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NCLB Alternate Assessment Policies and Post-School Employment Outcomes for Individuals with Significant Cognitive Disabilities

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Supplemental materials: Supplemental tables, figures, and appendices referenced throughout the manuscript, along with syntax for running analyses, may be accessed at https://osf.io/af2ku/?view_only=247b853afed944388e7581623b40dae9.

Abstract

The participation of students with significant cognitive disabilities in accountability assessments aligned with general education standards, is a heavily debated topic in the field of special education. Attempts to understand the impact of these assessments have generally been limited to correlational methods. We employed a difference-in-differences approach using select waves of the National Longitudinal Transition Study-2 dataset to estimate the impact of alternate assessment policies from the No Child Left Behind Act of 2001 on the employment outcomes of individuals with significant cognitive disabilities. Our hypothesis was that these policies would produce a detrimental effect. Analyses suggested that alternate assessment policies resulted in descriptively positive employment outcomes, yet estimates were highly imprecise, which yields a complicated picture requiring more research.

Keywords: *alternate assessment, NCLB, significant cognitive disabilities, NLTS-2*

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The No Child Left Behind Act of 2001 (NCLB, 2002) required that all students in public schools participate in accountability assessments aligned with general education content standards. There were no exceptions for students with Individualized Education Programs. Even for students with the most significant cognitive disabilities, for whom Individualized Education Programs generally pertained to daily living and vocational skills (Lynch & Beare, 1990; Ysseldyke & Olsen, 1999), there were no exceptions. Rationales supporting the inclusion of all students were multifaceted, but generally reflected notions that all students should be held to high expectations and that including all students in accountability assessments would ensure that all students are considered in policy decisions (Thompson et al., 2001). Published literature supporting these rationales came from conceptual and pedagogical articles, teacher perception research, and descriptions of methods for assessing students with significant cognitive disabilities (Browder et al., 2003). When NCLB passed, there was no empirical research on the impact such a policy may have for students with significant cognitive disabilities. Now, roughly 20 years since the passing of the policy, there are still no evaluations of the impact of NCLB's alternate assessment policies on these students.

The first section of the manuscript describes the literature and policies surrounding assessment for individuals with significant cognitive disabilities followed by our research question, the second section presents the design for our proposed analysis, the third section describes the results, and the fourth section discusses the implications of findings.

Assessment Policies for Students with Significant Cognitive Disabilities

The 1997 amendments to the Individuals with Disabilities Education Act (IDEA) required schools to document and report progress for students with and without disabilities starting in the 2000-2001 school year (Quenemoen, 2008). This position was reinforced by both the passage of the NCLB Act in 2001 and the 2004 reauthorization of IDEA calling for increased accountability of all students, regardless of intended diploma (e.g., general education, special education; Cameto et al., 2009a). Although IDEA 1997 did not require that a set percentage of a school district's students participate in assessments, NCLB allowed for states to count students with the most significant cognitive disabilities towards accountability assessments if those students were assessed on alternate assessments aligned with alternate achievement standards (AA-AAS). Regulations under the U.S. Department of Education specified that alternate achievement standards were an "expectation of performance that differ[ed] in complexity from a grade-level achievement standard" (68 Fed. Reg. 68699 [Dec. 9, 2003]).

NCLB allowed up to 1 percent of a district's students to participate in AA-AAS. This 1 percent subset of all K-12 students represented about 10 percent of all students nationwide receiving special education services in 2007 as reported by the U.S. Department of Education (2017). Although districts could have more than 1 percent of their student population participate in alternate assessments, only 1 percent could be scored for accountability purposes under NCLB. The 1 percent maximum was intended to prevent the over-inclusion of students in AA-AAS by districts in order to escape accountability provisions, as these alternative standards under NCLB were intended solely for students with the most significant cognitive disabilities. Guidance documents from the U.S Department of Education (2005) specified that it was the "State's responsibility to define which students have the most significant cognitive disabilities" (p. 23); and as a result, participating students often had varying disabilities and received special

education services under varying eligibility categories (e.g., intellectual disability, learning disabilities; Thurlow et al., 2017). Generally, students with significant cognitive disabilities were those with the most intensive needs surrounding intellectual ability and adaptive behavior (Musson et al., 2010). We think it relevant to acknowledge that to date, these students remain difficult to identify without objective federal guidelines for states follow. For each student with significant cognitive disabilities that was assessed above the 1 percent cap, this negatively impacted a district's overall accountability score (i.e., Adequate Yearly Progress or AYP). For schools that failed to make AYP, various sanctions could be instated on the school. Likewise, for schools demonstrating continued improvement in AYP, rewards may be provided. Specific sanctions and rewards, along with specific measures of AYP were determined by individual states.

