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Christopher Cleveland
Brown University

Jessica Markham
Boston University

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Understanding Individualized Education Program (IEP) Goals at Scale

Christopher Cleveland*
chris_cleveland@brown.edu
Brown University

Jessica Markham
jfma@bu.edu
Boston University

Abstract

Students with disabilities represent 15% of U.S. public school students. Individualized Education Programs (IEPs) inform how students with disabilities experience education. Very little is known about the aspects of IEPs as they are historically paper-based forms. In this study, we develop a coding taxonomy to categorize IEP goals into 10 subjects and 40 skills. We apply the taxonomy to digital IEP records for an entire state to understand the variety of IEP goal subjects and skills prescribed to students with different disabilities. This study highlights the utility of studying digital IEP records for informing practice and policy.

Keywords: special education, achievement, text analysis, regression

Author Note

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*Correspondence author

Introduction

Under the Individuals with Disabilities Education Act (IDEA), children with disabilities receive specially designed instruction and other services to meet their unique needs as defined by their Individualized Education Programs (IEPs). The services provided under IDEA amount to approximately 14 billion dollars of investment through the federal government (Dragoo, 2018), and as of 2022, account for 15% of students aged 3-21 in the U.S. public school system (National Center for Education Statistics, n.d.). Despite such high costs for the 15 percent of students who receive special education services, little is known within the research literature regarding the nature of IEPs provided to students with disabilities.

Understanding the scope of IEPs is challenging due to their individualized nature, the fact that little information from the IEP must be reported to the state, and the varying ways of documenting IEP forms and data. Prior research uses small samples to investigate legal compliance in IEPs (Hott et al., 2021), or analyzes small samples of goals for specific subsets of students, such as students eligible under single disability categories, such as autism (Ruble et al., 2010; Kurth & Mastergeorge, 2010) or students with social, emotional, or behavioral challenges (Hott et al., 2021a). However, no recent studies explore the comprehensive nature of goals and skill areas associated with all disability types and other student characteristics at the state level.

In this paper, we provide the first statewide study of IEP goals. We create a taxonomy to categorize and analyze IEP goal subjects and skills using assessments that inform the special education evaluation process: we taxonomy 10 IEP subject areas and 41 sub-related skill areas. We then leverage a digital database containing IEP goals to understand better the variability of goals in terms of the subjects and skills they specify across disability categories. Specifically, we research which disability types most likely have different goal subject areas. For example,

students with a language/speech disability are most likely to have a communication-related IEP goal. In contrast, students with a specific learning disability are most likely to have reading and math-related goals. We also examine the prevalence of different IEP goal subjects and skills across grades for the disability types most likely to have various goal subjects. For example, we demonstrate that more complex reading and math skills are more likely present in students with specific learning disability IEPs in later grades, reflecting the different skills students are being remediated against as they age.

Observing the variation in IEP goals at scale allows for a better understanding of the breadth and depth of goals educators and districts must be prepared to teach. The development of formal approaches to student IEPs through text analysis also highlights the potential to inform research policy regarding how to analyze and develop IEP goals and overall IEPs.

Background

IDEA Disability Categories

IDEA includes federal provisions for special education disabilities that are then adopted by states for implementation. Indiana's special education law, Article seven, provides special education and related services for students aged three through 22 with one or more of the 13 identified disabilities. A student must be eligible under one or more disability areas to receive special education or related services. These disability categories include autism spectrum disorder (ASD), Blind or Low Vision (BLV), Intellectual disability (ID), Deaf or Hard of Hearing (DHH), Deaf-Blind (DB), Developmental Delay (DD), Emotional Disability (ED), Language or Speech, Impairment (LSI), Multiple Disabilities (MD), Other Health Impairment (OHI), Orthopedic Impairment (OI), Specific Learning Disability (SLD), and Traumatic Brain Injury (TBI). Like other states, Indiana uses variations to the federal labels for eligibility

determination. This paper uses labels the IDOE uses, slightly different from federal category labels. Notably, IDOE distinguishes ED into two categories: “Full Time Emotional” and “Other Emotional,” and similarly distinguishes ID into “Mild,” “Moderate,” and "Severe” categories. Results presented later in this paper use these additional categories but can be interpreted within the larger context of IDEA’s 13 disability categories. See Appendix Table 1 for the 13 IDEA disability definitions.

Individualized Education Programs (IEPs)

IEPs provide rich information about student’s annual experiences receiving special education, such as information related to 1) Present Levels: students’ present levels of academic achievement and functional performance, including how the child’s disability affects their involvement and progress in the general education curriculum; 2) Goals: measurable annual goals across all goal types; 3) Services: the special education and related services and supplementary aids to be provided to the student; 4) Accommodations: the modifications or accommodations a student receives to allow a student to progress on the goals; 4) Participation: a description of a student’s participation with non-disabled peers; and 5) Placement: Where a student will receive services if not the general education environment (IEP TA Center, 2022). Notably, IEP goals are co-developed by the educational team, typically including parents, caregivers, administrators, specialists, and teachers. The educational team reconvenes to change goals annually as goals are designed to be achievable within a school year and must fluctuate to address students’ changing needs and growth. Finally, students eligible for special education can exit from services at any time but must be re-evaluated for continued eligibility every three years.

Special Education Evaluation Assessments and Goal Development

In special education, assessment is a tool to determine the presence of a disability, inform eligibility for goals and services, and inform the development of IEPs (Individuals with Disabilities Act, 2004). Students receive special education goals after being evaluated by a school staff team. Each disability category is connected to hypothesized underlying concerns that must be evaluated to determine special education eligibility and the development of an IEP. Many assessments have been developed to support the identification of student strengths and areas of need. States often require full batteries and selected tests to be used to identify various conditions, such as intellectual disabilities, ASD, and SLD, among others. Indiana's special education law, Article Seven, identifies the eligibility criteria for each of the 13 areas of disability. Criteria are specific to the disability area and include the requirement that the disability adversely affects the student's educational or functional performance such that specially designed instruction is necessary. In this context, students are evaluated for these general issues across disability categories: development, cognition, academic achievement, functional performance or adaptive behavior, communication skills, and motor and sensory abilities, and if found eligible, evaluation results in these areas inform the development of a student's IEP. See Appendix Table 2 for evaluation assessment domains.

School psychologists and special educators frequently use large educational achievement batteries to better understand a student's educational performance compared to a normative same-grade or same-age sample. These achievement tests include large composite areas such as "Writing" made up of smaller subtests, such as "Spelling" and "Written Expression." Some examples of commonly used educational achievement testing batteries include the Kaufman Test of Educational Achievement-III (KTEA-III; Kaufman & Kaufman, 2018), the Wechsler Individual Achievement Test-IV (WIAT-IV; NCS Pearson, 2020), and the Woodcock-Johnson

Tests of Achievement-IV (WJ-IV ACH; Schrank et al., 2014). This assessment structure allows educators to identify broad areas of need (e.g., a student needs additional support in the academic area of writing) and more discrete skill areas (e.g., a student needs additional support in writing and spelling). Given the role of assessment in this process, IEP goals are essentially derived from the already determined categorization structured in these reliable and validated assessment instruments.

Assessment categorization alone may not be discrete enough to capture all potential IEP goal skill areas. There are standard curricular categorizations on which educators can draw to determine more discrete skill areas for core academics. For example, in many assessments, the "Reading" composite includes fluency, decoding, and comprehension as subtest areas (e.g., KTEA-III, WIAT-IV), yet this is not as many discrete skill areas as researchers and practitioners have determined to be imperative for evidence-based reading instruction. For example, a national report conducted by the National Reading Panel (2002) synthesized decades of reading effectiveness research and identified five pillars of "the science of reading," including phonemic awareness, phonics, fluency, vocabulary, and reading comprehension, and has recently been a matter of state, district, and building-level policy developments. Similarly, a group of researchers synthesized research to identify core areas of math instruction coined "the science of math" (Codding et al., 2023), which identifies five core areas of mathematics instruction, including math concepts, math procedures, math disposition, math problem solving, and math reasoning. These practical curricular categorizations can further specify the areas of skill that educators focus on in IEP goals and assessment categorizations.

Prior Study of IEP Goals

Creating and implementing special education services through IEPs is costly, and very little is known about the patterns of these individualized programs at scale. That said, a body of work focuses on understanding the patterns of IEPs within small samples. Research thus far has traditionally focused on understanding IEP goals and progress related to select disability categories or issues of legal compliance in the development, implementation, and maintenance of IEPs.

