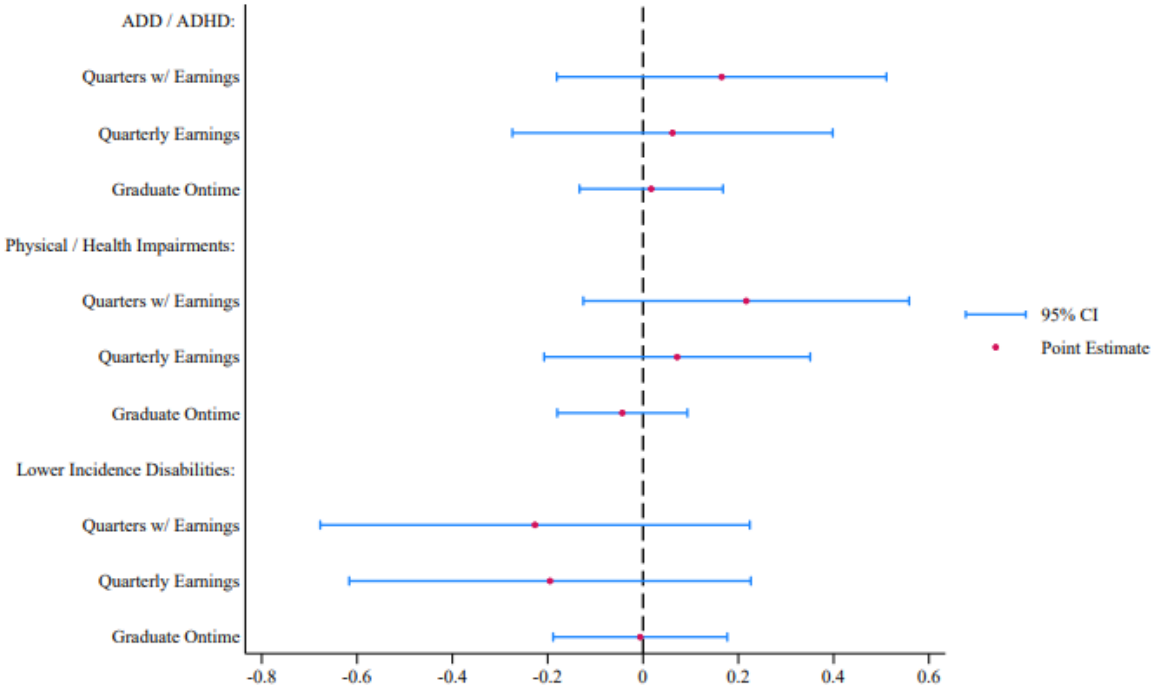
Notes: The scores forming the horizontal axis have been re-centered by subtracting the threshold for each school and year from the scores associated with the applicants from those schools and years. The figures are based on all applications from 8th graders with an IEP from 2006-2014. Panel A shows the results for admission, panel B shows the results for acceptance, and panels C and D show the results separately for male students. Full set of estimates and standard errors are reported in Table A3.

Figure 2: Intermediate High School Outcomes as Potential Mechanisms



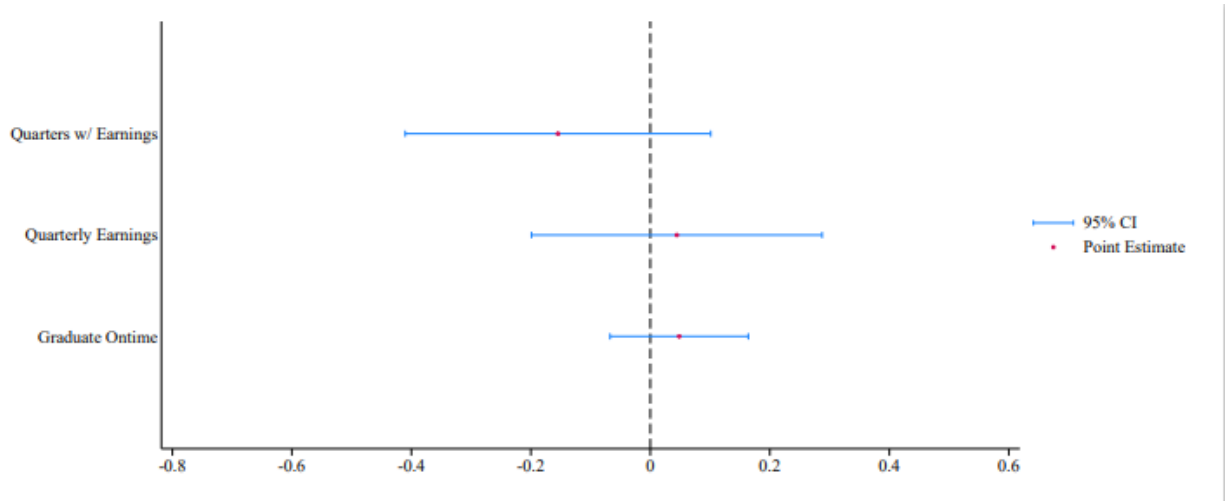
Notes: Figure presents point estimates and 95% confidence intervals for potential mechanisms underlying the results reported in Table 1. All results are based on a RD local linear regression with a 16-point bandwidth. Full set of estimates and standard errors are reported in Table A9.

