WORKING PAPER 2025–4
SUMMER 2025

Leveraging IEPs to Understand Special Education Services at Scale

Christopher Cleveland, Ph.D., Brown University, Providence, RI*
Lindsey Kaler, Ph.D., Brown University, Providence, RI
Jessica Markham, Boston University, Boston, MA

Boston University Wheelock College of Education & Human Development
Wheelock Educational Policy Center

WHEELOCK EDUCATIONAL POLICY CENTER

ABSTRACT

7.5 million (15%) U.S. public school students have Individualized Education Programs (IEPs) that guide $14 billion in special education services. However, the content of IEPs remains unexplored, primarily because they have been historically inaccessible to researchers at scale. In this study, we develop a coding taxonomy to categorize IEP services from digital IEP records for an entire state. We identify the diverse IEP services provided to students with disabilities. We codify 459,703 IEP services for 158,460 students into 25 categories, six subjects, four support types, five settings, five service modalities, six group types, and five personnel types. This information helps understand variation in IEP services across schools. It can inform educator training and future research on the efficacy of services.

Keywords: special education, administrative data, students with disabilities, text analysis, regression

ACKNOWLEDGMENTS

This work was conducted as part of a research-practice partnership between Boston University's Wheelock Educational Policy Center (WEPC), the Annenberg Institute at Brown University, and the Indiana Department of Education (IDOE). The authors are grateful to IDOE for providing data access, feedback, and comments throughout the research process. The findings and conclusions in this presentation are those of the authors and do not necessarily represent the positions or policies of IDOE or its employees. Olivia Martin provided expert research assistance.

*Corresponding author: Christopher Cleveland, PhD, *Brown University,* Box 1985, Providence, RI, 02912, christopher_cleveland1@brown.edu.

INTRODUCTION

Students eligible for special education services under the Individuals with Disabilities Education Act (IDEA) receive a variety of individualized services to provide them with specially designed instruction (SDI) or related services, as outlined in their Individualized Education Program (IEP). More than 7.5 million public school students (15 percent) receive special education services through an IEP under IDEA (Irwin et al., 2021; National Center for Education Statistics, 2023; U.S. Department of Education, Office for Civil Rights, 2024). Nationally, special education services provided under the IDEA amount to approximately $15 billion in federal investment (Dragoo, 2019). Services denoted in students' IEPs can vary but may include individualized math instruction, individual counseling, transportation, physical therapy, and other related services. A range of personnel (e.g., special educators, speech therapists, psychologists, occupational therapists, physical therapists) deliver services denoted on an IEP, and despite national shortages of special education teachers and related specialists who support students with disabilities (e.g., Gilmour et al., 2024; NASP, 2023; Nguyen et al., 2024), little is formally documented regarding the nature and demand of different special education services.

Recent evidence suggests that special education services improve outcomes for students, and these improvements persist after students exit special education services (Hanushek et al., 2002; Hurwitz et al., 2020; O'Hagan & Stiefel, 2025; Schwartz et al., 2021). For example, in a longitudinal analysis of 575 students in Kentucky (Hurwitz et al., 2020), the authors employ fixed effects models to evaluate student outcomes as students transition in and out of special education, comparing each student's outcomes over time. The authors find that students performed better on math and reading assessments when receiving special education services, as well as after receiving these services, compared to their performance prior to enrolling in special education. In a review of 15 quantitative studies on the effect of special education on student outcomes, O'Hagan and Stiefel (2025) find that their sample of included studies indicates that special education does indeed improve outcomes and results in academic growth that matches or outpaces that of students' general education peers.

Other studies more closely examine variation within special education service delivery, focusing on differences in service delivery models. Examining such variation is key because each special education and related service is delivered through various service models across schools, classroom settings, and different staffing arrangements within those settings. Recently, there have been calls to understand better the types and effectiveness of service delivery models in special education (Kaler et al., 2024). While there are numerous ways special education services can be delivered, prior research describes the nature of services conceptually or through smaller-scale studies, many of which indicate that more inclusive service delivery models are more effective (Hehir et al., 2016). Larger-scale studies examining

the effects of different service delivery models across settings using administrative data have relied mainly on the proportion of time students spend in general education settings as a proxy for a few standard service delivery models (e.g., Barrett, 2020; Kleinert et al., 2015; Theobald et al., 2019). While some studies leverage administrative data to study service delivery models such as co-teaching on a more fine-grain level (Jones & Winters, 2024), these studies are limited due to the challenges of studying different service delivery models using available administrative data, which often does not report the nature of special education services with such specificity (Kaler et al., 2024). Understanding the nature of specific special education services on a large scale is crucial for reporting on how services are delivered to students across schools and informing efforts to assess their effectiveness and identify areas for improvement (Government Accountability Office, 2024).

In this paper, we present the first statewide study of IEP services, utilizing a unique administrative dataset: text data from the IEPs of all students with disabilities across a statewide sample. Using IEP text data enables us to gain specific insights into not only who is receiving special education services, but also which services students receive, as well as details of how service delivery is described (e.g., group setting, associated personnel). We answer the following research questions:

1. What service categories and subjects are specified in IEPs?
2. How does the likelihood of having a particular service category vary by disability?
3. How are other service delivery descriptors specified in IEPs?

To answer these questions, we create a taxonomy to categorize IEP services across seven text-based descriptors: 25 categories, six subjects, four support types, five settings, five service modalities, six group types, and five personnel types. We then leverage the digital IEPs to analyze service variation across 459,703 IEP services for 158,460 students. In addition to descriptive analyses of the frequency of each text-based descriptor, we examine the relationship between students' primary disability classification and service categories in their IEPs. For example, Specially Designed Instruction (SDI) services are mostly assigned to students primarily with Specific Learning Disabilities and Other Health Impairments. In contrast, Speech-Language services are most frequently assigned to students with Speech-Language Impairment or Developmental Delay. We further document that most services do not provide details about the other service descriptors (support, setting, modality, group, and personnel) based on the keywords we use. Among the services that provide details on these descriptors, most services are provided in the general education setting, with push-in modality, in an individual or small group, and with a teacher.

Categorizing and observing the variation in IEP services at scale allows a better understanding of the nature and breadth of services. The development of formal approaches to studying student IEPs through text analysis also highlights the potential to inform research and policy regarding how to analyze and develop IEP services and overall IEPs.

BACKGROUND

IDEA Disability Categories

IDEA specifies federal provisions for disabilities that entitle students to receive special education, which 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 of the federal categories for eligibility determination. This paper utilizes the labels provided by the Indiana Department of Education (IDOE). IDOE distinguishes ED into "Full Time Emotional" and "Other Emotional," and ID into "Mild," "Moderate," and "Severe" categories. We treat these categories as distinct, rather than creating an aggregate disability classification for ED or ID because we wanted to be able to discern any differences in the ways that services are assigned to students across each distinct category, including those that share a broader disability classification (e.g., mild ID, moderate ID, and severe ID).

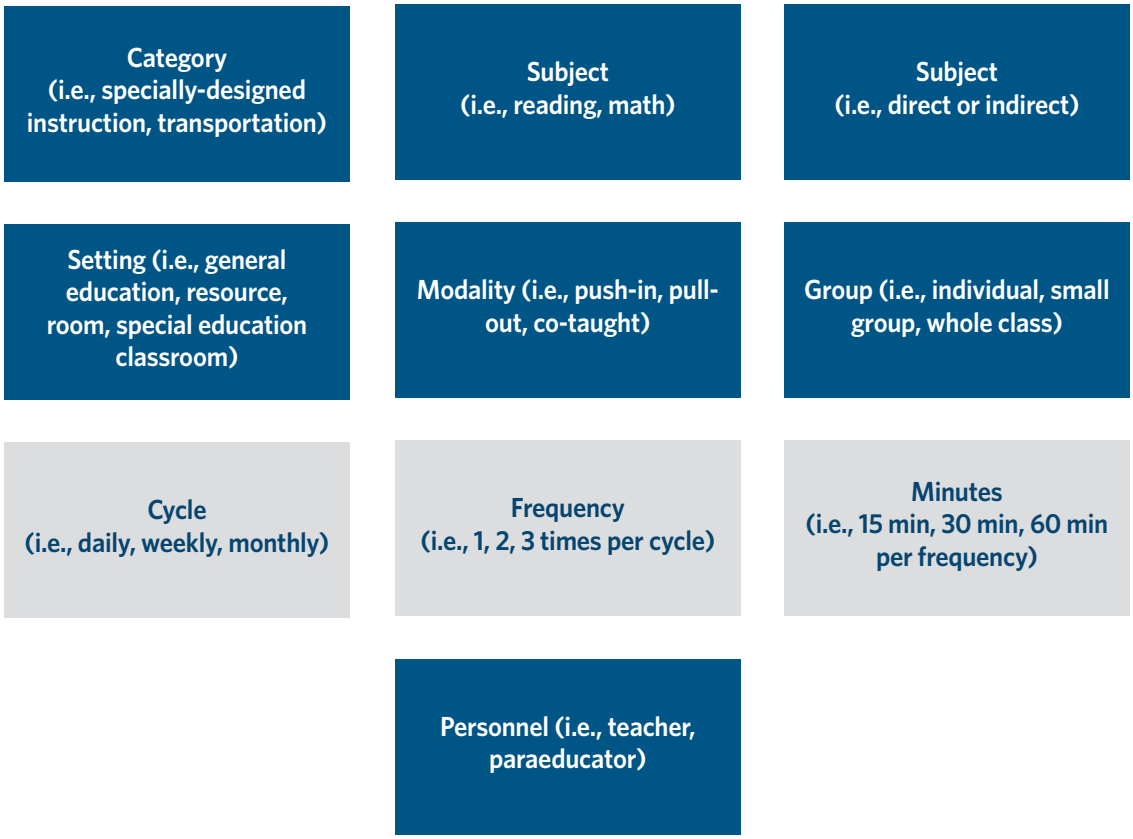
Individualized Education Programs (IEPs)

IEPs are annual documents that provide information about a student's special education, including 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 their 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 (IDEA, 2004; IEP TA Center, 2022).

Special Education and Related Services

When school teams convene to reach a consensus on the contents of a student's IEP, they must determine what special education and related services are necessary to support the student in school. Special education and related services have been conceptualized and studied in several ways, including the types of services offered, whether services are delivered directly or indirectly, the setting and modality for the service, the student group size during service delivery, and which school personnel are assigned support in the delivery (Giangreco, 2001; Giangreco et al., 2023; Kouo et al., 2024; Rogers et al., 2021). IEP services are also studied in terms of duration and frequency (e.g., minutes per session and times per week), but these elements are not part of the present study. Figure 1 provides an overview of these conceptual dimensions, each further described below.

FIGURE 1: SERVICE DELIVERY DESCRIPTORS



Note. Each service (n = 459,703) was coded for the highlighted seven descriptors. Service category was based on each service title, while service subject, support type, service setting, service modality, group type, and personnel were coded based on a series of keywords within each service narrative. Cycle, frequency, and minutes are not coded in this study.

SERVICE CATEGORY

Under IDEA, students are eligible for both special education and related services. Special education includes SDI, which involves a curriculum that is intensified and adapted as appropriate to meet the needs of an eligible child, ensuring access to the general curriculum so that the child can meet educational standards. Related services include transportation, speech-language pathology and audiology, interpreting, psychological, physical, occupational, recreation, counseling, orientation and mobility services, medical services, and parent counseling and training (IDEA, 2004).

SERVICE SUBJECT

The focal subject of special education and related services can vary based on students' IEP goals. For example, a school psychologist may provide related services focused on teaching students to develop stress tolerance skills, enabling them to access their education more broadly. Alternatively, a speech therapist may provide therapy aimed at improving articulation skills, ensuring effective communication in the classroom and academic settings. Specific service subjects are tied to different personnel based on their expertise and defined role within a district. Prior research on IEPs – including studies on IEPs at scale (Cleveland & Markham, 2024) – has examined the academic subject areas on

which IEP services are typically focused. For special education services, these subjects may include academic topics such as reading or math, as well as non-academic subjects like social skills, communication, or life skills (Cleveland & Markham, 2024). While several studies on the effectiveness of different service delivery models have focused on outcomes in ELA and math (e.g., Jones & Winters, 2024), students may also receive special education support in other academic subjects, such as science, and elective subjects, like physical education. Thus, the subjects and skills taught in IEPs vary significantly and require a wide range of personnel and expertise.

SUPPORT TYPE

Services may also be delivered as either direct or indirect support. Direct support is delivered directly to the student by a specialist; for example, speech therapy is provided to a student by a speech-language therapist. Indirect support is indirectly provided to a student; for example, a psychologist might provide 20 minutes of consultation per month to a student's grade-level team. IEP teams must determine which support type is most appropriate based on the individual student's needs, and teams must formally document these supports in a student's IEP (Giangreco, 2001).