For the most part, IEP goal literature has focused on compliance and legal issues, IEP content for small samples, and IEP content for specific disability categories or neurodevelopmental disorders, such as EBD, ASD, and ADHD (Hott et al., 2021a; Ruble et al., 2010; Kurth & Mastergeorge, 2010; Spiel et al., 2014). For example, Hott and colleagues (2021) descriptively analyzed IEP goals from 133 IEPs with consideration for federal and state compliance—such as ensuring that all federally required sections of an IEP are present within IEP documents. Mainly, they were interested in analyzing the quality of IEPs and observing the alignment of present levels of functional performance and goal development, quantitative progress monitoring practices, and sufficient disability impact statements. Similarly, Hott and colleagues (2021a) descriptively analyzed IEPs concerning Free and Appropriate Education (FAPE) for students with EBD. They found that only four of the 95 IEPs evaluated met the requirements of high-quality IEPs. Hoover and colleagues qualitatively analyzed the quality of 29 IEPs for students who were English learners with SLD and found limited to no mention of student linguistic or cultural diversity in their IEPs, as well as variation in meeting legal requirements of IEP documentation. Ruble and colleagues (2010) developed an IEP evaluation tool focused on assessing the quality of IEP content specific to IDEA and recommendations

made by the National Research Council. They utilized it to assess the quality of IEP content for students with ASD. They found the overall quality of IEPs in their sample (n=35) to be low, including lack of specificity in goals, lack of measurable goals, lack of alignment between specially designed instruction methodology and goal development, and ambiguity in identified objectives (Ruble et al., 2010). They also, however, identified communication and social skills as surprisingly missing goal topics for students with ASD, as these are common areas of challenge associated with ASD diagnostic criteria. Similarly, Kurth and Mastergeorge (2010) evaluated the IEPs of 15 students with ASD relative to their placement (inclusion placement or separate placement). They found differences in which settings facilitated focus on procedural or more applied skills. Finally, Spiel and colleagues (2014) evaluated the present performance levels and goals and objectives for students with ADHD from 97 IEPs. They found that the recommendations provided in the IEPs did not align with evidence-based practice.

Although the literature underscores legal compliance issues and lack of alignment to evidence-based practice in IEPs, significant gaps remain in our understanding of IEPs, including the lack of observing patterns in IEPs across large samples by disability and grade types. There remains a lack of research on the highest incidence of disabilities (e.g., SLD and DD) and a lack of attention to demographic information. These gaps remain despite states collecting such data and well-documented cases of disproportionality in over-identifying and under-identifying subgroups of students (such as students of color being over-identified for behavioral disabilities or multi-lingual students as under or overidentified for learning difficulties) as eligible for special education services (Artiles, 1998; Kramarczuk & Voulgarides et al., 2017).

Unlike previous work, this paper does not focus on quality, compliance, or alignment issues. Instead, it systematically explores the content of IEP goals to understand variation in

individualized goals across a state-wide sample. Given limited work in this area, there are also limited methods for analyzing IEP goals. This paper seeks to add significantly to the literature by investigating the likelihood of different goal subjects and skills included in a student's IEP by identifying disabilities and grade levels to understand patterns in IEP goals across various factors and a state-wide sample.

Methods

Data

For this study, the Indiana Department of Education provided data from several sources from the 2022-2023 school year.

- The student enrollment data includes information on students' district, school, grade, race/ethnicity, gender/sex, poverty status, English learner status, foster/homeless status, and special education status.
- The special education data includes information on students' primary disability, secondary disability, special education placement, and location.
- The IEP goals data includes a goal title and a goal narrative for each goal.

The student enrollment, special education, and goals data are merged using the student ID to create the file used for analysis in this study.

Table 1 describes the study's sample based on the number of goals and students. We analyzed data for 448,533 goals and 184,960 students. Across goals, 24% of the sample has a specific learning disability, the largest disability category. 62% of the sample is White, and 49% receive free lunch. Our analyses excluded any IEP goals that could not be tied to student demographic and disability information.

Table 1. Description of Sample

Text Analysis

Our first objective was to devise a coding structure for the IEP goals. Of the 448,533 unique goals, these goals originally had 49,258 unique goal titles. For example, some goals focused on reading comprehension skills were titled "Comprehension," "Reading Comprehension," "Comprehension skills," or "ELA Comprehension." Given the variation in goal titles and goal narratives, it was essential to develop a taxonomy to which goals could be assigned so that we could observe all reading comprehension goals (and other key subjects and skills) for analysis.

To create a taxonomy, we used terminology from assessment batteries typically used in school-based evaluations used to inform the development of IEP goals (Hutton et al., 1992; Wilson & Reschly, 1996; Benson et al., 2019; Bailey & Weingarten, 2019; Lockwood et al., 2022; IEP TA Center, 2022). This approach allows us to use the standard composite and subtest area terminology to sort goals into a critical assessment area (e.g., reading, writing, behavior, social-emotional, etc.). Additionally, because many skills comprise major subject areas, we wanted to capture these skills to provide more detailed and helpful information about the goals. Thus, in addition to the subtest areas of assessments to determine goal skill areas, we applied additional curricular layered subdomains, such as the "Five Pillars of Reading" (National Reading Panel, 2000) in the case of core academic subject areas (e.g., Reading and Math). For example, as noted previously, "reading" is a subject area composed of sub-related skill areas, including phonemic awareness, phonics, fluency, vocabulary, and reading comprehension. Appendix Table 3 depicts the assessment-based categories and theoretical concepts we used to break goal subjects into their sub-related skills.

Some goal areas needed clear links to field-wide assessment terminology. For example, for daily living skills goals, some were focused on areas, such as functional academics (e.g., counting money or memorizing common sight words for street signs). In contrast, others were focused on community skills (e.g., independently finding a bathroom in the community or learning about a community's public transit system). Some other goals focused on personal care (e.g., developing a grocery list or learning to prepare simple foods). While these goals are all broadly focused on daily living skills, we used common adaptive testing categories to determine skill areas (community, personal, functional academics). We used similar assessments to determine subject and skill titles and sort for behavioral, social-emotional, and executive functioning-focused goals.

Using this approach, we determined 10 subjects and 41 total skills. We identified keywords associated with each category to search the goal titles and goal narratives in the data set, such that if a goal included "expressive" and "language" in the title of the goal, it was categorized as a communication goal for the subject area, and specifically, an expressive communication goal for the skill area. 1,819 goals did not fit our keyword taxonomy to be identified with a clear subject area, and 9,292 goals did not fit our keyword taxonomy to be identified with a distinct skill within a subject. Thus, they are not represented in the analysis. Appendix Table 3 shows examples of how the keywords identified IEP goal subjects and skills. Appendix Table 4 provides examples of raw goal titles and goals coded to our subjects and skills taxonomy.

Regressions

Using regression-based methods, we leverage the coded goals data to examine several research questions of interest regarding the patterns of IEP goal subjects and skills by disability and by grade.

Subjects and Skills

We analyze which types of goal subjects are most likely to be associated with the different disability types. We use a linear probability regression model of the following form:

$$1)\ \mathrm{Y_i} = \beta_0 + \beta_1 Disability_i + X_i + \ \delta_g + \epsilon_{ig}$$

Where *Y* is one of the IEP goal subject areas, and *Disability* is a categorical variable for the primary disability classification. X_i is a vector of demographic characteristics, including secondary disability, race/ethnicity, gender/sex, English learner status, and poverty status. δ_g is a fixed effect for student grade. This model uses specific learning disability and pre-kindergarten as the baseline categories.

We also explore how the skills within each subject progress across grades for the disability group most likely to have a goal within that subject. We use a linear probability regression model of the following form:

$$2)\ Y_{ig} = \beta_0 + B_1 Grade_g + X_i + \epsilon_{ig}$$

Where Y_{ig} is a binary variable representing the linear probability of a specific skill for student i. $Grade_g$ is a categorical variable for student grades. X_i is a vector of demographic characteristics, including secondary disability, poverty status, race/ethnicity, gender/sex, English learner status, and homeless/foster status. Standard errors are clustered on the district in which a student resides. Pre-Kindergarten is the baseline grade in the model, which allows us to understand the changes in skills relative to Pre-Kindergarten.

Results

We provide the results of our study of the IEP goals from the 2022-2023 school year. As previously noted, the data has 448,533 overall goals sorted into 10 subjects and 41 skills. The total number of goals and students corresponding to each primary and disability type, grade level, and other demographic factors are denoted fully in Table 1. These data inform our understanding of 1) the most prevalent IEP goal subjects and skill areas overall and by primary disability type, 2) the probability of goal subject and skill areas by primary disability type, and 3) the probability of goal subject and skill areas by grade level.

We first present an overview of the results of the IEP coding for different subjects and skills overall in Figure 1. In our sample, the most prevalent goal subject is communication, with 95,980 goals (21.4% of all goals), followed by reading and math, with 80,606 and 60,636 goals. The least common goal subject is physical therapy, with 11,122 goals (2.5% of all goals). Figure 1, Panel A, depicts the total number of goals in each subject area within our sample. Given the frequency of goal subject areas, we also investigated the most frequent skill areas within each goal subject type. Communication is the most frequent IEP goal subject, and five key skill areas exist. Articulation is the most frequent communication goal at 31,807, and auditory processing is the least frequent goal at 1,931. Within reading are five skill areas: comprehension is the most frequent at 50,343 goals, and phonemic awareness is the least frequent at 1,189 goals. Math goals were sorted into five skill areas: math procedures is the most frequent at 25,102 goals, and math disposition is the least frequent at 6,938 goals. Figure 1, Panel B, depicts the total number of goals for each skill area within each subject. These trends highlight the variation and patterns in skill focus for student goals within different subjects.