Federal policies have also played a role in shifting the content of alternate assessments from an alignment with functional skills (e.g., job training, communication, independent living) to an alignment with academic content (e.g., language arts, mathematics) over the same time period. When IDEA 1997 first mandated that schools assess the progress of all students, special education researchers pushed for assessments aligned with functional curriculums that addressed vocational and daily living skills (Ysseldyke & Olsen, 1999). However, NCLB 2001 required a state to adopt "the same academic standards that the state applies to all schools and children in the state" (Cameto et al., 2009b, p. 2). Therefore, states worked to align all their assessments with general education content standards. Additional regulations provided by the U.S. Department of Education in 2003 indicated that alternate achievement standards may be used for students with the most significant cognitive disabilities so long as the standards were (a) aligned with academic content standards and (b) promoted access to the general education curriculum.

AA-AAS for students with significant cognitive disabilities differed in complexity and difficulty from general education academic content standards but remained aligned with those standards. For example, an eighth grader with significant cognitive disabilities may be assessed on general education science standards pertaining to elements and compounds in the periodic table through an alternate assessment that is aligned with alternate achievement standards. To assess the student, a teacher may present a picture of the element, helium, and a picture of the compound, salt, and ask the child, *Which one of these is a compound: helium or salt?* (Ohio Department of Education, 2020). As specified within NCLB 2001, the implementation of AA-AAS began during the 2005-2006 school year across public schools nationwide; although only select grades were required to participate (e.g., 10th, 11th, and 12th graders). Initial assessments focused on the subjects of math and reading, with assessments addressing other subjects added over time (e.g., science).

Within the field of special education, the transition to accountability based on performance tied to general education standards was met with disagreement. Many argued that the transition diminished the purpose of an education plan that was *individualized* for students receiving special education services. If teachers were required to provide instruction and assessment on elements of the periodic table (as described previously), then for many students with significant cognitive disabilities, researchers worried that this may take away from finite instructional time that could otherwise be devoted to foundational daily living and employment skills reflected in students' Individualized Education Programs (Ayres et al., 2011). This concern was further exacerbated by a decrease in work-experience programs that provided high school students with disabilities an opportunity to access career-readiness and technical education courses—a decrease that was directly linked with the "increased attention on academic courses

in many school districts nationwide" (Johnson, 2004, p. 245). In addition, this change in focus from vocational education to academic education for students with disabilities was in stark contrast with calls for school districts to act in securing competitive employment for all students with disabilities, especially those with the most significant cognitive disabilities (Rusch & Braddock, 2004). Given concerns that the change from an individualized functional curriculum devoted to job skills and life skills for students with significant cognitive disabilities was being replaced by a standards-based academic curriculum, attempts were made to mitigate the differences by recommending educators develop individualized goals aligned with broader general education standards (Hunt et al., 2012). Rather than reconcile, others stressed that federal policy attempting to dictate what students learn should be based primarily on outcome data that identify the skills students with significant cognitive disabilities need to live high-quality lives (Ayres et al., 2012)—data that were not available when NCLB was passed.

In the same time period as the passage of NCLB, federal initiatives and policies led to a greater push for using empirical data when making educational decisions. In 2002, Congress passed the Education Sciences Reform Act, establishing the Institute for Education Sciences for the purpose of evaluating and funding research for improving practices, policies, and outcomes for all students. Four centers were established under the Institute for Education Sciences, including the National Center for Special Education Research. One of the initial projects funded by the center was the National Longitudinal Transition Study-2 (NLTS-2), which "provided a national picture of the experiences and achievements of young people as they transition[ed] into adulthood" (NLTS-2, n.d.). The NLTS-2 comprised data from young people, parents, teachers, and schools collected across a decade. A unique characteristic of the NLTS-2 not found in other longitudinal data sets of young people, is that the sample is "nationally representative… of

students receiving special education services" in the year 2000. As such, studies using NLTS-2 data may be able to evaluate the impacts of special education services and practices influenced by NCLB on the students receiving those services.

For our study, we used data from the NLTS-2 to examine the impact of NCLB assessment policies on the post-school employment outcomes of individuals with significant cognitive disabilities. This study serves as an initial evaluation of NCLB alternate assessment policies to provide empirical data on educational programming that may help students with significant cognitive disabilities live high-quality lives. We recognize that there may be other outcomes of interest to readers (e.g., post-school education, independent living; see Mazzotti et al., 2016); however, we chose to focus solely on employment related outcomes for this initial evaluation given previously stated concerns reported throughout the special education literature linking changes to educational curriculums as a result of NCLB assessment policies with potentially worse employment outcomes for individuals with significant cognitive disabilities (e.g., Hunt et al., 2014; Johnson, 2004). We encourage researchers to use our analytical framework and syntax for running analyses to extend our methods to other outcomes of interest (syntax and related materials may be obtained for public use at https://osf.io/af2ku/?view_only=247b853afed944388e7581623b40dae9). The research question guiding this study was:

1. What is the effect of NCLB alternate assessment policies on post-school employment outcomes for individuals with significant cognitive disabilities?

Our hypothesis for this study was that NCLB alternate assessment policies would have a detrimental effect on employment outcomes for individuals with significant cognitive disabilities.

