Preschool as a Gateway to Health Care Services for Low-Income Children*

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Abstract

We find that public preschools are a gateway to health care services. Low-income children born before their state's public preschool entry cutoff date—who can start preschool younger than those born after—are more likely to receive speech-language pathology, occupational or physical therapy, mental health, hearing or vision, and dental services, both inside and outside of school. The increased preventive dental care at age three is followed by a reduced likelihood of restorative dental care at older ages, suggesting the increase in services is welfare-improving.

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1 Introduction

A large body of evidence documents lasting benefits of early childhood education on children's long-term outcomes, especially among disadvantaged populations (Campbell et al., 2014; Hahn and Barnett, 2023). As mechanisms, the literature points to early education curricula promoting the development of cognitive and non-cognitive skills, and improvements in parent–child interactions (Heckman and Mosso, 2014; García and Heckman, 2023). However, preschools may also connect children to health care services, shaping children's long-term trajectories through early intervention (Shonkoff and Phillips, 2000; Nelson, Sullivan, and Engelstad, 2024).

This paper uses administrative Medicaid data to study how earlier access to public preschool impacts the receipt of health care, focusing on services that school staff may initiate or recommend. We use a sample of children born in 2008-2009 and 2013-2014, whom we can observe at ages three and four in the data.[1] Leveraging variation from public school entry cutoff dates, we compare the outcomes of children with birth dates just before and after the cutoff in a regression discontinuity design. These children are born days apart, but face an almost one-year gap in the age at which they can enroll in a public preschool: those born before the cutoff can enroll shortly after turning three, while those born after the cutoff must wait until they are nearly four. This additional year of waiting is most often spent in informal or family-based care.[2]

We find that children born just before the school entry cutoff date are 0.7 percentage points (8.5 percent) more likely to receive speech-language pathology services, 0.3 percentage points (9.2 percent) more likely to receive occupational or physical therapy, 0.5 percentage points (11.3 percent) more likely to receive mental health services, 0.7 percentage points (15.6 percent) more likely to receive hearing or vision services, and 1.2 percentage points (1.9 percent) more likely to receive dental care. These additional services are received both inside and outside of schools: services delivered by schools are 1.5 percentage points (22.7 percent) higher among children born before the cutoff, while services delivered elsewhere are 1.2 percentage points (1.9 percent) higher.[3]

While we cannot observe public preschool enrollment directly in the Medicaid data, the increase

[1] We select these two cohorts because we can observe them at ages three and four entirely within the same Medicaid data format. Medicaid transitioned from the Medicaid Analytic eXtract to the Transformed Medicaid Statistical Information System Analytic Files format in 2015, and there are known data quality problems around the transition period (Schpero et al., 2025). See Section 2 for more details.

[2] Public preschool programs like Head Start and universal pre-K use the same cutoff dates as the public elementary schools in their districts (NIEER, 2026). We use American Community Survey (ACS) data to approximate how many children on Medicaid are enrolled in preschool from years 2011–2019 in the 31 states and Washington, DC used in our analysis. We find that about 18 percent of children aged three and 40 percent of children aged four are enrolled in public preschools. Less than eight percent of Medicaid-covered children attend private preschools that do not necessarily adhere to these cutoff dates. The ACS considers public preschool to be a nursery school or preschool that is operated by and/or supported primarily by any level of government. This includes federal programs like Head Start, as well as state-level universal and targeted preschool and pre-Kindergarten (pre-K) programs. See Section 2.3 for more details.

[3] Schools directly bill Medicaid for school-based services, so we can measure them in our Medicaid claims data.

in services delivered by schools strongly suggests enrollment is a key driver.[4] Moreover, we find that related diagnoses of behavioral and developmental health conditions, including speech and language disorders, attention-deficit/hyperactivity disorder (ADHD), and hearing or vision conditions, are more common among children born just before than after the cutoff. This diagnosis gap, which we observe at the preschool ages of three and four, parallels research showing that *elementary* school environments drive similar gaps among children aged five and older.[5] In further support of preschool as a main mechanism, we show that being born before versus after the cutoff does not affect placebo diagnoses unlikely to be detected or triggered by school exposure.[6]

Although our main analysis focuses on services received before children begin elementary school, we also examine how the effects on our main outcomes evolve with age, using alternative samples of children observed at different ages in the Medicaid data. For speech-language pathology, occupational or physical therapy, mental health services, and hearing or vision services, the positive effects of being born before the cutoff emerge at age three or four and persist through at least age eight.[7] These results imply that children born after the cutoff do not appear to "catch up" in their service use as they move through preschool and enter elementary school.

While the results suggest that public preschools serve as a gateway to health care services for low-income children, the welfare implications are nuanced and likely depend on the underlying need and conditions. It is possible that some children would have improved their speech and language skills without intervention as they got older, although it is harder to argue that vision services (i.e., prescription glasses) and dental care reflect "over-use." The composition of dental services provides more direct evidence on this question. We find that children born before the cutoff are more likely to receive preventive and diagnostic care at age three, and *less* likely to receive restorative care, such as cavity fillings, at age four, consistent with a welfare-improving pattern of earlier prevention averting problems that would otherwise require treatment later.[8]

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[4] If anything, we under-count services provided by schools, since some schools do not bill Medicaid for services they deliver (MACPAC, 2024).

[5] See, for example: Elder, 2010; Evans, Morrill, and Parente, 2010; Dhuey and Lipscomb, 2010; Mühlenweg and Puhani, 2010; Black, Devereux, and Salvanes, 2011; Dalsgaard et al., 2012; Morrow et al., 2012; Zoëga, Valdimarsdóttir, and Hernández-Díaz, 2012; Clark and Royer, 2013; Halldner et al., 2014; Krabbe et al., 2014; Pottegård, Hallas, and Zoëga, 2014; Chen et al., 2016; Schwandt and Wuppermann, 2016; Layton et al., 2018; Whitely et al., 2019; Dee and Sievertsen, 2018; Dhuey et al., 2019; Root et al., 2019; Balestra, Eugster, and Liebert, 2020; Furzer, 2020; Furzer, Dhuey, and Laporte, 2022; Nicodemo, Nicoletti, and Vidiella-Martin, 2024; Persson, Qiu, and Rossin-Slater, 2025; Billioti de Gage et al., 2025; Cavallo et al., 2026.

[6] We construct an aggregate placebo diagnosis indicator, which is equal to one if a child is diagnosed with any of the following conditions that are typically detected prenatally or in early infancy: congenital anomalies (e.g., Down syndrome), intellectual disabilities, or sickle cell disease.

[7] The age pattern for dental services reflects a separate confounder: many states require an oral health screening in the 12 months before a child begins kindergarten. Children born before the cutoff start kindergarten shortly after turning five, so their screening typically falls at age four; children born after the cutoff start nearly a year later, so theirs falls at age five. The mandate therefore reinforces the effect at age four and reverses it at age five, for reasons unrelated to preschool. The age-three effect is not subject to the mandate, and we do find a strong effect on dental care receipt at that age.

[8] A full welfare analysis would require tracing children's long-term outcomes and well-being, which our data and

This paper contributes to the literature about the effects of early childhood education programs on children's outcomes. Studies have shown that the federal Head Start program improves short-term outcomes such as test scores (Currie and Thomas, 1995, 1999; Kline and Walters, 2016) and longer-term outcomes like high school graduation, teen parenthood, college enrollment, adult economic well-being, mortality, child maltreatment, and crime (Garces, Thomas, and Currie, 2002; Ludwig and Miller, 2007; Deming, 2009; Gibbs, Ludwig, and Miller, 2013; Carneiro and Ginja, 2014; Walters, 2015; Thompson, 2018; Johnson and Jackson, 2019; Bailey, Sun, and Timpe, 2021; Sandner, Thomsen, and González, 2025), and even the outcomes of the next generation (Barr and Gibbs, 2022). The literature on the effects of universal public preschool programs extends these insights, finding positive effects on educational outcomes, especially among lower-income children (Gormley and Gayer, 2005; Fitzpatrick, 2008; Wong et al., 2008; Weiland and Yoshikawa, 2013; Lipsey, Farran, and Durkin, 2018; Weiland et al., 2020; Gray-Lobe, Pathak, and Walters, 2023; Cascio, 2023), and on parental economic outcomes (Humphries et al., 2024; Jackson, Turner, and Bastian, 2025).[9]

While much of this literature emphasizes the importance of cognitive and non-cognitive skill development in the preschool environment, less is known about how preschools interact with the health care system. The Head Start Impact Study—a randomized evaluation of the Head Start program conducted by the US Department of Health and Human Services in 2002—found that the program led to higher use of health insurance and dental care in the short run, with effects fading out over time (Puma et al., 2010).[10] Additionally, an analysis of New York City's universal preschool program by Hong, Dragan, and Glied (2019) showed that eligibility for the program increased asthma- and vision-related diagnoses, immunizations and screenings for infectious diseases, and the treatment of hearing and vision conditions among children on Medicaid. Whereas prior evidence comes from a single program or a single city, we study over two million Medicaid-enrolled children in 31 states and Washington, DC, spanning universal, targeted, and newly implemented public preschool programs. We also show that services delivered inside and outside of schools increase, and that the effects persist through at least age eight rather than fading out. Further, the change in the composition of dental care suggests that the additional services are beneficial.

Our findings also complement the literature using kindergarten entry cutoffs to document differences in ADHD and other mental health-related diagnoses between young-for-grade and old-for-grade children in the US (Elder, 2010; Evans, Morrill, and Parente, 2010; Layton et al., 2018),

sample do not allow.

[9]Related, a large literature on older small-scale "model" early childhood education programs, including the Perry Preschool Program and the Carolina Abecedarian Project, find lasting positive impacts on a wide range of outcomes (see, e.g., Heckman et al., 2010; Heckman, Pinto, and Savelyev, 2013 as well as reviews in Almond and Currie, 2011 and Almond, Currie, and Duque, 2018).

[10]Studies of the initial implementation of the Head Start program in the 1960s point to the importance of the program's health and nutrition services, including vaccinations, screenings, referrals to medical providers, and healthy meals and snacks (Ludwig and Miller, 2007; Bailey, Sun, and Timpe, 2021).

Canada (Morrow et al., 2012; Furzer, 2020), Denmark (Dalsgaard et al., 2012; Pottegård, Hallas, and Zoëga, 2014), Germany (Schwandt and Wuppermann, 2016), Iceland (Zoëga, Valdimarsdóttir, and Hernández-Díaz, 2012), the Netherlands (Krabbe et al., 2014), Sweden (Halldner et al., 2014; Persson, Qiu, and Rossin-Slater, 2025), Taiwan (Chen et al., 2016), and the United Kingdom (Root et al., 2019; Clark and Royer, 2013). These studies measure diagnosis gaps at elementary school ages (and older), and point to mechanisms related to mis- or over-diagnoses of children who are less mature than their classmates due to being relatively young-for-grade (see also Whitely et al., 2019 for a systematic review of the literature across nine countries). We show that there are significant gaps in access to health care services—which are likely in part driven by gaps in diagnoses—that appear before children begin kindergarten due to earlier exposure to preschool.

2 Data and Sample

We use administrative data from the Medicaid program, the primary source of public insurance coverage for low-income individuals in the United States (Stanford Center for Population Health Sciences, 2023a,b,c). Medicaid and its extension, the Children's Health Insurance Program (CHIP), covered approximately 78 million Americans in 2025 (Centers for Medicare & Medicaid Services, 2025a). The data are collected and curated by the Centers for Medicare & Medicaid Services (CMS), and capture all Medicaid and CHIP beneficiary claims from 2011 to 2019 (i.e., a 100 percent sample).

Two different data formats were used over this period. In 2011–2014, states submitted their data via Medicaid Analytic eXtract (MAX) files, while in 2016–2019, states used Transformed Medicaid Statistical Information System Analytic Files (TAF). Most states shifted formats in 2015 and there are known data quality issues associated with the transition (Schpero et al., 2025). Therefore, we focus on two cohorts of children born in March 2008–February 2009 and March 2013–February 2014, and restrict our observation windows to fall entirely within the MAX (2011–2014) and TAF (2016–2019) periods, respectively.[11] We include children who are ever enrolled in full-scope Medicaid or CHIP at age three.[12]

Our main sample focuses on children residing in the 31 states and Washington, DC that have a uniform legislated kindergarten school entry cutoff date that remained the same throughout our analysis period.[13] Table A1 reports the relevant cutoff dates by state. We exclude five

[11] We use March-February cohorts to center birth dates around the modal school entry cutoff date of September 1.

[12] We drop beneficiaries who receive partial benefits (e.g., undocumented immigrants in some states) to ensure we observe their full set of claims.

