

Transforming Minds: The Impact of Public Mental Healthcare Provision on Education Outcomes in Brazil*

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Abstract

We present the first causal evidence that large-scale provision of public mental health services improves educational outcomes for children. We exploit the roll-out of Juvenile Psychosocial Care Centers (CAPS), which were introduced as a community-based substitute for inpatient mental healthcare, across municipalities in Brazil. Using unique nationwide data linking multiple large administrative datasets, we find that these centers increased the provision of mental health services for children through public outpatient care. Following a juvenile CAPS opening, children in treated municipalities experienced an increase in their probability of remaining enrolled in school by up to 1.6 percentage points. These effects are concentrated among children from relatively more disadvantaged backgrounds, with mothers who have not completed high school and who live in lower-income municipalities. The increases in enrollment are more pronounced for boys, who are twice as likely to receive treatment and at younger ages due to the early onset of the mental conditions they typically experience. Our findings indicate that providing accessible mental health services through community-based centers can significantly enhance educational outcomes for children.

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1 Introduction

Common mental health disorders often first emerge during adolescence, a critical period for human capital formation and long-term well-being. Nearly half of all adult mental health disorders begin before the age of 14, and about three-quarters by age 24 (Seedat et al. 2009; Kessler et al. 2005, 2007). When left untreated, these conditions can hinder emotional and cognitive development, reduce school engagement, and lower educational attainment. Consequently, they are associated with long-term economic disadvantages, including lower rates of high school and college completion, weaker labor market outcomes, and reduced lifetime earnings. Mental illness during adolescence is also correlated with a higher likelihood of risky behaviors, including early pregnancy and criminal involvement, likely due to impaired impulse control and decision-making (Coker et al. 2014; Vickers et al. 2023). These patterns suggest that early interventions targeting adolescent mental health may generate substantial private and social returns (Patton et al. 2016; Ridley et al. 2020).

Despite strong observational evidence linking youth mental health to educational outcomes, we know relatively little about the causal effects of access to mental health treatment, particularly at scale and in low- and middle-income countries. Most existing studies rely on small-scale interventions or clinical trials and focus on adult populations. As highlighted by Ridley et al. (2020), there is a significant gap in understanding how broad-based mental health interventions affect human capital accumulation during childhood and adolescence. In particular, it remains unclear whether community-based mental healthcare can overcome barriers to diagnosis and treatment, such as stigma and limited affordability, and whether such programs can improve outcomes for disadvantaged youth, who are more likely to face untreated mental illness and poor educational prospects.

This paper provides new insights on this topic by investigating the effects of community mental health centers targeting children and adolescents in Brazil. The 2002 psychiatric reform in Brazil focused on establishing Psychosocial Care Centers (*Centros de Atenção Psicossocial*—CAPS) as community-based alternatives to inpatient care for individuals with mental disorders. These centers provide outpatient mental health services—such as psychotherapy, occupational therapy, and

psychiatric consultations—delivered by professionals trained in child and adolescent care. Funded through Brazil’s public healthcare system, juvenile CAPS aim to increase access to treatment for youth with mental health needs. While community-based treatments can be cost-effective and appropriate for many conditions, previous studies caution that reducing reliance on inpatient services without sufficient investment in outpatient infrastructure may lead to under-provision of care ([Patel et al. 2007, 2011](#); [Lamb 2015](#); [Bolton et al. 2023](#); [Dias and Fontes 2024](#)).¹

We exploit the staggered rollout of juvenile CAPS centers across Brazilian municipalities to identify the impact of public mental healthcare provision on children’s outcomes. Our analysis links administrative school records for over 37 million children to detailed data on the timing and location of CAPS openings, along with rich socioeconomic information from the Brazilian welfare registry that enables precise parent-child matching. Using a matched difference-in-differences design, we compare children exposed to juvenile CAPS in their municipality to similar children in municipalities without such centers during the same period. The rollout timing is plausibly exogenous to children’s mental healthcare needs, supporting our identification strategy. We first estimate the effect of juvenile CAPS openings on the use of outpatient mental health services among children and adolescents. We then assess how improved access to care affects school enrollment and other educational outcomes, with particular attention to heterogeneous effects among disadvantaged subpopulations, such as children of low-educated mothers and those living in low-income municipalities.

We begin by documenting the impacts of the introduction of juvenile CAPS on access to and utilization of community-based mental health care for children and adolescents. Consistent with the earlier studies focusing on the effects of adult CAPS on utilization ([Dias and Fontes 2024](#)), we show that a juvenile CAPS opening substantially increases the provision of mental health services for children and adolescents through public outpatient care. In terms of magnitude, mental health

¹Despite the availability of effective treatments, global health systems are significantly under-resourced, leading to substantial treatment gaps. Mental health often receives lower priority than other health issues, with less than 2% of healthcare budgets allocated to it on average ([WHO 2022](#)). In many areas, a severe shortage of mental health professionals makes services inaccessible and unaffordable for a large portion of the population. Additionally, most mental health spending in low- and middle-income countries is directed towards psychiatric hospitals, leaving community-based care underfunded ([WHO 2022](#)).

outpatient visits increase by 41 procedures per 10,000 people under age 18 per year on average over the three years following the introduction of a juvenile CAPS at the municipality level, equivalent to 77% increase relative to the baseline. This sizable effect underscores the importance of the juvenile CAPS policy and the low levels of mental care provision before the CAPS arrival. The sizable effect on the number of procedures is also in line with the opening of CAPS for the adult population in Brazil (Dias and Fontes 2024).

As a placebo exercise, we test whether juvenile CAPS has any significant impacts on public health visits other than mental health purposes, and find no evidence of changes in other health visits in treated municipalities. Moreover, we find no evidence of a significant impact of juvenile CAPS on public spending on other municipality expenditures such as spending on education, sanitation, or transportation.

Turning to the effects on children's education, our analysis shows that public mental health care provision significantly improves children's school enrollment. The treated and control units follow similar trends in their school enrollment prior to a juvenile CAPS opening, supporting the common trends assumption. By the end of the first year following a juvenile CAPS opening, children's enrollment starts to rise, and this increase continues over the next two years. On average, enrollment increases by 1.6 percentage points (p.p.), which corresponds to a 16% reduction in the school dropout rate relative to baseline. Exploring heterogeneous treatment effects, we show that improving access to public mental health services benefits educational outcomes of children from relatively more disadvantaged backgrounds living in lower-income municipalities.