SERVICE SETTING

According to the IDEA, services are meant to be delivered in the least restrictive environment (LRE) that is determined for a student. Generally, special education services are delivered in these settings: general education (80% or more general education time), resource room (40-79% of general education time), separate class (less than 40% of general education time), public or private separate school, residential, and correctional. Prior research primarily focuses on describing services based on the time spent in general education, as categorized by federal data collection settings. Specifically, studies have often focused on investigating the effectiveness of time spent in general education to determine whether greater inclusion is associated with more positive outcomes for students with disabilities (e.g., Barrett, 2020; Hehir et al., 2016; Jones & Winters, 2024; Kaler et al., 2024; Kleinert et al., 2015; Schifter, 2016). Additionally, some literature has explored service settings along the LRE continuum and service delivery models within such settings (Kaler et al., 2024).

SERVICE MODALITY

There are different modalities in which service delivery may be implemented. Broadly, these fall into two categories: "push-in" and "pull-out" models. In a push-in model, support staff enter the service setting to provide services. One push-in service delivery model that has been studied relatively extensively is co-teaching (e.g., Jones & Winters, 2024). In a pull-out model, students are removed from one service setting to receive special education support in another (e.g., being pulled from a general education classroom to receive counseling support services in a separate setting).

Kaler et al. (2024) note that few studies examine specific service delivery models at scale using quantitative methods, particularly causal inference methods. Those that do tend to focus broadly on time spent in general education as a proxy for service settings (i.e., general education, resource room, special education classroom), with very few studies exploring service delivery models within those settings. In their review of seven studies on service delivery models and student outcomes, co-teaching was the only service modality studied within a unique setting (Jones & Winters, 2024), specifically within the general education setting. Prior studies have examined various components of push-in and pull-out services, including the time spent on instruction in push-in versus pull-out settings and their related impacts on

academic outcomes (Gelzheiser, 1992). Other studies have focused on service provider perceptions of push-in versus pull-out delivery of related services such as occupational therapy (Johnson & Skuthan, 2024).

GROUP TYPE

Special education services may also be provided in a variety of group sizes. For example, a typical specification of some special education services is that they are delivered individually. This is particularly common when assigning one paraeducator to support one student (Suter & Giangreco, 2009). In contrast, a co-teaching support model would imply a mix of whole class and small group types. Additionally, speech services are commonly described as being provided in groups of one to three students with a speech therapist; this is also often true of social skills instruction and, as prescribed by some evidence-based practices, group therapy as well. Indeed, some state agencies guide IEP teams in determining group size for related services, given that it is a critical consideration in service delivery (Kouo et al., 2024).

PERSONNEL

Another integral component of special education service delivery is the personnel assigned to implement services. Given the range of services students are eligible to receive, there is also substantial variation in the personnel required to implement the services specified in students' IEPs. A growing body of research has explored patterns in the composition, distribution, stability, and effectiveness of the special education workforce, particularly among special education teachers and paraeducators (Bettini et al., 2023). However, substantially less research has been dedicated to other personnel supporting students, such as speech pathologists, psychologists, social workers, and paraeducators (Gilmour et al., 2024; Theobald et al., 2025).

Prior IEP Research

Research on IEPs broadly has been relatively limited, especially when considering research of large populations. To date, research on IEPs has focused primarily on ensuring legal compliance standards or understanding the kinds of services denoted in IEPs for specific disability categories (e.g., EBD, ASD, or ADHD; McKenna et al., 2024; Spiel et al., 2014; Hott et al., 2021; Kurth & Mastergeorge, 2010; Ruble et al., 2010; Spiel et al., 2014). For service delivery, questions of access to a Free and Appropriate Public Education (FAPE), the LRE, and inclusion have been central to the work. For example, Kurth and Mastergeorge (2010) descriptively analyzed 15 IEPs for students aged 12-16 in inclusion and non-inclusion programs to identify the types of services and adaptations made for inclusion and non-inclusion settings. The authors found that students in later grades tended to receive more adaptations to their services to participate in inclusive settings, and they found that goals differed based on the setting's delivery. However, the small sample of IEPs limits the external validity of their work. It is not easy to understand broadly how goals and services may differ by setting based on 15 IEPs. In contrast, new literature by Cleveland and Markham (2024) captured the contents of IEPs at scale by analyzing IEP goal content and skill areas across an entire state, using a sample of over 180,000 students and over 440,000 goals. Although research on IEP contents has steadily grown, it remains significantly limited, especially regarding services directly noted on IEPs.

METHODS

Data

For this study, the IDOE provided data from several sources from the 2022-2023 school year. Our primary data source is the full text of each student's IEP, including present levels, goals, services, accommodations, and related information (e.g., service initiation date). The information in each IEP related to services included a service title and service narrative for each service listed in a student's IEP.

We combine individual IEP data with student-level data on special education eligibility. Special education eligibility data includes students' primary and secondary disabilities, special education location (e.g., public school, home-schooled), and placement (e.g., in general education for less than 40%, 40-79%, or over 80%, or full-time in a residential or correctional setting).

We combine this data with student-level enrollment and demographic information, including district, school, grade, race/ethnicity, gender/sex, poverty status, English learner status, foster/homeless status, and special education status (i.e., whether the student is eligible for special education services or not). The data includes students in grades PK-13. Students enrolled in grade 13 include those who are over 18 but eligible to receive special education services until the age of 22.

Notably, we define students with disabilities as those who are deemed eligible to receive special education services through an Individualized Education Program (IEP). There are other students, however, who may identify as disabled or who receive services and accommodations through another pathway, such as Section 504 (i.e., a 504 plan) or English Learner (EL) support. This paper focuses on students who are eligible for special education services. These datasets were merged using a unique student identifier to create a comprehensive file used for analysis, in which observations are at the service-by-student level. Students with demographic and disability eligibility information that could not be linked to IEP information are excluded from the sample.

See Table 1 for descriptive statistics of the study sample, comprising 459,703 services and 158,460 students, including primary disability and various demographic characteristics (e.g., gender, race/ethnicity, grade). Overall, the sample predominantly comprises students whose primary eligibility classification is a specific learning disability and those without a secondary disability classification. Additionally, most of the sample is comprised of students who are identified as male (63%), eligible for free meals (51%), not in foster care (99%), and not homeless (94%), White (61%), and all students are distributed across grades PK–13.

Text Analysis and Coding

To answer our research questions, we developed a coding structure in Stata Version 18 to classify key components of IEP services based on explicitly specified keywords. In our analysis, we classify each unique service using a series of text-based descriptors grounded in the literature on service delivery and comprising descriptors that the team determined would equate to an appropriate level of service detail for implementation. In our analysis, we code—using

a set of pre-specified keywords—for service category, service subject, support type, service setting, service modality, group type, and personnel. Each service was coded using the raw text data from IEPs, along with a combination of the service title and narrative. See Table 2 for examples of how services were coded for each of the seven text-based descriptors, including services that yielded unclassified domains within the coding taxonomy.

SERVICE CATEGORY

This variable was developed based on each service title. Initially, there were 718 unique service titles, which we refined to 25 service categories. The second author coded each service title into a corresponding service category, and the first and third authors, along with the research assistant, verified all codes individually before the entire recoded database was discussed as a team. Coding service categories was an iterative process revisited multiple times throughout the data cleaning and analysis.

As a first step in coding the raw text data, we hand-coded each unique service category label and grouped them according to their alignment with how IDEA defines SDI and related services in Sections 300.34 and 300.39 (IDEA, 2004). According to Section 300.34 of IDEA, there are 16 unique related services that students with disabilities are eligible to receive, in addition to services defined broadly as "special education" in Section 300.39. We leveraged these descriptions to develop a codebook for categorizing services. For example, services such as "check-in," "test," or "special education" would all be coded as SDI, while services such as "speech therapy" or "speech services" would be coded as Speech-Language Pathology. Importantly, IDEA does specify that all students must receive SDI to be eligible for special education services. Our study focuses on categorizing and coding services based on their appearance in specific sections of IEPs' texts, and we do not—and cannot—draw conclusions about the legal nature of students' eligibility based on our current analysis.

Our coding process was organized to consolidate the wide variation in individual IEP services, which are written by individual practitioners when creating IEPs, into a dataset that could be analyzed at scale. Given the variation within each service title, some services did not align precisely with either SDI or one of the related services as defined by IDEA. In those cases, the research team agreed to expand our taxonomy to include additional categories, such as Behavioral Services, Social Skills Services, or Disability-Specific Services. This coding decision was made in order to balance maintaining specificity in services while also developing a dataset that could highlight trends in IEP services as specified in IEPs statewide. See Appendix Table 1 for a crosswalk of how each service category was determined (i.e., IDEA Sec. 300.34, IDEA Sec. 300.39, or a category developed by the research team). All services (n = 495,299) are coded in one of 25 mutually exclusive service categories. Our coding process was iterative and collaborative in nature. All authors agreed upon coding decisions for all observations before the final sample was analyzed. Additionally, to verify the effectiveness of our codebook and coding scheme, we blindly recoded a sample of all observations and discussed any coding conflicts until reaching adequate intercoder reliability (Cronbach's alpha > 0.90).

Each of the other text-based descriptors (e.g., support type, service setting) is coded using specific keywords identified in the narrative text of IEP service descriptions. Each keyword was individually entered into our coding software (i.e., Stata), and all authors agreed upon all keywords. Given that coding is done deductively based on pre-specified keywords, codes are only applied when they appear in the service narrative text, rather than being applied universally based on an inductive analysis of the IEP service narratives. When an IEP service narrative does not include keywords

associated with a specific text-based descriptor, it is coded as "unclassified." See Table 2 for an example of how each service description may be coded, including those coded as "unclassified" for specific descriptors.

OTHER DESCRIPTORS

In addition to coding a service category based on each service title, we coded for six other descriptors based on each service narrative: subject, support type, setting, modality, group type, and personnel. To code the text data for each descriptor, we developed a series of keywords that identified any of our codes within the IEP service narrative text field. This coding structure was applied to all services, regardless of their category or type. It is essential to note that all services are assigned a service category based on their title, and each service is coded to include all six text-based descriptors derived from the service narrative. While each service is coded for all seven descriptors, a "multiple" or "unclassified" category can be applied to all descriptors except the service category itself. The "multiple" code means multiple code categories are present in the service narrative. The "unclassified" code is applied across descriptors to address cases in which service narratives do not specify one of the coded components. See Figure 1 for a sequence of the coding process.

Service subjects were coded based on primary academic and non-academic subject areas related to those identified in a prior analysis of the content of IEP goals using the same dataset (Cleveland & Markham, 2024). For all services classified within the SDI category, we further differentiated services as one of the following mutually exclusive categories: reading only, mathematics only, math and reading, another academic subject, another non-academic subject, or unclassified SDI.

Support type describes the proximity of services as either direct or indirect. While there may be other ways to describe the proximity of services in IEPs, for example, through consultation (Giangreco, 2001), we defined support type as direct, indirect, multiple, or unclassified.

We identified three different service settings to describe the classroom setting in which each service is being delivered. Notably, the service setting text-based descriptor is coded based on direct text data from IEP service descriptions, which are separate from placement data that describe a student's overall special education enrollment details. Our categories for service settings are general education, resource room, special education, multiple, or unclassified. We classified service modality based on keywords describing services as push-in, pull-out, co-taught, multiple, and unclassified. Additionally, we coded for the type of student group: individual, small group, large group, whole class, multiple groups, or unclassified. Finally, we coded each service narrative for the personnel mentioned. We identified a range of different service providers described in the service narratives. For this study, we consolidated the different role types into the following personnel categories: teacher, paraeducator, other provider, multiple, and unclassified.

Combining these seven descriptors enables us to gain a better understanding of how special education and related services are described in IEPs across the dimensions studied in prior literature and considered by IEP teams in practice.

Regression

After analyzing the IEP service data, we leveraged the coded services data to examine patterns in the IEP service category by disability. We analyzed which types of services are most commonly associated with different types of disabilities. We used a linear probability regression model of the following form:

$$Y_{ig} = B_0 + B_1 Disability_i + X_i + \delta_g + \epsilon_{ig} \quad (1)$$

Y_{ig} is one of the IEP service categories, 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 grade level. Standard errors are clustered by school. This model uses specific learning disability and pre-kindergarten as the baseline categories.