[13] Cutoff dates for kindergarten entry for each state were sourced from the National Center for Education Statistics (2018) and the Education Commission of the States (ECS, 2014; Bush, 2011; Workman, 2013). Whenever the sources provided conflicting information or a cutoff date changed, we referred to legislative documents and newspaper articles for clarification, as described in Table A2. To confirm public preschool programs follow school entry cutoff dates, we used NIEER (2026), secondary sources in Table A2, and, specific to Head Start, Head Start Program Performance Standards (2024).

states—California, Hawaii, Michigan, Nebraska, and Tennessee—that changed their cutoff date over our analysis period. We also exclude Connecticut, which has a January 1st cutoff, to avoid potential bias due to manipulation of births in response to claiming the Earned Income Tax Credit (LaLumia, Sallee, and Turner, 2015). We exclude the remaining 13 states because their public preschool cutoff dates were determined by local school districts during our analysis period.

Our baseline sample contains 2,432,094 children: 1,221,238 in the first cohort and 1,210,856 in the second cohort. The estimation sample is smaller because it only includes children born in narrow bandwidths around the school entry cutoff, as described in Section 3. Additionally, we test the robustness of our results to restricting our analysis to the sub-sample of children continuously enrolled in Medicaid throughout the observation period (1,432,989 children; see Appendix A.2 for more details).

We use the demographic enrollment file to construct our cohort-based samples. The file contains information on beneficiaries' birth date, race, ethnicity, sex, and residence ZIP code. It also contains anonymized unique identifiers for each beneficiary based on social security numbers.[14] We use unique identifiers to link the enrollment file to beneficiaries' other services (OT) and inpatient claims over the window spanning their third birthday to the day before they turn five. [15,16] We assign beneficiaries to their state of residence in the year they turn three and we define beneficiaries' race and ethnicity as the most frequently reported non-missing value over 2011–2019. Crucially for our research design, all children in our analysis sample are observed at the exact same ages, which means that any discontinuities at the school entry cutoff cannot be explained by differences in outcome observation windows.

2.1 Outcomes

We focus on health care services that teachers and other staff in formal early childhood settings may initiate or recommend.[17] A useful feature of the data is that we can separately identify claims billed by preschools, implying that a child who receives these services is interacting with the school environment (MACPAC, 2024).[18] We create indicators capturing the receipt of the following ser-

[14]There are state-specific Medicaid identifiers for individuals without a social security number, but these identifiers are not necessarily unique over time. We therefore omit children without a CMS unique identifier, since our analyses require the ability to follow children over time.

[15]The OT files contain claims for services occurring in many settings, including physician offices, emergency departments, and outpatient clinics, along with the associated ICD diagnosis and procedure codes.

[16]The data contain fee-for-service claims and "encounter" records for individuals enrolled in Medicaid managed care plans. We broadly refer to our data as "claims" although the encounter information does not include payment information.

[17]Our focus is on services targeting conditions that impede learning and development, which may be flagged by preschool staff. We exclude health outcomes like respiratory diagnoses (e.g., flu infections and asthma) and accidental injuries (e.g., broken bones), which may be directly caused by preschool attendance.

[18]This includes claims filed by Head Start programs, but whether we categorize the place of service as a school depends on whether the Head Start program is run by a Local Education Agency or some other type of organization, like a non-profit. For instance, in Missouri, "office" is explicitly stated as the place of service for services

vices: speech-language pathology, occupational or physical therapy, mental health services (e.g., behavioral therapy for ADHD), hearing or vision services (e.g., hearing aids, glasses, and contact lenses), and dental services.[19] We further decompose dental services into preventive, diagnostic, and restorative, the three largest sub-categories. Preventive care includes cleanings, fluoride treatments, and sealants that avert disease; diagnostic care includes exams and radiographs used to detect disease; and restorative care includes procedures like fillings and crowns that treat disease after it has developed.

As secondary outcomes, we consider diagnoses of conditions that impede learning, are known to benefit from early intervention, and are likely to be diagnosed as a result of a referral or nudge from an educator in a formal learning environment: speech and language disorders, ADHD, and hearing or vision conditions. For placebo tests, we define an aggregate indicator that includes three outcomes unlikely to be affected by preschool attendance—congenital anomalies (e.g., Down syndrome), intellectual disabilities, and sickle cell disease—because they are typically diagnosed prenatally or in infancy (NICHD, 2024; Moeschler, Shevell, and Committee on Genetics 2014; NHLBI, 2024). Appendix A.2 and Table A3 provide more details on the outcomes and the exact codes used to define them.

2.2 Descriptive statistics

Table 1 presents means of observable characteristics for the children in our sample, split by whether they are born in the 70 days before or after the school entry cutoff date. Our sample is fairly evenly split between the two cohorts and balanced in terms of child sex. About 23 percent of the children are Black, 32 percent are Hispanic/Latino, 34 percent are white, and just over 11 percent belong to another race and ethnicity group or are missing this information. Around 19 percent reside in a rural ZIP code.[20]

Approximately nine percent of children receive speech-language pathology therapy, four percent receive occupational or physical therapy, five percent receive mental health services, four percent receive hearing or vision services, and 63 percent receive dental services. When it comes to diagnoses of behavioral and developmental conditions, we observe that seven percent of children have a speech and language disorder, two percent are diagnosed with ADHD, and ten percent have

delivered by Head Start (Missouri Department of Social Services, MO HealthNet Division, 2018).

[19] We exclude hearing and vision screening exams from "hearing or vision services" because they are often mandated for school entry, so their timing varies mechanically with the cutoff. However, we do include dental exams in the "dental services" category because those are usually bundled together with preventive services (i.e., cleanings), which we want to capture. Since oral health screenings are also mandated for elementary school entry, we discuss the implications of that for our results in Section 4. The American Academy of Pediatrics (AAP) 2011 guidelines recommend behavioral therapy as first-line treatment for children aged 4–5 years with ADHD (Wolraich et al., 2011). In the Medicaid data, behavioral therapy is captured by the more general mental health services category. Adjustment disorders and non-ADHD behavioral disorders (e.g., conduct disorders, emotional disorders) are the most common diagnoses associated with the service, at 24 percent and 20 percent, respectively. ADHD is the third most common diagnosis associated with the service at 14 percent.

[20] We use the urban/rural zip code crosswalk from the USDA (2025).

a hearing or vision condition. The rate of our placebo outcome is 0.8 percent.

Table 1 shows that the observable characteristics of children born before and after the cutoff are very similar. However, the percentages receiving health care services and the rates of behavioral and developmental health diagnoses differ. We explore the differences between children born before and after the school entry cutoff more formally using the regression discontinuity design approach, as described in Section 3.

2.3 Preschool enrollment

Since the Medicaid data do not allow us to directly observe preschool enrollment, we use data from the American Community Survey (ACS) from 2011–2019. We construct a sample of 135,208 three- and four-year-old children who are reported to be insured by Medicaid and who reside in the 31 states and Washington, DC included in our main analysis. We then calculate the share of children enrolled in public and private preschools by year. The ACS defines public preschool as any nursery school or preschool that is operated and funded primarily by a local, county, state, or federal government, which includes universal and targeted public preschool programs and Head Start (U.S. Census Bureau, 2011).

Figure 1 presents the trends in public preschool enrollment among three- and four-year-olds in this sample. Over 2011–2019, we find that about 18 percent of Medicaid-covered three-year-olds and 40 percent of Medicaid-covered four-year-olds attended public preschools.[21] We find that less than eight percent of these children reported attending private preschools. This implies that the most common counterfactual to public preschool is informal or family-based care. Figure 1 also shows that attendance rates are stable over our analysis period.[22] Note that while this analysis allows us to study trends in preschool enrollment over time, we are unable to capture the change in enrollment at the school entry cutoff because the ACS does not contain information on children's exact dates (or even months) of birth. Therefore, we rely on Cascio (2023)—who provides an estimate of the effect of school entry age eligibility on preschool attendance—to conduct a back-of-the-envelope scaling calculation, as described later in Section 5.

[21] We also explore heterogeneity in preschool enrollment among children enrolled in Medicaid across states that have different types of public preschool programs in Appendix Figure A1. Specifically, we split our 32 analysis states into four categories: (i) those with a state-level universal (i.e., not means-tested) public preschool program, (ii) those with a state-level targeted or means-tested public preschool program, (iii) those that either implemented or expanded public preschool programs during the analysis period, and (iv) those with no state-level program from 2011 to 2019. The Figure shows that public preschool enrollment rates for all states are above 20 percent, with universal, targeted, and implementing states being at similar levels. Thus, it appears that there is limited state-level heterogeneity in public preschool enrollment rates among Medicaid-covered children.

[22] In contrast, NIEER (2026) shows public preschool enrollment grows over time because their definition does not include Head Start.

3 Empirical Framework

To estimate the impacts of preschool entry age, we use a regression discontinuity design that compares children with birthdays shortly before and after the school entry cutoff date in their state of residence. We estimate the following regression model using individual-level data, with the running variable measuring the number of days between a child's exact birthday and the school entry cutoff:

$$Y_{its} = \beta_0 + \beta_1 \mathbf{1}[D_i \leq c_s] + f(D_i - c_s) + \mathbf{1}[D_i \leq c_s] \times f(D_i - c_s) + \mathbf{x'}_i \gamma + \delta_t + \rho_s + \epsilon_{its} \tag{1}$$

for each child i born in cohort t (either 2008–2009 or 2013–2014) and residing in state s. Y_{its} is the outcome of interest, such as an indicator for receiving speech-language pathology services at age three or four. $\mathbf{1}[D_i \leq c_s]$ is an indicator for a child's birthday D_i being on or before the cutoff c_s in their state, and $f(D_i - c_s)$ is a function of the running variable, which captures the difference in days between a child's birthday and the cutoff, and which we allow to differ on opposite sides of the cutoff. $\mathbf{x}_i$ is a vector of individual-level controls, which include indicators for whether one's birthday falls on a weekend or holiday, female sex, residing in an urban ZIP code, and race and ethnicity (white, Black, Hispanic, and other or missing). We also include fixed effects for the child's birth cohort, δ_t, and state of residence, ρ_s, to account for aggregate time trends and differences in policy environments and data quality across states, respectively.

Our key coefficient of interest, β_1, captures the effect of being born before the cutoff date—and therefore eligible to start preschool shortly after turning three—on each outcome of interest. We estimate model (1) non-parametrically following Kolesár and Rothe (2018) and Armstrong and Kolesár (2020). We use "honest" confidence intervals as they suggest. We obtain optimal bandwidths ranging from 17.88 to 51.75 days around the cutoff in our primary specification (shown in Table 2).

Identification and interpretation. The regression discontinuity design relies on the assumption that only the treatment variable changes discontinuously at the cutoff, and all other variables related to the outcomes are continuous functions of the running variable (Imbens and Lemieux, 2008; Lee and Lemieux, 2010). In our setting, treatment is measured by whether a child's birthday is before the school entry cutoff date, or that the child is eligible to start preschool at a younger age.

Since the school entry cutoff date is known, parents may strategically time births in a way that leads to non-random sorting, violating the identification assumption (Dickert-Conlin and Elder, 2010). To assess this possibility, Appendix Figure A2 plots the distribution of births of Medicaid enrollees in seven-day bins. There does not appear to be any major sorting around the cutoff visually, and the Cattaneo, Jansson, and Ma (2018) regression discontinuity design manipulation test yields an insignificant t-statistic of 0.08. Nevertheless, to address this possibility, we implement a "doughnut regression discontinuity design" in a robustness check by dropping children with birthdays within a week of the cutoff date. Since our analyses use a running variable with a daily frequency, the main concern is strategic manipulation of birth timing among families who conceive around the same time. This can happen through, for example, planned cesarean sections or inductions, and can alter the timing of birth by no more than a few days to a couple of weeks. Therefore, by dropping children born one week before to one week after the cutoff, we remove any such manipulations. As we discuss in Section 4.6, our results are very similar when using this alternative specification.

Another concern is that there could be non-random sorting around the cutoff because preschools facilitate enrollment in Medicaid, either by referring families to program offices or even signing them up directly. Importantly, this type of sorting would imply that we should expect to observe more children with birthdays before than after the cutoff in our sample, which we do not. That said, it is still possible that the composition of children differs between the two groups. We address this concern in two ways. First, we check whether there are any discontinuities in children's observable characteristics in the Medicaid data. Appendix Figure A3 shows that there are no significant jumps in the shares of female, Black, Hispanic/Latino, or white children at the cutoff. The share of children residing in an urban ZIP code shows no discontinuity, either. As noted in Section 2, Table 1 provides further support for the comparability of children born before and after the cutoff by showing that the means of observable characteristics are similar across the two groups. Moreover, we find that our results are not sensitive to the inclusion or exclusion of individual-level controls. We also show that our results are robust to using a sub-sample of children who are continuously enrolled in Medicaid throughout the observation window. Overall, our sensitivity analyses support the identifying assumption and suggest that non-random sorting is unlikely to influence our key findings—see Section 4.6 for more details.