Moreover, we find that the increase in school enrollment is more pronounced for boys, who receive more mental health treatments at younger ages, partly due to the earlier onset of certain mental health conditions they experience. Specifically, the average increase in boys' enrollment is 2.2 p.p., corresponding to a 21% decline in the school dropout rate relative to baseline. These positive treatment effects appear earlier for boys at age-grade 11 and peak at age-grades 12 and 13, dissipating afterward.² In contrast, girls' enrollment increases by 1 p.p., which is a 10.2%

²Throughout the study, grade levels are referenced by age-grade, where age-grade 6 indicates grade 1, age-grade 7 indicates grade 2, which continues up to age-grade 17, corresponding to grade 12.

reduction in the dropout rate relative to baseline. These findings align with existing literature indicating that boys are more likely to develop externalizing disorders such as Attention Deficit Hyperactivity Disorder (ADHD) and conduct disorder at earlier ages, typically before puberty. For instance, ADHD symptoms often emerge between ages 3 and 6, with boys being approximately three times more likely to be diagnosed than girls ([Salari et al. 2023](#)). Similarly, conduct disorder may develop in childhood, with early-onset cases (before age 10) being more prevalent among boys ([Bachmann et al. 2024](#)). These early-onset disorders may lead to earlier engagement with mental health services for boys. Conversely, girls are more prone to internalizing disorders such as depression and anxiety, which tend to manifest during adolescence. Studies have shown that prior to puberty, the prevalence of mood disorders is similar in boys and girls; however, by mid-adolescence, girls are more than twice as likely to be diagnosed with a mood disorder ([Campbell et al. 2021](#); [Apicella et al. 2025](#)). This later onset corresponds with increased usage of mental health services by girls in late adolescence ([dos Santos and Fernández 2014](#)). Overall, the heterogeneous treatment effects on educational outcomes by age and gender are consistent with the differential timing and types of mental health problems experienced by boys and girls, as well as the intensity of mental health treatments delivered through the juvenile CAPS facilities.

Altogether, our findings support the view that offering public mental health services to children and adolescents through community-based centers can substantially improve educational participation. We show that increased access to outpatient mental health care reduces school dropout, particularly among disadvantaged children and adolescent boys. However, we do not find evidence of improvements in academic achievement as measured by standardized test scores. This suggests that while mental health support can help keep children in school, additional interventions may be needed to enhance learning outcomes. Our results underscore the importance of integrating mental health services into community settings to reduce stigma and close participation gaps in education systems in developing countries.

Our study contributes to several strands of literature. First, this paper contributes to the literature examining the effects of mental health on children's educational outcomes. Longitudinal

studies have shown that mental health conditions such as Attention Deficit Hyperactivity Disorder (ADHD) and mood disorders, including depression, are associated with increased delinquency, grade repetition, special education enrollment, and lower test scores (Currie and Stabile 2006, 2009). Depression among adolescents has been linked to higher high school dropout rates (Fletcher 2010), while acute traumatic events such as school shootings have been shown to reduce educational attainment (Cabral et al. 2021). The consequences of mental health issues in childhood extend into adulthood, affecting labor market outcomes: individuals with early-life mental health problems are more likely to rely on welfare, attain lower educational levels, and earn less over their lifetimes (Currie et al. 2010; Smith and Smith 2010; Lund et al. 2024). As Currie (2025) emphasizes, the child mental health crisis has persisted for decades, underscoring the need for effective interventions. We contribute to this literature by presenting causal evidence on the educational impacts of a community-based intervention that expanded access to specialized treatment for mental health disorders among children and adolescents.

Second, we add to research on the effects of interventions addressing child mental health on educational and physical health outcomes. While existing studies have consistently found positive effects of therapy-based interventions on mental health, there is limited evidence on their effects on educational outcomes, particularly at scale. Policies expanding prescription drug coverage for children have increased medication use but yielded limited or no improvements in educational attainment (Currie et al. 2014). Other studies have found positive physical health effects, such as reductions in injuries, but no significant educational gains (Dalsgaard et al. 2014; Chorniy and Kitashima 2016). A recent large-scale randomized controlled trial in Nepal shows that individualized therapy substantially improves adolescents' mental health, even among those without prior diagnoses, but does not increase school attendance or cognitive performance (Edmonds et al. 2025). While prior empirical work has either focused on high-income countries or smaller-scale interventions in lower-income settings, our study provides the first evidence from a large-scale public psychiatric reform in a middle-income country. By documenting population-level impacts using national data, we highlight the potential for integrated community-based mental healthcare to im-

prove educational outcomes in contexts where school dropout remains a major challenge.

Finally, our study relates to a broader literature evaluating interventions that target vulnerable children or those from disadvantaged backgrounds. Prior research has examined a range of policy areas, including the expansion of youth Medicaid eligibility (Arenberg et al. 2024), access to welfare benefits (Deshpande and Mueller-Smith 2022), foster care placement of abused and neglected children (Doyle Jr 2007, 2008; Bald et al. 2022), and youth employment programs (Gelber et al. 2016; Le Barbanchon et al. 2023). By examining a nationwide psychiatric reform that improved access to specialized outpatient mental healthcare, we contribute new evidence on how changes in health service provision can reduce school dropout. Our findings underscore the importance of investing in mental health infrastructure to support the long-term educational trajectories of disadvantaged youth.

The remainder of this article is organized as follows. In Section 2, we provide institutional background on the mental healthcare system and the education system in Brazil. Section 3 discusses the data. Section 4 presents the identification strategy we employ in our analysis. Section 5 presents the empirical results, and Section 6 concludes the paper.

2 Institutional Background

2.1 Mental Healthcare System in Brazil

Starting in the late 1980s, Brazil underwent a significant transformation in its healthcare sector, coinciding with the nation’s redemocratization process. This transformation has been a collaborative effort involving health professionals, social movements, and civil organizations. The establishment of the Unified Health System (SUS) since 1988, outlined in the Laws 8.080/90 and 8.142/90, marked a significant milestone, emphasizing health as a fundamental right for all citizens (dos Santos and Fernández 2014). Since then, SUS has provided free and universal coverage to all citizens, successfully reaching the most remote areas of the country (Bhalotra et al. 2019).

However, progress in mental health legislation was slow-moving.³ An initial bill proposing the closure of asylums and the adoption of a community-based mental healthcare model was introduced in 1989 but remained dormant for 12 years. Eventually, in 2001, the Psychiatric Reform Law was approved, advocating for integrated and universal mental healthcare aligned with international standards. Despite this landmark legislation, the specific mental health needs of children and adolescents were overlooked until 2002 when the 3rd National Conference of Mental Health recognized the necessity for dedicated services in this area (Sampaio and Bispo Júnior 2021).

The subsequent establishment of Community Psychosocial Centers (CAPS) marked a significant shift towards community-based mental healthcare in the country, as mandated by the Psychiatric Reform Law. The juvenile CAPS—also known as CAPS-II i or CAPS Infant—emerged as a specialized service designed to cater to the mental healthcare needs of children and adolescents, as well as young adults up to 24 years old and they were staffed with multidisciplinary teams to provide comprehensive care (Ceballos et al. 2018). The establishment of CAPS-II i reflects a recognition of the unique challenges and developmental considerations in addressing mental health issues among younger age groups. Similar to other SUS services, access to and use of CAPS are free of charge for all citizens.