Method

Data Description

Data[1] for this study come from the NLTS-2, which collected longitudinal data on a nationally representative sample of individuals with disabilities. Individuals were between the ages of 13-16 years old at the start of data collection in 2000 and 21-25 years old at the end of data collection in 2009. Individuals were in 7th grade or higher at the start of the study. Data were collected biannually in five data collection waves, with data collected through interviews, assessments, and questionnaires given to students with disabilities, parents, teachers, and school representatives. Approximately 12,000 students with disabilities participated in the NLTS-2. For our study, we used data from parent and student interviews in Waves 1 and 5, and student scores on assessments administered in Waves 1 and 2.[2]

Analytical Sample

Pre- and post-NCLB implementation. For this study, individuals were separated into "before" and "after" cohorts with the implementation of NCLB regulations and AA-AAS during the 2005-2006 school year serving as the cut-point. The "before" cohort was comprised of individuals enrolled in the 10th, 11th, or 12th grade between the year 2000 and spring of 2005. These individuals were ineligible to participate in AA-AAS as the policy was not yet implemented. Individuals in the "after" cohort were enrolled in the 10th, 11th, or 12th grade between fall 2006 and the end of data collection in 2009. Individuals within this cohort participated in AA-AAS. We only included individuals if they reported valid outcome measures by the final year of data collection, described further in the section titled "Outcome Variables."

[1] Supplemental tables, figures, and appendices referenced throughout the manuscript, along with syntax for rerunning analyses, may be accessed at https://osf.io/af2ku/?view_only=247b853afed944388e7581623b40dae9.
[2] In compliance with the Institute of Education Sciences' Restricted-Use Data Procedures Manual, we have rounded all unweighted sample size numbers to the nearest ten.

Individuals who completed, dropped-out, or aged-out of school during the 2005-2006 school year were not included in analyses due to our inability to identify the specific date that they withdrew, which would affect if they participated in AA-AAS. We did not include 9th grade students in our analyses given that there was no requirement within NCLB that 9th graders participate in accountability testing.

AA-AAS testing eligibility. To identify students with the most significant cognitive disabilities that would be eligible to participate in AA-AAS[3], we used student scores reported on the Woodcock-Johnson III (WJ-III; Shrank, McGrew, & Woodcock, 2001) because we do not directly observe participation in AA-AAS. Prior to describing the scores on the WJ-III that indicated eligibility to participate in AA-AAS, we present a rationale for using these scores as a proxy for AA-AAS participation. First, no more than 1 percent of all students nationwide should have taken part in AA-AAS as per NCLB. The intent was for these 1 percent of students to represent those with the most significant cognitive disabilities and account for about 10 percent of all students with special needs. Given that the NLTS-2 is a nationally representative sample of students receiving special education services, we can translate eligibility for AA-AAS directly to administration of the WJ-III. That is, students in the NLTS-2 sample that scored below the 10th percentile on the WJ-III can be considered representative of students with the most significant cognitive disabilities (i.e. the lowest 10 percent of students with special needs would be the lowest 1 percent of all K-12 students), and thus, most likely to have taken part in AA-AAS.

[3] It should be noted that the NLTS-2 included a variable to indicate if a student participated in alternate assessments; however, this variable pertained to the 2002-2003 school year for which alternate assessments differed in comparison to AA-AAS that began in the 2005-2006 school year. Therefore, we do not perceive the alternate assessment variable included in the NLTS-2 dataset to be appropriate for identifying students participating in AA-AAS.

To identify precise percentile scores on the WJ-III to indicate eligibility and ineligibility to participate in AA-AAS, we used the maximum and minimum percentages of high school students nationwide taking part in AA-AAS in a single year between 2005-2010 (U.S. Department of Education, n.d.). We used these years because they covered the years in which data were collected for the NLTS-2. Between 2005-2010 the percentage of students taking part in AA-AAS varied by year and by the type of assessment. That is, students of all grades participating in AA-AAS may have taken part in a single AA-AAS targeting math standards, a single AA-AAS targeting reading standards, or both assessments. Different percentages of students participated in AA-AAS targeting reading standards than AA-AAS targeting math standards. The minimum and maximum percentages of high school students taking part in AA-AAS for reading in a single year between 2005-2010 was 8.0 percent and 11.3 percent, respectively. The minimum and maximum percentages of high school students taking part in AA-AAS for math in a single year during the same time period was 8.9 percent and 11.4 percent, respectively. Students in the NLTS-2 with percentile ranks below 8.0 percent on WJ-III subsections specific to reading or 8.9 percent specific to math were determined to be eligible to participate in AA-AAS. Students in the NLTS-2 with percentile ranks above 11.3 percent on WJ-III subsections specific to reading or 11.4 percent specific to math were determined to be ineligible to participate in AA-AAS. We did not include data from students with percentile ranks between 8.0-11.3 percent in reading and 8.9-11.4 percent in math, given that their eligibility based on percentile rank would vary from year to year depending upon the number of students nationwide taking part in AA-AAS; thus, we could not confidently determine to which group to assign them.