4 Results

We begin by presenting the results for health care services received by children at ages three and four. Figure 2 contains raw data plots using seven-day bins in the running variable of the percentage of children who receive (a) speech-language pathology services, (b) occupational or physical therapy, (c) mental health services, (d) hearing or vision services, and (e) dental services.[23] The graphs show clear discontinuities in each outcome at the cutoff date: children born before the cutoff are more likely to receive each type of service than children born after. We report the corresponding regression estimates for these outcomes in Panel A of Table 2, and print the estimate of β_1 from equation (1) on each graph for reference.[24]

[23]We cannot show day-level bins due to minimum cell size disclosure requirements.

[24]Our regression models use the optimal bandwidth for each outcome (reported in the last column of Table 2), while our graphs use a consistent 70-day bandwidth for visual ease.

Our results indicate that children born before the cutoff are 0.7 percentage points (8.5 percent) more likely to receive speech-language pathology services, 0.3 percentage points (9.2 percent) more likely to get occupational or physical therapy, 0.5 percentage points (11.3 percent) more likely to receive mental health services, 0.7 percentage points (15.6 percent) more likely to receive hearing or vision services, and 1.2 percentage points (1.9 percent) more likely to obtain dental care at the same ages.

4.1 Health care services delivered at versus outside of schools

Earlier preschool entry could improve access to services in two ways: directly, through services delivered at the school, or indirectly, through referrals to outside health care providers. To distinguish these channels, we construct an aggregate binary indicator for the receipt of any services across the five categories, and then separate the aggregate category into whether the services were or were not provided at school. The results appear in Figure 3 and Table A4. Overall, being born before the school entry cutoff raises the probability of receiving any of our five types of health care services by 1.3 percentage points (2.0 percent). Receipt of school-delivered services rises by 1.5 percentage points (22.7 percent), while receipt of services from non-school-based health care providers rises by 1.2 percentage points (1.9 percent). The much larger relative effect on school-based services suggests that direct provision by preschools is an important pathway behind our results, though the increase in outside services indicates that referrals also play a role.

4.2 Diagnoses

Since some of the health care services that we study are only provided to children with diagnosed conditions or impairments, we also examine how earlier preschool entry affects behavioral and developmental health diagnoses at ages three and four. Figure 4 presents the raw data plots for rates of diagnoses of (a) speech and language disorders, (b) ADHD, and (c) hearing or vision conditions. We report the corresponding regression estimates in Panel B of Table 2 and, as before, print the estimate of β_1 from equation (1) on each graph for reference. We find that children born before the cutoff are 0.5, 0.4, and 2.0 percentage points (6.9, 21.1, and 20.4 percent) more likely to be diagnosed with speech and language disorders, ADHD, and hearing or vision conditions, respectively, at ages three and four.[25] These conditions can impede children's learning at an early age and are likely to be flagged by educators in a preschool environment, suggesting that earlier preschool attendance drives the discontinuities. Our findings echo a large literature documenting similar diagnostic gaps (mostly in ADHD) due to starting elementary school at a younger age.[26]

We also present results for an aggregate outcome consisting of three placebo diagnoses—congenital anomalies (e.g., Down syndrome), intellectual disabilities, and sickle cell disease—in Table A5 and

[25] Our definition of vision conditions contains both profound visual impairments (e.g., blindness, glaucoma, retinal disorders) and common conditions typically corrected with glasses (e.g., myopia, hypermetropia, astigmatism).

[26] See the references in footnote 5.

in Figure A4. These are severe, mostly genetically influenced conditions, typically diagnosed prenatally or in early infancy, for which we do not expect preschool attendance to affect the likelihood of diagnosis. Consistent with this conjecture, we do not find any significant discontinuities at the school entry cutoff for these outcomes.

4.3 Effects by age

While our main focus is on health care services received either in preschool settings or through referrals from preschool staff, we also explore how the effects evolve with child age. To do so, we create several additional samples of children who are observed at different ages in the MAX and TAF data. Specifically, we use a sample of four cohorts of children born in March 2009–February 2011 and March 2014–February 2016 to observe children aged two, March 2008–February 2010 and March 2013–February 2015 to observe children aged three, those born in March 2007–February 2009 and March 2012–February 2014 at age four, and so on. We also exclude children residing in the three states (AR, DC, and IN) that used different cutoffs before 2011.

Figure 5 presents the RD estimates and 95 percent confidence intervals for each of our five main categories of services that are observed at the ages specified on the x-axis. For four out of our five outcomes, we find no significant discontinuities in services delivered at age two, consistent with entry into public preschools being the main channel (since children are eligible to start preschool beginning at age three). We then observe positive effects of being born before the school entry cutoff on services delivered starting at ages three to four and continuing through age eight. These patterns suggest that children who start preschool at an older age (i.e., those born after the cutoff) do not catch up in regard to service receipt as they move through preschool and into elementary school.

There is one important exception to the broad pattern. For dental services, we observe a flipped discontinuity at age five—that is, children born before the cutoff are less likely to receive dental care at age five than those born after the cutoff. This pattern is explained by state-level oral health screening mandates, which require children to have a dental evaluation in the year before beginning kindergarten (Association of State and Territorial Dental Directors, 2008; Gracy et al., 2018). Children born after the cutoff are not eligible to start kindergarten until they are almost six, meaning that their pre-kindergarten-entry dental visit must occur when they are age five. By contrast, children born before the cutoff can start kindergarten right when they turn five, so their mandatory dental visit typically happens at age four. Importantly, these mandates also affect the interpretation of effects on dental services received at age four—that is, children born before the cutoff may be more likely to have dental care not only due to preschool exposure, but also due to this kindergarten entry mandate. That said, we do not find a significant discontinuity in overall dental services at age four, but we do find one at age three, when kindergarten entry mandates should not be confounding.[27] We further unpack dental services into preventive and

[27]Head Start also has oral health screening requirements, which could explain the significant discontinuity in dental

diagnostic versus restorative categories in Section 4.5, when we discuss the welfare implications of our findings.

4.4 Heterogeneity across individual characteristics

A large literature finds that the likelihood of diagnosis and the use of health care services varies with children's race and ethnicity, sex, and residence in an urban versus rural area. For instance, Chauhan et al. (2023) find that Black and Hispanic children have lower rates of vision care access and higher rates of uncorrected vision impairment. Differences between boys and girls are also well documented—for example, girls are more likely to wear glasses than boys (Centers for Disease Control and Prevention, 2017) and are less likely to be diagnosed with ADHD (Layton et al., 2018). Urban-rural disparities exist as well: Bush et al. (2014) find that children with congenital hearing loss in rural Appalachia experience greater delays in diagnosis and are more likely to be lost to follow-up than children in non-rural areas.

Therefore, we ask whether the effects of earlier exposure to public preschool vary with these characteristics in Appendix Figures A5 and A6. Specifically, we present sub-group-specific β_1 coefficients and 95 percent confidence intervals in absolute terms in Appendix Figure A5 and as relative effects scaled by the respective sub-group outcome means in Appendix Figure A6. For speech-language pathology, occupational or physical therapy, hearing or vision services, and dental services, the effects are very similar across children from different racial and ethnic sub-groups, boys and girls, and those living in urban and rural ZIP codes, with overlapping confidence intervals. The only exception is mental health services, where we find that the effect is driven entirely by boys and children residing in urban ZIP codes, likely due to these groups being much more likely to be diagnosed with behavioral conditions like ADHD.

In general, it does not appear that public preschools exacerbate pre-existing disparities in service use; if anything, they facilitate access similarly irrespective of children's race/ethnicity, sex, or urban/rural residence.

4.5 Welfare

While our results show that earlier entry into preschool increases the likelihood of receiving a broad range of health care services among Medicaid-covered children, how increases in these services affect welfare is less clear. For instance, there is considerable debate over whether the gap in ADHD diagnoses between young-for-grade versus old-for-grade children reflects over- or under-diagnosis of the condition (see e.g., Layton et al., 2018; Hinshaw and Scheffler, 2014; Evans, Morrill, and Parente, 2010).

To conceptualize this, we adapt the framework from Persson, Qiu, and Rossin-Slater (2025) in Figure A7. The bell curves represent the distribution of underlying need for a service among children born before versus after the cutoff. We assume the distributions of underlying need are

services at age two.

the same for both groups; this is supported by Table 1, which shows that observable characteristics are similar for children on either side of the school entry cutoff.

In this framework, we assume that there is a level of need above which a child is clinically indicated for a service. However, this level is unobserved in the data. Instead, what we can show is that a higher share of children born before the cutoff receive services than of those born after the cutoff. Visually, we depict this pattern with yellow shading in Figure A7(a)—the yellow shaded area among children born before the cutoff is larger than the yellow shaded area for children born after the cutoff, implying that the threshold level (denoted by the solid vertical line) is shifted to the left in the former compared to the latter group. Put differently, there are more marginal cases of clinical need among children born before than after the cutoff—consistent with preschool teachers making referrals to services at lower levels of severity of a condition.[28]

There are three possible welfare-related interpretations of these patterns, depicted visually in Figure A7(b)–(d). Specifically, these panels show different locations of the dashed vertical line, which reflect different assumptions about the level of need at which the service is beneficial (something that is unobserved empirically). Panel (b) illustrates the case where the dashed line falls between the two thresholds, meaning that children born before the cutoff get care they do not need, while those born after are under-served. Panel (c) shows the case where the dashed line falls above both thresholds, reflecting a scenario in which both groups are over-served, and children born before the cutoff are more over-served than children born after the cutoff. Panel (d) depicts the case where the dashed line falls below both thresholds, meaning that both groups are under-served, and earlier preschool moves children born before the cutoff closer to the optimal amount of care. Our empirical results cannot perfectly distinguish between these theoretical cases.

However, to get some traction on this question, we focus on dental care, the only outcome that has a clear way to measure *both* preventive care and what happens if preventive care is missed. For instance, while some children who are young-for-grade (i.e., born before the school entry cutoff) may have improved their speech and language skills in the absence of speech-language pathology services, it is harder to argue that providing fluoride treatments to preschoolers represents overuse. Moreover, dental care is neither stigmatized nor subject to the maturity comparisons that educators may draw between young-for-grade and old-for-grade students, as in the case of ADHD.[29]

We therefore construct two binary indicators capturing (1) preventive and diagnostic dental care (e.g., cleanings and imaging), and (2) restorative dental care (e.g., cavity fillings). As discussed in Section 4.3, kindergarten entry mandates regarding oral health screenings complicate the interpretation of effects on preventive and diagnostic dental services at ages four and five, but not at

[28]This is similar in spirit to Persson, Qiu, and Rossin-Slater (2025)'s insight that the average diagnosed child born before the cutoff has less severe ADHD than the average diagnosed child born after.

[29]Dental care is also important in its own right. Out of all of the services we study, it is the single largest category, accounting for 64.7 percent of health care services received by children with a birthday within 70 days of the cutoff date (see Table 1). See Section 2 for additional details on how we define preventive, diagnostic, and restorative care.

age three. Restorative care is not directly impacted by the mandates at any age. Therefore, in Figure 6 and Table A7, we present results separately for (a) preventive and diagnostic dental care at age three, (b) restorative care at age three, and (c) restorative care at age four.

We find that children born before the cutoff have a 1.6 percentage point (3.4 percent) higher likelihood of receiving preventive and diagnostic dental services at age three and are no more or less likely to receive restorative dental care at the same age. However, at age four, they are actually 0.8 percentage points (4.2 percent) *less* likely to receive restorative dental services. Together, these results suggest that earlier preventive and diagnostic care among children born before the cutoff reduces the need for downstream restorative care, a welfare-improving pattern.

We can map the increase in preventive and diagnostic services and the decrease in restorative services back to our conceptual framework in Figure A7. It is hard to reconcile the empirical results with panel (c). If the beneficial level is to the right of both thresholds, the marginal preventive and diagnostic dental care should not impact restorative services because the care was unnecessary. Instead, the empirical results could be captured by panels (b) or (d). For panel (b), the beneficial level sits between the two thresholds. However, for restorative care to decrease, it would have to be closer to the threshold for children born before the cutoff. The most clear-cut case is panel (d). If the beneficial level is to the left of both thresholds, marginal preventive and diagnostic care is valuable and results in a lower level of restorative care. In addition, an increase in dental visits mechanically creates more opportunities to detect existing decay, which should push restorative care up. That we observe a decline in restorative care points even more strongly toward panel (d).

4.6 Robustness

We conduct a number of analyses probing the sensitivity of our results and addressing concerns regarding possible non-random sorting around the school entry cutoff. Appendix Figure A8 and Table A8 show that our results are robust to using alternative optimal bandwidth algorithms and different bandwidths.[30] Appendix Table A9 shows results from the "doughnut" regression discontinuity model that omits beneficiaries born in a one-week bandwidth around the cutoff. Appendix Table A10 presents estimates of model (1) without the individual-level controls, while Appendix Table A11 presents the results for the subset of beneficiaries who are continuously enrolled throughout the observation period from their third to fifth birthday. The results are all broadly similar to our main findings.

5 Conclusion

The value of early intervention for children with behavioral and developmental conditions has been recognized for decades (e.g., Shonkoff and Phillips, 2000; Conroy and Brown, 2004; Petrenko,

[30] Specifically, we use the `RDHonest` command's MSE-optimal criterion in our primary specifications and show robustness to using its length-optimal criterion.