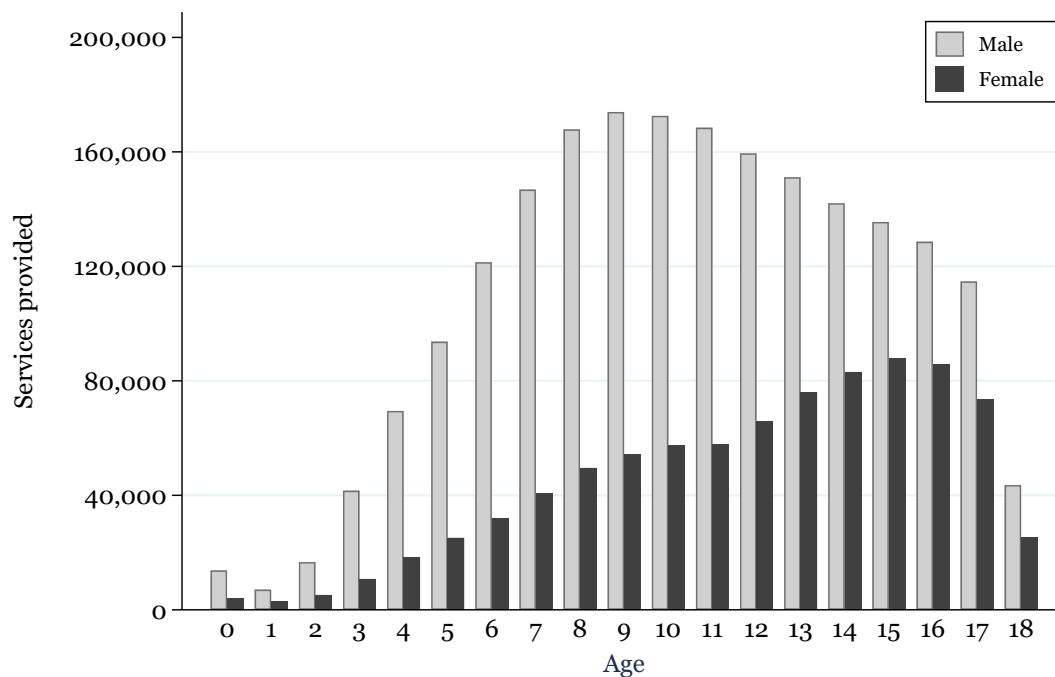
One of the key roles of juvenile CAPS is to organize and coordinate the children and adolescent mental healthcare network within its designated territory, which typically serves a population of no more than 200,000. This community-based approach ensures that mental health services are accessible and tailored to the local context, fostering better engagement and support for children and adolescents and their families (dos Santos and Fernández 2014). Notably, the municipalities in which juvenile CAPS began operating already had adult CAPS facilities in place prior to the introduction of juvenile CAPS.⁴

³Prior to the 2000s, Brazil's approach to child and adolescent mental health was marked by a reliance on institutional responses rather than specialized health services. Although legal advances such as the *Estatuto da Criança e do Adolescente* (1990) and the Psychiatric Reform Law (Lei 10.216/2001) expanded rights protections, mental-health policy for minors lagged behind reforms targeting adults. In practice, children and adolescents experiencing severe psychological distress were often treated in adult psychiatric wards or placed in philanthropic assistance facilities and correctional institutions, rather than receiving care through the health sector, contributing to unmet mental-health needs among minors (Taño and Matsukura 2015; Cubas et al. 2022).

⁴For this reason, we will control for the number of other CAPS facilities in our empirical analysis.

The multidisciplinary staff at juvenile CAPS typically includes professionals such as child and adolescent psychiatrists, pediatricians, nurses, psychologists, occupational therapists, and social workers, among others. This diverse team is essential for providing holistic and comprehensive care that considers the complex needs of children and adolescents and their families (dos Santos and Fernández 2014). Juvenile CAPS plays a crucial role in early intervention, prevention, and treatment of various mental health conditions affecting children and adolescents, including behavioral disorders, anxiety, depression, trauma-related disorders, and neurodevelopmental disorders. By providing timely and appropriate support, juvenile CAPS contributes to improving the overall well-being and mental health outcomes of children and adolescents, ultimately promoting healthier development and functioning into adulthood (Ceballos et al. 2018).

FIGURE 1: JUVENILE CAPS UTILIZATION BY SEX AND AGE (2008-2017)



Note: This figure plots the number of services (or procedures) provided at the juvenile CAPS facilities by sex and age of the patients over the period 2008–2017. The data comes from the National System of Information on Ambulatory Care (*Sistema de Informações Ambulatoriais de Saúde—SIA*) (DATASUS 2023a).

Figure 1 shows the distribution of the number of procedures provided at the juvenile CAPS facilities by sex and age of the children aged 18 and under from 2008 to 2017. Several important

patterns emerge. First, the majority of the children who received treatment were male (71%). Second, boys start using the services earlier compared to girls, and their usage peaks at an earlier age. The average age at the onset of service use was 11 years for boys and 12 years for girls. The peak service usage takes place at age 9 for boys and 15 for girls. Third, the age distribution by sex reveals that the highest usage percentage (almost 40%) is observed between ages 10 and 14, with similar rates for boys and girls (39.7% for girls and 38.4% for boys). However, there are significant gender differences in mental health service usage. Among younger children aged 5-9 years, boys account for 34% of visits, compared to 24% for girls.⁵ During late adolescence of ages 15-18, girls constitute a higher share of the visits (32%) compared to boys (20%).

These patterns are consistent with evidence from the psychology literature that, while there are no significant gender differences in the prevalence of mental health disorders among young populations under the age of 18, boys are more likely to experience mental health problems before adolescence (Salari et al. 2023; Bachmann et al. 2024).⁶ Boys account for a higher share of disorders with an early onset, including hyperkinetic disorders, which are characterized by excessive movement, impulsivity, and difficulty maintaining attention (e.g., Attention-Deficit/Hyperactivity Disorder (ADHD)), and autism spectrum disorders, which involve challenges with social interaction, communication difficulties, and a tendency to engage in repetitive behaviors (Araujo et al. 2022; Ceballos et al. 2018). In contrast, girls have a higher likelihood of experiencing symptoms of anxiety and depression, which typically have a later onset (Apicella et al. 2025).

2.2 Education in Brazil

Over the past three decades, Brazil has seen a notable rise in primary and secondary school enrollment rates. The gross enrollment rate for primary education rose from 89% in 1990 to nearly 98% in recent years (World Bank 2023). This improvement was achieved through several public