RESULTS

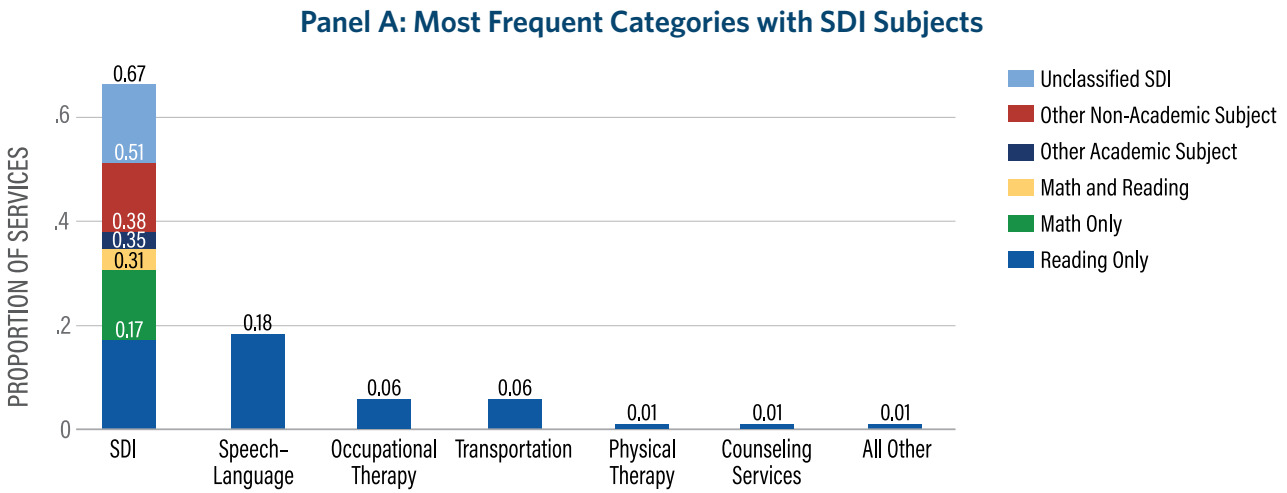
RQ1: What Service Categories and Subjects Are Specified in IEPs?

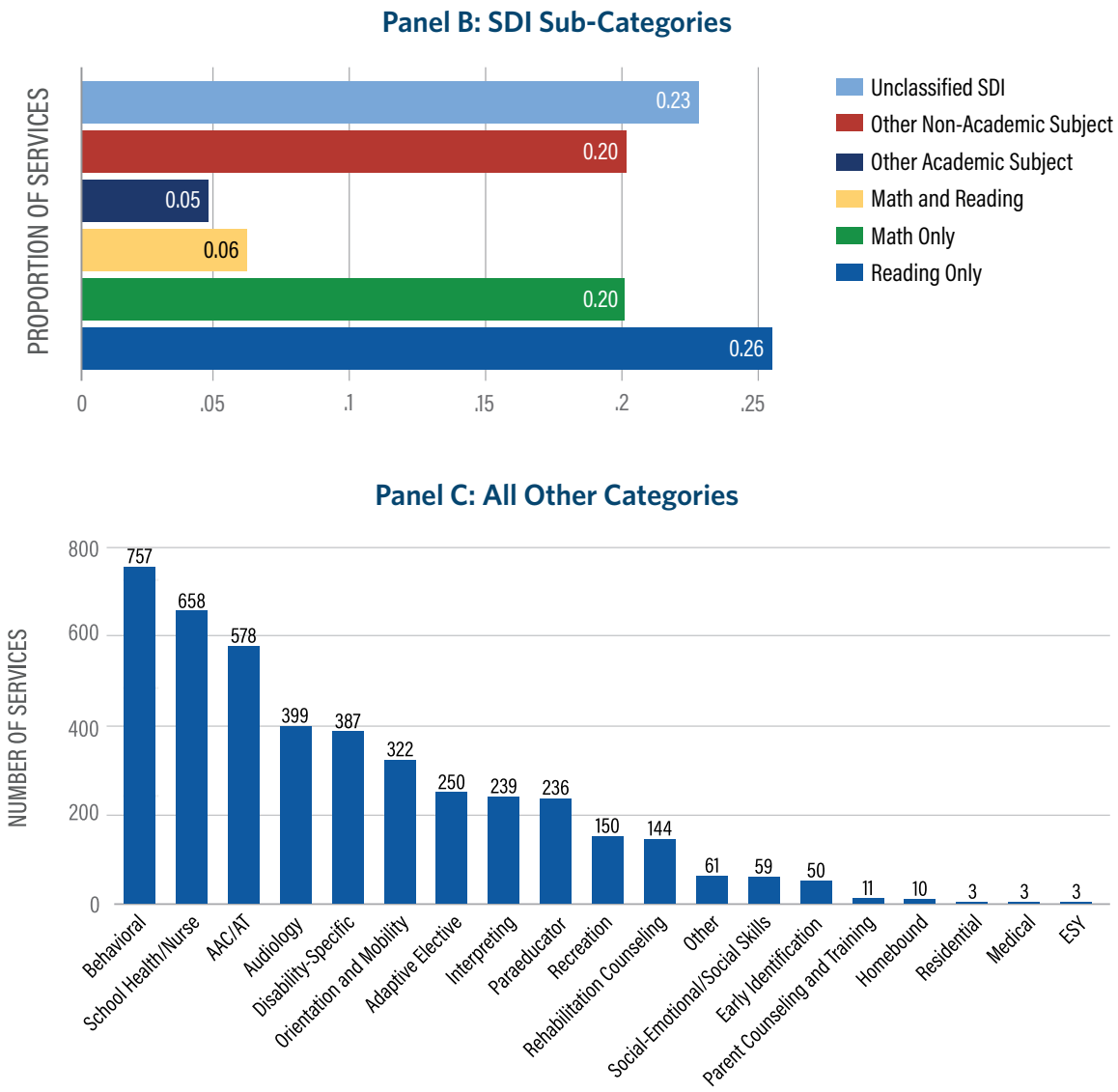
Our first research question focuses on the types of services included in the Individualized Education Programs (IEPs) of all students in the sample.

SERVICE CATEGORY: SDI AND RELATED SERVICES

First, we examine the frequency of services across all service categories. As in Panel A of Figure 2, most services in students' IEPs are for SDI. The number of SDI services (n > 300,000) far exceeds the number of other services; the next most common service, speech-language pathology, is approximately one-third as common (n = 104,229). even less common still are occupational therapy (n = 34,174), transportation (n = 32,784), physical therapy (n = 7,397), and counseling services (n = 6,980). Panel C of Figure 2 reflects substantial variation among the least common services; none were observed more than 800 times (<1%) across the sample.

FIGURE 2. FREQUENCY OF SERVICE CATEGORIES





Note. The y-axis for Panels A and B reflects the proportion of services, while the y-axis for Panel C reflects the number of services. SDI = Specially Designed Instruction. AAC/AT = Augmented and Alternative Communication/Assistive Technology. ESY = Extended School Year.

SERVICE SUBJECT

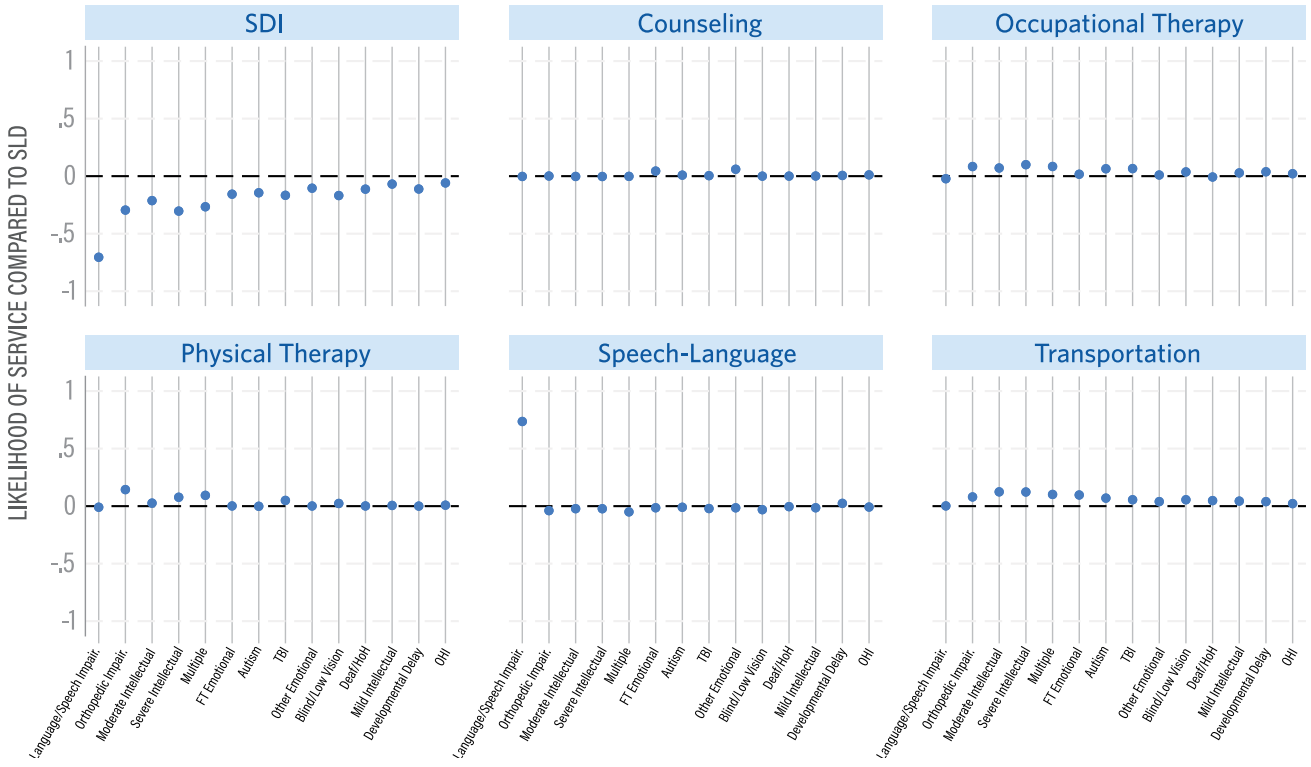
Next, we examined the subject area sub-categories within services classified as SDI. Panel B of Figure 2 indicates that most services classified as SDI that mention a subject area (i.e., reading, mathematics, another academic subject, or a non-academic subject) mention reading or mathematics only. Approximately 80,000 services, or about 25% of SDI services, mention reading only, while approximately 60,000 services (about 20%) mention mathematics only. A much smaller number—about 20,000—mentions both reading and mathematics. In contrast, even fewer (approximately 16,000) mention neither reading nor math, but do mention other academic subjects such as social studies or science.

A substantial proportion of SDI services—about 60,000, or 20%—mention a non-academic subject area, such as executive functioning or behavior. Furthermore, approximately 70,000 SDI services do not include keywords that indicate a specific subject area, which we define as unclassified.

RQ2: How Do Service Categories Vary by Primary Disability?

Our second research question examines the heterogeneity of IEP services by disability classification. Figure 3 reflects the probability of service category by disability. This indicates that students with specific learning disabilities are likely to receive SDI services. Students with specific learning disabilities are less likely than students with almost any other disability classification, however, to receive transportation services. Additionally, regression results indicate that students with emotional disabilities (full-time or other) are more likely to receive counseling services than their peers with other disability classifications, and students identified with speech-language impairments (SLI) have over a 50-percentage point higher probability of receiving speech-language pathology services than their peers identified with other disabilities. Students with orthopedic impairments and students with intellectual disabilities are more likely to receive physical and occupational therapy services. However, there is slightly more variation across disabilities in the likelihood of receiving occupational therapy services.

FIGURE 3. PROBABILITY OF SERVICE CATEGORY, BY DISABILITY



Note. The y-axis represents the probability of a service in the category being associated with students with different disabilities represented along the x-axis. The probabilities are relative to students with SLD in PK. SDI = Specially Designed Instruction. Disability classification abbreviations are as follows: FT Emotional = Full-Time Emotional Disability; TBI = Traumatic Brain Injury; HoH = Hard of Hearing; OHI = Other Health Impairment.

RQ3: How Are Other Service Delivery Descriptors Specified in IEPs?