Figure 1

We present counts of the goals by subject by disability in Figure 2. For some disability types, the prevalence of goals tightly aligns with the area of disability. For example, for students with language/speech impairment, communication goals were the most common (38,561), while writing goals were the least common (470). Similarly, students with SLD frequently had goals focused on reading (35,623) followed by math (23,764), and least often had physical therapy (1,034) goals. For other disability types, the prevalence of goals includes more variation. For example, the most common goal areas for students with OHI are reading (14,982), math (12,896), and executive functioning (9,981), with the least common being physical therapy (1,392). For DD, the most common goal area was communication (17,317), and the least common goal area was writing (1,170). For more low-incidence disability categories, such as intellectual disabilities (mild, moderate, and severe) or multiple disabilities, we see a smaller number of goals overall, and a more even spread of goals across possible types. For multiple disabilities and mild and severe intellectual disabilities, the most common goal subject area is functional skills (MD:1805; MID: 2756; SID: 217), and for mild intellectual disabilities, the most common goal area is reading (6,493).

Figure 2

Next, we provide results for our regression analysis of the probability of the different IEP goal subjects across disabilities in Figure 3. We examined the probability of goal subject by disability type relative to a specific learning disability and pre-kindergarten baseline. Results show that students with language/speech impairment are 57 percentage points more likely to have a communication goal. Students with SLD are generally 30 percentage points more likely to have a reading goal and 18 percentage points more likely to have a math goal than students with other disabilities. Students with orthopedic impairment are likelier to have functional skills goals

(7 percentage points), and those with blindness or vision impairment are seven percentage points more likely to have occupational therapy-focused goals. Students with FT emotional and other emotional are more likely to have behavior and social-emotional goals (12 and 11 percentage points, respectively). Students with severe intellectual impairment are 22 percentage points more likely to have functional goals. Students with other emotional and OHI are more likely to have executive functioning goals (6 and 9 percentage points, respectively), and students eligible under the "other emotional" category are eight percentage points more likely to have social-emotional goals.

Figure 3

Next, we provide information regarding the progression of IEP goal skills within a subject across grades by showing counts of the IEP skill areas within a subject in Figure 4.

For the largest goal subject area, communication, goals in the early grades are higher (96,463) and tend to focus on the skill areas of articulation, oral fluency, and receptive and expressive language. The overall number of communication goals decreases in later grades, with less focus on articulation in the older grades than younger ones.

For academic subject areas, reading goals for this sample are at their highest in 4th grade, and we see more focus on fluency, phonics, and phonemic awareness skills in grades Pre-Kindergarten-2. Beginning in 3rd grade, goals focused on comprehension increased and continued to account for most reading goals later. In math, results show that goals in the early grades focus on concepts and procedures while beginning in second grade, procedures, and problem-solving goals account for most goals through the end of high school. Writing goals are at their highest in number in 4th and 5th grade, focusing primarily on written expression instead of spelling.

Most executive function goals focus on task-monitoring skills. They are most frequent in the early grades (Pre-Kindergarten), and results show increased variability in executive functioning skill areas beginning in 4th grade. Similarly, social-emotional goals are also highest in the early grades and heavily focused on relationship skills, while skill areas in the later grades increase in variability later. Behavior goals are also highest in the early grades (Pre-Kindergarten) and primarily focus on inhibiting and managing externalizing behaviors. Occupational and physical therapy goals are the highest and most variable in the earlier grades, with a heavy focus on fine motor skills.

Figure 4

We extend the analysis of the goals by grade to include probability models for specific skills within each of the ten subject areas being present across grades for the disability types most likely to have an IEP goal within the corresponding subject in Figure 5.

Communication goals are most likely for students with language/speech impairment. Relative to a Pre-Kindergarten baseline, communication goals are five percentage points more likely in grade 4 and 8 percentage points less likely in grade 11 overall. Communication goals have five identified skill areas. Of these skills, articulation is focused on heavily in the early grades, with the greatest probability in 4th grade (6 percentage points more likely) and five percentage points less likely to be present by 10th grade. Functional communication goals are least likely for grade 12, and this likelihood does not change significantly based on grade relative to the Pre-Kindergarten baseline. Goals focused on receptive and expressive language are .6 percentage points less likely in kindergarten, which increases in later grades, with seven percentage points more likely in 9th grade.

Reading goals are most common for students with developmental delay and SLD. We find reading goals to be 23 percentage points more likely in grade 4 and 8 percentage points more likely in kindergarten relative to pre-kindergarten. Reading has five composite skill areas. Reading comprehension goals range from 0.6 to 24 percentage points more likely, with the highest likelihood in 7th grade and the lowest likelihood in Kindergarten. The likelihood of fluency goals ranges from 3 percentage points less likely to 9 percentage points more likely and tends to be more likely in grades 2 through 4, and that likelihood declines in later grades. Phonics goals are similarly more likely in earlier grades and decline in later grades, with a range of 0.8 percentage points being less likely and 0.5 percentage points being more likely. The likelihood of vocabulary goals remains similar across grades with a range of 0.05 percentage points more likely to 1 percentage point, as does phonemic awareness with a range of 0.8 percentage points less likely to .5 percentage points more likely.

Math goals are most common for students with developmental delay and specific learning disability. Math goals are one percentage point more likely in grade 12 and 12 percentage points more likely in grade 8. Math goals are also sorted into five primary skill areas. Math reasoning goals are one percentage point more likely in grade 10, math concepts goals are one percentage point more likely in kindergarten, and six percentage points less likely in grade 8. Math disposition goals are most likely in grade 8. Math Problem Solving goals are least likely in kindergarten and eight percentage points more likely in grade 8. Math procedures goals are 1 percent more likely in grade 12 and 7 percentage points more likely in grade 4.

Executive functioning goals are most common for students with developmental delay and other health impairment. Executive functioning goals are ten percentage points more likely in grade 12 and .8 percentage points more likely in grade 8, relative to pre-kindergarten. Executive

functioning goals are sorted into five primary skill areas. Within these areas, goals focused on planning, task monitoring, and organization of materials increase in likelihood in the later grades; task monitoring is significantly less likely in the earlier grades (up to 3 percentage points less likely in grade 3). Goals focused on initiation and working memory slightly decreased in the later grades.

Functional goals are most common for students with developmental delay and autism. They are eight percentage points more likely in grade 10 and eight percentage points less likely in grade 1. Functional goals are sorted into four primary skill areas. Of these areas, functional academics are least likely overall, while community, domestic, and personal skills are focused on similarly in early grades. In later grades, the likelihood of community and domestic goals increases, with community-focused goals comprising the most likely.

Writing goals are most common for students with developmental delay and specific learning disability. Writing goals across grades differ widely, with the heaviest focus on writing in the middle grades and seven percentage points more likely in fifth grade. Writing goals are sorted into two primary categories. Written expression goals are five percentage points more likely in 7th grade and .6 percentage points more likely in kindergarten. Similarly, spelling goals are five percentage points more likely in 7th grade and .6 percentage points more likely in kindergarten. These likelihoods dip to around five percentage points in high school grades.

Social goals are most common for students with developmental delay and autism. Social goals are most likely in the later grades (2 percentage points more likely in grade 12) and are less likely in early grades overall (3 percentage points less likely in 1st grade). Social goals are also sorted into five primary skill areas. Self-advocacy and Self-awareness goals are of similar likelihood in elementary school but increase in the later grades, reaching their highest point in

11th grade for Self-Advocacy and 12th for self-awareness. The likelihood of goals focused on responsible decision-making and social awareness remains relatively stable across grades, with a slight increase in later grades. Relationship skills are the least likely goals across all grade levels, with the lowest likelihood in grade 3 (2 percentage points less likely).

Occupational and physical therapy goals are most common for students with developmental delay and autism. Occupational and physical therapy-focused goals follow similar patterns, with their highest likelihood in the early grades and rapid decline in later grades. For occupational therapy-focused goals, there are four primary skill areas. Of these areas, fine motor skills are most likely focused on in the earlier grades and then significantly decline in later grades to a low of 4 percentage points less likely in 12th grade. Grasping and visual perception-focused goals remain the most likely occupational therapy goals over time, although they are still less likely in later grades relative to the Pre-Kindergarten baseline.

Behavior goals are most common for students with developmental delay and other health impairments. Behavior goals overall are more likely in later grades, with a peak of 3 percentage points more likely in 8th grade and a low of .2 percentage points more likely in 1st grade. Behavioral goals are sorted into three skill areas. Externalizing behaviors tend to be the most likely skill area, peaking in ninth grade and least likely in 12th grade and Kindergarten. Behavior monitoring and inhibition goals follow similar patterns, peaking in likelihood in the middle grades and less likely in earlier grades and near the end of high school.

Figure 5

Discussion

Summary of Results

This is the first study to propose a taxonomy for coding digital IEP goals according to existing special education evaluation assessments and leverages this taxonomy to understand the prevalence of goals for specific subjects and skills within a school year for an entire state's population of students with disabilities. This study documents the prevalence of IEP goals across ten subjects and 41 skill areas. The goals coded in this study are sourced directly from the IEP of each student receiving special education services in Indiana public schools for one year, encompassing 15% of all students enrolled in public schools in Indiana.

We document how many goals are prescribed for students with different disabilities across grades. Students in earlier grades, like pre-kindergarten, have the most goals on average across all disability categories. The number of goals declines across grades. Across all grades, students with language impairment have the fewest goals, while students with multiple disabilities or moderate intellectual disability have the most goals.

We then study how different goal subjects and skills are associated with different disability categories. We highlight how communication goals are most likely associated with language impairment disability. In contrast, goals for academic subjects like reading and math are more likely associated with students with developmental delay or specific learning disability.