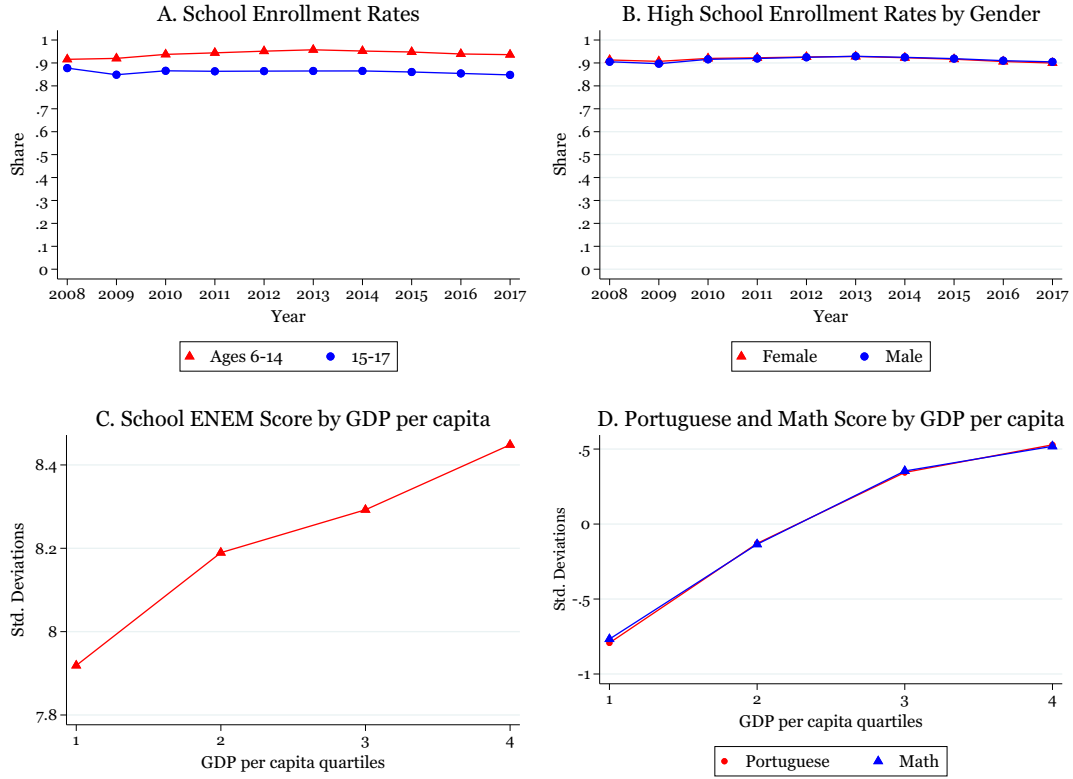
⁵For children up to 4 years old, the percentages are 5% for girls and 7% for boys.

⁶World Health Organization (WHO) notes that mental health issues often manifest earlier in boys, contributing to higher rates of certain disorders before adolescence. <https://www.who.int/news-room/spotlight/coming-of-age-adolescent-health>

initiatives, such as the establishment of new public schools, raising the compulsory schooling age in 1996, and the launch of the *Bolsa Família* program in 2004, which provides financial aid conditional on school attendance (Glewwe and Kassouf 2012). Despite the increase in secondary school enrollment over time and the 2009 compulsory schooling law that extended mandatory schooling up to age 17, dropout rates from secondary school remain large with approximately 15% as shown in Panel A of Figure 2. We observe no significant gender differences in secondary school enrollment rates (Panel B, Figure 2).

Primary public education in Brazil is primarily managed by the 5,570 municipalities, while secondary public education is provided by the 27 state governments (OECD, 2021). Both levels of education are provided completely free of charge to all citizens. Panels C and D show that there is a large degree of regional inequality in educational achievement, with students living in lower income municipalities performing significantly worse in the university entrance exams (measured by ENEM score in Panel C) as well as middle school tests (measured by standardized Portuguese and math scores in Panel D) than those living in higher income municipalities.

FIGURE 2: SCHOOL ENROLLMENT IN BRAZIL



Note: This figure plots average school enrollment for children in primary and secondary school ages, average school quality measured by ENEM (university entrance exam) test scores and high school Portuguese and math test scores by quartiles of municipality GDP per capita measured in 2010, based on school census data.

3 Data

We rely on rich administrative data sources that allow us to track mental health facilities and services, children's outcomes, and municipality characteristics.

3.1 Data on mental health facilities and services

The data on the opening dates and places of each CAPS facility come from the Brazilian Ministry of Health ([Ministério da Saúde do Brasil 2022](#)). The dataset encompasses the years 2002 to 2022, providing information on the opening date, municipality, and category of each CAPS established

following the enactment of the mental health reform legislation.

We use two administrative datasets to measure mental health care services: (i) outpatient care services using the National System of Information on Ambulatory Care (*Sistema de Informações Ambulatoriais de Saúde*—SIA) (DATASUS 2023a), and (ii) inpatient care services using the Hospital Information System of the Unified Health System (*Sistema de Informações Hospitalares*—SIH) (DATASUS 2023b). First, the outpatient care dataset—SIA—provides administrative details on every visit funded by SUS, where outpatient medical services are rendered. These visits can occur in any health facility offering primary health care services. Specifically, SIA provides information on outpatient care procedures, categorized by the patient’s municipality of residence and the diagnosis, with the latter encoded using the ICD-10 system. Using the ICD classification, we categorize outpatient procedures linked to mental health conditions. The matching between these categories and ICD-10 codes is provided in Appendix Table A1. This allows us to document the provision of specific mental health outpatient procedures in each municipality from 2008 onwards.

Second, the inpatient care dataset—SIH—contains data on hospital stays funded by SUS. Specifically, it provides information on hospital admissions, categorized by the patient’s municipality of residence and the cause of admission. We use this data to measure mental health hospitalizations for children under age 18 at the municipality level. In addition, we use data from the Finances of Brazil (FINBRA)—(*Informações Contábeis e Fiscais do Setor Público Brasileiro*), which provides information on different categories of municipal spending for 2013–2019. We construct measures of municipal spending on placebo expenditure categories per 10,000 population for each municipality over time.

3.2 Data on children’s educational outcomes

We use two sources of administrative data to measure children’s educational outcomes. First, we use data from the annual school census for the period between 2008 and 2017. This compulsory census is completed by every public and private school nationwide. It provides detailed information on students and schools, which can be followed over time by unique identifiers assigned to

each student and school. This enables the tracking of students’ enrollment status, grade level, class, demographic attributes, and characteristics of schools.

Second, for our analysis of the test scores, we use exam data from the Sistema de Avaliação da Educação Básica (Saeb), obtained from an open-source platform, Base Dos Dados ([Dahis et al. 2022](#)). These exams, in Portuguese and Math, are administered every two years nationwide. We use data for grades 5 and 9 from 2007 to 2021. The scores are standardized against the 1997 exam by the Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira (Inep) to ensure compatibility across exam years.⁷

3.3 Linking children to parental characteristics

Our analysis focuses on children present in CadÚnico in any year between 2008 and 2013 who can be linked to the School Census panel for 2008-2017 through a unique ID. CadÚnico covers roughly two thirds of the Brazilian population, being used by the administration of Federal social programs such as *Bolsa Família*. It provides excellent coverage for the low and middle-income populations, which represent the bulk of children enrolled in Brazilian public schools. CadÚnico data allows us to link children to their parents tax codes that we use to recover parental characteristics—used in our matched difference-in-differences design and to conduct heterogeneity analyses. Specifically, we recover parental birth dates, education, and labor income using population employment data (RAIS, 2002-2019), a population person registry provided by the Brazilian Tax Authority (CPF), and the CadÚnico data.