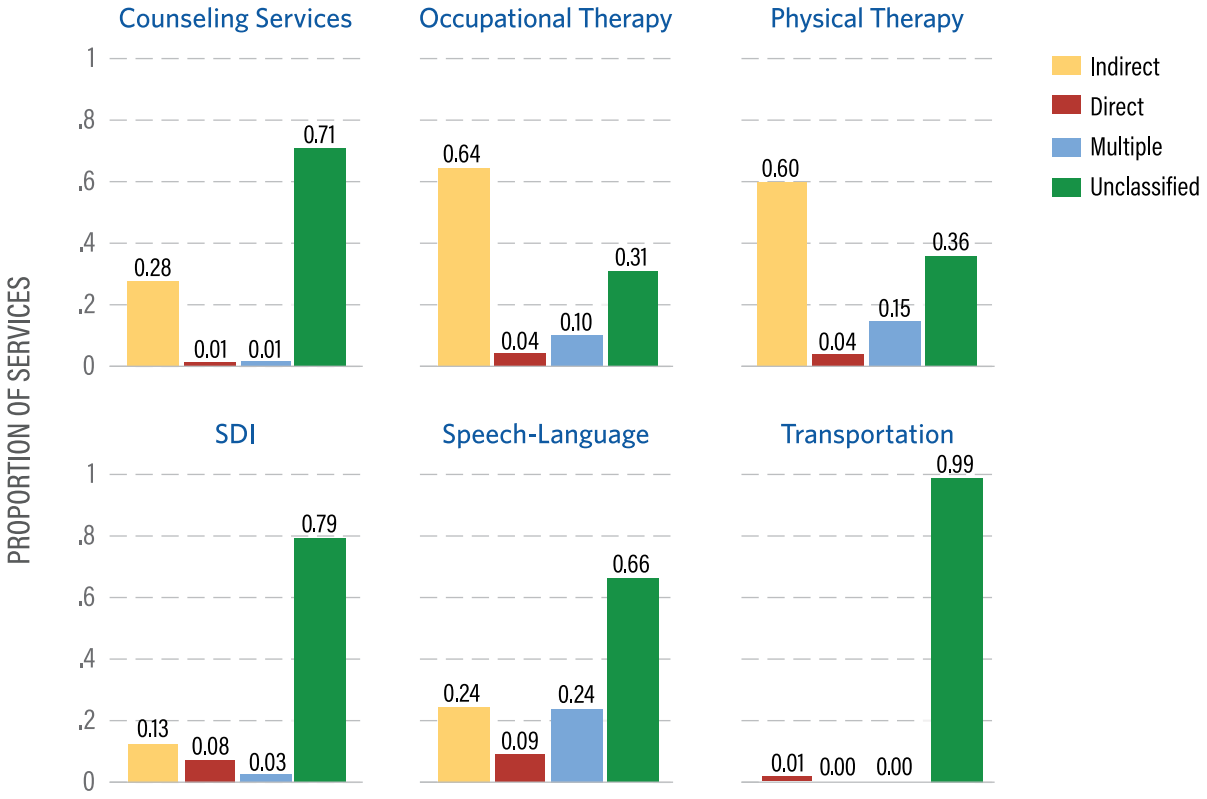
Our third research question focuses on the other descriptors—aside from service category and subject—specified in students' IEPs.

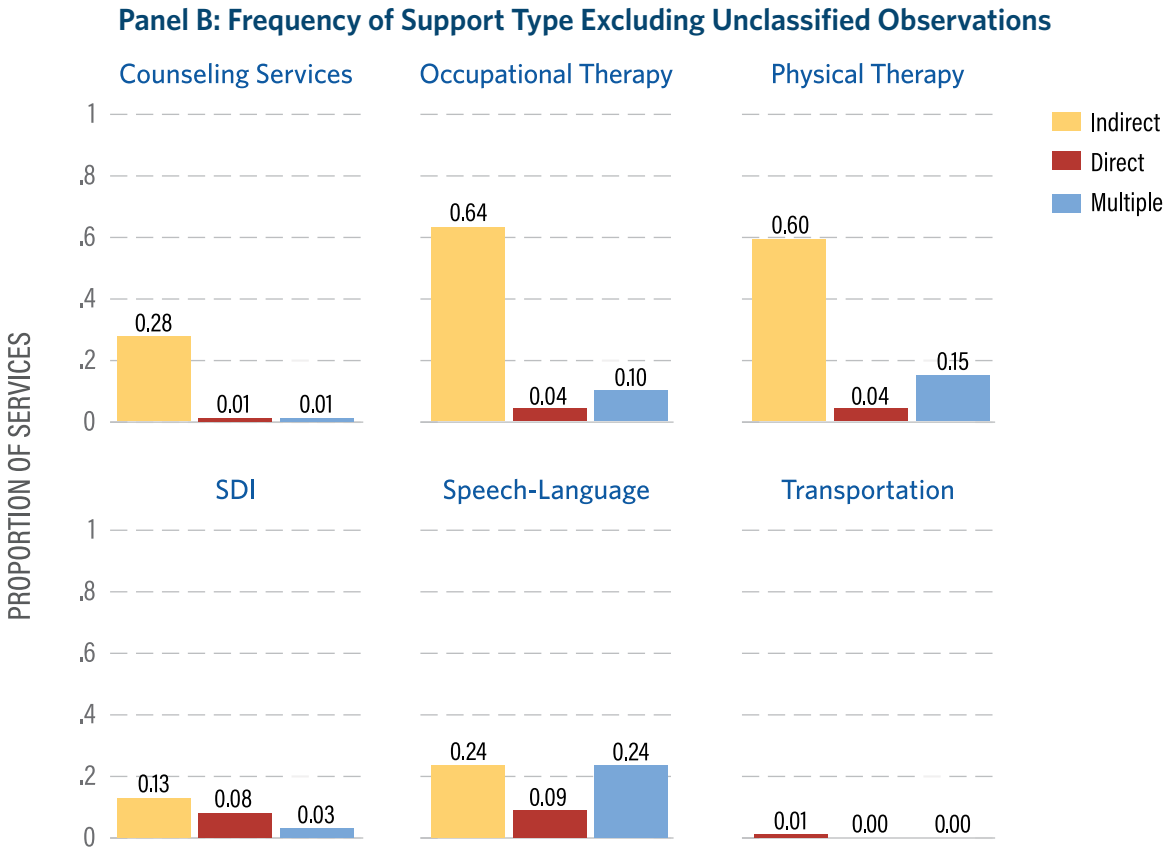
SUPPORT TYPE

Focusing first on the frequency of support type (e.g., direct, indirect), we find that indirect services are most included in the service descriptions of the six most common service categories (e.g., SDI, counseling services, occupational therapy, physical therapy, speech-language pathology, transportation). While Panel A of Figure 4 indicates that most services across categories are unclassified, occupational and physical therapy services are often described as indirect rather than unclassified. Across all six most frequent service categories, indirect support was more commonly provided than direct support. Support types were infrequently mentioned in the service descriptions of Transportation services, with less than 1% of these services flagged as including a keyword related to indirect or direct support.

FIGURE 4. FREQUENCY OF SUPPORT TYPE, BY SERVICE CATEGORY

Panel A: Frequency of Support Type Including Unclassified Observations



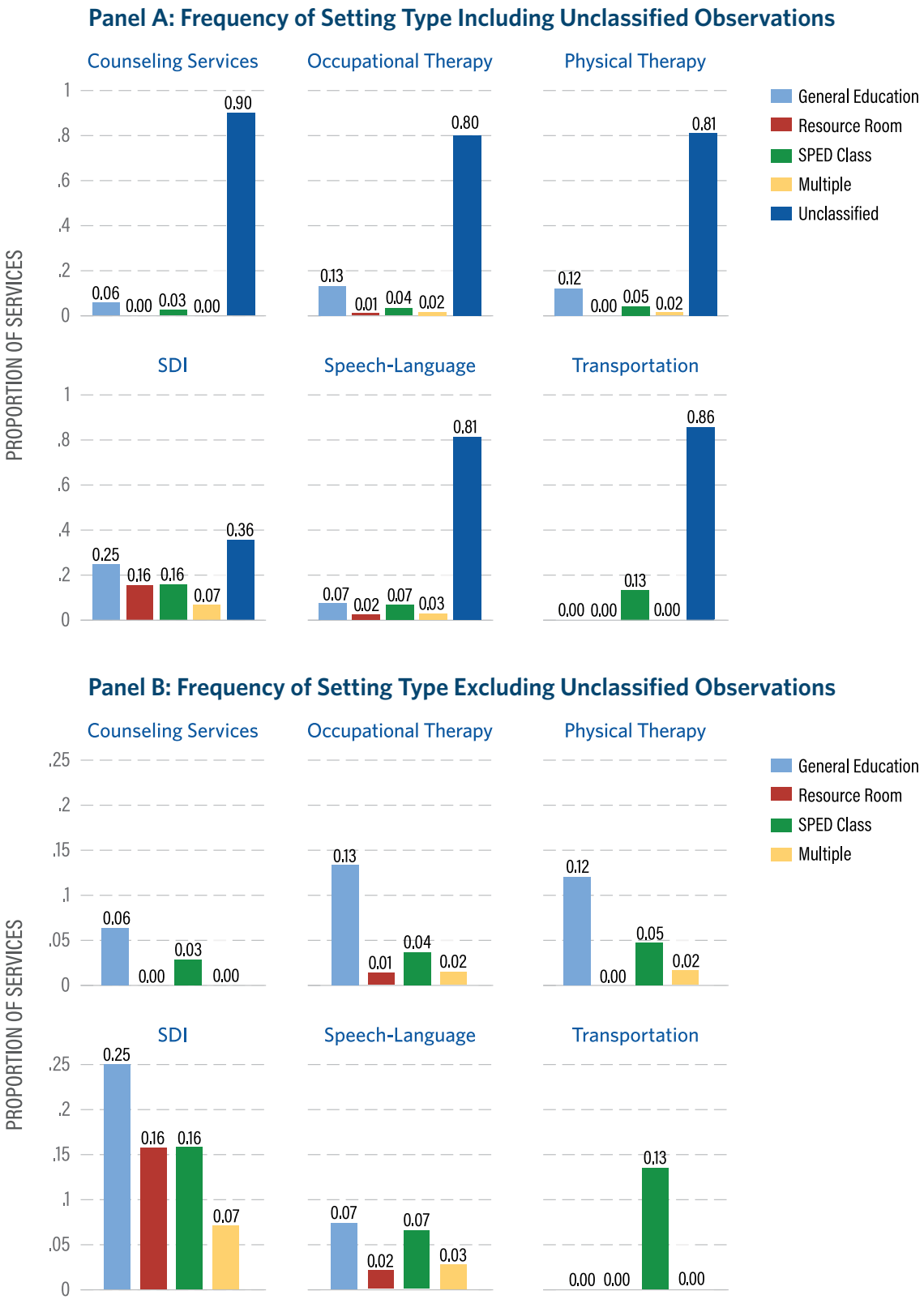


Note. The y-axis for Panels A and B reflects the proportion of services within a category. SDI = Specially Designed Instruction.

SERVICE SETTING

We next examine the service setting. Figure 5 indicates that, while most services do not specify a particular setting type, general education is the most commonly specified setting among those that do. Unlike the support type, SDI services are more likely to include a reference to a setting type than the other service categories. Additionally, the multiple classroom settings were referenced with relative frequency, particularly for SDI services, in which about 10% of observations reference multiple settings. Interestingly, while transportation services were still largely unclassified, those classified were most likely to reference a special education classroom setting. This contrasts with the other frequent service types, for which a general education setting is more commonly referenced than a special education setting.