2013; Britto et al., 2017; Nelson, Sullivan, and Engelstad, 2024). This paper suggests that public preschool programs in the United States link families to health care services that support children's learning and development. Using administrative data from the Medicaid program and a regression discontinuity design, we show that, at ages three and four, children born shortly before their state's school entry cutoff date are more likely to receive health care services than children born shortly after.

The increase in dental services reflects an increase in preventive and diagnostic care, and a decrease in restorative care, which is most consistent with a model where the services are beneficial. These effects appear nearly universal to all Medicaid enrollees, spanning all races, ethnicities, sexes, and urbanicity sub-groups.

Our estimates represent intent-to-treat (ITT) effects for the entire population of Medicaid-covered children, since we do not observe preschool enrollment directly. However, we can use Cascio (2023)'s finding that age-based eligibility for public preschool raises attendance by 22 percentage points among children with incomes less than or equal to 185 percent of the federal poverty line to do a back-of-the-envelope calculation of the treatment-on-the-treated (TOT) effect.[31] Scaling our estimates by the effect on preschool attendance yields the following TOT magnitudes: 3.27 percentage points for speech-language pathology services, 1.50 percentage points for occupational or physical therapy, 2.41 percentage points for mental health services, 2.95 percentage points for hearing or vision services, and 5.45 percentage points for dental care.

We can benchmark these magnitudes against Hong, Dragan, and Glied (2019), who quantify the impact of universal preschool on hearing and vision services among Medicaid-enrolled children in New York City.[32] Similarly, they do not observe preschool enrollment and rely on external data sources for their first-stage estimate. They scale their intent-to-treat estimate of 0.9 percentage points for hearing and 2.2 percentage points for vision treatment to derive TOT estimates of 2.6 percentage points and 6.5 percentage points, respectively. In contrast, our combined TOT estimate for hearing and vision services is 2.95 percentage points, which is smaller. This is likely because their hearing and vision measure is defined to be broader: it also includes exams, procedures, and therapy.

Our findings are strongly consistent with the possibility that attending public preschool at a younger age leads to earlier access to health care services. Future research linking health and education data can assess this conjecture more directly. Moreover, an analysis of the longer-term

[31] Cascio (2023) uses the 2001 Early Childhood Longitudinal Study Birth Cohort, and shows a first-stage of 0.226 in states where preschool is universal and 0.223 in states where preschool is targeted. As a result, we consider 0.22 a reasonable first-stage across our set of states that include both universal and targeted programs.

[32] Hearing and vision services are the only outcomes that overlap between the two papers. Their measure is broader than ours: we focus on services such as hearing aids, frames, and lenses, whereas they also include exams, procedures, and therapy. For instance, 55 percent of their vision treatments are eye exams, whereas we deliberately exclude exams. They are often mandated for school entry, so their timing varies mechanically with the cutoff (see our discussion of dental services at age five).

outcomes of children who receive health care services at preschool ages would help illuminate the long-term value of public preschool for human capital development and well-being.

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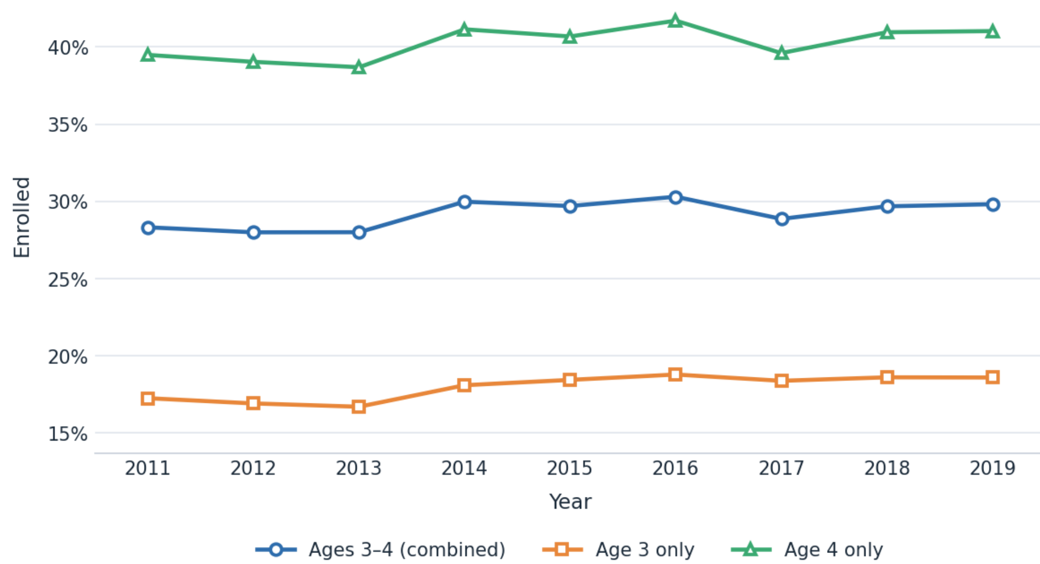
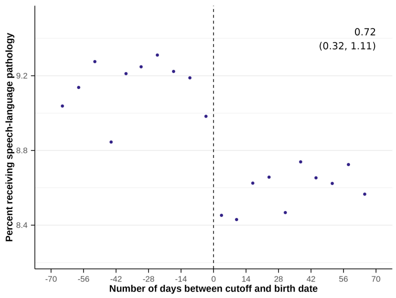
6 Figures

Figure 1: Percent of Children on Medicaid Enrolled in Public Preschool

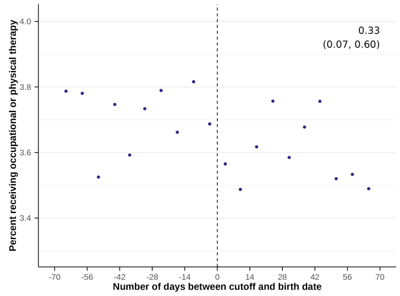


Notes: This figure displays the percentage of children aged three and four on Medicaid who are enrolled in public preschool, from 2011 to 2019. Using the ACS 1-year estimates, we restrict to 135,208 three- and four-year-olds in our 32 analysis states who receive Medicaid. Then, we tabulate the yearly percentage of children attending public nursery school or preschool, defined as facilities controlled and supported primarily by a local, county, state, or federal government (e.g., universal public preschool programs and Head Start).

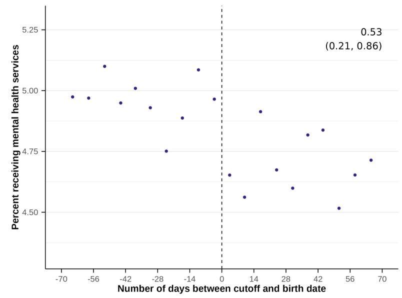
Figure 2: Receipt of Health Care Services at Ages Three and Four by Birth Date



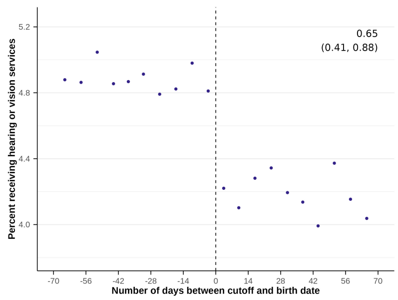
(a) Speech-language pathology



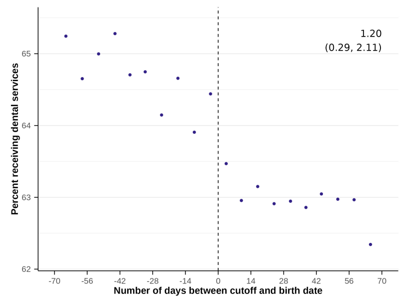
(b) Occupational or physical therapy



(c) Mental health services



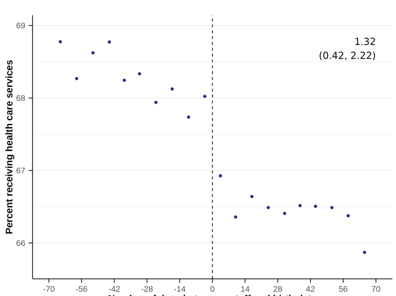
(d) Hearing or vision services



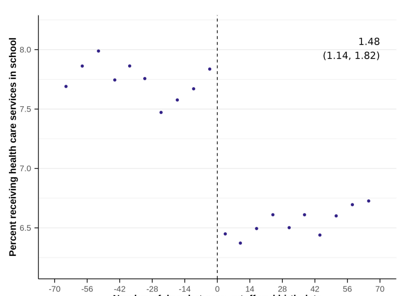
(e) Dental services

Notes: The sample is comprised of two cohorts of children born in March 2008–February 2009 and March 2013–February 2014 who are observed in the Medicaid data at ages three and four. We include children residing in the 31 states and Washington, DC that have a uniform legislated school entry cutoff date that remained the same throughout our analysis period. The plots display the percentages of receipt of services in seven-day bins within a bandwidth of 70 days around the cutoff. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts. Figures include the regression discontinuity estimate and 95 percent confidence intervals from Panel A of Table 2.

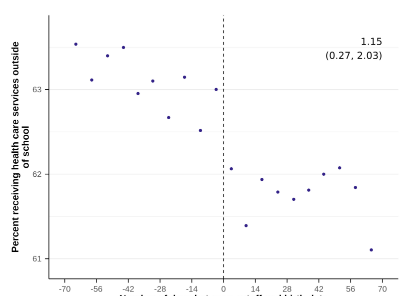
Figure 3: Whether Health Care Services Occur Inside or Outside of School



(a) Any health care service



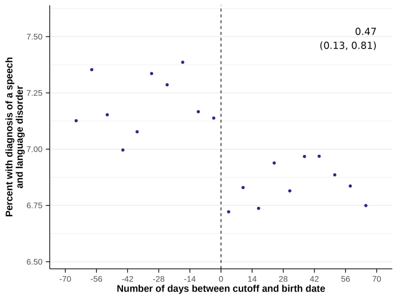
(b) Inside of school



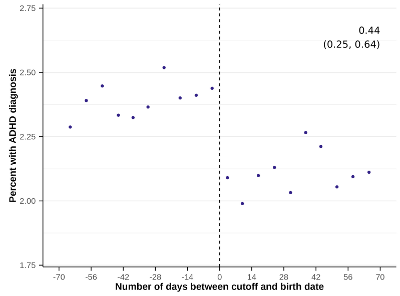
(c) Outside of school

Notes: See notes under Figure 2 for more details on the sample. The plots display the percentages of receipt of services in seven-day bins within a bandwidth of 70 days around the cutoff. Figures include the regression discontinuity estimate of β_1 in equation (1) and bias-aware 95 percent confidence intervals (in parentheses). Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See Table A4 for the corresponding regression estimates.

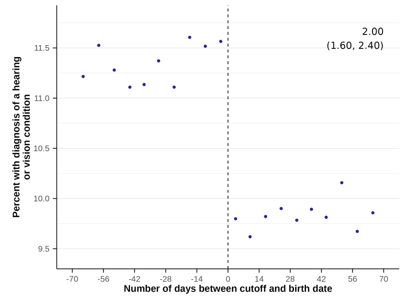
Figure 4: Behavioral and Developmental Health Diagnoses at Ages Three and Four by Birth Date



(a) Speech and language disorders



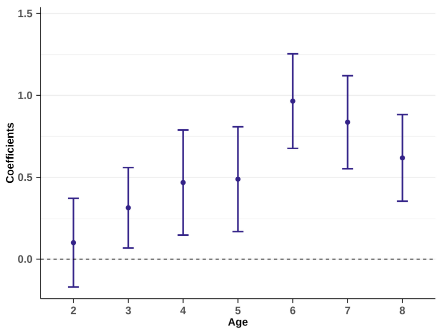
(b) ADHD



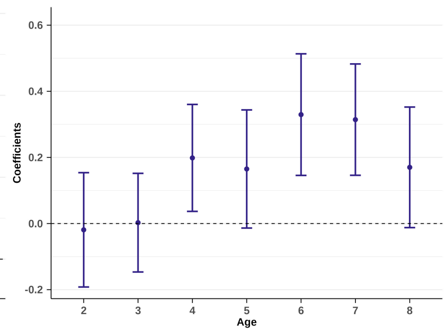
(c) Hearing or vision conditions

Notes: See notes under Figure 2 for more details on the sample. The plots display the percentages of diagnosis in seven-day bins within a bandwidth of 70 days around the cutoff. "ADHD" denotes attention-deficit/hyperactivity disorder. Figures include the regression discontinuity estimate and 95 percent confidence intervals from Panel B of Table 2.