3.4 Data on municipality characteristics

We use data on the GDP of each municipality, which is estimated by the Brazilian Statistical Office (*Instituto Brasileiro de Geografia e Estatística*—IBGE). We incorporate data on Brazil’s primary conditional cash transfer scheme, the *Bolsa Família* Program (PBF), from the Ministry of Social Development (MDS/SAGI), and data on the Family Health national program, *Programa Saúde da*

⁷The dataset is available at [Sistema de Avaliação da Educação Básica \(Saeb\) – Base dos Dados](#).

Família (PSF), from the Ministry of Health.⁸

We use data on the demographic breakdown by age and gender within each municipality provided by the Brazilian Ministry of Health. We also obtain a set of geographic variables at the baseline for each municipality, which is provided by the Institute of Applied Economic Research (IPEA).

Additionally, data on the number of mental health professionals and facilities at the baseline come from the IBGE’s 2002 Health and Medical Care Survey (*Pesquisa de Assistência Médico-Sanitária—AMS*). Lastly, we incorporate socioeconomic data from the 2000 and 2010 Brazilian Census (*Instituto Brasileiro de Geografia e Estatística*).

4 Empirical Strategy

We use variation in the timing of juvenile CAPS openings to identify the effects of public mental healthcare provision on children’s outcomes with a difference-in-difference design. Such timing is plausibly unrelated to the utilization of mental healthcare services by children or subsequent outcomes for children.

We construct an annual panel at the parent-child level, with parents appearing multiple times if they have more than one child. The panel aligns with the school census, which records student enrollments as of May 31st each year. Hence, our panel operates on a June-to-May cycle rather than January-to-December.⁹ For example, the juvenile CAPS openings from June 2011 to May 2012 are categorized under the year 2011 for simplicity. We consistently track all outcomes according to these June-to-May cycles.

Our treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015. We focus on children enrolled in school aged 9-15 years immediately prior to the CAPS facility’s opening year. This allows us to observe school enrollment trends four years before and three years after the opening of these facilities. We restrict our data

⁸We thank Rudi Rocha for sharing this data with us.

⁹In Brazil, the academic year aligns with the calendar year, running from January to December.

analysis to children within the age grades of 9-15 at the time of the juvenile CAPS opening. While the compulsory schooling age is 6–17, we include children aged 18 when we examine the effects of juvenile CAPS observed three years after the center establishment. This age group is particularly important due to delays in secondary school completion for disadvantaged children in Brazil.¹⁰

The control group is constructed through exact matching on a detailed set of characteristics. For each juvenile CAPS opening year, the potential control units are children living in later-treated municipalities that introduced juvenile CAPS facilities from 2016 to 2023.¹¹ Each treated child is exactly matched to a control child on mother’s education level (indicators for college and high-school completion), child characteristics including gender, birth cohort, grade in the year prior to facility opening, enrollment status, welfare registry (*CadUnico*) status before facility opening, and municipality population indicators (under 100K, 100K-200K, 200K-300K, 300K-750K, and above 750K). When multiple controls match a treated unit, we select the closest geographical match.¹² Out of 0.9 million children in the treated municipalities, we successfully match 89.5% to a control child.

Each treatment-control pair forms a single difference-in-differences (DiD) comparison. We measure time in years relative to the opening of juvenile CAPS, assigning control units a placebo opening date matching their corresponding treatment unit. We stack these pairs to form a balanced panel tracking outcomes from four years pre-opening to three years post-opening. The estimator is the simple average of DiD comparisons for each pair, implying that no negative weight is assigned to any unit. The control units are always later-treated units, which prevents using currently-treated units to absorb time effects. This approach tackles the concerns highlighted by recent research regarding the estimation of dynamic treatment effects in two-way fixed effects settings (De Chaisemartin and D’Haultfoeuille 2020; Goodman-Bacon 2021; Callaway and Sant’Anna 2021; Sun and Abraham 2021; Borusyak et al. 2024). Moreover, we will further show that our results remain very similar when we use an alternative estimator proposed by De Chaisemartin and D’Haultfoeuille

¹⁰We restrict the youngest cohort in our analysis to 6-year-olds, in line with the compulsory school entry age.

¹¹This results in 81 municipalities matched with 75 control municipalities in our baseline specifications.

¹²When the number of control units is less than the number of treated units, some control units are matched with multiple treated units.

(2020).

We estimate a dynamic DiD specification as follows:

$$Y_{imt} = \sum_{t=-\tau, t \neq -1}^T \beta_t Time_t * Treat_m + \delta_i + \lambda_t + X'_{mt} \gamma + \varepsilon_{it} \quad (1)$$

where Y_{imt} is an outcome for treated child i in municipality m relative to its control pair at the year since juvenile CAPS opening, whereby control units are assigned a placebo opening date equal to matched treated unit. $Treat_m$ is a treatment group indicator, composed of children in municipalities where a juvenile CAPS facility opened. $Time_t$ denotes time period t corresponding to the year since facility opening. The individual fixed effects, δ_i , absorb any remaining unobserved heterogeneity at the pair level that is not removed by our exact matching strategy. The period fixed effects, λ_t , absorb any shocks that may affect all pairs at the same time. The coefficients $\{\beta_0, \dots, \beta_T\}$ identify dynamic treatment effects, β_{-1} is the omitted category, and $\beta_{-\tau}, \dots, \beta_{-2}$ estimate anticipation effects. The latter coefficients allow us to examine whether the treatment and control groups exhibit similar trends in outcomes before the juvenile CAPS opening, thereby testing the common-trend assumption. Finally, we also control for the number of other CAPS facilities operating at each point in time, X'_{mt} , to account for the fact that juvenile CAPS were introduced in municipalities with pre-existing adult CAPS facilities and that the number of adult CAPS facilities varied over time across municipalities, as described in Section 2. We cluster standard errors at the municipality level.

To complement these dynamic treatment effects, we use the following specification to estimate the average treatment effects:

$$Y_{imt} = \theta Post_t \times Treat_m + \delta_i + \lambda_t + X'_{mt} \gamma + \varepsilon_{it}, \quad (2)$$

where $Post_t$ represents the post-treatment period following juvenile CAPS opening and θ is the coefficient of interest. All other variables are defined as in Equation (1).

Table 1 shows that the treatment and control groups defined by exact matching are similar

TABLE 1: TREATMENT AND CONTROL GROUP DESCRIPTIVE STATISTICS

	Treated (1)	Control (2)	Normalized difference (3)
PARENT CHARACTERISTICS			
Mother's age	36.422	36.416	0.001
Mother completed high school	0.267	0.267	0.000
Mother completed college	0.005	0.005	-0.000
Mother's years of schooling	8.170	8.111	0.013
Father's age	36.956	37.190	-0.016
Father completed high school	0.204	0.184	0.034
Father completed college	0.008	0.006	0.018
Father's years of schooling	8.361	8.254	0.026
Parental income	7002.078	6558.559	0.047
CHILD CHARACTERISTICS			
Age	11.743	11.743	0.000
Gender	0.503	0.503	-0.000
Age-grade	10.802	10.801	0.000
School INSE score	7.248	7.373	-0.158
School income	1.112	1.118	-0.016
MUNICIPALITY CHARACTERISTICS			
Log population	12.926	12.614	0.233
GDP per capita	22926.523	18515.250	0.231
Unemployment rate	8.617	8.195	0.116
Share of rural population	0.041	0.032	0.099
Mental health providers per capita	0.005	0.005	0.056
Observations	827,263	827,263	

Notes: This table reports the average characteristics for treated children in municipalities where a juvenile CAPS opened (column 1); for matched control children in municipalities where a juvenile CAPS did not open in the same year (column 2); and the normalized difference between the two groups (column 3).

across a wide range of parent and child characteristics, including some that were not used in the matching process such as father's education, parental income, school quality indicators, and municipality attributes. Moreover, the normalized difference between the two groups is less than the threshold of 0.25, implying that differences in distributions are minimal (Imbens and Wooldridge 2009). Our difference-in-difference design remains valid even if the treatment and control groups are not similar as long as the common-trends assumption holds. The similarity of the treatment and control units raises the probability that they follow parallel trends prior to the policy change,

which makes the common-trend assumption more plausible.