FIGURE 5. FREQUENCY OF SETTING TYPE, BY SERVICE CATEGORY

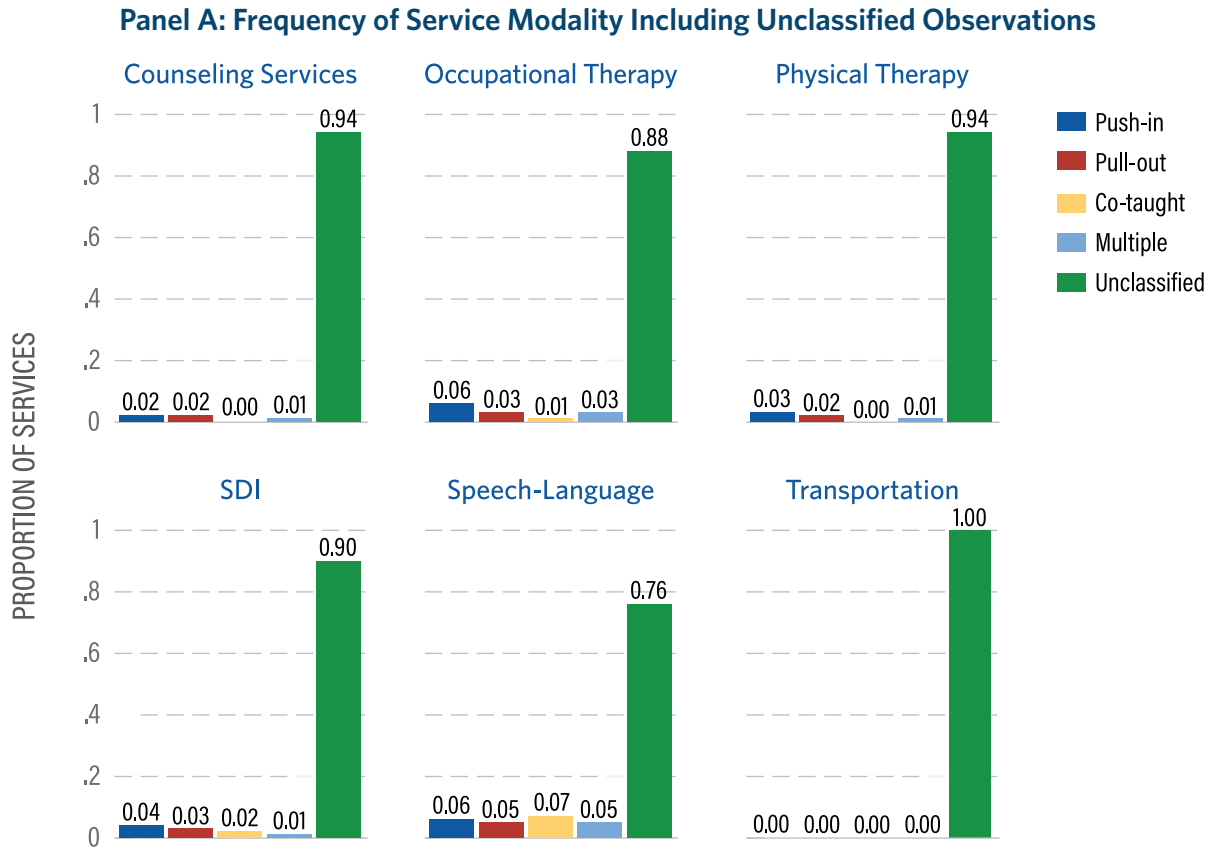


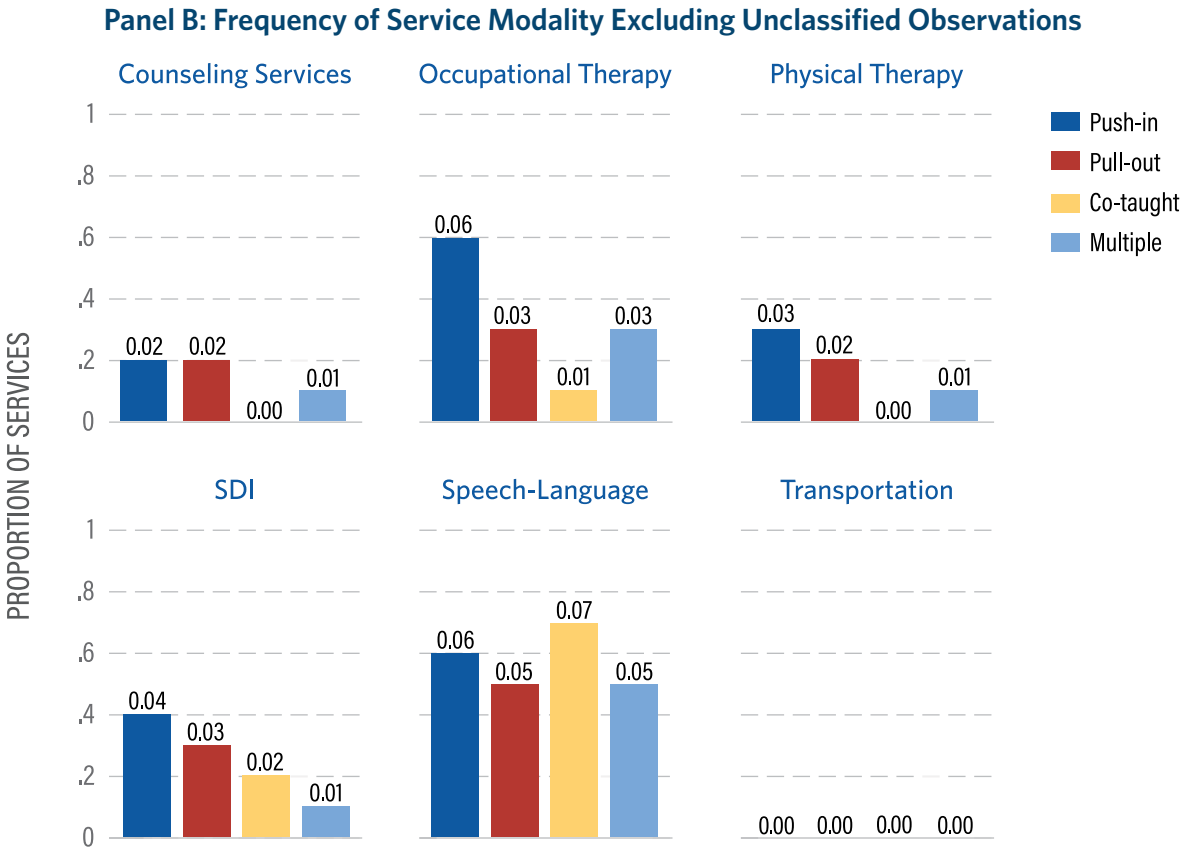
Note. The y-axis for Panels A and B reflects the proportion of services within a category. SDI = Specially Designed Instruction. General Ed. = inclusive general education classroom; Resource Room = resource classroom; SPED Class = self-contained special education classroom.

SERVICE MODALITY

Across the six most common service categories, Panel A of Figure 6 indicates that most services do not specify a service modality (i.e., push-in, pull-out, co-taught) and are coded as unclassified. Panel B of Figure 6 indicates that the services most frequently including a specified service modality are speech-language pathology services, in which over 20% of services reference a specific service modality. Among those, approximately 6% are push-in, 7% are co-taught, 6% are pull-out, and 5% include a reference to multiple service modalities. Occupational therapy services are the next most likely to specify a service modality among the five most common service categories. Among occupational therapy services, about 6% are push-in, compared to just over 2% pull-out or multiple, and under 1% co-taught. In comparison, approximately 10% of SDI services, about 5% of physical therapy services, and less than 1% of counseling services reference a specific service modality.

FIGURE 6. FREQUENCY OF SERVICE MODALITY, BY SERVICE CATEGORY



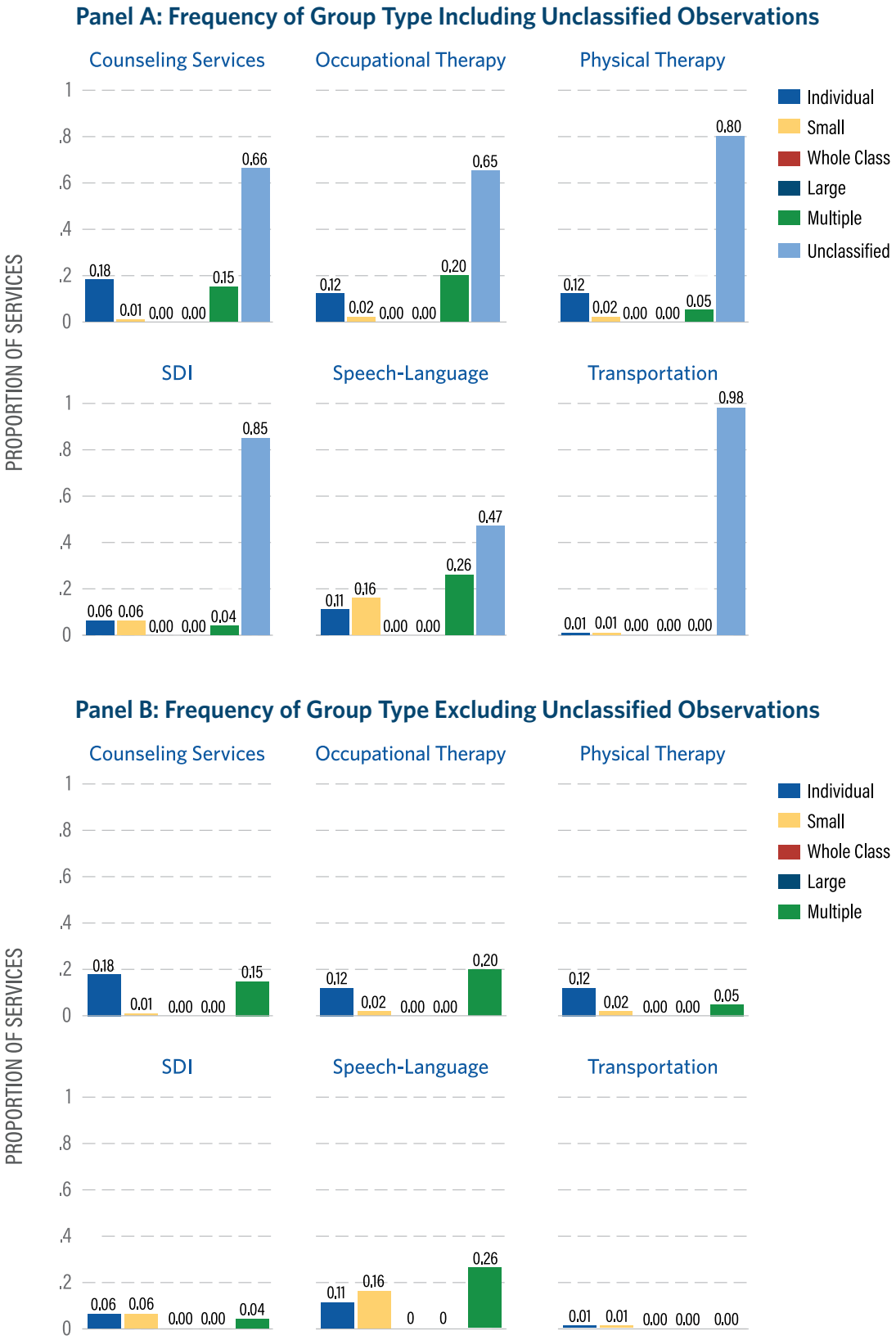


Note. The y-axis for Panels A and B reflects the proportion of services within a category. SDI = Specially Designed Instruction

GROUP TYPE

Like service modality, most services do not include a specified group type. This is particularly true for SDI and transportation services, for which over 80% and over 90% of services, respectively, are unclassified. Excluding unclassified observations, most observations involve multiple group types for occupational therapy and speech-language pathology services. Most classified observations are for individual services in counseling and physical therapy.