Implications

These results have practical implications, policy-focused implications, and research-related implications. First, this work informs what training may be relevant for the realities of K-12 special education services. Our results indicate that students in earlier grades tend to have more goals and that these goals are frequently focused on language, communication, and early

academic skills, including reading and math. State initiatives bolstering training on topics, such as the science of reading and the science of math may prove helpful for effective prioritization of different skills within a subject area at earlier grade levels (e.g., prioritizing phonics goals in the early grades and comprehension goals later or both earlier). A greater understanding of these subjects at a conceptual level may lead to more specific and realistic goals that align with how academic skills typically develop. Furthermore, this work allows practitioners to understand the extent to which IEP goal subjects align with disability type. For example, results showed that communication goals were most likely for students with language/speech impairments, which we would expect. However, several disability areas are not as evident about specific goal subjects. Disability areas like OHI are mostly associated with academic-related goals, such as reading or math, even though the disability may impact a broad range of skills (executive functioning, mobility, cognitive functioning, social-emotional functioning, etc.). This work highlights how certain subjects are commonly prioritized given a particular disability category, indicating that solid training in multiple subjects is highly relevant for educators who teach students across disability categories.

Furthermore, the many goals for students with DD indicate that educators must be well-prepared to work with a specific age range (3-9). In other states, research has demonstrated high turnover rates among early childhood special educators (Bellows et al., 2021). Attending to the workforce development and retention of preschool-early grades may be critical, as students at this level tend to work on the most significant number of goals.

Thirdly, our work provides insight for states to consider specialists' workloads and expertise by grade and allocate specialists to grade levels. For example, most students in the early grades work on communication goals, which related service providers, such as

language/speech pathologists (SLPs) likely monitor and focus on. This suggests that SLPs' early childhood caseloads are likely higher than those in the later grades. Therefore, staffing organizations may differ significantly by grade level.

Finally, our work supports the need for more systematic and organized data storage over time. As noted previously, some work on IEPs has focused on compliance issues or alignment with evidence-based practices, but the scale of these studies is limited. Some have recently posited that administrative data offers significant opportunities better to understand special education services and issues, such as inclusion (Kaler et al., in press). Similarly, we posit that utilizing state-wide data systems for IEPs offers a substantial opportunity to understand special education services at scale and over time. This can inform more proactive planning, training, staffing, retention, and implementation efforts at district and state levels.

Limitations and Future Directions

Although we significantly contribute to a better understanding of IEPs at scale with this study, our work has several limitations. First, the coding for this analysis sought to determine the presence of assessment subject areas within IEP goals and does not provide an overall accounting of the different terms present across IEP goals. Future analysis regarding IEP goals can further analyze the language used in IEP goals using different theoretical and technical frameworks.

Second, this work is limited by only having one year of data and cannot consider the variation of IEP goal skills for individual students over time. With additional data, future analyses can explore how students' grades correlate with different IEP goal skills across disabilities over time and typical trajectories and goal patterns for students with various disabilities.

Future work could also tie the IEP goals data with other core portions of the IEP, including service delivery grids (where and how students receive their services), accommodation and modification types, and present levels of performance data to see the extent to which assessment findings and goal areas align. Additionally, there is a significant opportunity to understand better how educators and specialists determine IEP goals and develop these goals in ways aligned with developmental and educational skill-building trajectories, evidence-based practice, and legal requirements.

Conclusion

Using digital text analysis coding and assessment content areas is a promising way to organize the subjects and skills within IEPs. The content of IEP goals is highly variable within subjects and skill areas. Content areas tend to align with a disability category for high-incidence disabilities (e.g., communication goals are frequent for those with language/speech impairments, and math and reading goals are frequent for those with specific learning disabilities). As disability categories have lower incidence, we observe more significant variability in the subject and skill concentrations of IEP goals. Understanding the development of skills and subjects across disability and by grade provides an understanding of the topics typically covered by IEPs across the state and can be used to inform educational planning, teacher training, and district-staffing efforts.

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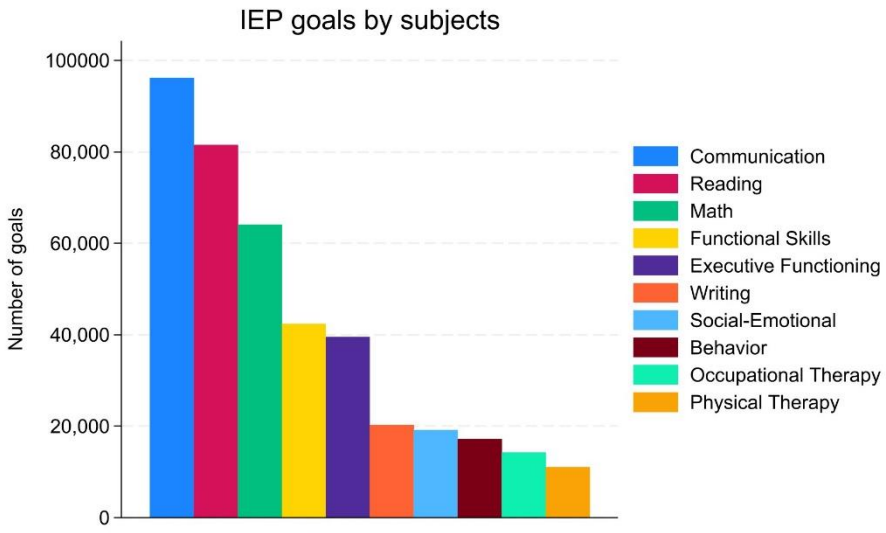
Tables & Figures

Table 1. Sample Descriptive Statistics

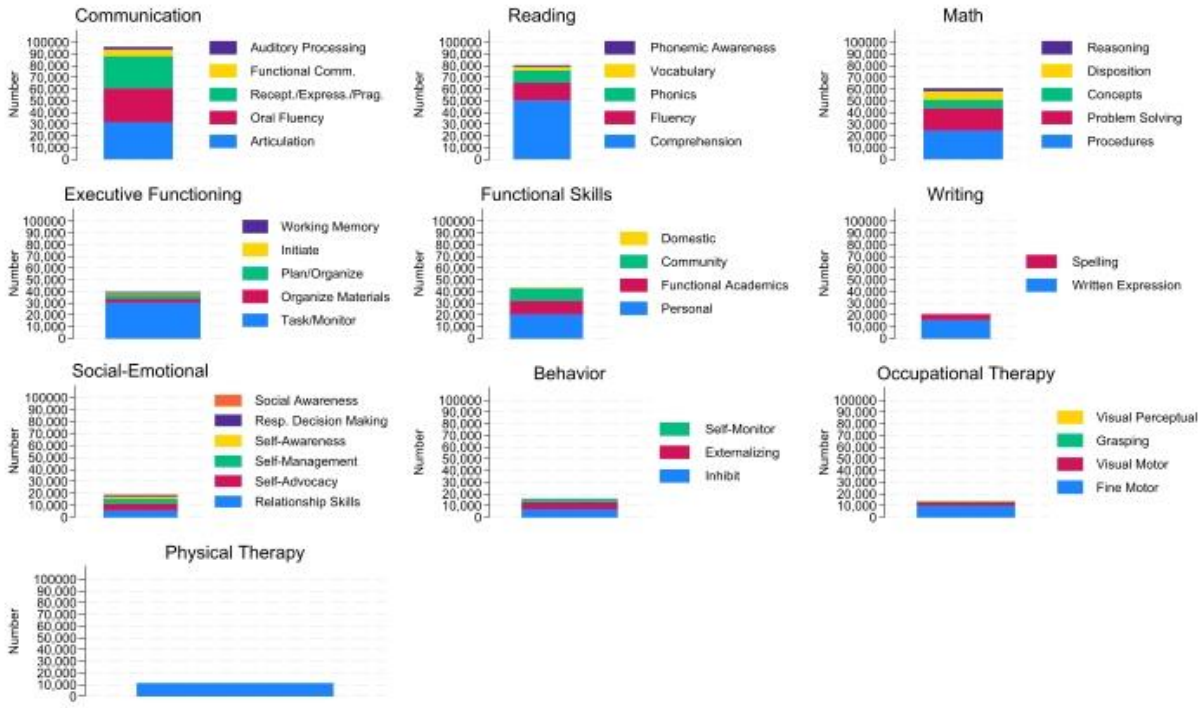
		Goals		Students	
Variable		Obs	Mean	Obs	Mean
Primary Disability	Autism	59,186	0.13	18,177	0.10
	Blind/Low	2,665	0.01	1,015	0.01
	Deaf/HoH	6,583	0.01	2,404	0.01
	Dev Delay	63,824	0.14	17,232	0.09
	FT Emotional	13,442	0.03	5,693	0.03
	Language	60,241	0.13	38,064	0.21
	Learning	109,881	0.24	52,227	0.28
	Mild Intell	28,769	0.06	8,670	0.05
	Mod Intell	10,872	0.02	2,921	0.02
	Multiple	6,772	0.02	1,763	0.01
	Other Health	70,321	0.16	29,830	0.16
	Ortho	3,641	0.01	1,254	0.01
	Other Emot	10,470	0.02	5,100	0.03
	Severe Intell	693	0.00	212	0.00
	Trauma Brain	1,173	0.00	398	0.00
Secondary Disability	None	210,573	0.47	115,899	0.63
	Language	207,872	0.46	56,197	0.30
	OHI	16,422	0.04	7,315	0.04
	Other	13,666	0.03	5,549	0.03
Gender/Sex	Male	281,368	0.63	113,547	0.61
Poverty	Free Meals	231,174	0.52	90,848	0.49
Foster	Not Foster	396,291	0.88	162,321	0.88
Homeless	Not Homeless	418,073	0.93	173,064	0.94
Race/Ethnicity	Am Indian	767	0.00	324	0.00
	Asian	6,845	0.02	2,382	0.01
	Black	63,855	0.14	23,165	0.13
	Hispanic	55,448	0.12	20,507	0.11
	Multiracial	24,661	0.05	10,204	0.06
	Haw / Pac Isl	375	0.00	128	0.00
	White	276,011	0.62	120,137	0.65
Grade	PK	46,214	0.10	16,689	0.09
	KG	32,760	0.07	12,120	0.07
	1	34,500	0.08	12,975	0.07
	2	36,366	0.08	13,753	0.07
	3	38,688	0.09	14,314	0.08
	4	37,953	0.08	14,357	0.08
	5	35,067	0.08	13,565	0.07
	6	32,795	0.07	13,274	0.07
	7	31,607	0.07	13,302	0.07
	8	29,796	0.07	13,050	0.07
	9	27,841	0.06	13,277	0.07
	10	25,145	0.06	12,591	0.07
	11	20,963	0.05	11,383	0.06
	12	16,800	0.04	9,590	0.05
	13	2,038	0.00	720	0.00
Obs		448,533		184,960	