To establish groups of students most comparable to one another, we used bandwidths of the same size around percentile ranks to form groups of students that were eligible and ineligible to participate in AA-AAS. Students with percentile ranks on the WJ-III between 0.0-8.0 percent on reading or 0.0-8.9 percent in math were in the eligible group (approximately the lowest 1 percent of all K-12 students), and students with percentile ranks between 11.3-19.3 percent in reading or 11.4-20.3 percent in math were in the ineligible group (students in approximately the 2nd percentile of all K-12 students). In essence, setting these cut points and narrowing our focus to groups immediately on either side of the cutoff allows our research design to function similar to a regression discontinuity design through the logic that the groups near the cutoff are more comparable to one another than at other points along the achievement distribution. We provide a descriptive comparison of all individuals with reported WJ-III scores vs. those without in Appendix A. In Appendix B, we compare individuals within the analytical window of WJ-III scores to those outside of this window.

In Supplemental Table S1, we display our mechanism for creating the "before" and "after" cohorts as well as the "eligible" and "ineligible" assignments to potential AA-AAS treatment. Within the table, we also display the number of students in the NLTS-2 falling into each category. From these available data and our research design, our analytical sample included 510 individuals who reported at least one of the outcomes for the study. Of these, 460 individuals contained complete records of all outcome variables and all covariates. For the 50 individuals (10.5% of the analytical sample) missing values at random for at least one – but not all – covariates, we imputed these values using multiple imputation by chained equations with 30 iterations. We did not impute for missing outcome data, nor did we impute for missing data which would have determined a student's treatment status. As such, all students with missing

outcome or treatment determination data were dropped from the analysis. After imputation, we ran all regression models within the multiple imputation framework, whereby estimates from the 30 datasets were pooled and averaged together.

Appropriateness of sample. Given that we do not directly observe participation in AA-AAS, it is critical that we understand (a) the extent to which our assignment mechanism appropriately differentiated individuals into eligible and ineligible groups for participating in AA-AAS, and (b) the extent to which our groups are representative or not representative of the actual individuals who took part in AA-AAS. We pull from two primary sources to support our understanding. First, during the initial years in which AA-AAS was implemented (i.e., the years examined in our study), the two most common criteria that states used to determine an individual's participation in AA-AAS were if the individual had a significant cognitive disability and if the individual presented delays in adaptive behavior (Musson et al., 2010). The implications of these criteria are such that individuals participating in AA-AAS would have more intensive needs in the areas of cognition and adaptive behavior than individuals not taking part in AA-AAS. Given that our assignment variable was directly linked to cognitive ability, all individuals in our eligible group scored lower on a cognitive assessment, the WJ-III, than all the individuals in our ineligible group. Regarding adaptive behavior, we created a composite score for each individual in our sample by averaging scores of functional and self-care skills (discussed further in the Covariates section). There was a significant difference between the eligible and ineligible groups on their average adaptive behavior composite score, such that an individual in the eligible group scored on average 0.720 points (SE=0.285, p=0.012) less than an individual in the ineligible group. This indicates that the individuals in the eligible group, on average, displayed more intensive needs surrounding adaptive behavior than the individuals in the

ineligible group. We take these findings to suggest that our eligible group is more appropriate for participation in AA-AAS than our ineligible group.

To understand the extent to which our eligible group was representative of the actual individuals taking part in AA-AAS, we examined data from states that reported on the distribution of individuals included in the 2006-2007 administration of the AA-AAS by special education disability category (Kearns et al., 2011; see Supplemental Figure S1). Data from six states, each located in a different region of the contiguous United States, indicated that individuals participating in the AA-AAS mostly commonly received special education services under the category of mental retardation (range across states=36.3%-73.6%). It should be noted that we do not condone the use of this term, and it is used solely for clarifying purposes given the term's application within the referenced studies and federal guidelines specifying special education disability categories. For the remainder of the manuscript we use the term intellectual disability in its place. With one exception (State 4), the next three most common categories to which individuals taking the AA-AAS pertained, were multiple disabilities, autism, and other health impairment; though, the rank order of these categories varied across states. Two states had modestly elevated levels of individuals with learning disability (State 1=6.2% and State 3=4.0%) and one state had an elevated level of individuals with hearing impairment (State 6=7.4%). All other special education disability categories combined (n=8) represented 13.0% or less of all individuals participating in AA-AAS within each state. Regarding our sample of individuals that were eligible to take part in AA-AAS, 70.4% received special education services under the category of intellectual disability. The next most common category to which an individual pertained was learning disability (8.3%), followed by multiple disabilities (6.4%) and other health impairment (3.4%); and all other categories combined comprised 11.5%.