FIGURE 7. FREQUENCY OF GROUP TYPE, BY SERVICE CATEGORY

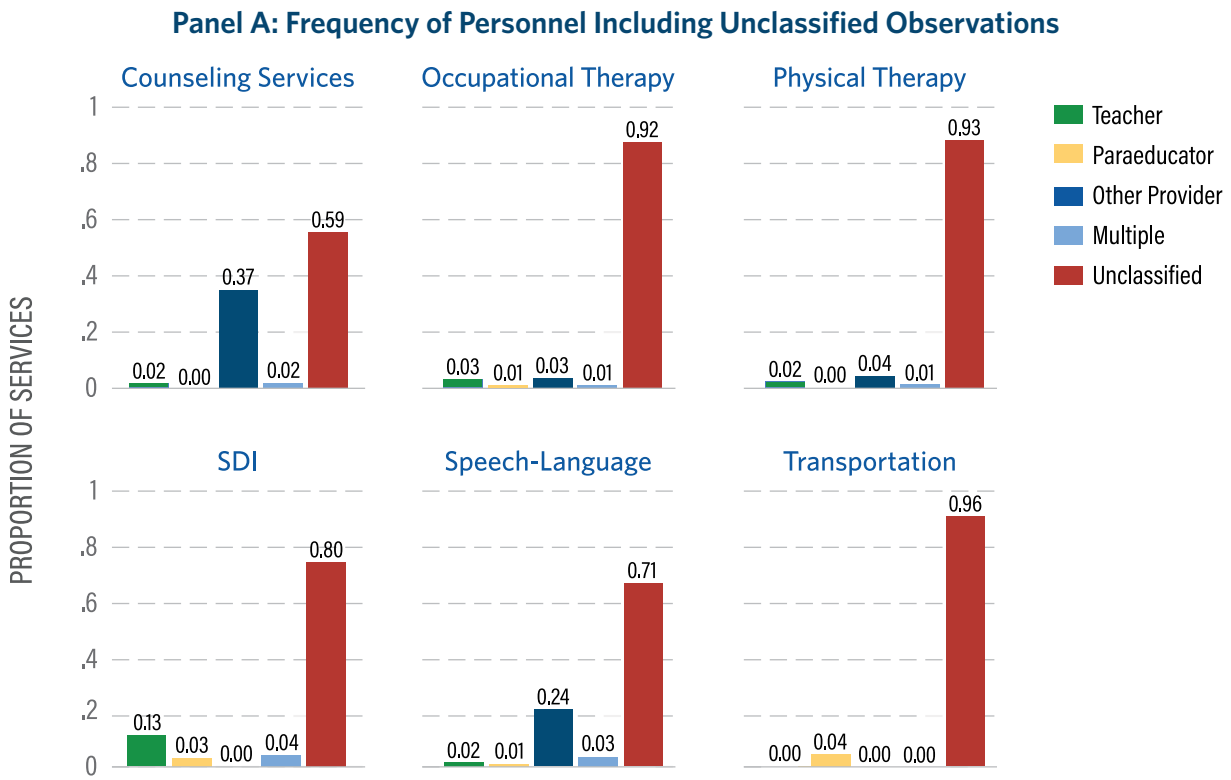


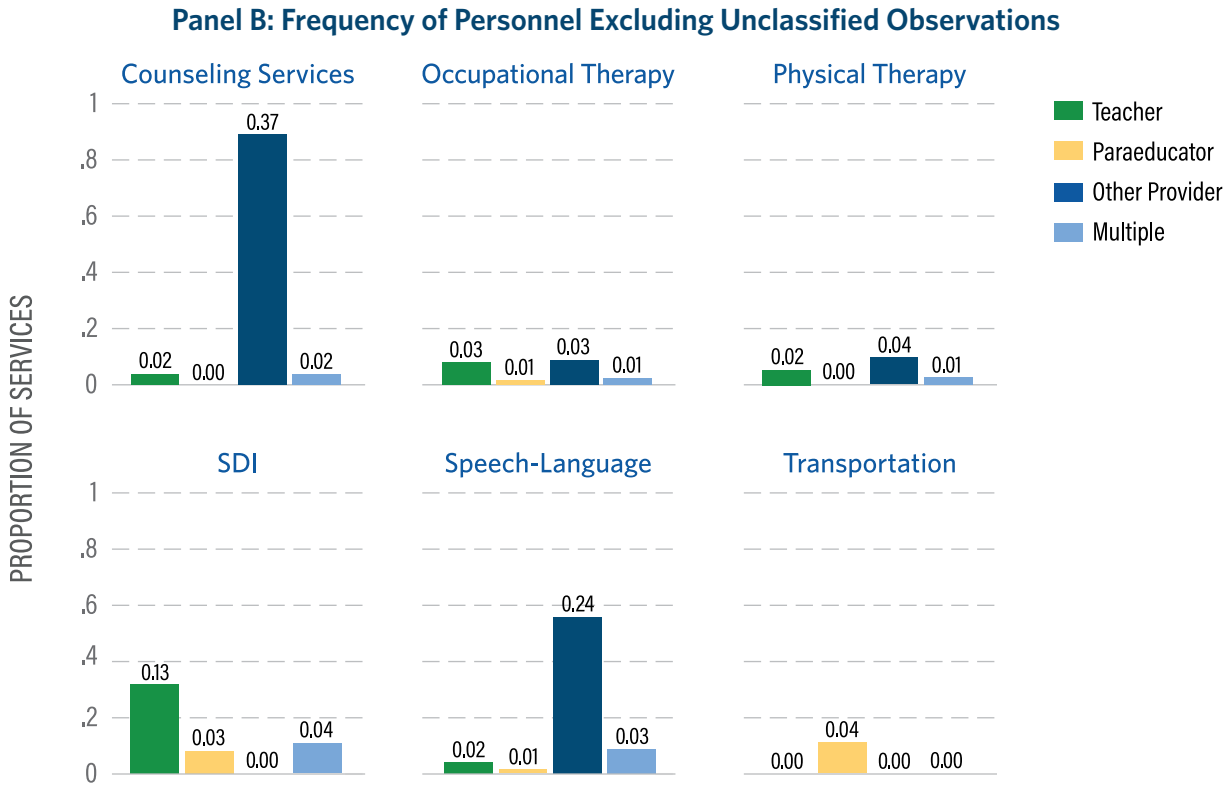
Note. The y-axis for Panels A and B reflects the proportion of services within a category. SDI = Specially Designed Instruction.

PERSONNEL

Finally, we examined the personnel referenced in the services. Among the six most common service categories, occupational therapy, physical therapy, and transportation services do not commonly specify personnel. Personnel are most likely to be specified for counseling services, among which "other providers" (which includes keywords such as "counselor" and "therapist") are most referenced. "Other providers" are the most common personnel category for speech-language pathology services. Keywords related to paraeducators or aides, such as "adult" or "aide," are most commonly used in transportation services. Similar keywords related to teachers, such as "teacher of record" or "special education teacher," are most common among SDI services.

FIGURE 8. FREQUENCY OF PERSONNEL, BY SERVICE CATEGORY





Note. The y-axis for Panels A and B reflects the proportion of services within a category. SDI = Specially Designed Instruction.

DISCUSSION AND CONCLUSION

Summary of Results

This study analyzes text data from the IEP service titles and narratives of all students with disabilities in Indiana during the 2022–2023 school year. This analysis method provides a unique insight into the nature and breadth of IEP services, which, to our knowledge, has not yet been explored at this scale. We provide a statewide landscape analysis of not only the types of services included in IEPs but also other elements such as support type (e.g., direct or indirect), setting type (e.g., general education classroom, resource room), service modality (e.g., push-in, pull-out, co-taught), group size (e.g., individual, large group), and personnel (e.g., teacher, paraeducator), which are not often included in administrative datasets that have been more traditionally used to study service delivery for students with disabilities in qualitative and smaller scale studies. Thus, we offer a unique contribution in terms of both methodology and findings.

Our analysis reflects differences in the likelihood of receiving certain services based on a student's primary disability, and there is significant variation in how services are described across the sample. For example, our analysis indicates that SDI and speech-language pathology services are the most assigned services across all IEPs. The highest number of SDI services are assigned to students with specific learning disabilities and other health impairments. At the same time, speech-language pathology was most frequently assigned to students with specific language impairments or developmental delays. Additionally, some service categories are more frequent for individuals with more low-incidence

disabilities. For example, audiology and interpreting services are most common for deaf/hard-of-hearing students, while school nurse services are most frequently assigned to students with multiple disabilities. Further still, within each service category, there is variability in the frequency of other service descriptors. This finding has implications for the different types and presentations of disabilities that service providers should have detailed training and understanding of, and it informs the kinds of practices and settings with which certain providers should be most fluent and familiar. Our findings also have direct funding allocation implications, as these results provide additional understanding of the kinds of education specialists that districts may need to prioritize hiring given the number of students qualifying in specific categories.

In addition, a key finding from our analysis is that most services do not provide details about the other service descriptors (support, setting, modality, group, and personnel) based on the keywords we use. Among the services that provide details on these descriptors, most services are provided in the general education setting, with push-in modality, in an individual or small group, with a teacher or other providers. The absence of these descriptors may suggest a few different things. First, it may suggest that our coding taxonomy based on the literature may not match the writing of IEPs in practice. Even when service narratives provide information about these descriptors, they often incorporate multiple codes within the service line, which may result in overlapping code (i.e., "multiple"). To address this possibility, future research may benefit from differential methods of text analysis that describe the nature of the IEPs as written rather than identifying particular key words. Second, it may imply that writers of IEPs are not including some details related to elements of service delivery—such as modality, setting, and personnel—in their service descriptions. It would be beneficial for future research to explore the potential benefits, challenges, and implications of this practice. Further still, there may be alternative reasons why we find a predominance of "unclassified" service descriptors. Future research should explore this in depth and should seek to determine whether the use of IEPs as a measure of service delivery is a valid proxy. Given the data that we examine in this study and the breadth of the taxonomy we have developed, we suggest that in terms of key practice and policy implications, these findings imply that schools seek flexibility in implementing services. This might highlight a desire for general service implementation flexibility to avoid scheduling or legal constraints or may reflect a change in practice given the challenges experienced for service delivery during the COVID-19 pandemic.

Policy Implications

The nature of IEP services is essential for policymakers and practitioners, as IEPs hold critical information about special education for students with disabilities on an individualized level. As this study demonstrates, analyzing such data on an aggregate, statewide level can bring important insights into how special education services are allocated to students with disabilities and how schools seek flexibility while working to organize themselves best to deliver services. This insight directly affects how districts and states build and deploy their educational funding schemes, who they prioritize in the hiring process, and how they can utilize IEP administrative data to make more proactive hiring choices.

Limitations and Future Directions

One limitation of this study is that we only examine one year of data and cannot draw conclusions about longitudinal patterns in service delivery. This has implications for understanding whether IEPs are being written more flexibly

than they might have been before COVID-19. Another limitation is that this study focuses exclusively on coding and analyzing IEP service titles and narratives, which precludes us from concluding the relationship between different components of individual IEPs (e.g., goals and services).

Relatedly, one clear next step for future analysis could be to link data on IEP services with data on IEP goals to determine if there are relationships in how IEP teams delineate these two components of special education and related services. Another step for this work is examining the relationships between grade level and IEP services. Based on findings from Cleveland and Markham (2024) regarding IEP goals, there may be differences across grades in the types and details of services assigned to students of different disability classifications across grades.

Future research on IEP services may more directly explore variations based on both student (e.g., poverty) and school characteristics (e.g., concentration of poverty). Many studies in education research indicate that educational resources—and special education identification itself—can often be variable across these dimensions (e.g., Fish, 2019; Hart & Lindsay, 2020; Shores et al., 2020), and future research could explore how IEP services may be similar or different from these other dimensions.

Additionally, this study did not explore service duration and frequency. However, future research can also examine these elements of services which will be helpful for further understanding the investments in service delivery.

Lastly, the words used across service narratives vary greatly beyond the categories we describe in this paper. We will explore these variations in forthcoming analyses using additional text analysis tools.

Conclusion

Overall, this work uniquely contributes to the education policy literature and builds upon Cleveland and Markham (2024) by highlighting the variation in IEP services provided to students with disabilities. To our knowledge, this study is the first study of the content of IEP services in public schools statewide. We identify the diverse IEP services provided to students with different disabilities. We codify 459,703 IEP services for 158,460 students into 25 categories, six subjects, four support types, five setting types, five service modalities, six group types, and five personnel types. We find patterns in the probability that specific service categories are assigned to students identified with certain disability classifications. We also find substantial variation in how services are described in students' IEPs—for example, whether specific descriptors such as setting or group type are described in service narratives or left unspecified.

While this study does not provide us with all the answers that we may seek about how IEPs are developed and implemented, whether the content of IEP text aligns with practice, and how IEPs can be most effectively leveraged to promote positive student outcomes, it does provide us with a few key insights. Particularly in conversation with other work examining IEP goals at scale (Cleveland & Markham, 2024), this study indicates that there is variation in both which types of services are assigned to students with different disability classifications, as well as variation in how the implementation of IEPs based on what is contained within them. Thus, these results can inform how schools organize themselves to provide IEP services for students and will inform future research about IEP services.

REFERENCES

Barrett, C. A., Stevenson, N. A., & Burns, M. K. (2020). Relationship between disability category, time spent in general education and academic achievement. *Educational Studies, 46*(4), 497–512. https://doi.org/10.1080/03055698.2019.1614433

Bettini, E., Scott, L. A., Meyer, K. M., Mathews, H. M., & Shaheen, T. (2023). Challenges facing the special education teacher workforce: Composition, distribution, and effectiveness. In J. Kauffman, D. Hallahan & P. Pullen (Eds.), Handbook of special education (3rd ed.).

Cleveland, C., & Markham, J. (2024). *Understanding individualized education program (IEP) goals at scale* (EdWorkingPaper: 24–992). Annenberg Institute at Brown University. https://doi.org/10.26300/x8j7-rv06

Dragoo, K. E. (2019). The Individuals with Disabilities Education Act (IDEA) Funding: A Primer. CRS Report R44624, Version 4. Updated. In Congressional Research Service. Congressional Research Service. https://crsreports.congress.gov/product/pdf/R/R44624/6

Gelzheiser, L. M., Meyers, J., & Pruzek, R. M. (1992). Effects of pull-in and pull-out approaches to reading instruction for special education and remedial reading students. *Journal of Educational and Psychological Consultation, 3*(2), 133–149. https://doi.org/10.1207/s1532768xjepc0302_4

Giangreco, M. F. (2001). Guidelines for making decisions about IEP services. Montpelier, VT: Vermont Department of Education. https://scholarworks.uvm.edu/cgi/viewcontent.cgi?article=1007&context=cessfac

Giangreco, M. F., Pennington, R. C., & Walker, V. L. (2023). Conceptualizing and utilizing board certified behavior analysts as related services providers in inclusion-oriented schools. *Remedial and Special Education, 44*(1), 73–85. https://doi.org/10.1177/07419325211063610

Gilmour, A., Aniagyei-Cobbold, E., & Theobald, R. (2024). Special Education Personnel Attrition in Pennsylvania. CALDER Working Paper 305-0724. https://caldercenter.org/sites/default/files/CALDER%20WP%20305-0724.pdf

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2002). Inferring program effects for special populations: Does special education raise achievement for students with disabilities?. *Review of Economics and Statistics, 84*(4), 584-599.