Figure 1. Number of Goals by Subject and Skills

Panel A. Number of Goals by Subject

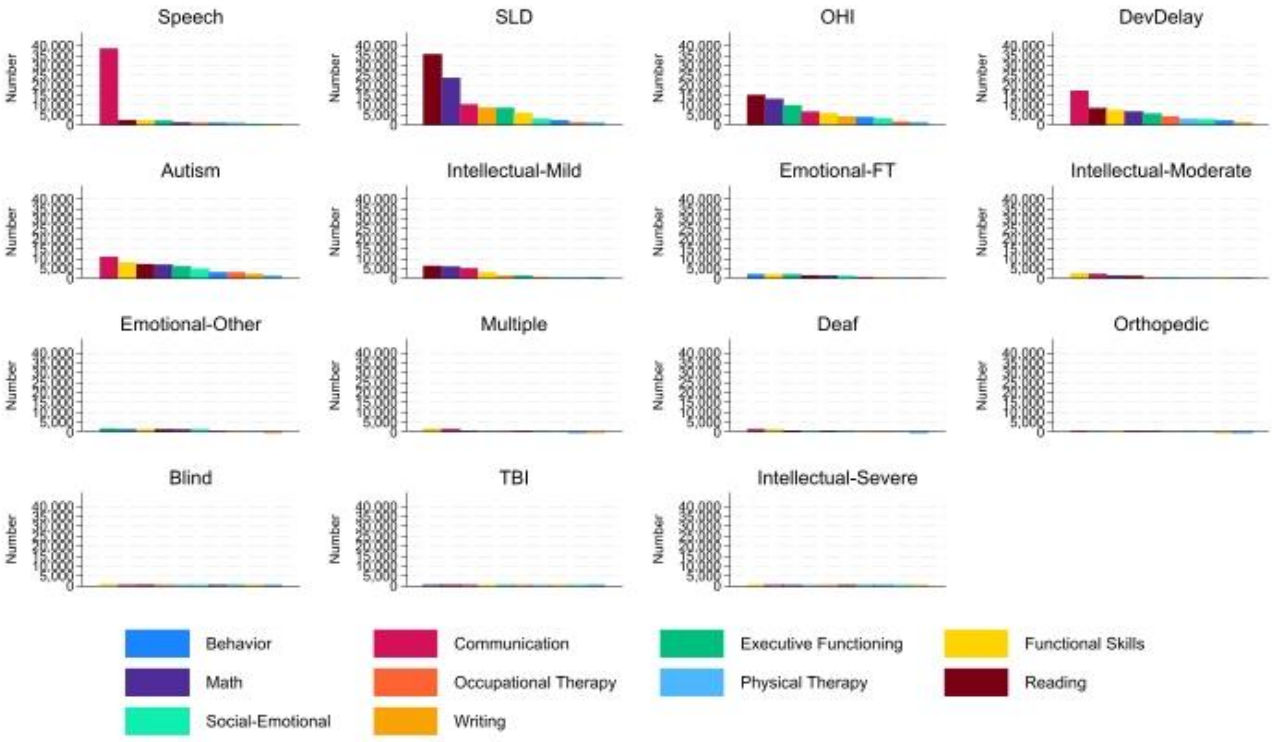


Panel B. Number of Goals by Subjects and Skills



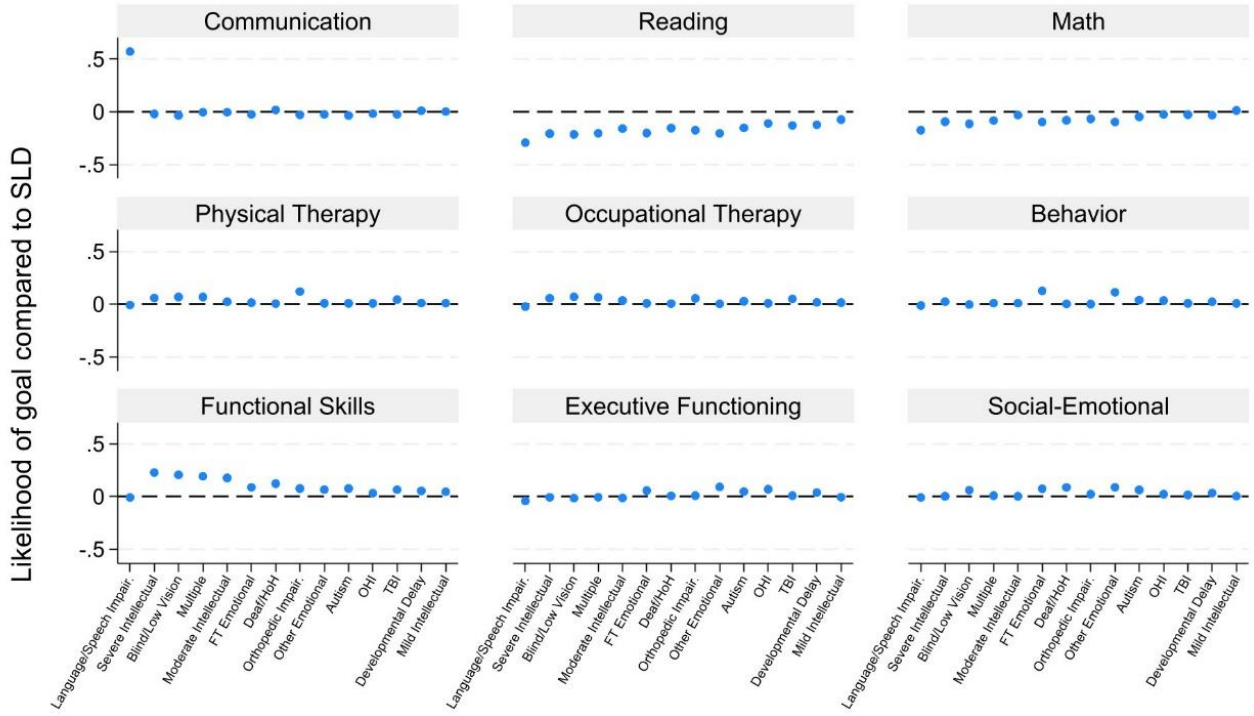
Notes: Panel A provides the count of goals by subject area. Panel B provides the count of goals within subject by skill.