We perceive there to be a meaningful difference between our eligible group of individuals and the individuals that took part in AA-AAS across the six states. Specifically, a smaller percentage of individuals were classified under the autism category in our eligible group (2.3%) compared with the states' percentages of autism classifications (range=13.9%-26.5%). This difference is likely a result of the ages of individuals that comprised our eligible group versus the ages of individuals reported in the states' data, relative to when autism was added as a special education disability category. States reported on all school-aged individuals (ages 6-22 years in 2006) that took part in AA-AAS, whereas our analytical sample pertained solely to individuals in high school (ages 18-21 years in 2006). Autism was added as a special education disability category during the 1990-1991 school year; at which time all individuals in our eligible group would have already been at least 3 years old and 64% of those individuals were already receiving special education services under an eligibility category other than autism. When autism was added as a special education disability category, autism prevalence in the general population was estimated to be only 4.9 cases per 10,000 children (Fombonne & Mazaubrun, 1992). By 2006, the prevalence rate was 90.0 cases per 10,000 children (Centers for Diseases Control and Prevention, December 2021). This change in prevalence spurred the autism acceptance movement throughout the 1990s and 2000s (Fombonne, 2003; Wing & Potter, 2002). Given the differences in the ages of individuals across our eligible group and the states' data in relation to when autism was established as a special education disability category and when autism prevalence increased to garnering the public's attention, we would expect there to be differences between our eligible group and the states' data on the percentage of individuals classified under the autism category and participating in AA-AAS.

In addition to looking at the representativeness of our eligible sample, we need to consider the extent to which our ineligible sample was *not* representative of the individuals that actually took part in AA-AAS, as this can provide further information about the appropriateness of our assignment mechanism. For our group that we determined to be ineligible to participate in AA-AAS, most of these individuals were classified under the category learning disability (59.2%), followed by intellectual disability (28.3%), emotional behavior disorder (3.5%), and other health impairment (2.3%). All other categories represented 6.5%. Although the percentage of individuals classified under the category of intellectual disability was modestly high relative to the other categories, this percentage did not reach any of the levels from the states' data nor the level reported in our eligible group. We do not perceive there to be meaningful similarities between our ineligible group and the states' data or our eligible group.

Taken collectively, these findings provide evidence that our assignment mechanism for determining eligibility and ineligibility to participate in AA-AAS performed appropriately.

Outcome Variables

Outcomes for this study come from interviews conducted during Wave 5 data collection in 2009. Three dichotomous outcomes were examined: (a) is individual currently employed, (b) has individual been employed within the last two years, and (c) has individual been competitively employed in the last two years. For individuals with significant cognitive disabilities, a distinction between *employment* and *competitive employment* is necessary, as many individuals may be employed within sheltered workshops (Rusch & Braddock, 2004). These workshops generally operate outside of the regulations directed at businesses in the competitive employment arena, as the workshops are frequently regarded as rehabilitation facilities for individuals with disabilities. As such, 'employees' often make less than minimum wage, and

therefore, individuals working in sheltered workshops would not be considered as competitively employed. Refer to Supplemental Table S2 for information on the NLTS-2 variables from which our outcomes, as well as covariates and assignment variables, were derived.

Covariates

We also included seven covariates in our analyses. These were an individual's functional skills level, self-care level, race or ethnicity, sex, age, parent education level, and family income. Functional skills level was a continuous variable that ranged from 4-16, with higher ratings indicating greater functional skills. The ratings were determined based on how well an individual "looks up phone numbers, tells time, reads and understands signs, and counts change" (NLTS-2, n.d., p. B1-G-6). We recoded this variable to range from 0-12. Self-care level was a continuous variable that ranged from 2-8, with higher ratings indicating greater self-care skills. Ratings were determined based on how well an individual dressed and fed themselves. Ethnicity was a dichotomous variable, with individuals identifying as White, coded as one, and individuals identifying as a different race or ethnicity coded as zero. Sex was a dichotomous variable, with female individuals coded as one. Age was a continuous variable that ranged from 14-17 and reflected the age of an individual in years in 2002. Parent education was a categorical variable and indicated parents (a) without a high school diploma, (c) with a high school diploma, and (c) with a 4-year college degree. Family income was a categorical variable indicating families in 2002 making (a) less than $25,001, (b) between $25,001 and $50,000, and (c) above $50,000. Descriptive information and comparative data for all covariates are included in Table 1. None of the difference-in-differences estimates for these covariates were statistically significant, suggesting our treatment and comparison groups were comparable based on these measures.

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We also considered using four additional variables but omitted these from analysis due to more than 25 percent of observations having missing information. We considered using the location of an individual's high school (i.e., rural or urban), testing pressure at the school, whether an individual was an only child, and if an individual's family spoke English at home. Except for testing pressure, the other variables considered were likely time-invariant and unlikely to differ in meaningful ways between the treatment and comparison groups, suggesting that their exclusion should not threaten the validity of the findings.

Estimation Strategy

In order to understand the impact of the AA-AAS policy on outcomes for individuals with significant cognitive disabilities, we used a difference-in-differences approach. By using difference-in-differences, we can not only account for between group differences (those eligible for AA-AAS and those ineligible), but also for secular trends over time. For the functional form of our model, we chose to use ordinary least squares regression models. Given the dichotomous nature of our outcome variables, these models take the form of a linear probability model (LPM), where coefficients can be interpreted as percentage point (PP) changes in the probability that an individual experienced a given outcome. Our preferred model is displayed in equation (1) below:

$$Y_i = \beta_0 + \beta_1 Eligible + \beta_2 After + \beta_3 (Eligible \times After) + \mathbf{X}_i + \varepsilon_i \quad (1)$$