Figure 3: Heterogeneity by Type of Disability Relative to Learning Disability



Notes: Figure shows the difference between point estimates for each disability type (lower incidence, physical/health, ADD/ADHD) and the point estimate for learning disability, the largest subsample based on disability type, with 95% confidence intervals. Estimates for each disability type arise from separate regressions for each subsample based on student's identified disability in 8th grade, and standard errors are calculated exploiting the independence between estimates resulting from the use of separate subsamples for estimation. All results are based on a RD local linear regression with a 16-point bandwidth. A full set of estimates and standard errors are reported in Table A11.

Figure 4: Heterogeneity by Time Spent with Non-Disabled Peers (Below relative to Above 90% of Time)



Notes: Figure shows the difference between the point estimate for the below median subsample based on 8th grade time spent with non-disabled peers and the point estimate for the above median subsample with 95% confidence intervals. Estimates for the below and above median subsamples arise from separate regressions for each subsample, and standard errors are calculated exploiting the independence between estimates resulting from the use of separate subsamples for estimation. All results are based on a RD local linear regression with a 16-point bandwidth. A full set of estimates and standard errors are reported in Table A12.

Table 1: 2SLS Estimates for Main Outcomes (Bandwidth 16) with Controls

Outcome	(1) On Time H.S. Grad	(2) Any College	(3) In Labor Market	(4) Log of Total Earnings	(5) Log of Quarterly Earnings	(6) Quarters with Earnings	(7) Log of Quarterly Earnings Age 22+
				Male Students			
Attend	0.0633	-0.0293	-0.00977	0.453**	0.245**	2.917**	0.292**
	(0.0364)	(0.0333)	(0.0104)	(0.142)	(0.0835)	(0.943)	(0.0901)
Observations	4,639	4,639	4,639	4,039	4,039	4,039	3,292
Mean CG	0.696	0.176	0.897	11.136	8.441	19.155	8.626
St. Dev. CG	0.460	0.381	0.304	1.489	0.814	11.394	0.857
				Female Students			
Attend	0.00729	-0.0874	-0.0431	0.142	0.0882	2.160	0.0843
	(0.0960)	(0.0590)	(0.0385)	(0.254)	(0.150)	(1.395)	(0.163)
Observations	1,618	1,618	1,618	1,327	1,327	1,327	1,048
Mean CG	0.716	0.316	0.837	10.701	8.059	17.820	8.234
St. Dev. CG	0.451	0.465	0.370	1.448	0.793	10.327	0.852

Notes: Table presents 2SLS estimates and clustered standard errors for main outcomes. Top panel presents estimates for male IEP students. Bottom panel presents estimates for female IEP students. All results are based on a RD local linear regression with a 16-point bandwidth and include applications from 8th graders from 2006-2014. Mean CG is the mean of the dependent variable for the control group and is defined as the mean to the left of the cutoff within the 16-point bandwidth. St. Dev. CG is the standard deviation of Mean CG. All specifications include controls for standardized 7th grade combined test scores in English and math and indicators for whether an applicant is Black, Hispanic, Free or reduced-price lunch eligible and whether the student is an English language learner. All specifications also include CTECS school-by-year fixed effects and 8th grade sending town fixed effects. Robust standard errors, clustered at the school-by-year and town levels in parentheses. ** $p<0.01$, * $p<0$.