Finally, for the analysis on the utilization of healthcare services at the municipality level, we follow a similar empirical strategy. We match on the same municipality population indicators to define the control municipalities. We estimate the following dynamic difference-in-differences equation:

$$Y_{mt} = \sum_{t=-\tau, t \neq -1}^T \beta_t Time_t * Treat_m + \delta_m + \lambda_t + X'_{mt} \gamma + \varepsilon_{mt} \quad (3)$$

where Y_{mt} denotes an outcome at the treated municipality m relative to its control pair at the year since juvenile CAPS opening, $Treat_m$ is an indicator for treated municipality group, $Time_t$ is a set of indicators for time period t corresponding to the year since the facility opening. δ_i represent municipality fixed effects and λ_t represent period fixed effects. X'_{mt} is a vector of municipality covariates including log GDP per capita, the number of adult CAPS facilities, and age-by-gender composition of municipal population (the share of residents within each nine-year-by-gender bracket, from 10-19 up to 79 years), state-year fixed effects, and initial municipality characteristics interacted with time trend, including poverty rate, Gini index, unemployment rate, illiteracy rate, rural share, number of mental health providers, municipality area, temperature, rainfall. We cluster standard errors at the municipality level.

As a preliminary check, we test whether the opening of a juvenile CAPS predicts the opening of an adult CAPS facility. If it does, one could be concerned that the adult CAPS openings may confound our estimates. Appendix Figure A1 presents the results. We find no evidence that juvenile CAPS openings predict the openings of adult CAPS facilities. In all of our regressions, we also control for the number of adult CAPS facilities at the municipality-year level.

5 Juvenile Psychosocial Centers and Children’s Education

5.1 Effects on Public Mental Healthcare Outcomes

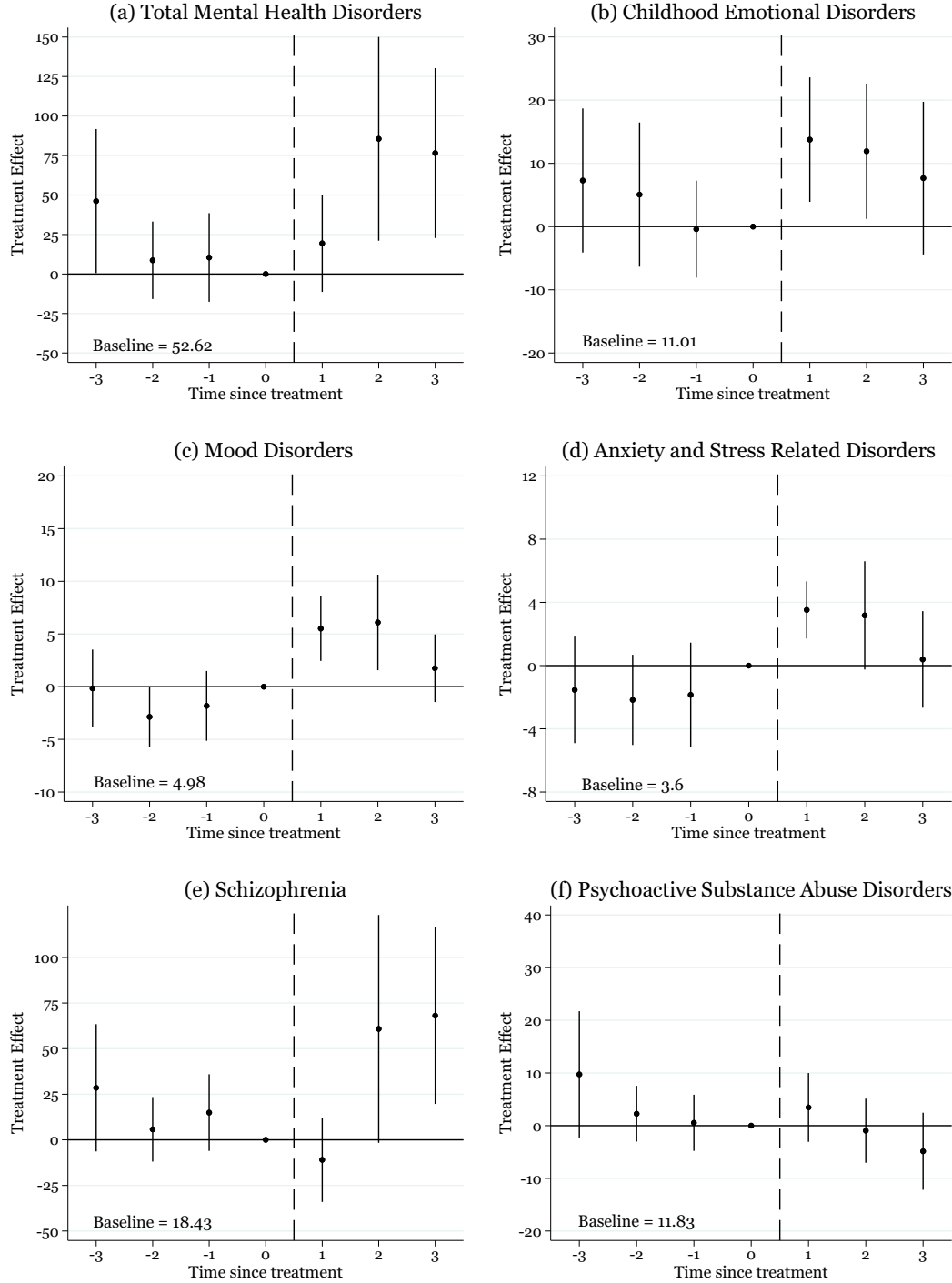
We start by analyzing the impact of juvenile CAPS on the public mental healthcare outcomes focusing on the availability of outpatient, community-based care services for children and adolescents, estimating the dynamic specification in Equation (3). We measure time in relation to the facility opening date and track outcomes for up to three years following the establishment. Figure 3 shows that the number of mental health procedures provided through public outpatient care for the population under the age of 18 increases significantly following the opening of a juvenile CAPS. Panel A shows that the total mental health procedures increase by 41 procedures per 10,000 people per year on average, which is a substantial increase compared to the baseline mean of 52.62 procedures per 10,000 people, an increase of 77% relative to the baseline.¹³ The sizable relative increase in the number of outpatient procedures highlights the importance of the juvenile CAPS and the fact that mental healthcare provision was fairly low before their arrival.