Hart, C. M., & Lindsay, C. A. (2024). Teacher-student race match and identification for discretionary educational services. *American Educational Research Journal, 61*(3), 474-507. https://doi.org/10.3102/00028312241229413

Hehir, T., Grindal, T., Freeman, B., Lamoreau, R., Borquaye, Y., & Burke, S. (2016). A summary of the evidence on inclusive education. Abt Associates. https://files.eric.ed.gov/fulltext/ED596134.pdf

Hott, B. L., Jones, B. A., Randolph, K. M., Kuntz, E., McKenna, J. W., & Brigham, F. J. (2021). Lessons Learned from a Descriptive Review of Rural Individualized Education Programs. *The Journal of Special Education, 55*(3), 163-173. https://doi.org/10.1177/0022466920972670

Hurwitz, S., Perry, B., Cohen, E. D., & Skiba, R. (2020). Special education and individualized academic growth: A longitudinal assessment of outcomes for students with disabilities. *American Educational Research Journal, 57*(2), 576-611. https://doi.org/10.3102/0002831219857054

IEP TA Center. (2022). Areas of Assessment in Educational Evaluations: A Primer for Families and Teachers. Retrieved from https://padlet.com/IEPTA/evaluations-cj84f31pjq7qqaj

Individuals with Disabilities Education Improvement Act, 20 U.S.C. §§ 1400-1482.

Irwin, V., Zhang, J., Wang, X., Hein, S., Wang, K., Roberts, A., York, C., Barmer, A., Bullock Mann, F., Dilig, R., and Parker, S. (2021). Report on the Condition of Education 2021 (NCES 2021-144). U.S. Department of Education. Washington, DC: National Center for Education Statistics. https://nces.ed.gov/pubs2021/2021144.pdf

Johnson, K., & Skuthan, A. (2024). Teachers' perspectives on best occupational therapy service provision in school-based Practice: A qualitative study. *Journal of Occupational Therapy, Schools, & Early Intervention,* 1–19. https://doi.org/10.1080/19411243.2024.2341665

Jones, N., & Winters, M. A. (2024). Are Two Teachers Better Than One?: The Effect of Coteaching on Students with and without Disabilities. *Journal of Human Resources, 59*(4), 1180–1206. https://doi.org/10.3368/jhr.0420-10834R3

Kaler, L., Markham, J., & Jones, N. D. (2024). Service delivery models and outcomes for students with disabilities. *Remedial and Special Education.* https://doi.org/10.1177/07419325241268747

Kleinert, H., Towles-Reeves, E., Quenemoen, R., Thurlow, M., Fluegge, L., Weseman, L., & Kerbel, A. (2015). Where students with the most significant cognitive disabilities are taught: Implications for general curriculum access. *Exceptional Children, 81*(3), 312–328. https://doi.org/10.1177/0014402914563697

Kouo, J. L., Harkins-Brown, A. R., & Phung, V. H. (2024). Reported Policies, Guidance, and Related Resources for the Determination of Special Education and Related Services. *The Journal of Special Education, 58*(2), 100–110. https://doi.org/10.1177/00224669231218451

Kurth, J., & Mastergeorge, A. M. (2010). Individual education plan goals and services for adolescents with autism: Impact of age and educational setting. *The Journal of Special Education, 44*(3), 146-160. https://doi.org/10.1177/0022466908329825

McKenna, J. W., Solis, M., Garwood, J., & Parenti, M. (2024). Characteristics of individualized education programs for students with learning disabilities: A systematic review. *Learning Disability Quarterly, 47*(3), 194-207.

National Association of School Psychologists (2023). *State Shortages Dashboard,* retrieved from https://www.nasponline.org/about-school-psychology/state-shortages-data-dashboard

Nguyen, T. D., Lam, C. B., & Bruno, P. (2022). Is there a national teacher shortage? A systematic examination of reports of teacher shortages in the United States. EdWorkingPaper No. 22-631. Annenberg Institute for School Reform at Brown University. https://doi.org/10.26300/76eq-hj32

O'Hagan, K. G., & Stiefel, L. (2024). Does special education work? A systematic literature review of evidence from administrative data. *Remedial and Special Education.* https://doi.org/10.1177/07419325241244485

Rodgers, W. J., Weiss, M. P., & Ismail, H. A. (2021). Defining specially designed instruction: A systematic literature review. *Learning Disabilities Research & Practice, 36*(2), 96-109. https://doi.org/10.1111/ldrp.12247

Ruble, L. A., McGrew, J., Dalrymple, N., & Jung, L. A. (2010). Examining the quality of IEPs for young children with autism. *Journal of Autism and Developmental Disorders, 40*(12), 1459–1470. https://doi.org/10.1007/s10803-010-1003-1

Schifter, L. A. (2016). Using survival analysis to understand graduation of students with disabilities. *Exceptional Children, 82*(4),479–496. https://doi.org/10.1177/0014402915619418

Schwartz, A. E., Hopkins, B. G., & Stiefel, L. (2021). The effects of special education on the academic performance of students with learning disabilities. *Journal of Policy Analysis and Management, 40*(2), 480-520

Shores, K., Kim, H. E., & Still, M. (2020). Categorical inequality in Black and White: Linking disproportionality across multiple educational outcomes. *American Educational Research Journal, 57*(5), 2089-2131. https://doi.org/10.3102/0002831219900128

Spiel, C. F., Evans, S. W., & Langberg, J. M. (2014). Evaluating the content of Individualized Education Programs and 504 Plans of young adolescents with attention deficit/hyperactivity disorder. *School Psychology Quarterly, 29*(4), 452. https://doi.org/10.1037/spq0000101

Suter, J. C., & Giangreco, M. F. (2009). Numbers that count: Exploring special education and paraprofessional service delivery in inclusion-oriented schools. *The Journal of Special Education, 43*(2), 81-93. https://doi.org/10.1177/0022466907313353

Theobald, R. J., Goldhaber, D. D., Gratz, T. M., & Holden, K. L. (2019). Career and technical education, inclusion, and postsecondary outcomes for students with learning disabilities. *Journal of Learning Disabilities, 52*(2), 109–119. https://doi.org/10.1177/0022219418775121

Theobald, R. J., Kaler, L., Bettini, E., & Jones, N. D. (2025). A descriptive portrait of the paraeducator workforce in Washington State. *Exceptional Children, 91*(2), 166–186. https://doi.org/10.1177/00144029241300518

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. (2023). Table 204.50. Children and students 3 to 21 years old served under Individuals with Disabilities Education Act (IDEA), Part B, by age group and sex, race/ethnicity, and type of disability: School year 2022–23. *Digest of Education Statistics.* https://nces.ed.gov/programs/digest/d23/tables/dt23_204.50.asp

U.S. Department of Education, Office for Civil Rights. (2024). *Profile of students with disabilities in U.S. public schools during the 2020–21 school year.* https://www2.ed.gov/about/offices/list/ocr/docs/crdc-student-disabilities-snapshot.pdf

U.S. Government Accountability Office. 2024. Special Education: Education Needs School- and District Level Data to Fully Assess Resources Available to Students with Disabilities. Report to Congressional Requesters. https://www.gao.gov/products/gao-24-106264

TABLE 1. DESCRIPTIVE STATISTICS

VARIABLE		SERVICES		STUDENTS	
		N	Mean	N	Mean
Primary Disability	Autism	67,427	0.15	15,924	0.10
	Blind/Low Vision	3,151	0.01	866	0.01
	Deaf/HoH	7,508	0.02	2,106	0.01
	Dev Delay	61,085	0.13	15,340	0.10
	FT Emotional	15,794	0.03	4,902	0.03
	Language	42,715	0.09	31,057	0.20
	SLD	114,112	0.25	44,927	0.28
	Mild Intellectual	30,318	0.07	7,458	0.05
	Moderate Intellectual	12,226	0.03	2,488	0.02
	Multiple	9,640	0.02	1,522	0.01
	OHI	75,951	0.17	25,826	0.16
	Orthopedic	5,423	0.01	1,062	0.01
	Other Emotional	12,011	0.03	4,476	0.03
	Severe Intellectual	888	0.00	167	0.00
	TBI	1,454	0.00	339	0.00
Secondary Disability	None	206,810	0.45	97,904	0.62
	Language/Speech	219,150	0.48	49,278	0.31
	OHI	513	0.00	6,411	0.04
Gender/Sex	Male	289,778	0.63	97,409	0.61
Poverty	Free Meals	236,504	0.51	79,500	0.50
Foster	Foster Student	6,312	0.01	1,986	0.01
Not Homeless	Not Homeless	430,747	0.94	148,230	0.94
Race/Ethnicity	American Indian	830	0.00	279	0.00
	Asian	6,810	0.01	1,839	0.01
	Black	67,085	0.15	20,427	0.13
	Hispanic	54,444	0.12	17,505	0.11
	Multiracial	25,502	0.06	8,504	0.05
	Hawaiian/Pacific Islander	347	0.00	111	0.00
	White	285,565	0.62	102,816	0.65
Grade	PK	45,984	0.10	14,416	0.09
	KG	27,392	0.06	10,183	0.06
	1	28,942	0.06	10,825	0.07
	2	31,674	0.07	11,536	0.07
	3	34,962	0.08	12,148	0.08
	4	37,158	0.08	12,246	0.08
	5	39,503	0.09	11,540	0.07
	6	37,537	0.08	11,401	0.07
	7	33,510	0.07	11,486	0.07

VARIABLE		SERVICES		STUDENTS	
		N	Mean	N	Mean
	8	40,020	0.09	11,260	0.07
	9	31,367	0.07	11,551	0.07
	10	27,807	0.06	11,027	0.07
	11	22,687	0.05	9,863	0.06
	12	18,535	0.04	8,332	0.05
	13	2,625	0.01	646	0.00
	TOTAL	**459,703**		**158,460**	

Note. This table provides the demographic characteristics of the students included in the analysis. Disability classification abbreviations are as follows: HoH = Hard of Hearing; Dev Delay = Developmental Delay; FT Emotional = Full-Time Emotional Disability; SLD = Specific Learning Disability; OHI = Other Health Impairment; TBI = Traumatic Brain Injury. Race/ethnicity abbreviations are as follows: Am. Indian = American Indian; Haw/Pac Isl.= Hawaiian/Pacific Islander. Grade abbreviations are as follows: PK = Prekindergarten; K= Kindergarten.

TABLE 2. EXAMPLE OF IEP SERVICE DATA AND CODING ON TEXT-BASED DESCRIPTORS

IDOE TEXT DATA	TEXT-BASED DESCRIPTORS						
Service Narrative	**Service Category**	**Service Subject**	**Support Type**	**Service Setting**	**Service Modality**	**Group Type**	**Personnel**
Special Education Services							
[X] will receive **direct** instructional supports with his **math** problem solving skills via **push in** the **general education setting** and/or **pull out** to a separate setting for **small group/one-on-one** assistance.	Specially Designed Instruction (SDI)	Math	Direct	General education	Both	Multiple	(U)
Speech							
[X] will be provided with **direct speech/language** instruction through **push-in** lessons at the IPS/IUPUI SITE program.	Speech-Language Pathology Services	Non-academic	Direct	(U)	Push-in	(U)	(U)
Special Education Services							
[X] receives services for **academic**, functional, social, and adaptive needs in a **special education setting**. Sessions will be broken down throughout the week to meet the needs of the student.	Specially Designed Instruction (SDI)	Other academic	(U)	Special education	(U)	(U)	(U)

Note. Each service (n = 459,703) was coded for the above descriptors. Service category was based on each service title. In contrast, service subject, support type, service setting, service modality, group type, and personnel were coded based on a series of keywords within each service narrative. [X] represents a redacted student name. (U) represents unclassified.

APPENDIX

APPENDIX TABLE 1. SERVICE CATEGORY AND SOURCE OF CATEGORY

SERVICE CATEGORY	N	IDEA Sec. 300.39 (Special Education)	IDEA Sec. 300.34 (Related Services)	Team-Developed Category
Specially Designed Instruction (SDI)	306794	X		
Speech-Language Pathology	83531		X	
Occupational Therapy	27797		X	
Transportation	25791		X	
Physical Therapy	5808		X	
Counseling Services	5662		X	
School Health/Nurse Services	658		X	
Audiology	399		X	
Orientation and Mobility	322		X	
Interpreting	239		X	
Recreation	150		X	
Rehabilitation Counseling	144		X	
Early Identification/Assessment of Disabilities in Children	50		X	
Parent Counseling and Training	11		X	
Other Services	61		X	
Medical Services	3		X	
Behavioral Services	757			X
Assistive Technology/AAC	578			X
Disability-Specific Services	387			X
Adaptive Elective	250			X
Paraeducator	236			X
Social Skills Services	59			X
Homebound Services	10			X
ESY	3			X
Residential Services	3			X
TOTAL	459,703			
TOTAL CATEGORIES	25	1	15	9

Note. This table provides the number of observations for each service category and the source of the service category. In the "Service Category" column, AAC = Augmented and Alternative Communication. "Other Services" includes a range of services that do not fall into one of the categories above due to a small total n for each category (e.g., "Medical Services" is observed 3 times across the sample, so it is included in "Other Services").