The probability that an individual *i* experienced a given employment outcome *Y* is a function of whether an individual was eligible to participate in AA-AAS (*Eligible*), enrolled in high school after the implementation of the NCLB alternate assessment policies (*After*), and a set of covariates ($\mathbf{X}_i$). In all models we included sample weights to ensure we obtained correct coefficient estimates and replicate weights to ensure we obtained correct standard errors for the population of special education students in the U.S. The sample and replicate weights came from

the NLTS-2 Wave 5 interview dataset. We estimated separate models for each outcome variable, and all estimates are reported as PP changes in the outcome due to using the LPM model.[4]

In this model, β_3 is our treatment effect, the estimated effect of NCLB alternate assessment policies on employment outcomes for individuals with significant cognitive disabilities. This parameter is the additive impact of being eligible to take part in AA-AAS in the years after the implementation of NCLB alternate assessment policies. By using a difference-in-differences framework to derive this estimate, we accounted for pre-policy, unobserved, time-invariant differences between the eligible and ineligible groups (this estimate is captured in β_2). We also accounted for secular time trends by differencing-out the changes in employment that occurred over time for individuals that were not eligible to take part in AA-AAS both prior to and after the implementation of NCLB policies (this estimate is captured in β_2). The change in policy acts as an exogenous assignment variable to group individuals into "before" and "after" cohorts. The difference-in-differences model produces a less biased estimate of effect than a sole pre-post comparison by controlling for pre-treatment differences between treatment and comparison groups and trends that occurred over time and significant events that may have impacted our examined outcomes for one group but not the other (e.g., the onset of the Great Recession).

Results

Supplemental Table S3 provides descriptive data for each outcome variable. These data indicate that 46.5% of the treatment individuals (students eligible for AA-AAS and in school after the implementation of NCLB assessment policies) were currently employed when data were

[4] We also estimated a logistic regression model using the same covariates. We chose the linear probability model for our preferred model due to ease of interpretation as percentage point differences. The logistic regression results are similar in magnitude and statistical significance and are available upon request.

collected in 2009. Additionally, 60.3% of treatment individuals were employed within the previous two years and 51.5% were competitively employed in the last two years. Notably, these percentages are comparable to each of the pre-NCLB implementation groups and quite greater (21 to 34 PPs) than the AA-AAS ineligible post-NCLB group.

Supplemental Table S4 provides results across each outcome from difference-in-differences LPMs without covariates included. Mean estimates suggest greater employment for the treatment group, over and above the comparison groups, given the positive direction of the estimates for each outcome. However, standard errors for all treatment estimates were relatively large, and no estimate achieved statistical significance at the 5 percent level (nor 10 percent level).

Table 2 displays results from the second series of models which include covariates. Controlling for all variables, individuals with significant cognitive disabilities in the treatment group were on average an additional 30.3 PPs more likely to be currently employed in 2009 (p=0.077). This group of students was also an average of an additional 9.3 PPs more likely to be employed in the two years prior to 2009 (p=0.605) and an additional 35.8 PPs more likely to be competitively employed in the two years prior to 2009 (p=0.062).

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Sensitivity Analysis

We conducted sensitivity analyses (a) using smaller bandwidths to determine students that were included in the eligible and ineligible groups based on their scores on the WJ-III reading and math assessments, and (b) when eligibility for AA-AAS was based on meeting criteria across *both* math and reading scores on the WJI-III, as opposed to meeting criteria in *either* math or reading. Point estimates were similar across these analyses but imprecise, and thus

we cannot draw meaningful conclusions about the statistical significance (results available upon request). We also conducted an analysis in which the analytical sample was restricted to only individuals reporting data for each outcome (see Appendix C). Points estimates were similar although a slight reduction in precision was observed.

Discussion

The results of this study paint a complicated picture. With regard to our research question, the findings indicate that the average estimated effects of NCLB alternate assessment polices on employment outcomes for individuals with significant cognitive disabilities were large and positive in magnitude, which would typically suggest a signal of a positive effect. However, the precision of these effects obscures more nuanced insight as the standard errors on our estimates were also exceedingly large, suggesting substantial variability and not enough evidence to draw strong conclusions about the large estimates. Although some coefficient estimates for our treatment variable (i.e., *Eligible x After*) had p-values below the 10 percent significance level but above the 5 percent level, we also need to consider that we made multiple comparisons. Specifically, we tested three outcome variables, for which a significance level that accounts for multiple comparisons and is equivalent to the traditional 5 percent level, would be 1.67 percent using a Bonferroni correction.

Results from our sensitivity analysis add additional skepticism in the robustness of our estimates. That is, despite decreasing the sample size by only 10 individuals when conducting sensitivity analyses, we observed that the average effect for the outcome of currently employed decreased by nearly 20 percent. Taken collectively, we cannot determine the impact of NCLB 2001 alternate assessment policies on employment outcomes for individuals with significant cognitive disabilities with statistical precision to warrant definitive claims of the policies'

effectiveness. However, because we observed average point estimates indicating a 10-30 PP difference between groups across outcomes, we believe that additional research is warranted.