The subsequent panels display that the treatment effects are 10 procedures for childhood emotional disorders (which includes ADHD), 6 for mood disorders, 4 for anxiety and stress-related disorders, 19 for schizophrenia, and no evidence of a significant impact for psychoactive substance abuse disorders. These represent large increases in mental health care attention relative to the baseline: 91% for childhood emotional disorders, 118% for mood disorders, 107% for anxiety and stress-related disorders, and 102% for schizophrenia.¹⁴

¹³For this analysis, we set the baseline as the pre-treatment mean outcome in the treatment group (i.e., $E[Y_i|Pre == 1, Treat == 1]$). For the rest of the paper, we set the baseline as the expected outcome had the treatment not taken place (i.e., $E[Y_i^0|Post == 1, Treat == 1]$), which is given by the mean in the treatment group before treatment plus the mean variation after treatment observed in the control group following the difference-in-difference framework.

¹⁴These large effects are in line with the low baseline rates in the number of procedures, which relate to the absence of other relevant programs tackling mental health issues in the public health system. The effect sizes are within the same range of the effect sizes estimated for the adult population using the rollout of adult CAPS centers in Brazil (Dias and Fontes 2024).

FIGURE 3: EFFECTS OF JUVENILE CAPS ON PUBLIC MENTAL HEALTH PROCEDURES (PER 10,000 POPULATION, UNDER AGE 18)



Note: The figure presents the effect of juvenile CAPS opening on the number of mental health procedures provided to children under age 18 through public outpatient care as a share of 10,000 population under age 18 at the municipality level, estimated from Equation (3) with 95% confidence intervals. The treatment group consists of municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline is the pre-treatment mean outcome in the treatment group (i.e., $E[Y_i | Pre == 1, Treat == 1]$). Standard errors are clustered at the municipality level.

In Appendix Figure A3, we provide a placebo test by estimating the effects of a juvenile CAPS opening on public health procedures other than those for mental health treatments. Specifically, we examine the effects of a juvenile CAPS opening on public health procedures on infectious diseases (Panel A), diseases of the nervous system (Panel B), diseases of the circulatory system (Panel C), diseases of the digestive system (Panel D), diseases of the skin (Panel E), diseases of the musculoskeletal system (Panel F), hematological diseases (Panel G), pregnancy and childbirth (Panel H), and perinatal period conditions (Panel I). These placebo procedures show no evidence of a significant change in response to a juvenile CAPS opening in affected municipalities after the treatment.

In Appendix Figure A4, we examine whether a juvenile CAPS opening had a significant impact on mental health hospitalizations for children and adolescents in affected municipalities. In particular, the increased provision of outpatient mental health services through juvenile CAPS may reduce the need for inpatient mental health treatments, potentially lowering hospitalization rates for children and adolescents with mental disorders. The event study results in Appendix Figure A4 show a decline in mental health hospitalizations per 10,000 population under age 18 in treated municipalities starting in the second year after a juvenile CAPS opening, although this decline is not statistically significant. These results are broadly consistent with patterns documented for the adult population in response to adult CAPS openings (Dias and Fontes 2024), but suggest that any substitution away from inpatient care for children may be more modest or harder to detect precisely.

Moreover, in Appendix Figure A5, we provide a placebo exercise by examining whether other categories of municipal spending change in treated municipalities following a juvenile CAPS opening.¹⁵ These event study figures show no evidence of a significant change in federal spending on education (Panel A), sanitation (Panel B), urban planning (Panel C), transportation (Panel D), commerce (Panel E), or other expenses (Panel F) per 10,000 population in treated municipalities after

¹⁵Since the FINBRA data covers 2013–2019, we use the juvenile CAPS openings from 2014 to 2018 as our source of identifying variation in these regressions. The matching and the estimating regression specification remain the same.

a juvenile CAPS opening.

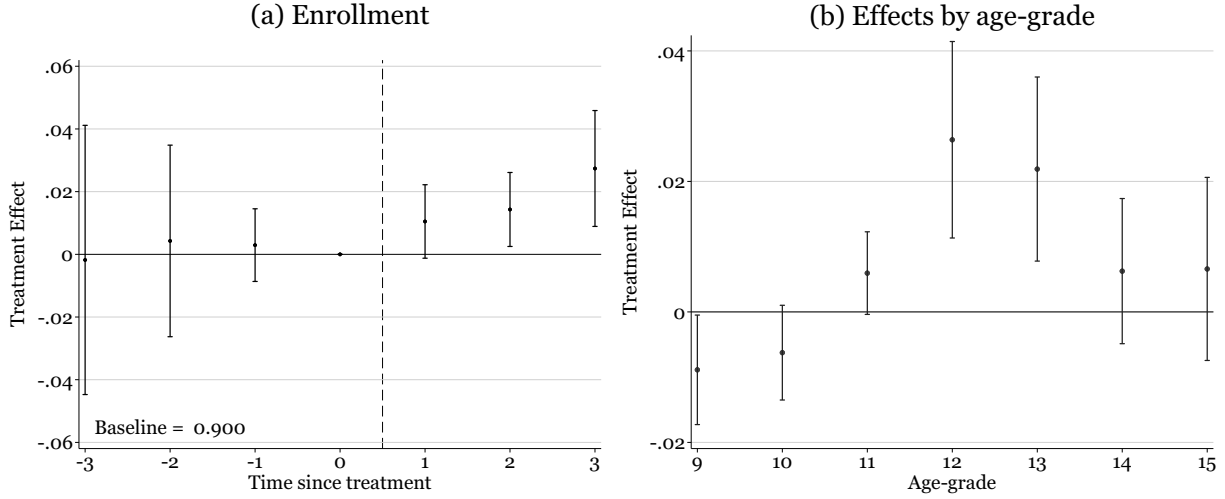
5.2 Effects on School Enrollment

We continue now with the analysis of children’s educational outcomes. First, we examine whether a juvenile CAPS increases the probability of remaining enrolled in school, reducing the likelihood of school dropouts for treated children. The left panel of Figure 4 shows the estimates of the dynamic specification in Equation (1). The school enrollment of children follows similar trends prior to the juvenile CAPS opening, providing support for the common trends assumption. By the end of the first year after a juvenile CAPS opens, children’s enrollment begins to increase and this increase persists in the following two years. On average, this increase in enrollment is 1.6 p.p., which is equivalent to a 16% decline in the 10% dropout rate at the baseline.¹⁶

In the right panel of Figure 4, we examine whether the average effect in enrollment after a facility opening changes by the age-grade of students, based on Equation (2) for each age-grade group. The positive impact on children’s enrollment starts at age-grade 11, increases further at age-grades 12 and 13, and remains positive but imprecisely estimated for age-grades 14 and 15. Such heterogeneity by grade could be partly driven by differences in exposure to mental health services across gender and age.