APPENDIX TABLE 2. EXAMPLE TEXT-BASED DESCRIPTORS CODED BY KEYWORDS

TEXT-BASED DESCRIPTORS	Possible Codes	Example Keywords
Service Subject	Reading	Reading, ELA, language arts
	Mathematics	Math, geometry
	Other Academic	Writing, science, social studies, history
	Other Non-Academic	Executive function, speech, behavior, emotional
Support Type	Direct	Receive direct
	Indirect	Consult, collab, indirect, case manage
Service Setting	General Education	General ed setting, regular classroom, inside the classroom
	Resource Room	Resource, study hall, lab
	SPED Class	Special education class, special education setting
Service Modality	Push-in	Push, plug, inside of the class
	Pull-out	Pull, outside of the class
	Co-taught	Co-taught, co-teach, co-supported
Group Type	Individual	1:1, individual, independent
	Small Group	Small group
	Large Group	Large group
	Whole Class	Whole class
Personnel	Teacher	Co-teach, teacher of record, special education teacher, general education teacher
	Paraeducator	Aide, paraeducator
	Other Provider	Psychologist, therapist, social worker

Note. This table shows example keywords for each text-based descriptor code. The research team established all codes and keywords through an iterative process. The keywords were searched on all IEP service narratives (n = 459,703). The example keywords included in this table are not exhaustive, but instead provide a sample of those used in the coding process.

APPENDIX TABLE 3. SERVICE CATEGORIES CODEBOOK AND EXAMPLES

SERVICE CATEGORY	N	Codebook definition	Examples
Specially Designed Instruction (SDI)	306,794	All observations that include words like "academics" "class" "instruction" (even for observations that could be personnel, such as "instructional support")	Academic Interventions
Speech-Language Pathology	83,531	Uses terms such as "speech" or "language" or "communication"	Communication Log
Occupational Therapy	27,797	Uses the terms OT or "sensory"	Indirect OT services
Transportation	25,791	Uses the term "transportation"	Transportation
Physical Therapy	5808	Uses the term "physical therapy"	Physical therapy, PT
Counseling Services	5662	Counseling or therapy are mentioned; "counseling" supersedes "behavior" in terms of counseling vs. behavioral services	Group Therapy
Behavioral Services	757	Involves specific programs/personnel types that are directly tied to behavior support (e.g., "BCBA", "behaviorist", "RBT" or "ABA")	ABA Clinic
School Health/Nurse Services	658	Terms such as: bathroom, emergency, health, plan, hygiene, toileting, feeding	Nursing Services
Assistive Technology/AAC	578	Includes the terms AAC, AT, CAT, augmented/ assistive technology, FM system	AAC Consultation
Audiology	399	Must use the term "audiology" or "audiological" or a specific related service (e.g., "listening check," "I Hear Therapist")	Auditory Verbal Therapist
Disability-Specific Services	387	A specific disability classification is mentioned (e.g., DHH, ASD) but no specific service (e.g., "Autism support" rather than "ABA" or "DHH teacher" rather than "listening check")	Indirect Autism Consultant
Orientation and Mobility	322	Uses term such as "orientation" or "mobility," "Braille," "Access School Environment," "Orthopedic Impairment"	Access School Environment
Adaptive Elective	250	Must use the term "adaptive"	Adapted P.E.
Interpreting	239	Mentions ASL, interpreting, "language facilitator," signing, or related terms	ASL Support
Paraeducator	236	Indicates a paraeducator, aide, or assistant	1-1 paraprofessional
Recreation	150	Uses the term "recreation" (but, could be superseded by "recreational art therapy" which is coded as "counseling services")	Recreational Art
Rehabilitation Counseling	144	Uses terms such as: independent, rehabilitation, employment, transition, work, job, community, career, ADL	Career Transition
Social Skills Services	59	Uses terms such as "social skills" or "SEL"	Social Skills Lunch Group

SERVICE CATEGORY	N	Codebook definition	Examples
Early Identification/ Assessment of Disabilities in Children	50	Uses language like "developmental" or mentions K or PK	Developmental Therapist
Parent Counseling and Training	11	Mentions "parent" or "family"	Family Support Services
Homebound Services	10	Uses the term "homebound"	Homebound
Other Services	61	Miscellaneous observations that do not fit in other categories	Advisory
ESY	3	Mentions ESY	ESY Support
Medical Services	3	Uses the term "medical"	Medical Evaluation/ Monitoring
Residential Services	3	Uses the term "residential"	Residential Services
TOTAL	459,703		

Note. This table provides examples of the codebook used to code services to the seven text-based descriptors. The research team established all codes and keywords through an iterative process. The keywords were searched on all IEP service narratives (n = 459,703). The examples included in this table are not exhaustive, but instead provide a sample of those used in the coding process."

APPENDIX TABLE 4. SERVICES BY DISABILITY TYPE

	Total	SLD	OHI	ASD	DD	SLI	Mild ID	FT ED	Other
Specially Designed Instruction	306794	102780	61897	39175	31035	6826	21909	11806	31366
Speech-Language	83531	7879	5514	12171	14198	32597	4272	668	6232
Occupational	27797	1604	3436	7411	7668	1561	1621	505	3991
Transportation	25791	721	2493	6214	6146	1469	1767	1737	5244
Physical	5808	67	777	482	1470	135	292	15	2570
Counseling	5662	891	1377	921	234	84	263	844	1048
Behavioral	757	30	132	230	57	12	14	159	123
School Health and Nursing	658	31	117	60	56	10	24	6	354
AAC/AT	578	39	73	140	64	10	33	6	213
Audiology	399	12	17	8	10	0	11	2	339
Disability-Specific	387	2	16	300	15	1	4	2	47
Orientation	322	1	13	16	4	0	11	0	277
Adaptive Elective	250	0	11	76	34	2	29	1	97
Interpreting	239	21	4	7	4	5	4	0	194
Paraeducator	236	5	33	81	29	0	20	5	63
Recreation	150	0	5	49	4	0	14	3	75
Rehabilitation	144	9	13	45	10	0	22	11	34
Other Services	70	8	10	15	3	1	2	8	23
Social-Emotional/ Social	59	11	6	14	3	1	4	13	7
Early Identification	50	0	2	4	40	1	0	0	3
Parent Counseling	11	0	0	8	0	0	2	1	0
Homebound	10	1	5	0	1	0	0	2	1
TOTAL	459703	114112	75951	67427	61085	42715	30318	15794	52301

Note. Abbreviations for disability classifications (column labels) are as follows: SLD = Specific Learning Disability, OHI = Other Health Impairment, ASD = Autism Spectrum Disorder, DD = Developmental Delay, SLI = Speech-Language Impairment, Mild ID = Mild Intellectual Disability, FT ED = Full-Time Emotional Disability. "Other" includes observations for students with the following disabilities: Multiple Disabilities, Deaf/Hard of Hearing, Orthopedic Impairment, Blind/Low Vision, or Traumatic Brain Injury. "Total" includes all students with disabilities across all disability classifications. In the "Services" column, AAC = Augmented and Alternative Communication. "Other Services" includes a range of services that do not fall into one of the categories above due to a small total n for each category (e.g., "Medical Services" is observed 3 times across the sample, so it is included in "Other Services").

APPENDIX TABLE 5. CONCEPTUAL GROUPING OF SERVICE CATEGORIES

Special Education Services/SDI/Academics			
Specially Designed Instruction*	306,794		
Adaptive Elective	250	307,034	66.79%
Speech/Language, Deaf, & Vision Services			
Speech-Language Pathology Services*	83,531		
Interpreting Services*	239		
Audiology*	399		
AAC/AT	578	84,747	18.44%
OT/PT/Orientation & Mobility			
Occupational Therapy*	27,797		
Physical Therapy*	5,808		
Orientation and Mobility Services*	322	33,927	7.38%
Transportation			
Transportation	25,791	25,791	5.61%
Counseling/Behavior/SEL			
Counseling, Psychological, Social Work Services*	5,662		
Behavioral Services	757		
Social-Emotional/Social Skills Services	59	6,478	1.41%
Medical/Health			
School Health Services and School Nurse Services*	658		
Medical Services*	3	661	0.14%
Other/Miscellaneous			
Disability-Specific Services	387		
Other*	61		
Paraeducator	236		
Recreation*	150		
Rehabilitation Counseling*	144		
Early Identification and Assessment of Disabilities in Children*	50		
Parent Counseling and Training*	11		
Homebound Services	10		
Residential Services	3		
ESY	3	1055	0.23%
TOTAL	459,703		

Note. An asterisk indicates that the related service category is defined in IDEA 300.39 or Sec. 300.34. Given the overlap in descriptions based on IDEA definitions, two IDEA categories were combined in Counseling Services: Psychological Services and Social Work Services.

APPENDIX TABLE 6. FIGURE 3 REGRESSION RESULTS

	SDI b/se	Counseling b/se	OT b/se	PT b/se	SLP b/se	Transport. b/se	All Other b/se
Autism	-0.149 (0.002)	0.010 (0.001)	0.067 (0.001)	-0.001 (0.001)	-0.012 (0.002)	0.072 (0.001)	0.013 (0.001)
Blind/Low Vision	-0.175 (0.007)	0.000 (0.002)	0.038 (0.004)	0.024 (0.002)	-0.030 (0.006)	0.060 (0.004)	0.083 (0.002)
Deaf/HoH	-0.120 (0.005)	-0.001 (0.001)	-0.006 (0.003)	0.002 (0.001)	-0.004 (0.004)	0.052 (0.003)	0.077 (0.001)
Dev Delay	-0.115 (0.003)	0.006 (0.001)	0.040 (0.002)	0.001 (0.001)	0.024 (0.002)	0.040 (0.002)	0.004 (0.001)
FT Emotional	-0.160 (0.003)	0.045 (0.001)	0.016 (0.002)	0.001 (0.001)	-0.017 (0.003)	0.102 (0.002)	0.012 (0.001)
Speech/ Language	-0.711 (0.003)	-0.001 (0.001)	-0.020 (0.002)	-0.009 (0.001)	0.737 (0.002)	0.002 (0.002)	0.001 (0.001)
Mild Intellectual	-0.073 (0.003)	0.003 (0.001)	0.029 (0.002)	0.006 (0.001)	-0.013 (0.002)	0.045 (0.002)	0.004 (0.001)
Moderate Intellectual	-0.223 (0.004)	-0.001 (0.001)	0.072 (0.002)	0.028 (0.001)	-0.023 (0.003)	0.130 (0.002)	0.017 (0.001)
Multiple	-0.276 (0.004)	-0.003 (0.001)	0.089 (0.003)	0.095 (0.001)	-0.051 (0.004)	0.108 (0.002)	0.038 (0.001)
OHI	-0.060 (0.002)	0.011 (0.001)	0.023 (0.001)	0.008 (0.001)	-0.011 (0.002)	0.024 (0.001)	0.004 (0.000)
Orthopedic Impairment	-0.292 (0.006)	-0.001 (0.002)	0.087 (0.003)	0.144 (0.002)	-0.045 (0.005)	0.082 (0.003)	0.024 (0.001)
Other Emotional	-0.114 (0.004)	0.067 (0.001)	0.010 (0.002)	0.002 (0.001)	-0.015 (0.003)	0.042 (0.002)	0.008 (0.001)
Severe Intellectual	-0.321 (0.014)	-0.001 (0.004)	0.105 (0.008)	0.079 (0.004)	-0.021 (0.011)	0.127 (0.008)	0.032 (0.003)
TBI	-0.165 (0.011)	0.002 (0.003)	0.069 (0.006)	0.050 (0.003)	-0.023 (0.009)	0.058 (0.006)	0.010 (0.003)
Constant	0.813 (0.001)	0.005 (0.000)	0.035 (0.001)	0.007 (0.000)	0.118 (0.001)	0.020 (0.001)	0.002 (0.000)
N	459,703	459,703	459,703	459,703	459,703	459,703	459,703

Note. This table provides the regression coefficients for Figure 3. Disability classification abbreviations are: HoH = Hard of Hearing; Dev Delay = Developmental Delay; FT Emotional = Full-Time Emotional Disability; SLD = Specific Learning Disability; OHI = Other Health Impairment; TBI = Traumatic Brain Injury.

SUGGESTED CITATION

Cleveland, C., Kaler, L., & Markham, J. *Leveraging IEPs to Understand Special Education Services at Scale* (Working Paper 2025–4, Summer 2025). Wheelock Educational Policy Center. Available at wheelockpolicycenter.org.

OUR MISSION

The Wheelock Educational Policy Center (WEPC) conducts and disseminates rigorous, policy-relevant education research in partnership with local, state, and federal policymakers and stakeholders to improve educational opportunities and holistic outcomes for underserved students.

www.wheelockpolicycenter.org
wheelockpolicy@bu.edu

BU

Boston University Wheelock College of Education & Human Development
Wheelock Educational Policy Center

WEPC
WHEELOCK EDUCATIONAL POLICY CENTER