Implications

For some consumers our findings may offer reprieve, given concerns that accountability tied to skills derived from academic content standards may take away from instructional time that teachers previously devoted to functional or vocational skills, and thus make students with significant cognitive disabilities less prepared when transitioning from school and into the workforce (Johnson, 2004). Our findings suggest that if such changes to instructional time did in fact occur because of NCLB alternate assessment policies, we were unable to conclusively detect any negative effects. Though, we should also state that we were unable to conclusively detect any positive effects.

In considering the lack of conclusive results, some individuals may view our findings as suggesting that AA-AAS may be neither beneficial nor detrimental for improving post-school outcomes. Ayres (2012) alluded to this is, albeit briefly, in saying, "if students fail to achieve their criterion of ultimate functioning… it may not be the fault of educators bickering over what to teach but rather the fact that there are societal barriers standing in the way" (p. 155). In this statement, Ayres was suggesting that variables outside of the school system may serve as active ingredients to ensuring individuals with significant cognitive disabilities access meaningful employment (e.g., public transportation, appropriate on-the-job training, employer attitudes towards individuals with disabilities). We think that Ayres's comments should be further explored; however, with regard to our results, consumers should not use our findings to indicate that AA-AAS was detrimental nor beneficial to students with significant cognitive disabilities. We simply cannot reject the null hypothesis that high school students with significant cognitive

disabilities were no worse- or better-off than they were before AA-AAS was implemented with respect to employment outcomes.

When interpreting our findings, it is critical that consumers recognize we examined only the initial years during which AA-AAS was implemented. We cannot infer any impacts of AA-AAS on employment after 2009. Thus, if attempting to extrapolate our findings to inform present-day policies, consumers will need to consider if there have been meaningful changes in the implementation of AA-AAS that may affect present-day employment outcomes for individuals with significant cognitive disabilities. At the same time, having even an additional year or two of data after the timeframe of the NLTS-2 study may have yielded a boost in sample size to detect significant effects. In addition, given variation in how the NCLB alternate assessment policies were initially implemented from state to state (Cameto et al., 2009b), we are unable to use our findings to guide the educational services or instructional practices provided to students with significant cognitive disabilities. Examples of services and practices for which districts, administrators, and educators should *not* use our findings to support, include, but are not limited to, (a) the type of educational track on which a student is placed (e.g., academic vs. career-readiness vs. functional skills), (b) the type of curriculum a student receives (e.g., standards-based vs. individualized), (c) the linking of Individualized Education Program goals and objectives with grade-level academic content standards, (d) the amount of time a student with significant cognitive disabilities receives instruction in general education settings, and (e) the number of days per week that a student participates in community-based instruction. Although the identification of resultant educational services and instructional practices stemming from NCLB assessment policies may be critical to understanding the mechanisms of change for improving employment outcomes in individuals with significant cognitive disabilities, we

foresee many obstacles to reliably obtaining this information. We discuss these challenges in the following section.

Research with Individuals with Significant Cognitive Disabilities

When considering that individuals with significant cognitive disabilities represent 1 percent of the U.S. student population, the use of survey datasets specific to education may not adequately capture this population. Even within the NLTS-2, which was specific to students receiving special education services, there are still challenges to identifying students with significant cognitive disabilities. Without (a) a consistent and objective definition across state departments of education to indicate the defining characteristics of students eligible for AA-AAS or (b) a variable within a dataset to indicate which students took part in AA-AAS, researchers using survey datasets to examine the impact of practices or policies on individuals with the most significant cognitive disabilities will need to carefully consider if variables are available that allow for reliable identification of these individuals and if there are a sufficient the number of individuals without missing data for such a variable.

With regard to examining the impact of NCLB alternate assessment policies, the use of regulatory data may offer some insights, although data will not be available on students taking part in AA-AAS prior to its mandated implementation in 2005-2006. Given that states report the number of students taking part in AA-AAS, it may be possible to use a state's longitudinal data system to examine the effects of practices and policies on individuals with significant cognitive disabilities; though, many states did not have longitudinal data systems established until after mandated implementation of the NCLB policies. If researchers are to obtain a *causal* understanding about the impact of NCLB alternate assessment policies on post-school outcomes

for individuals with significant cognitive disabilities, we think that knowledge of and access to long-established data systems will be essential.

Limitations

Potential threats to the validity of our estimates warrant further discussion. First, the NLTS-2 did not report data to specifically identify students that took part in the AA-AAS; therefore, we were unable to calculate the effect of the treatment-on-the-treated. Instead, the effects represent intent-to-treat estimates based on AA-AAS eligibility through using the WJ-III scores as a proxy. Second, the bandwidths encompassing individuals that were eligible and ineligible to take part in AA-AAS may encompass individuals in the groups that are not equal in expectation; this is always an issue when using a discontinuity design (discussed further in the "Sensitivity Analysis" section). Third, in the years leading up to the mandated implementation of NCLB assessment policies, schools were modifying the content on which students with disabilities were assessed. Despite these modifications, it was not until 2005 that states began assessing students on grade-level academic content standards (Quenemoen, 2008). Therefore, although there were some modifications to assessments prior to the implementation of the NCLB mandate, the most critical change (i.e., linking assessment material to grade-level academic content standards) did not occur on a nationwide level until NCLB alternate assessment regulations went into effect. Any time-varying changes over the NCLB implementation period that would have disproportionately impacted the AA-AAS eligible treatment group that are not associated with the assessment implementation itself, would further bias our results. Although not a limitation to our study's internal validity, we think it relevant to note that the WJ-III was not administered to students if the assessment "was reported to be inappropriate because [a student's] sensory, physical, behavioral, or cognitive disabilities made [the student] unable to