Figure 2. Goals by Subject by Disability



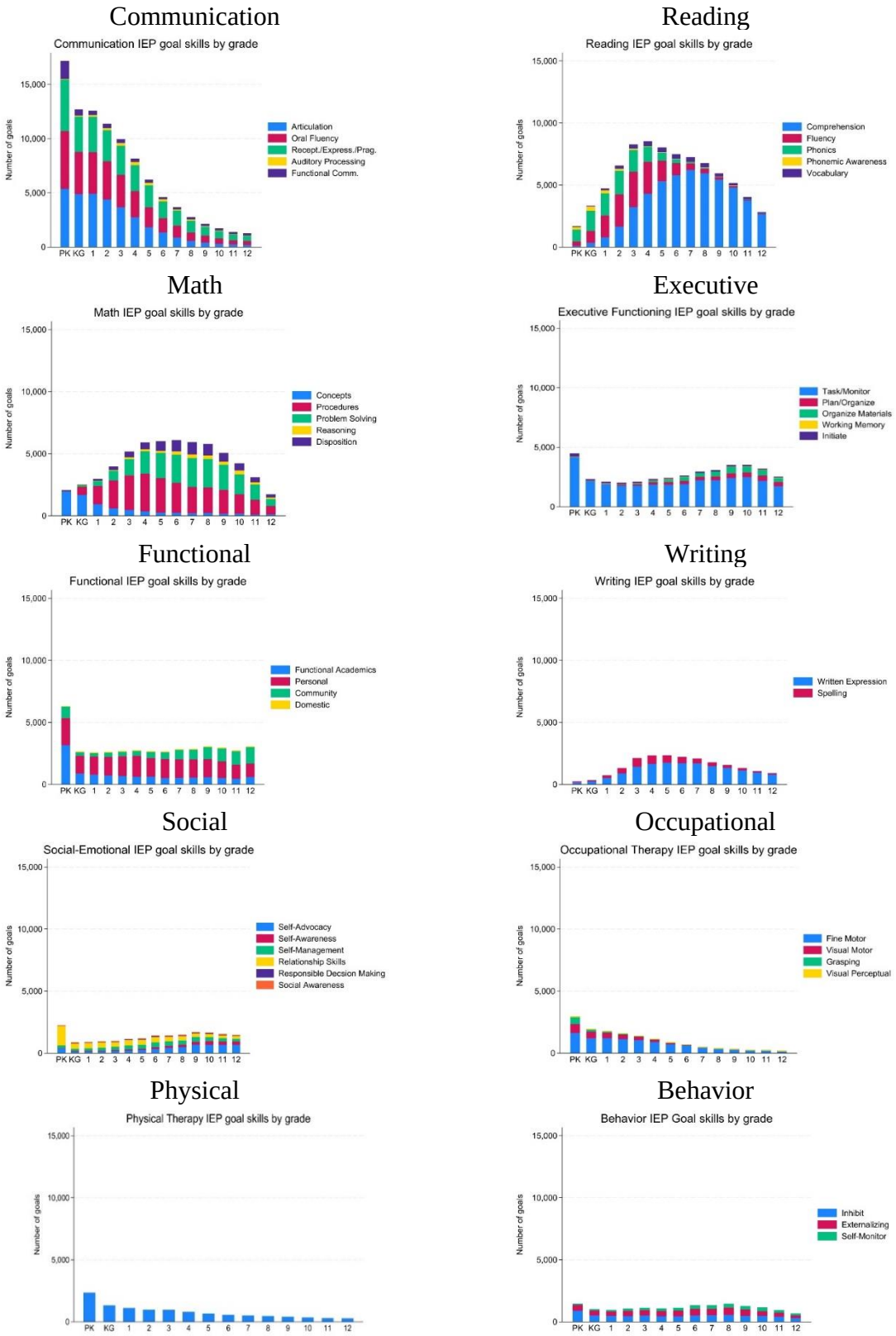
Notes: This figure provides the count of goals by disability and subject.

Figure 3. Probability of Goal Subjects by Disability



Notes: This figure provides the predicted probability of a student with a particular disability having an IEP goal of a particular subject in comparison to students with specific learning disability, conditional on student demographics.

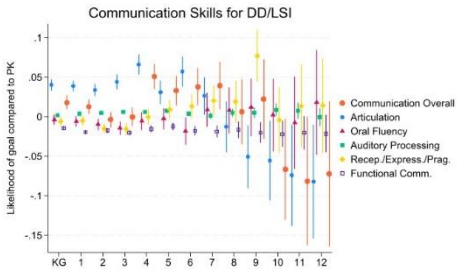
Figure 4. Goal Subjects and Skills by Grade



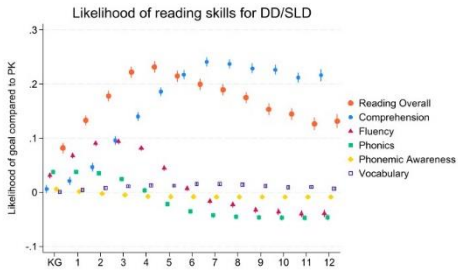
Notes: This figure provides the count of IEP goals by subject and skill by grade.

Figure 5. Probability of IEP Goal Subjects and Skills by Grade

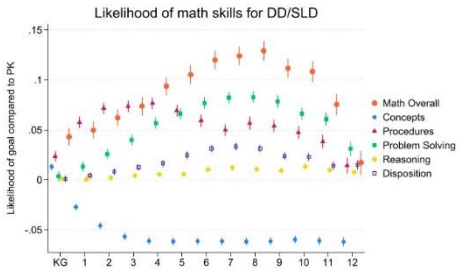
Communication



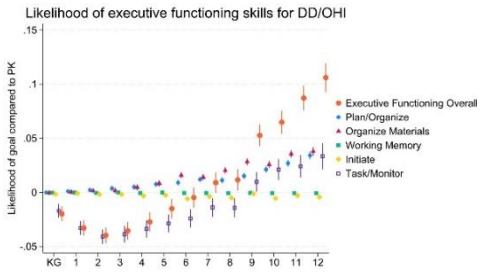
Reading



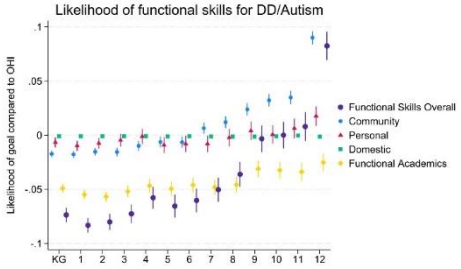
Math



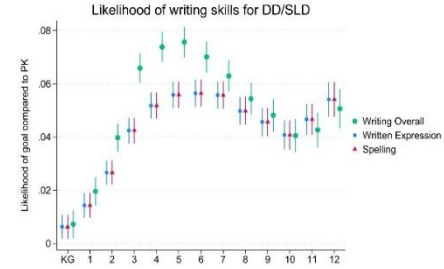
Executive



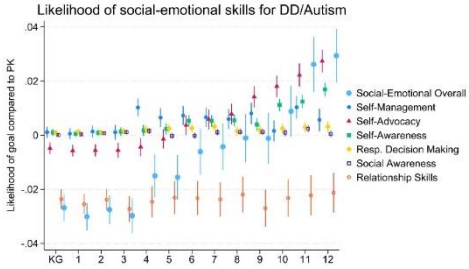
Functional



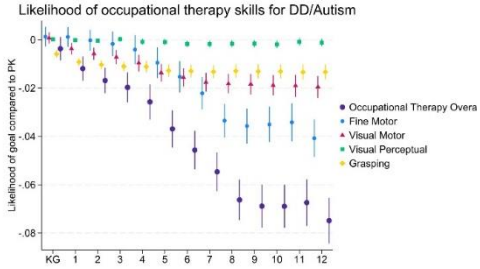
Writing



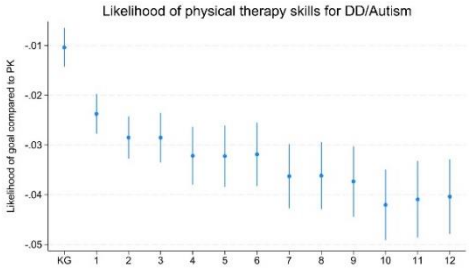
Social



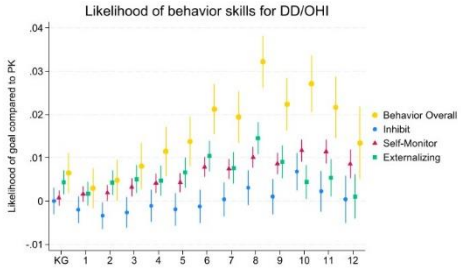
Occupational



Physical



Behavior



Notes: This figure provides the predicted probability of a student with a particular disability having an IEP goal of a particular subject and skill area by grade in comparison to a pre-kindergarten baseline, conditional on student demographics.

Appendix

Appendix Table 1. Eligibility Categories in Special Education

Disability	Definition
Autism Spectrum Disorder (ASD)	Is a lifelong developmental disability, general evident before age 3. ASD significantly affects the student's verbal, nonverbal, or pragmatic communication skills, social interactions skills, and adversely affects the student's educational performance. ASD includes autistic disorder, Asperger's syndrome, and other pervasive developmental disorders, as described in the current version of the American Psychiatric Association's Diagnostic Statistical Manual of Mental Disorders.
Blind or Low Vision (BLV)	Or a visual impairment, means that the student's ability to use vision for learning adversely affects educational performance, even with the best correction. This includes significantly reduced or absence of vision and/or reduced visual field.
Deaf or Hard of Hearing (DHH)	Or a hearing impairment, is a disability that, with or without amplification, adversely affects the student's ability to use hearing for developing language and learning, educational performance, and developmental progress. This includes hearing losses that are permanent or fluctuating, range from mild to profound, and unilateral (one ear) or bilateral (both ears). Students who are deaf or hard of hearing may use spoken language, sign language, or a combination of both.
Deaf-Blind (DB)	Or dual sensory impaired, means that a student has both a hearing and vision loss or reduction in functional hearing and vision capacity that causes significant communication and adaptive behavior deficits and adversely affects the student's educational performance. Student who are eligible as deaf-blind have needs that exceed programs or services designed for students eligible as blind or low vision or deaf or hard of hearing.
Developmental Delay (DD)	Is a disability category for students who are at least three years old and less than nine years old. Developmental delay means a significant delay in one developmental area (at least 2 standard deviations below the mean) or a moderate delay in at least two developmental areas (at least 1.5 standard deviations below the mean). Developmental areas include gross or fine motor development, cognitive development, receptive or expressive language development, social or emotional development, and self-help or other adaptive development.
Emotional Disability (ED)	Is an inability to learn or progress that cannot be explained by cognitive, sensory, or health factors. A student with an emotional disability shows one or more of the following characteristics over a long period of time and to a marked degree that adversely affects educational performance: a tendency to develop physical symptoms or fears associated with personal or school problems, a general pervasive mood of unhappiness or depression, an inability to build or maintain satisfactory interpersonal relationships, inappropriate behaviors or feelings under normal circumstances, and/or episodes of psychosis.
Intellectual disability (ID)	Means that a student has significant limitations in cognitive functioning (measured intelligence below a standard score of 70) and limitations in adaptive behavior that were evident during the developmental period and adversely affect educational performance. Students identified with a cognitive disability are further identified by the level of the disability based on the student's cognitive and adaptive behavior skills – mild (typically intelligence between 55 and 69), moderate (typically intelligence between 40 and 54), or severe (typically intelligence below 40).
Language or Speech Impairment (LSI)	Is a disability that includes language impairments and/or speech impairments that adversely affect the student's educational performance. Language impairments are impairments in the comprehension or expression of spoken or written language resulting from organic or nonorganic causes that are nonmaturational in nature that affect the student's primary language systems, in one or more of the following components: word retrieval, phonology, morphology, syntax, semantics, pragmatics. Speech impairments are impairments that may include fluency, articulation, and voice disorders in the student's speech in more than one speaking task that are nonmaturational in nature, including impairments that are the result of a deficiency of structure and function of the oral peripheral mechanism.
Multiple Disabilities (MD)	Means that the student has more than one disability, one of which must be a significant cognitive disability. The coexisting disabilities are lifelong, interfere with independent