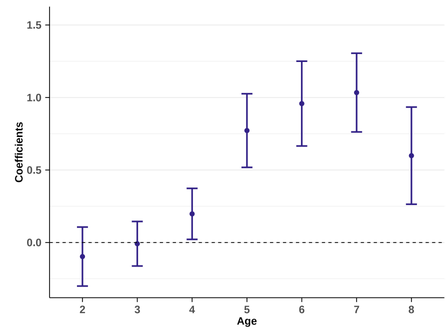
Figure 5: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date at Ages Two to Eight



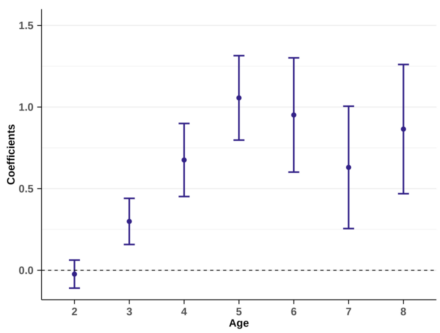
(a) Speech-language pathology



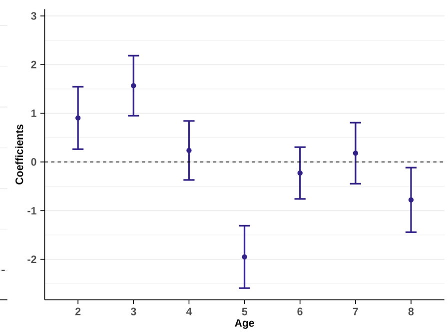
(b) Occupational or physical therapy



(c) Mental health services



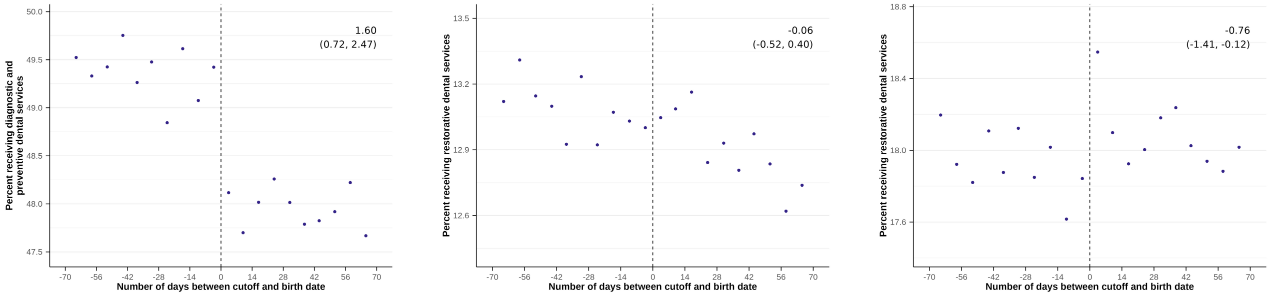
(d) Hearing or vision services



(e) Dental services

Notes: We plot the coefficients and bias-aware 95 percent confidence intervals of the regression discontinuity estimates at various ages, denoted on the x-axis. For age two, we use a sample of four cohorts of children born in March 2009–February 2011 and March 2014–February 2016. We observe children born in March 2008–February 2010 and March 2013–February 2015 at age three, those born in March 2007–February 2009 and March 2012–February 2014 at age four, and so on. AR, DC, and IN used different school entry cutoff dates before 2011 and are excluded from these figures. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Table 2 for more details on the sample and specifications, and Table A6 for the corresponding regression estimates. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts.

Figure 6: Type of Dental Care Received



(a) Preventive and diagnostic (b) Restorative at age three (c) Restorative at age four

Notes: See notes under Figure 2 for more details on the sample. The plots display the percentage of children receiving a dental service that is preventive or diagnostic at age three, restorative at age three, and restorative at age four in seven-day bins within a bandwidth of 70 days around the cutoff. See Appendix A.2 for sub-category definitions. Figures include the regression discontinuity estimate and 95 percent confidence intervals from Table A7.

7 Tables

Table 1: Sample Means of Key Variables

	Children born [-70, 0] days relative to the cutoff	Children born [1, 70] days relative to the cutoff
Observable characteristics		
Birth cohorts: percent born in...		
2008-2009	50.4	50.4
2013-2014	49.6	49.6
Percent female	48.8	48.9
Percent Black	22.8	22.8
Percent Hispanic/Latino	32.0	31.6
Percent white	33.9	33.6
Percent other or missing race/ethnicity	11.4	11.9
Percent residing in rural ZIP code	19.1	19.1
Percent receiving health care services		
Speech-language pathology	9.2	8.6
Occupational or physical therapy	3.7	3.6
Mental health services	5.0	4.7
Hearing or vision services	4.9	4.2
Dental services	64.7	62.9
Percent with a behavioral and developmental health diagnosis		
Speech and language disorders	7.2	6.8
ADHD	2.4	2.1
Hearing or vision conditions	11.3	9.8
Percent with a placebo diagnosis		
Congenital anomalies, intellectual disabilities, or sickle cell disease	0.8	0.8
Number of observations	491,772	479,376

Notes: The table displays sample means of key variables used in our analysis. The sample is comprised of two cohorts of children born in March 2008–February 2009 and March 2013–February 2014 who are observed in the Medicaid data at ages three and four and further limited to children born within 70 days of the cutoff in their state. We include children residing in the 31 states and Washington, DC that have a uniform legislated school entry cutoff date that remained the same throughout our analysis period. Outcome means capture services and diagnoses received at ages three and four. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts. "ADHD" denotes attention-deficit/hyperactivity disorder.

Table 2: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date at Ages Three and Four

	Mean	Estimate	Bandwidth
Panel A: Health care services			
Speech-language pathology	8.52	0.72 (0.32, 1.11)	34.23
Occupational or physical therapy	3.59	0.33 (0.07, 0.60)	33.47
Mental health services	4.71	0.53 (0.21, 0.86)	27.66
Hearing or vision services	4.17	0.65 (0.41, 0.88)	51.75
Dental services	62.88	1.20 (0.29, 2.11)	17.88
Panel B: Behavioral and developmental health diagnoses			
Speech and language disorders	6.81	0.47 (0.13, 0.81)	36.84
ADHD	2.09	0.44 (0.25, 0.64)	38.90
Hearing or vision conditions	9.80	2.00 (1.60, 2.40)	39.37

Notes: This Table reports estimates of β_1 in equation (1) using our sample of two cohorts of children born in March 2008–February 2009 and March 2013–February 2014 who are observed in the Medicaid data at ages three and four. We include children residing in the 31 states and Washington, DC that have a uniform legislated school entry cutoff date that remained the same throughout our analysis period. The regression models are estimated non-parametrically and apply an optimal bandwidth selection algorithm for each outcome. The effective sample sizes range from 201,076 to 581,180 across the outcomes due to different optimal bandwidths. 95 percent confidence intervals (in parentheses) are bias-aware. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. Means are calculated among beneficiaries born after the cutoff. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts. "ADHD" denotes attention-deficit/hyperactivity disorder. See Figure 3 for the impact on "any health care service" by whether the service was provided in or outside of a school.

A Appendix

A.1 School Entry Cutoff Dates

Table A1: School Entry Cutoff Dates

State	Date	State	Date	State	Date
AL	9/1	KS	8/31	OR	9/1
AR	8/1	MD	9/1	RI	9/1
AZ	8/31	ME	10/15	SC	9/1
DC	9/30	MN	9/1	SD	9/1
DE	8/31	MS	9/1	TX	9/1
FL	9/1	MT	9/10	UT	9/1
GA	9/1	NC	8/31	VA	9/30
IA	9/15	ND	7/31	WA	8/31
ID	9/1	NM	8/31	WI	9/1
IL	9/1	NV	9/30	WY	9/15
IN	8/1	OK	9/1		

Notes: The dates are the latest birth date one can have to be eligible for school entry. For example, a cutoff date of 9/1 means children must be 5 years old on or before 9/1 to enter kindergarten that year. We follow legislation and apply these dates to public preschool entry. See Table A2 for sources.

Table A2: Prioritization of Sources for Cutoff Dates After Main References

State	Preschool	Kindergarten
AZ	Arizona Department of Education (n.d.)	
DC	Code of the District of Columbia (2008)	
IN	Indiana Family and Social Services Administration (2015)	
MS	Mississippi Legislature (2013)	
ND	North Dakota Department of Health and Human Services (n.d.)	
UT		Utah Administrative Code (2014)

Notes: Kindergarten cutoff dates were primarily determined from National Center for Education Statistics (2018) followed by the Education Commission of the States (ECS, 2014; Bush, 2011; Workman, 2013). We referred to Utah's administrative code because NCES and ECS provided conflicting information on whether the cutoff date is inclusive or exclusive of September 2. Preschool cutoff dates were primarily sourced from the State of Preschool Yearbooks by NIEER (2026). Whenever there were inconsistencies, or if a state enacted some change (such as implementing a new program or adjusting their cutoff date), we sought clarification from a secondary source.

A.2 Defining variables

We consider beneficiaries to be continuously enrolled if they are continuously eligible and continuously receive full-scope benefits. Our eligibility criteria include CHIP eligibility (`EL_CHIP_FLAG_mm`

= 1, 2, or 3 in MAX and CHIP_CD_mm = 1, 2, 3, or 4 in TAF) and Medicaid eligibility (MAX_ELG_CD_MO_mm between 01 and 72 in MAX and ELGBLTY_GRP_CD_mm between 01 and 72 in TAF, along with a missing CHIP eligibility code). We define full-scope benefits as EL_RSTRCT_BNFT_FLG_mm = 1, 7, 8, or A in MAX and RSTRCTD_BNFTS_CD_mm = 1, 7, A, or D in TAF (Centers for Medicare & Medicaid Services, 2025b).

We measure claims filed by schools using the place of service code 03 (Centers for Medicare & Medicaid Services, 2024) and the billing provider taxonomy code identifying local education agencies, 251300000X (National Uniform Claim Committee, 2026). We define speech-language pathology therapy, occupational or physical therapy, and dental services using procedure codes following Morris et al. (2025) but do not treat them as sub-categories of school-based services. To decompose dental services into preventive, diagnostic, and restorative services, we follow the American Academy of Pediatric Dentistry (2017), and we additionally consider the application of topical fluoride varnish in a medical setting (procedure code 99188) to be a preventive dental service; see Dental Quality Alliance (2024). For speech-language pathology, we exclude the procedure code 96110, which primarily captures well-child visits (Kenney and Pelletier, 2010).[33] We define hearing or vision services as the receipt of hearing aids, frames, lenses, and other specialized items (AAPC, n.d.; Saunders et al., 2021). Our definition of mental health services comes from Visser et al. (2016). We define diagnoses of speech and language disorders, hearing or vision conditions, congenital anomalies, and intellectual disabilities following the Children With Disabilities Algorithm (Chien et al., 2015, 2023), diagnoses of ADHD following Shi et al. (2021), and diagnoses of sickle cell disease following Grosse, Green, and Reeves (2020). Under vision conditions, we additionally include conditions commonly treated with prescription glasses, such as disorders of refraction and accommodation, amblyopia, strabismus, and aphakia (Leat, 2011; Centers for Disease Control and Prevention, 2024). Table A3 lists all codes used to define these outcomes.

[33]In our data, we observe that over 87 percent of claims with the procedure code 96110 have a well-child visit diagnosis code (V20.2, V20.31, V20.32 in ICD-9; Z00.110, Z00.111, Z00.121, Z00.129 in ICD-10), whereas only 0.3 percent of claims with any of the other procedure codes for speech-language pathology have such a diagnosis code.