follow instructions or answer questions reliably in spoken or written English, Braille, or large print" (NLTS-2, n.d.). Therefore, our analytical sample likely excludes individuals with limited, multi-modal, or idiosyncratic response modalities (e.g., eye-gaze, gestures).

Conclusions

This study serves as an initial evaluation into the causal impact of federal policies on post-school outcomes for individuals with significant cognitive disabilities. Our findings suggest that the initial implementation of NCLB alternate assessment policies resulted in descriptively positive effects, though imprecision in these effects obscures conclusive claims at this point in time. To the readers of this study attempting to extrapolate our findings to answer questions on the effectiveness of specific educational services and instructional practices for students with significant cognitive disabilities, we urge caution and restraint. We perceive that a collective effort among special education researchers with backgrounds in school- and classroom-based services, and policy analysts with expertise in longitudinal data systems and quasi-experimental methods for obtaining causal inferences, will be essential to identifying and analyzing datasets that will unlock answers to the pathways, service provision models, individualized supports, and educational interventions that meaningfully contribute to the lives of individuals with significant cognitive disabilities.

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Table 1
Descriptive and comparative data for covariates

	Left high school before 2005-2006 school year		Left high school after 2005-2006 school year		
	Ineligible for AA-AAS	**Eligible for AA-AAS**	**In-eligible for AA-AAS**	**Eligible for AA-AAS**	**Difference-in-differences**
Functional Skills	8.036	7.078	7.521	6.090	-0.473
Self-care Skills	7.644	7.571	7.816	7.547	-0.195
White	0.421	0.505	0.272	0.414	0.058
Female	0.380	0.348	0.246	0.182	-0.032
Age in 2002	15.574	15.794	15.224	14.480	-0.887
Parent education					
No high school diploma	0.347	0.273	0.695	0.473	-0.147
High school diploma	0.522	0.649	0.276	0.488	0.084
4 year college degree	0.131	0.078	0.029	0.039	0.063
Family income in 2002					
Below $25,001	0.588	0.602	0.776	0.638	-0.152
$25,001-$50,000	0.155	0.225	0.084	0.264	0.109
Above $50,00	0.257	0.173	0.140	0.098	0.043
Number of observations	200	170	50	90	510
Population size	104,380	41,288	20,611	12,478	178,757

Note. ˜$p \leq 0.100$, *$p \leq 0.050$, **$p \leq 0.010$, ***$p \leq 0.001$; AA-AAS=alternate assessments aligned with alternate achievement standards; means reported for continuous variables; proportions reported for dichotomous and categorical variables; difference-in-differences estimates are based on linear regression models with the covariate entered as the dependent variable and *Eligible*, *After* and *Eligible x After* variables entered as independent variables; RG=reference group

SOURCE: *National Longitudinal Transition Study-2,* U.S. Department of Education, National Center for Special Education Research, previously unpublished tabulation.

Table 2

Results from linear probability models across outcome variables with covariates added

	Currently employed	**Employed in last 2 years**	**Competitively employed in last 2 years**
Eligible x After	0.303˜ (0.170)	0.093 (0.179)	0.358˜ (0.191)
Eligible	0.068 (0.081)	0.112 (0.086)	-0.114 (0.088)
After	-0.204* (0.085)	-0.179 (0.150)	-0.092 (0.144)
Functional Skills	0.043** (0.015)	0.052** (0.147)	0.060*** (0.017)
Self-care Skills	0.059 (0.039)	0.120** (0.038)	0.077* (0.037)
White	0.026 (0.071)	0.029 (0.075)	0.015 (0.086)
Female	-0.279*** (0.072)	-0.316*** (0.083)	-0.218** (0.082)
Age in 2002	0.029 (0.032)	-0.051 (0.031)	-0.001 (0.039)
Parent education			
No high school diploma	RG	RG	RG
High school diploma	0.193* (0.079)	0.310*** (0.091)	0.211* (0.090)
4 year college degree	0.129 (0.139)	0.203˜ (0.113)	0.079 (0.140)
Family income in 2002			
Below $25,001	RG	RG	RG
$25,001-$50,000	0.108 (0.084)	0.084 (0.077)	0.080 (0.092)
Above $50,000	0.371*** (0.083)	0.181* (0.079)	0.227 (0.101)
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Note. ˜$p \leq 0.100$, *$p \leq 0.050$, **$p \leq 0.010$, ***$p \leq 0.001$; estimates reported as proportions; standard errors in parentheses; RG=reference group

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