	functioning, and it is difficult to determine which disability most adversely affects educational performance. The term does not include deaf-blind.
Other Health Impairment (OHI)	Other health impairment means having limited strength, vitality, or alertness, including a heightened alertness to environmental stimuli, that results in limited alertness with respect to the educational environment that is due to chronic or acute health problems, such as: 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 syndrome; and adversely affects a student's educational performance.
Orthopedic Impairment (OI)	Is a severe physically disabling condition that adversely affects educational performance. The term may include impairments caused by a congenital anomaly; a disease, such as poliomyelitis or bone tuberculosis; or other causes such as cerebral palsy, amputations, or fractures or burns that cause contractures.
Specific Learning Disability (SLD)	Means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken, or written, that adversely affect the student's educational performance. A specific learning disability is evident when the student does not achieve adequately for the student's age or to meet state approved grade level standards in one or more of the following areas, when provided with learning experiences and instruction appropriate for the student's age or state approved grade level standards: • Reading disability, which is a specific learning disability that is neurological in origin and has a continuum of severity. It is characterized by difficulties with accurate or fluent, or both, word recognition and by poor spelling and decoding abilities. A reading disability may be due to difficulties in basic reading skills, reading fluency skills or reading comprehension. • Written expression disability, which is a specific learning disability that is neurological in origin and has a continuum of severity. Written expression is a complex domain that requires the integration of oral language, written language, cognition, and motor skills. • Math disability, which is a specific learning disability that is neurological in origin and has a continuum of severity. The ability to perform mathematical computations and reasoning requires multiple core cognitive processes. A math disability may be due to difficulties in mathematics calculation, and/or mathematics problem solving. • Oral expression disability, which is a specific learning disability that is neurological in origin, has a continuum of severity, and is characterized by deficits in using expressive language processes to mediate learning of reading, writing, spelling, or mathematics skills. • Listening comprehension disability, which is a specific learning disability that is neurological in origin, has a continuum of severity, and is characterized by difficulties in using receptive language processes to mediate learning of reading, writing, spelling, or mathematics skills. A specific learning disability does not include learning problems that are primarily the result of a visual, hearing, or motor disability, a cognitive disability, an emotional disability, cultural factors, environmental or economic disadvantage, limited English proficiency, or lack of appropriate instruction in reading or math
Traumatic Brain Injury (TBI)	Is an acquired injury to the brain caused by an external physical force, resulting in total or partial functional disability or psychosocial impairment, or both, that adversely affects a student's educational performance. The injury can be an open or closed head injuries resulting in impairment in one or more areas, such as cognition; language; memory; attention; reasoning; abstract thinking; judgment; problem solving; sensory, perceptual, and motor abilities; psychosocial behavior; physical functions; information processing; and/or speech. The term does not apply to brain injuries that are congenital or degenerative or induced by birth trauma.

Source: Indiana Department of Education

Appendix Table 2. Indiana Special Education Evaluation Requirement Chart

ASSESSMENT DOMAINS	ASD	BLV	ID	DHH	DB	DD	ED	LI	SI	MU	OHI	OI	SLD	TBI
Development														
Assessment of developmental areas						X								
Cognition														
Assessment of cognitive ability and functioning (norm-referenced or criterion-referenced)			X							X				X
Academic Achievement														
Assessment of current academic achievement as defined	X	X	X	X	X		X	X	X	X	X	X	X	X
Assessment of progress and interventions								X					X	
An observation to document academic progress and behaviors in areas of difficulty								X					X	
Functional Performance or Adaptive Behavior														
Assessment of functional skills or adaptive behavior across various environments from multiple sources	X	X	X	X	X					X	X	X		X
An assessment of emotional and behavioral functioning							X							
A functional behavioral assessment							X							
A systematic observation across various environments	X	X			X	X				X	X			
Communication Skills														
Assessment of communication… in mode of student				X	X									
An assessment of the student's receptive, expressive, pragmatic, and social communication	X													
Assessment of articulation, fluency, and voice									X					
Observation of student's speech by an SLP									X					
An assessment of functional literacy		X			X									
Motor and Sensory Abilities														
Vision and hearing screening						X								
An assessment of functional vision		X			X									
An assessment of motor skills and sensory responses	X													
An assessment of motor skills including travel skills		X			X									
A written report from an optometrist or ophthalmologist		X			X									
A written report from an educational or clinical audiologist, otologist, or otolaryngologist				X	X									
A statement from a physician if an organic cause suspected									X					
Available Educationally Relevant Medical Info						X		X	X	X	X	X	X	X
…and mental health information							X							
Social and Developmental History	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Any Other Assessments or Information Necessary to Determine Eligibility and Inform the CCC	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Source: Indiana Department of Education

Appendix Table 3. Example Taxonomy of IEP Goal Subjects and Skills Keywords

Subject	Example Skill	Example Keywords	Assessment or Theoretical Basis
Communication	Articulation	"speech" and "sound" "pronounce" "produce" and "speech"	Clinical Evaluation of Language Fundamentals (CELF)
Reading	Fluency	"read" and "fluently" "read" and "accurately" "words per minute"	The Big Five of Reading (National Reading Panel, 2000)
Math	Procedures	"solve" and "equation" "multi-step" "measure"	The Science of Math (Codding et al., 2023)
Writing	Spelling	"spell" "encode"	Wechsler Individual Achievement Test, 4th Edition (WIAT-IV)
Executive Functioning	Initiation	"begin" and "assignment" "start" and "work" "initiate" and "task"	Behavior Rating Inventory of Executive Function, 2nd Edition (BRIEF-2)
Behavior	Externalizing Behavior	"aggressive" "aggression" "disrupt" "outburst" "disruption"	Behavior Assessment System for Children, 3rd Edition (BASC-3)
Social-Emotional Learning	Relationship Skills	"social" and "interaction" "social skill" "interacting with peers" "interact with others" and "relationship building"	Social Skills Improvement System, Social-Emotional Skills (SSIS-SEL)
Occupational	Fine Motor	"fine" and "motor" "cutting" "hand" and "writing" "fasten" "zip" "pre-writing"	Peabody Developmental Motor Scales, 3rd Edition (PDMS-3)
Physical	Gross Motor	"physical therapy" "mobility" "core strengths" "stair" "jump"	Peabody Developmental Motor Scales, 3rd Edition (PDMS-3)
Functional	Community	"life skill" "independent living" "career" "job" "vocation" "shopping"	Vineland Adaptive Behavior Scales, 3rd Edition (Vineland-3)