Table A3: Definition of Outcomes

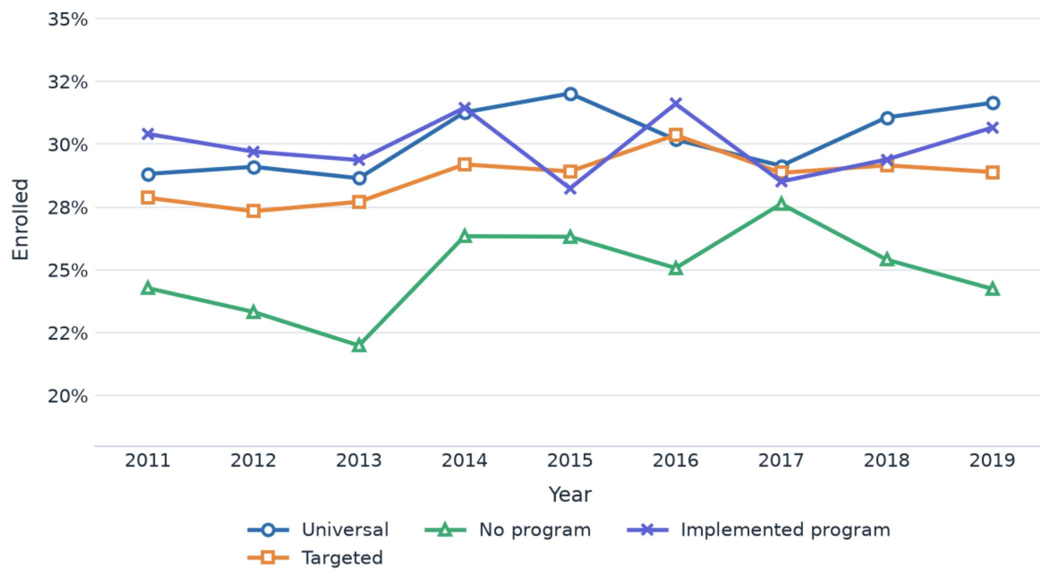
Speech-language pathology	CPT codes 92507, 92508, 92520–92526, 92606–92617, 96105, 96111–96113, 96116, 96121, 96125	
Occupational or physical therapy	CPT codes 90912, 90913, 92548, 92549, 95831, 95851, 96000–96004, 97010, 97012, 97016, 97018, 97022, 97024, 97026, 97028, 97032–97037, 97039, 97110, 97112, 97113, 97116, 97124, 97129, 97130, 97139, 97140, 97150, 97161–97168, 97350, 97530, 97533, 97535, 97537, 97542, 97545, 97546, 97550–97552, 97597, 97598, 97602, 97605, 97610, 97696, 97750, 97755, 97760, 97761, 97763, 97799, and HCPCS codes G0237–G0239, G0515	
Mental health services	CPT codes 90804–90819, 90821–90824, 90826–90829, 90832–90834, 90836–90840, 90845–90847, 90849, 90853, 90857, 99354–99355, 99510; HCPCS codes G0410–G0411, H0035–H0037, H2012–H2013, H2017–H2020, S9480, T1027; state-specific codes 1610 (NY); 5003H, 8226A, 8227A, 8228A, 8245A, 8247A, 8248A, 8245S, 8250A, 8250S (ID); CDABF, CDACM, CDAEP, CDAKQ (AK); G0177 (NE); Y9935 (NJ); and Z1840–Z1841, Z1843 (OH)	
Hearing or vision services	CPT codes 69710, 92590–92595, 92601, 92602, HCPCS codes V2020–V2799, V5011–V5299, ICD-9 code V532, and ICD-10 code Z461	
Dental services	CDT codes D0100–D9999, CPT code 99188, or CPT codes 99202–99205, 99211–99215, 99381–99385, 99391–99395 with modifier DA (diagnostic: D0100–D0999; preventive: D1000–D1999, 99188; restorative: D2000–D7999)	
Diagnosis codes:	ICD-9	ICD-10
Speech and language disorders	31500, 31501, 31502, 3151, 31532, 31534, 31539, 78461	F800, F802, F804, F8082, F8089, F810, F812, H9325, R480
ADHD	314	F90
Hearing or vision conditions	36081, 36221, 36226, 36227, 36271, 36272, 36322, 36355, 36424, 36510, 36511, 36515, 36524, 36541, 36542, 36543, 36573, 36633, 36634, 367, 3680, 3683, 36900, 36901, 36903, 36904, 36906, 36907, 36908, 3691 except for 36910, 36922, 36924, 3693, 3694, 37711, 37713, 37714, 3777, 378, 3793, 37953, 38843, 38904, 3891 except for 38917, 38920, 38922, 3897	H20829, H26219, H26229, H27, H30819, H3121, H35159, H35169, H35179, H36, H4010, H4011, H40159, H40249, H4089, H44829, H47219, H47239, H47299, H47619, H47629, H47639, H47649, H49–H52, H530, H531, H533, H540X, H541, H542X12, H542X2, H543, H548, H5503, H902, H903, H904, H905, H906, H908, H913, H93299

Congenital anomalies	740, 741, 7423, 7424, 74251, 74259, 7428, 74300, 74306, 74312, 7432, 74342, 74345, 74348, 74400, 74402, 74405, 74409, 7467, 75011, 7535, 7542, 75533, 75534, 75651, 7580, 7581, 7582, 7583, 7585, 7594, 75981, 75983	G901, Q00, Q030, Q031, Q038, Q045, Q046, Q048, Q05 except for Q053 and Q059, Q060, Q061, Q062, Q063, Q068, Q0701, Q0702, Q0703, Q078, Q111, Q112, Q131, Q133, Q1389, Q150, Q161, Q165, Q169, Q234, Q383, Q6410, Q6419, Q675, Q7210, Q7240, Q763, Q7642 except for Q76429, Q780, Q871, Q894, Q909, Q913, Q917, Q928, Q933, Q934, Q937, Q9381, Q9388, Q9389, Q992
Intellectual disabilities	317, 318	F70, F71, F72, F73
Sickle cell disease	28241, 28242, 2826	D57 except for D573

Notes: "ICD-9" are International Classification of Diseases, Ninth Revision and "ICD-10" are International Classification of Diseases, Tenth Revision diagnosis codes. "HCPCS" stands for Healthcare Common Procedure Coding System, "CPT" stands for Current Procedural Terminology, and "CDT" stands for Current Dental Terminology, all of which classify procedure codes in the Medicaid data. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts. "ADHD" denotes attention-deficit/hyperactivity disorder.

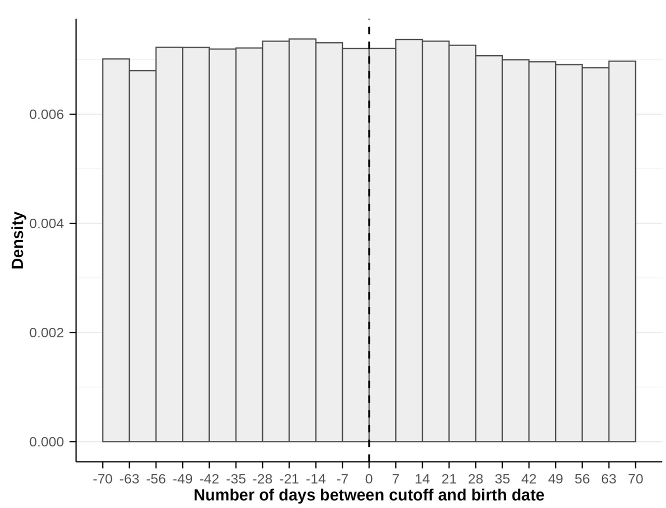
A.3 Additional results

Figure A1: Percent of 3- and 4-Year-Old Children on Medicaid Enrolled in Public Preschool by the Presence and Type of State-Funded Preschool Program



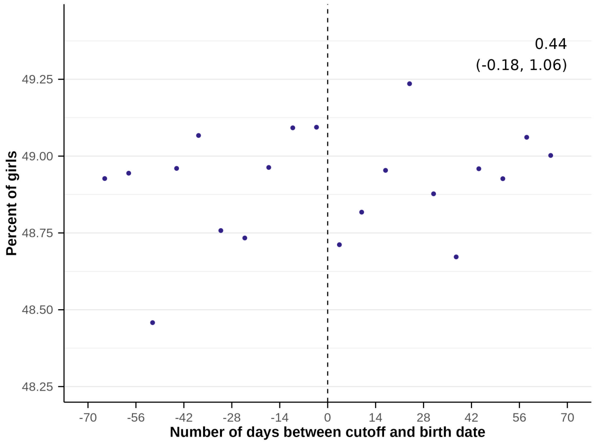
Notes: This figure displays the percentage of children aged three and four on Medicaid who are enrolled in public preschool, from 2011 to 2019, using the ACS 1-year estimates. The 32 states included in our analysis are grouped based on the existence and type of state-funded preschool program. States with a universal program (no eligibility requirements other than age) include AL, DC, FL, GA, IA, NM, OK, RI, and WI. States with a targeted (means-tested) program include AR, AZ, DE, IL, KS, MD, ME, NC, NV, SC, TX, WA, and VA. IN, MN, MS, MT, ND, and OR implemented either a universal or targeted program between 2011 and 2019; ID, SD, UT, and WY had no state-funded program. See notes under Figure 1 for more details on the sample construction.

Figure A2: Distribution of Birth Dates in Seven-Day Bins

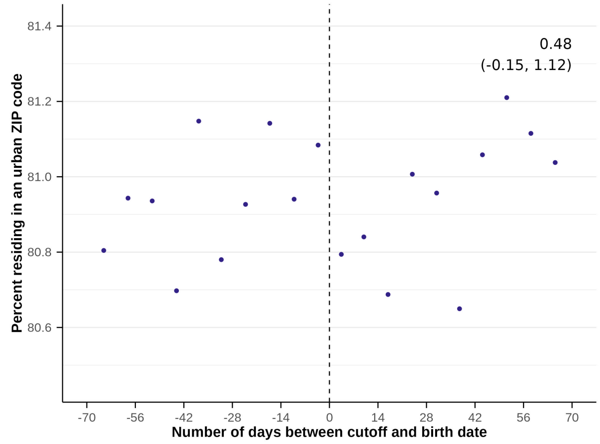


Notes: See notes under Figure 2 for more details on the sample. The histogram shows the sample distribution of birth dates in seven-day bins, within a bandwidth of 70 days around the cutoff.

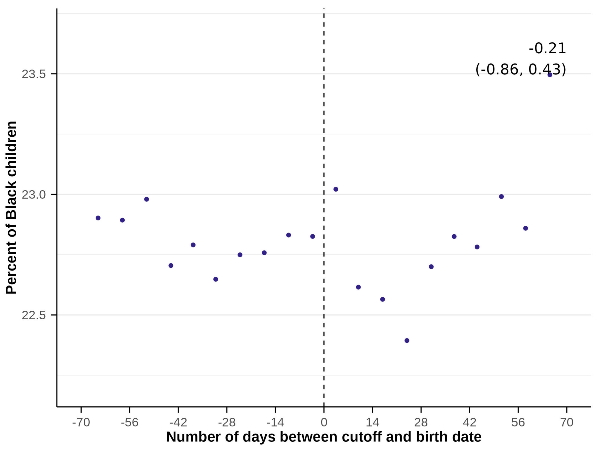
Figure A3: Gender, Urban/Rural, and Race/Ethnicity Composition by Birth Date



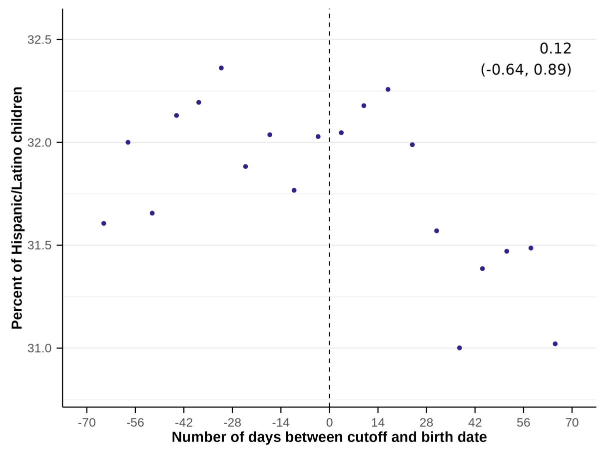
(a) Share of girls



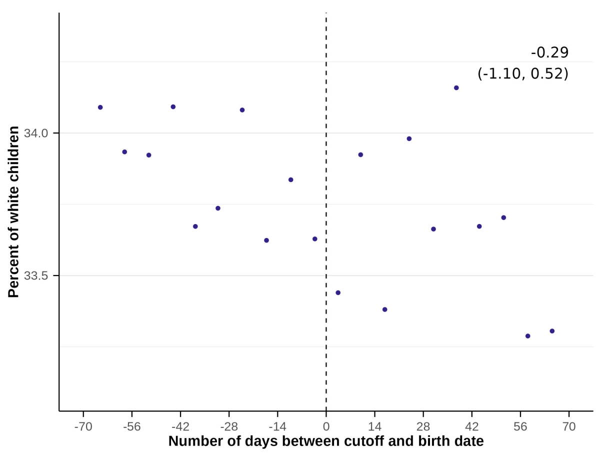
(b) Share residing in urban ZIP code



(c) Share of Black children



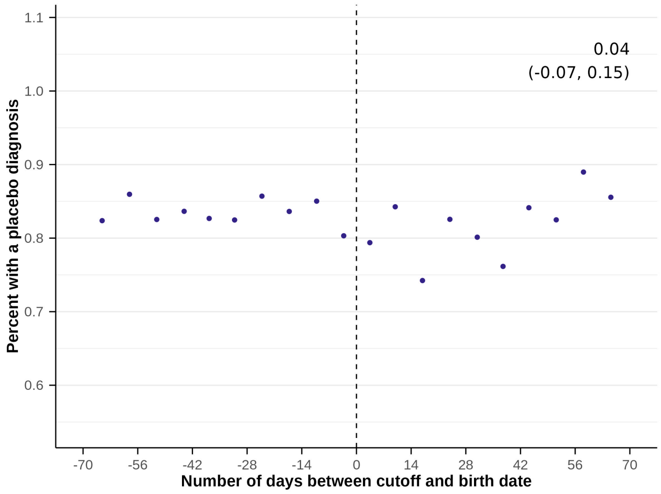
(d) Share of Hispanic/Latino children



(e) Share of white children

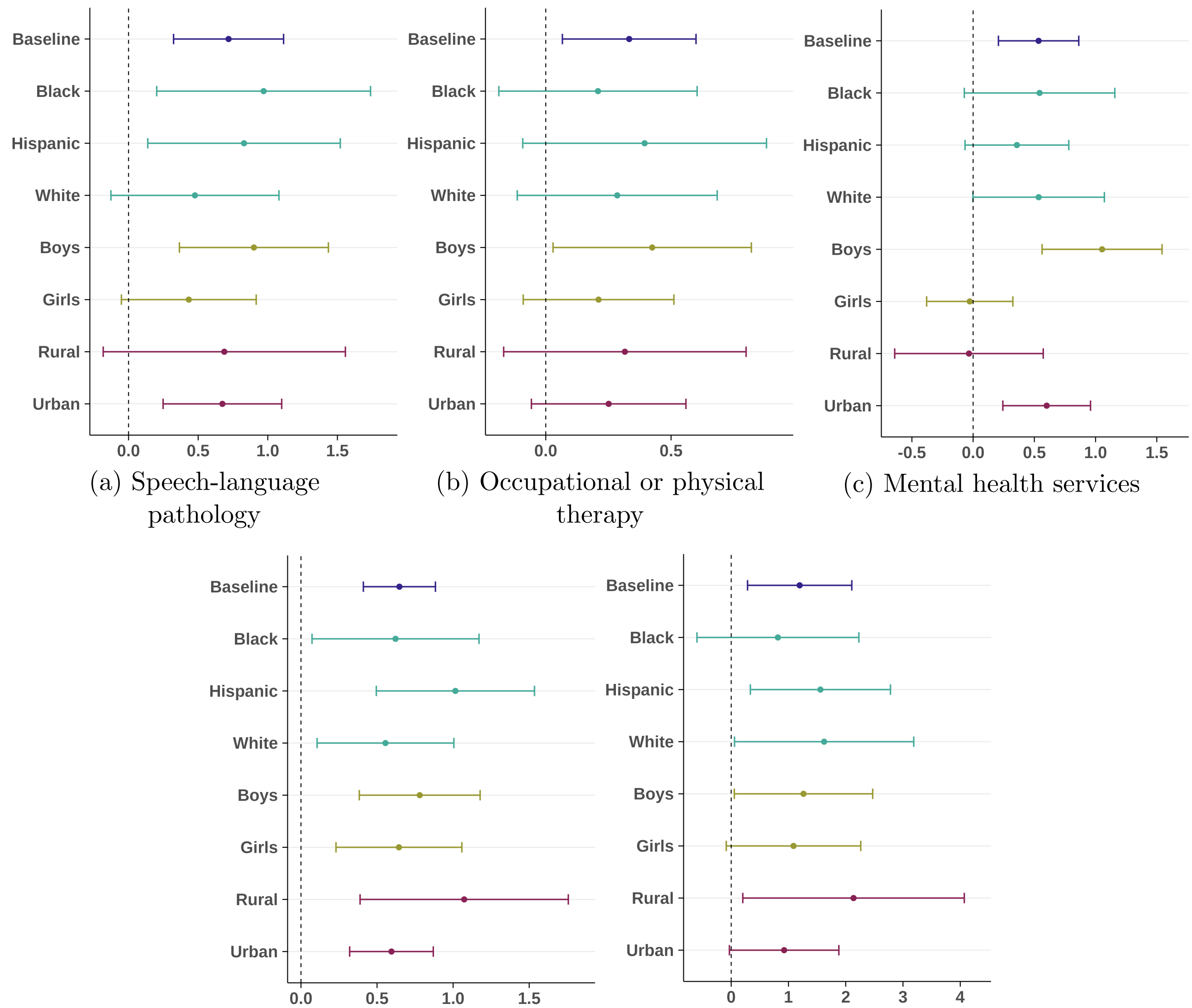
Notes: See notes under Figure 2 for more details on the sample. The plots display the percentages in seven-day bins within a bandwidth of 70 days around the cutoff. Figures include the regression discontinuity estimate and 95 percent confidence intervals, which are bias-aware and use the optimal bandwidth.

Figure A4: Placebo Diagnoses at Ages Three and Four by Birth Date



Notes: See notes under Figure 2 for more details on the sample. The plot displays the percent of children with a placebo diagnosis in seven-day bins within a bandwidth of 70 days around the cutoff. The figure includes the regression discontinuity estimate and 95 percent confidence intervals from column (1) of Table A5.

Figure A5: Heterogeneity in the Effect of Being Born Before the School Entry Cutoff Date by Individual Characteristics



(a) Speech-language pathology

(b) Occupational or physical therapy

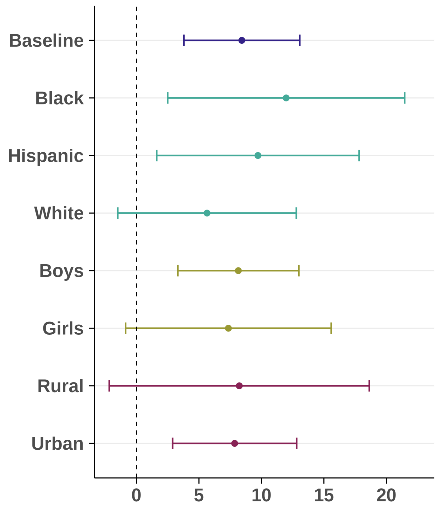
(c) Mental health services

(d) Hearing or vision services

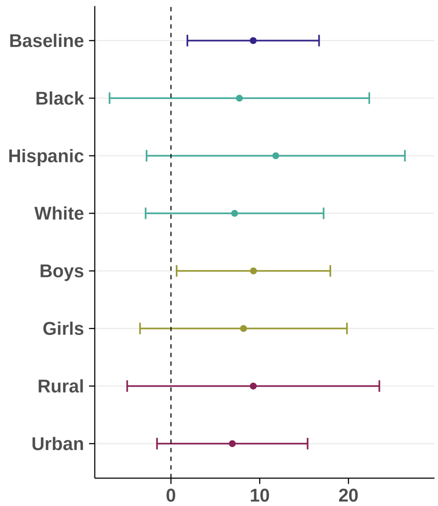
(e) Dental services

Notes: We plot the coefficients and bias-aware 95 percent confidence intervals of the regression discontinuity estimates for children belonging to the sub-group denoted on the y-axis. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and all individual-level demographic controls except for the characteristic being grouped on. See notes under Table 2 for more details on the sample and specifications. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts.

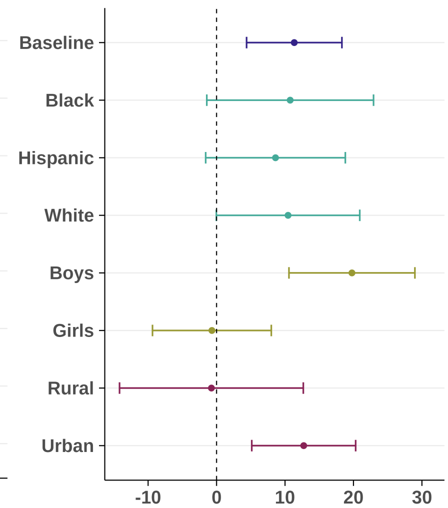
Figure A6: Heterogeneity in the Effect of Being Born Before the School Entry Cutoff Date by Individual Characteristics, Normalized Relative to Sub-Group Mean



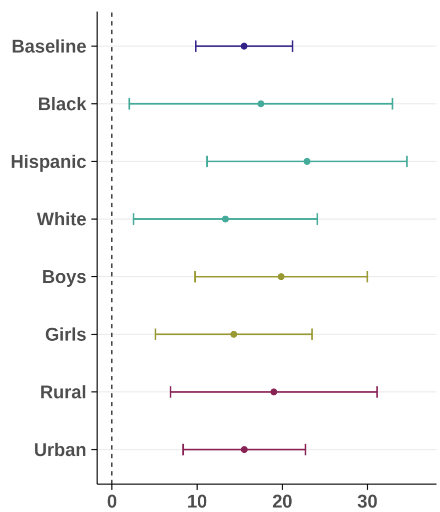
(a) Speech-language pathology



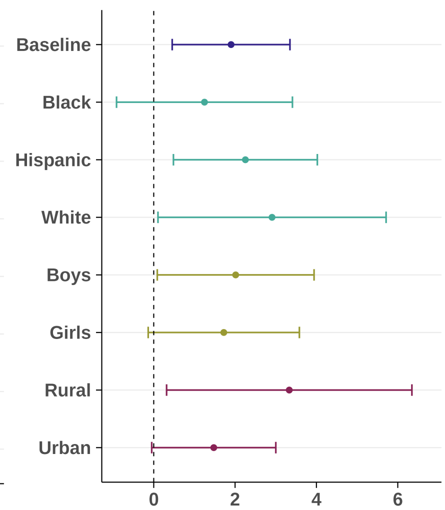
(b) Occupational or physical therapy



(c) Mental health services



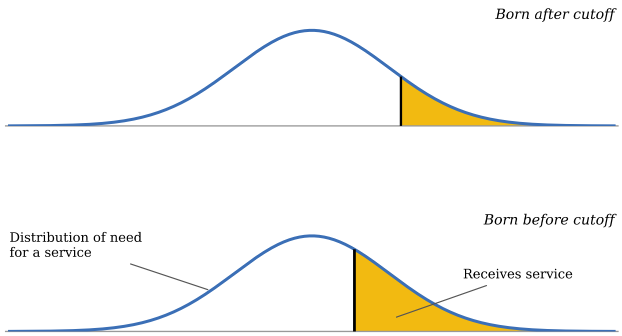
(d) Hearing or vision services



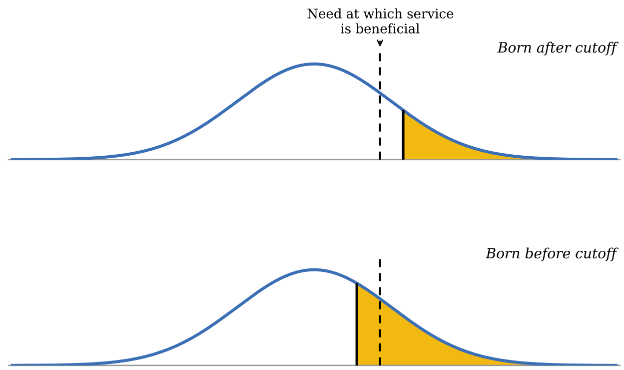
(e) Dental services

Notes: We plot the coefficients and bias-aware 95 percent confidence intervals of the regression discontinuity estimates for children belonging to the sub-group denoted on the y-axis. Coefficient estimates are scaled relative to the baseline outcome mean for each sub-group. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and all individual-level demographic controls except for the characteristic being grouped on. See notes under Table 2 for more details on the sample and specifications. “Hearing or vision services” includes specialized items like hearing aids, glasses, and contacts.

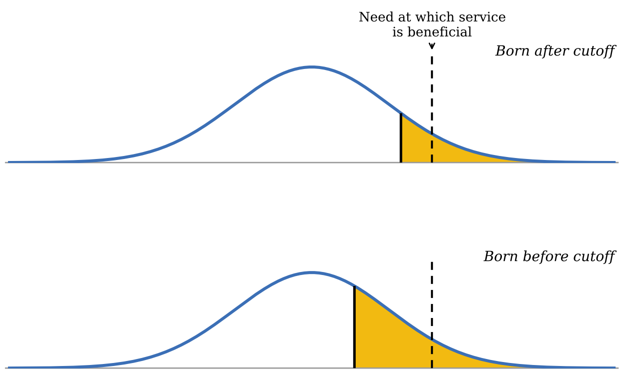
Figure A7: Stylized Framework for Interpreting the Service Gap;
Three Possible Interpretations



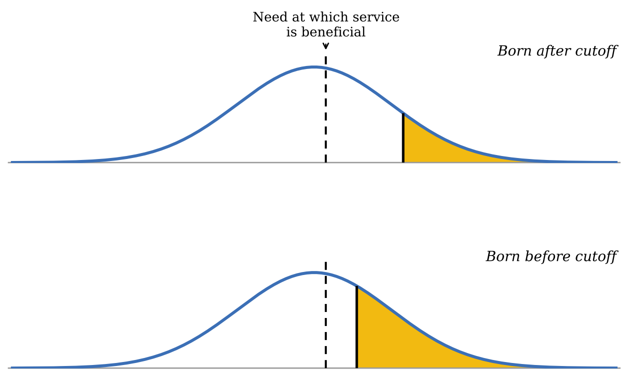
(a) Baseline framework



(b) Over-use before the cutoff, under-use after



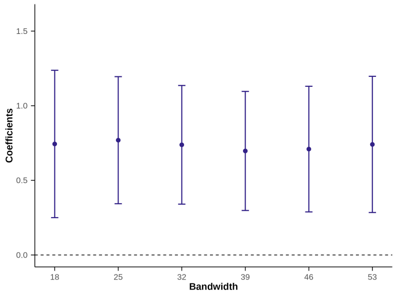
(c) More over-use before than after the cutoff



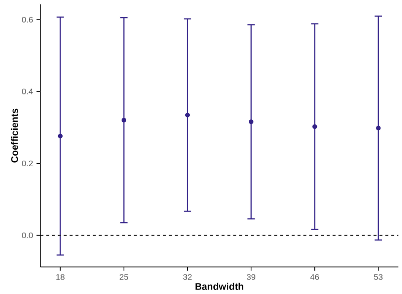
(d) Less under-use before than after the cutoff

Notes: These figures depict a stylized framework for interpreting the gap in service receipt at the school entry cutoff, adapted from Persson, Qiu, and Rossin-Slater (2025). The bell curves represent the distribution of underlying need for a service among children born before and after the cutoff, which we assume to be the same for both groups. The solid vertical line in each panel marks the level of need at which a child receives the service; earlier preschool exposure lowers this threshold for children born before the cutoff. The shaded areas signify the children who receive the service, and the gap we estimate is the difference between the two shaded areas. The dashed vertical line in panels (b),(c), and (d) represents different assumptions about the level of need at which the service is beneficial, which is assumed to be independent of the child's day of birth.