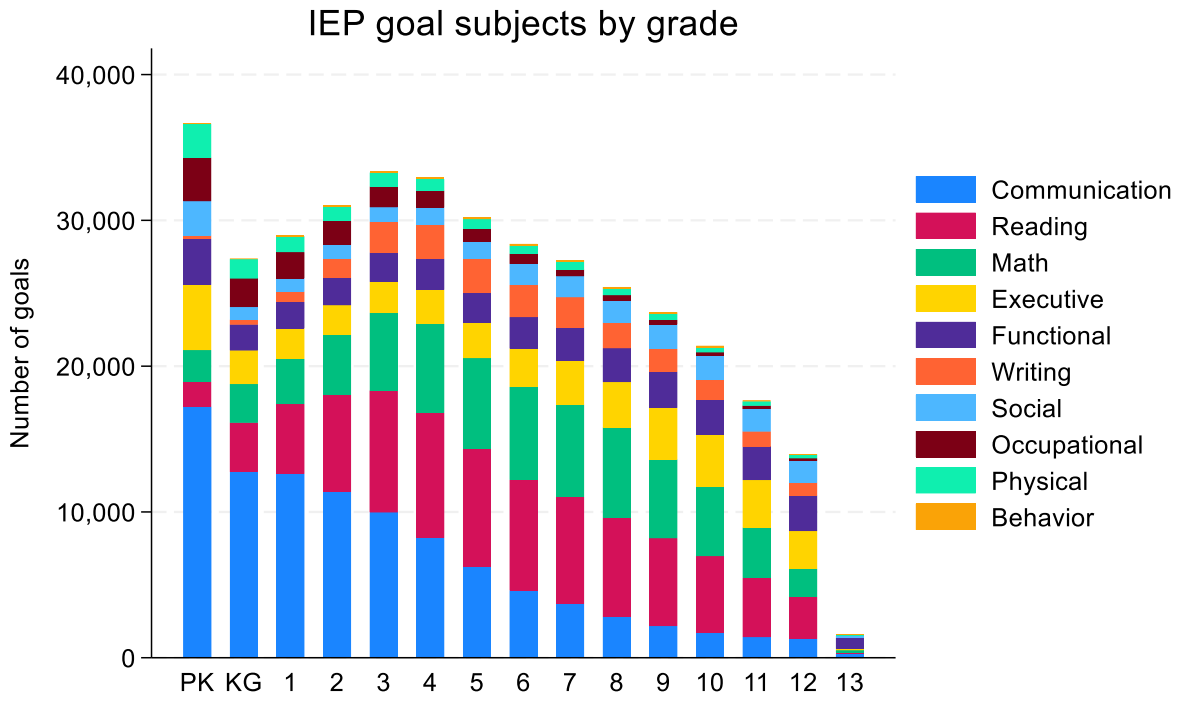
Notes: This table shows the goal subject areas, an example skill, examples of the keywords used to define the subject and skill, and the origin of the terminology used to determine the keywords.

Appendix Table 4. Example Coded Goals

Original Goal Title	Original Goal	Coded Subject	Coded Skill
Reading	Student will be able to read and answer comprehension questions increasing from a level 3.0 to a 4.2 with at least an 80% accuracy 3/4 trials by the end of the IEP cycle.	Reading	Comprehension
Math	Student will be able to solve a total of 10 subtraction, addition, and a real world problem with 80% accuracy by November 2023.	Math	Problem Solving
Articulation K, G, F, V, T, D	Student will correctly produce the sounds /k,g,f,v,t,d/ at the conversation level with 80% accuracy on two out of three attempts based upon slp observation and data collection.	Communication	Articulation
Social/Emotional	Within a calendar year, student will use strategies taught to them to help calm and regulate themselves when they are frustrated or upset on 4 out of 5 opportunities as measured by teacher observation and data collection each consecutive nine weeks.	Social-Emotional	Self-Management

Notes: This table shows example original goal titles and goals from the data along with the coded goal subject and skill used for the analysis.

Appendix Figure 1. Goal Subjects by Grade



Notes: This figure shows the number of goals by subject by grade for the 2022-23 school year.

Appendix Table 1. Regression Coefficients for Figure 3

	Reading	Math	Behav	Social	Exec	Funct	Occup	Phys	Comm	Writing
Autism	-0.152	-0.046	0.039	0.064	0.048	0.077	0.028	0.009	-0.034	-0.029
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Blind	-0.213	-0.113	-0.003	0.061	-0.014	0.207	0.071	0.068	-0.033	-0.048
	(0.007)	(0.007)	(0.004)	(0.004)	(0.006)	(0.006)	(0.003)	(0.003)	(0.007)	(0.004)
Deaf/ HoH	-0.153	-0.079	0.003	0.086	0.006	0.122	0.005	0.006	0.019	-0.015
	(0.005)	(0.004)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.005)	(0.003)
Dev. Delay	-0.122	-0.031	0.024	0.034	0.038	0.054	0.018	0.011	0.011	-0.031
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
FT Emot.	-0.201	-0.096	0.127	0.075	0.057	0.087	0.008	0.014	-0.023	-0.045
	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)
Lang/ Speech Impair.	-0.292	-0.173	-0.012	-0.008	-0.041	-0.009	-0.023	-0.007	0.572	-0.064
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Mild Intell.	-0.073	0.013	0.007	0.004	-0.005	0.046	0.016	0.010	0.003	-0.015
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Mod Intell.	-0.159	-0.030	0.010	0.003	-0.013	0.177	0.035	0.024	-0.002	-0.044
	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)
Mult	-0.203	-0.081	0.010	0.008	-0.006	0.192	0.065	0.069	-0.003	-0.054
	(0.005)	(0.004)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.005)	(0.003)
OHI	-0.110	-0.024	0.034	0.022	0.069	0.032	0.010	0.008	-0.017	-0.017
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Ortho Impair.	-0.173	-0.066	0.001	0.023	0.008	0.076	0.056	0.121	-0.028	-0.032
	(0.006)	(0.006)	(0.003)	(0.003)	(0.005)	(0.005)	(0.003)	(0.003)	(0.006)	(0.004)
Other Emot.	-0.203	-0.095	0.113	0.088	0.091	0.066	0.004	0.009	-0.023	-0.044
	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)
Severe Intell.	-0.206	-0.093	0.025	0.003	-0.007	0.228	0.056	0.059	-0.019	-0.062
	(0.015)	(0.014)	(0.008)	(0.008)	(0.011)	(0.011)	(0.007)	(0.006)	(0.014)	(0.008)
TBI	-0.128	-0.025	0.009	0.016	0.008	0.065	0.051	0.045	-0.024	-0.022
	(0.011)	(0.010)	(0.006)	(0.006)	(0.008)	(0.009)	(0.005)	(0.005)	(0.011)	(0.006)
Cons	0.304	0.190	0.019	0.021	0.068	0.055	0.023	0.017	0.145	0.071
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Obs	446,495	446,495	446,495	446,495	446,495	446,495	446,495	446,495	446,495	446,495

Notes: This table provides the regression coefficients for Figure 3.

Appendix Table 2. Regression Coefficients for Figure 5

	Reading	Math	Behav	Social	Exec	Funct	Occup	Phys	Comm	Writing
KG	0.082	0.043	0.018	-0.020	-0.027	-0.074	0.007	-0.010	-0.004	0.007
	(0.005)	(0.004)	(0.005)	(0.004)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
1	0.133	0.050	0.013	-0.033	-0.030	-0.083	0.020	-0.024	-0.012	0.003
	(0.005)	(0.004)	(0.005)	(0.004)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)
2	0.178	0.062	-0.003	-0.040	-0.028	-0.080	0.040	-0.029	-0.017	0.005
	(0.005)	(0.004)	(0.005)	(0.004)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)
3	0.222	0.074	0.000	-0.036	-0.030	-0.073	0.066	-0.029	-0.020	0.008
	(0.005)	(0.005)	(0.006)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
4	0.232	0.094	0.051	-0.027	-0.015	-0.058	0.074	-0.032	-0.026	0.012
	(0.005)	(0.005)	(0.008)	(0.005)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)
5	0.215	0.105	0.033	-0.015	-0.016	-0.065	0.076	-0.032	-0.037	0.014
	(0.005)	(0.005)	(0.010)	(0.005)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)
6	0.200	0.120	0.038	-0.005	-0.006	-0.060	0.070	-0.032	-0.046	0.021
	(0.005)	(0.005)	(0.012)	(0.005)	(0.004)	(0.006)	(0.003)	(0.003)	(0.004)	(0.003)
7	0.190	0.124	0.039	0.009	-0.004	-0.050	0.063	-0.036	-0.055	0.019
	(0.005)	(0.005)	(0.015)	(0.005)	(0.004)	(0.006)	(0.003)	(0.003)	(0.004)	(0.003)
8	0.175	0.129	0.006	0.012	-0.001	-0.036	0.054	-0.036	-0.066	0.032
	(0.006)	(0.005)	(0.021)	(0.005)	(0.005)	(0.006)	(0.003)	(0.003)	(0.004)	(0.003)
9	0.153	0.112	0.022	0.053	-0.001	-0.003	0.048	-0.037	-0.069	0.022
	(0.006)	(0.005)	(0.026)	(0.005)	(0.005)	(0.006)	(0.003)	(0.004)	(0.005)	(0.003)
10	0.145	0.108	-0.066	0.065	0.009	0.000	0.041	-0.042	-0.069	0.027
	(0.006)	(0.005)	(0.033)	(0.005)	(0.005)	(0.006)	(0.003)	(0.004)	(0.005)	(0.003)
11	0.127	0.075	-0.081	0.087	0.026	0.008	0.043	-0.041	-0.067	0.022
	(0.006)	(0.005)	(0.041)	(0.006)	(0.005)	(0.007)	(0.003)	(0.004)	(0.005)	(0.004)
12	0.132	0.017	-0.072	0.106	0.029	0.083	0.051	-0.040	-0.075	0.013
	(0.007)	(0.006)	(0.047)	(0.007)	(0.005)	(0.007)	(0.004)	(0.004)	(0.005)	(0.004)
Cons	0.108	0.102	0.442	0.121	0.074	0.169	0.015	0.058	0.081	0.035
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Obs	173,666	173,666	124,061	134,068	122,317	122,317	173,666	122,317	122,317	134,070

Notes: This table provides the regression coefficients for Figure 5.

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wheelockpolicy@bu.edu

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