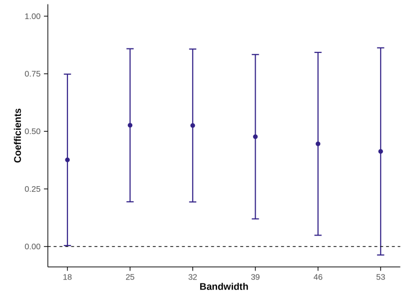
Figure A8: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date, with Varying Bandwidth



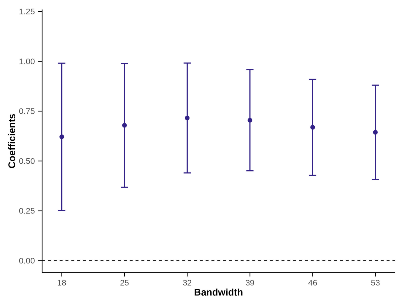
(a) Speech-language pathology



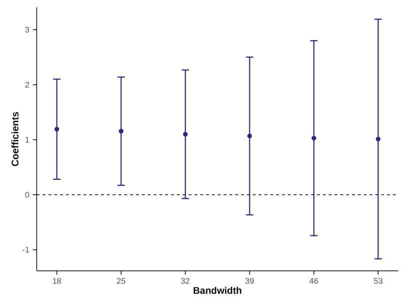
(b) Occupational or physical therapy



(c) Mental health services



(d) Hearing or vision services



(e) Dental services

Notes: We plot the coefficients and bias-aware 95 percent confidence intervals of the regression discontinuity estimates, varying the bandwidth from 18 to 53 days in seven-day increments. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Table 2 for more details on the sample and specifications. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts.

Table A4: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date on Receipt of Health Care Services Inside or Outside of School

	Mean	Estimate	Bandwidth
Any health care service	66.36	1.32 (0.42, 2.22)	17.70
Inside of school	6.53	1.48 (1.14, 1.82)	35.67
Outside of school	61.39	1.15 (0.27, 2.03)	19.01

Notes: The effective sample sizes range from 199,141 to 405,391 across the outcomes due to different optimal bandwidths. Confidence intervals (in parentheses) are bias-aware. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Table 2 for more details on the sample and specifications, and Appendix A.2 for sub-category definitions.

Table A5: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date on Placebo Diagnoses

	(1) Primary	(2) Doughnut	(3) Without controls	(4) Continuously enrolled
Mean	0.79	0.80	0.79	1.10
Estimate	0.04 (-0.07, 0.15)	0.05 (-0.14, 0.23)	0.03 (-0.08, 0.14)	0.03 (-0.14, 0.19)
Bandwidth	44.81	43.50	43.42	46.21

Notes: Placebo diagnoses include diagnoses of congenital anomalies, intellectual disabilities, and sickle cell disease. Columns (1)–(4) use MSE-optimal bandwidth selection and bias-aware 95 percent confidence intervals (in parentheses) from Kolesár and Rothe (2018) and Armstrong and Kolesár (2020). The effective sample sizes range from 308,890 to 505,607 across specifications due to different optimal bandwidths. Column (4) only includes beneficiaries who are continuously enrolled in Medicaid at ages three and four. Regressions include fixed effects for state, cohort, and weekend/holiday birth date. All specifications except for (3) control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Tables 2, A9, A10, and A11 for more details on the samples and specifications.

Table A6: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date at Ages Two to Eight

	Speech-language pathology			Occupational or physical therapy			Mental health services			Hearing or vision services			Dental services		
Age	Mean	Estimate	BW	Mean	Estimate	BW	Mean	Estimate	BW	Mean	Estimate	BW	Mean	Estimate	BW
2	6.61	0.10	30.42	2.70	-0.02	32.03	4.21	-0.10	34.65	0.88	-0.02	43.23	44.34	0.90	19.31
		(-0.17, 0.37)			(-0.19, 0.15)			(-0.30, 0.11)			(-0.11, 0.06)			(0.26, 1.55)	
3	6.15	0.31	35.44	2.52	0.00	40.49	2.58	-0.01	37.80	1.79	0.30	34.67	50.70	1.57	22.32
		(0.07, 0.56)			(-0.15, 0.15)			(-0.16, 0.15)			(0.16, 0.44)			(0.95, 2.18)	
4	6.85	0.47	24.19	2.81	0.20	39.73	3.69	0.20	42.64	3.49	0.68	27.72	55.96	0.24	23.08
		(0.15, 0.79)			(0.04, 0.36)			(0.02, 0.37)			(0.45, 0.90)			(-0.37, 0.84)	
5	6.72	0.49	23.91	2.85	0.17	33.81	4.75	0.77	28.20	6.22	1.06	35.30	59.32	-1.95	20.70
		(0.17, 0.81)			(-0.01, 0.34)			(0.52, 1.03)			(0.80, 1.31)			(-2.59, -1.31)	
6	6.04	0.96	28.28	2.65	0.33	31.82	5.68	0.96	25.88	8.79	0.95	26.98	58.09	-0.23	30.53
		(0.68, 1.25)			(0.15, 0.51)			(0.67, 1.25)			(0.60, 1.30)			(-0.76, 0.30)	
7	5.92	0.84	29.77	2.62	0.31	38.56	6.70	1.03	35.88	11.25	0.63	29.72	59.54	0.18	22.60
		(0.55, 1.12)			(0.15, 0.48)			(0.76, 1.31)			(0.26, 1.01)			(-0.45, 0.81)	
8	5.53	0.62	32.21	2.57	0.17	32.14	7.42	0.60	26.34	12.93	0.87	30.24	59.87	-0.78	20.74
		(0.35, 0.88)			(-0.01, 0.35)			(0.26, 0.93)			(0.47, 1.26)			(-1.44, -0.12)	

Notes: The effective sample sizes range from 387,153 to 886,369 across the outcomes and age groups due to different optimal bandwidths. 95 percent confidence intervals (in parentheses) are bias-aware. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Figure 5 for more details on the sample and specifications. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts. "BW" denotes bandwidth.

Table A7: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date on the Type of Dental Care Received

	Mean	Estimate	Bandwidth
Dental services at age three	48.17	1.73 (0.86, 2.61)	20.84
Preventive and diagnostic	47.71	1.60 (0.72, 2.47)	20.56
Restorative	12.93	-0.06 (-0.52, 0.40)	35.62
Restorative at age four	18.02	-0.76 (-1.41, -0.12)	24.20

Notes: The effective sample sizes range from 236,931 to 404,811 across the outcomes due to different optimal bandwidths. 95 percent confidence intervals (in parentheses) are bias-aware. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Table 2 for more details on the sample and specifications, and Appendix A.2 for sub-category definitions.

Table A8: The Effect of Being Born Before the School Entry Cutoff Date, Alternative Optimal Bandwidth Algorithms

	MSE	FLCI
Speech-language pathology		
Estimate	0.72 (0.32, 1.11)	0.71 (0.32, 1.11)
Mean	8.52	8.51
Effective N	389,639	400,090
Bandwidth	34.23	35.20
Occupational or physical therapy		
Estimate	0.33 (0.07, 0.60)	0.33 (0.06, 0.60)
Mean	3.59	3.60
Effective N	380,149	391,796
Bandwidth	33.47	34.41
Mental health services		
Estimate	0.53 (0.21, 0.86)	0.53 (0.21, 0.86)
Mean	4.71	4.70
Effective N	316,968	325,369
Bandwidth	27.66	28.47
Hearing or vision services		
Estimate	0.65 (0.41, 0.88)	0.64 (0.41, 0.88)
Mean	4.17	4.17
Effective N	581,180	596,916
Bandwidth	51.75	53.19
Dental services		
Estimate	1.20 (0.29, 2.11)	1.18 (0.27, 2.09)
Mean	62.88	62.89
Effective N	201,076	208,033
Bandwidth	17.88	18.38

Notes: Each column presents the regression discontinuity results using a different optimal bandwidth algorithm from Armstrong and Kolesár (2020) to select the bandwidths on each side of the school entry cutoff. "MSE" optimizes the finite-sample maximum mean squared error. "FLCI" minimizes the length of two-sided, fixed-length confidence intervals. 95 percent confidence intervals (in parentheses) are bias-aware. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Table 2 for more details on the sample and specifications. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts.

Table A9: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date, Doughnut Regression Discontinuity Design

	Mean	Estimate	Bandwidth
Panel A: Health care services			
Speech-language pathology	8.56	0.84 (0.15, 1.53)	36.97
Occupational or physical therapy	3.62	0.53 (0.05, 1.01)	35.43
Mental health services	4.72	1.05 (0.38, 1.72)	29.78
Hearing or vision services	4.18	0.73 (0.39, 1.08)	54.10
Dental services	62.83	0.94 (-1.72, 3.61)	20.06
Panel B: Behavioral and developmental health diagnoses			
Speech and language disorders	6.85	0.52 (-0.05, 1.09)	39.76
ADHD	2.10	0.50 (0.16, 0.83)	39.56
Hearing or vision conditions	9.80	2.14 (1.49, 2.80)	41.37

Notes: We additionally exclude all beneficiaries born in the one-week bandwidth around the cutoff. The effective sample sizes range from 132,331 to 495,837 due to different optimal bandwidths. 95 percent confidence intervals (in parentheses) are bias-aware. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Table 2 for more details on the sample and specifications. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts. "ADHD" denotes attention-deficit/hyperactivity disorder.

Table A10: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date, Without Controls

	Mean	Estimate	Bandwidth
Panel A: Health care services			
Speech-language pathology	8.53	0.67 (0.28, 1.06)	34.21
Occupational or physical therapy	3.60	0.29 (0.02, 0.55)	33.93
Mental health services	4.70	0.53 (0.21, 0.84)	29.77
Hearing or vision services	4.19	0.67 (0.43, 0.90)	50.95
Dental services	63.12	1.22 (0.32, 2.11)	18.11
Panel B: Behavioral and developmental health diagnoses			
Speech and language disorders	6.81	0.45 (0.10, 0.80)	34.84
ADHD	2.11	0.42 (0.24, 0.60)	45.06
Hearing or vision conditions	9.80	1.98 (1.59, 2.36)	41.44

Notes: The effective sample sizes range from 210,517 to 590,352 across the outcomes due to different optimal bandwidths. 95 percent confidence intervals (in parentheses) are bias-aware. Regressions include fixed effects for state, cohort, and weekend/holiday birth date. See notes under Table 2 for more details about the sample and specifications. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts. "ADHD" denotes attention-deficit/hyperactivity disorder.

Table A11: Regression Discontinuity Estimates of the Effect of Being Born Before the School Entry Cutoff Date, Among Those Continuously Enrolled

	Mean	Estimate	Bandwidth
Panel A: Health care services			
Speech-language pathology	10.95	0.83 (0.31, 1.36)	40.93
Occupational or physical therapy	4.80	0.24 (-0.06, 0.53)	59.28
Mental health services	5.91	0.47 (0.05, 0.89)	34.54
Hearing or vision services	5.27	0.93 (0.47, 1.39)	29.49
Dental services	72.99	1.10 (0.34, 1.86)	33.16
Panel B: Behavioral and developmental health diagnoses			
Speech and language disorders	8.66	0.65 (0.24, 1.06)	53.57
ADHD	2.73	0.52 (0.26, 0.77)	48.48
Hearing or vision conditions	12.07	2.82 (2.19, 3.44)	33.22

Notes: We only include beneficiaries who are continuously enrolled in Medicaid at ages three and four. The effective sample sizes range from 198,426 to 393,804 across the outcomes due to different optimal bandwidths. 95 percent confidence intervals (in parentheses) are bias-aware. Regressions include fixed effects for state, cohort, and weekend/holiday birth date, and control for sex, race/ethnicity, and urban/rural ZIP code. See notes under Table 2 for more details on the sample and specifications. "Hearing or vision services" includes specialized items like hearing aids, glasses, and contacts. "ADHD" denotes attention-deficit/hyperactivity disorder.