¹⁶The baseline dropout is given one minus the baseline enrollment rate reported in the Figure 4, left panel. For this analysis, we restrict the age at exposure to juvenile CAPS to 11-15 year-old children since the treatment effects begin to appear at age 11 as shown in the right panel of Figure 4. Appendix Figure A6 shows that the treatment effects are smaller when a younger group of children are added to the sample (with the sample including those exposed at ages 9–15) since their school enrollment rates are higher at baseline. Similarly, Appendix Figure A7 shows that the treatment effects are larger when the sample of analysis is restricted to older children (those exposed at ages 14–15) since their school enrollment rates are lower at baseline.

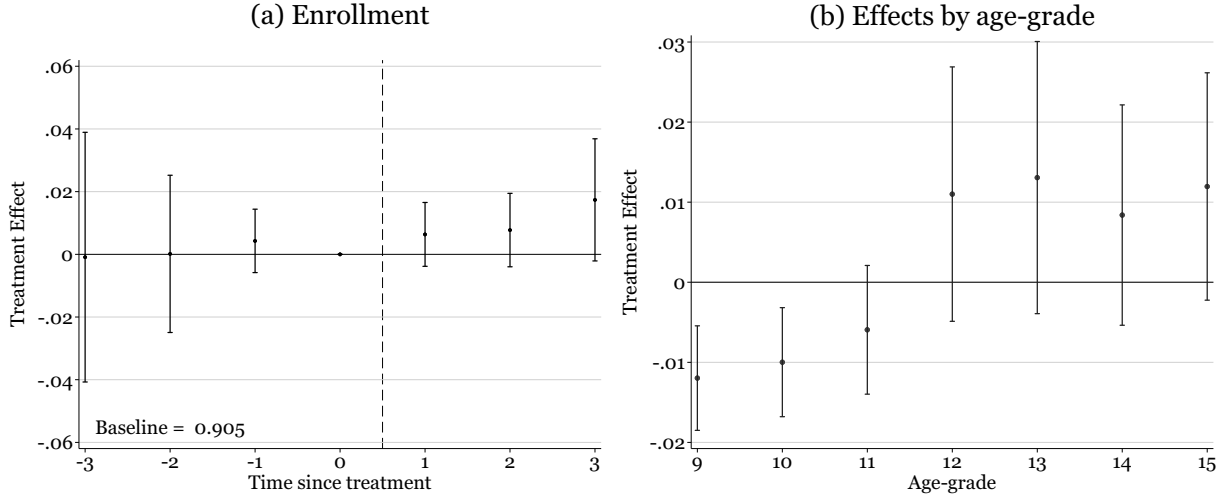
FIGURE 4: EFFECTS OF JUVENILE CAPS ON SCHOOL ENROLLMENT



Note: The figure presents the effect of juvenile CAPS opening on children's school enrollment. The left graph shows the dynamic treatment effects based on Equation (1) with 95% confidence intervals. The right graph shows the average treatment effect after juvenile CAPS opening by the students' age-grade prior to the opening, as estimated separately from Equation (2) for each age-grade. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.

We examine whether the effects of the psychiatric reform vary by gender by plotting dynamic treatment effects for girls and boys in Figures 5 and 6, respectively. The left graph in Figure 5 shows that following a juvenile CAPS opening, girls' school enrollment starts to increase, with larger effects observed in the third year after the opening; however, these estimates lack precision, which is consistent with the descriptive evidence that a much lower share of girls use mental health services after they become available. The right graph in Figure 5 indicates that the positive treatment effects for girls appear at slightly later grades, starting at age-grade 12 and remain high throughout later adolescence for age-grades 13-15. This pattern is also consistent with the descriptive evidence that girls start to experience mental health problems at later ages and their usage of mental health services is higher in late adolescence corresponding to the late onset of mental illnesses they tend to experience.

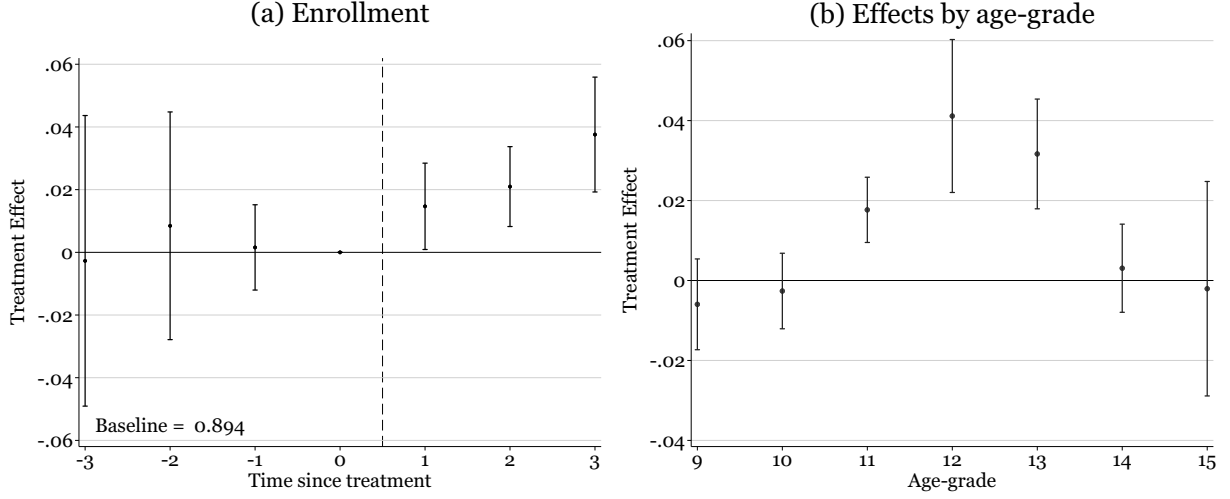
FIGURE 5: EFFECTS OF JUVENILE CAPS ON SCHOOL ENROLLMENT OF GIRLS



Note: The figure presents the effect of juvenile CAPS opening on girls' school enrollment. The left graph shows the dynamic treatment effects based on Equation (1) with 95% confidence intervals. The right graph shows the average treatment effect after juvenile CAPS opening by the students' age-grade prior to the opening, as estimated separately from Equation (2) for each age-grade. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.

In contrast, the left graph in Figure 6 indicates that an increase in boys' school enrollment emerge by the end of the first year following the juvenile CAPS opening and continues to rise in the subsequent two years. The average increase in boys' enrollment is 2.2 p.p. The right graph shows that these positive treatment effects begin to appear earlier for boys at age-grade 11, and peak at age-grades 12 and 13, dissipating afterwards. These findings are consistent with descriptive evidence that the onset of boys' mental health problems takes place before puberty, and their probability of seeking mental healthcare in late adolescence is therefore lower compared to girls. Since the majority of children using newly provided mental health services through juvenile CAPS are boys (approximately 70%), the treatment effects on education for the entire sample reflect predominantly changes in boys' school enrollment in response to juvenile CAPS openings.

FIGURE 6: EFFECTS OF JUVENILE CAPS ON SCHOOL ENROLLMENT OF BOYS

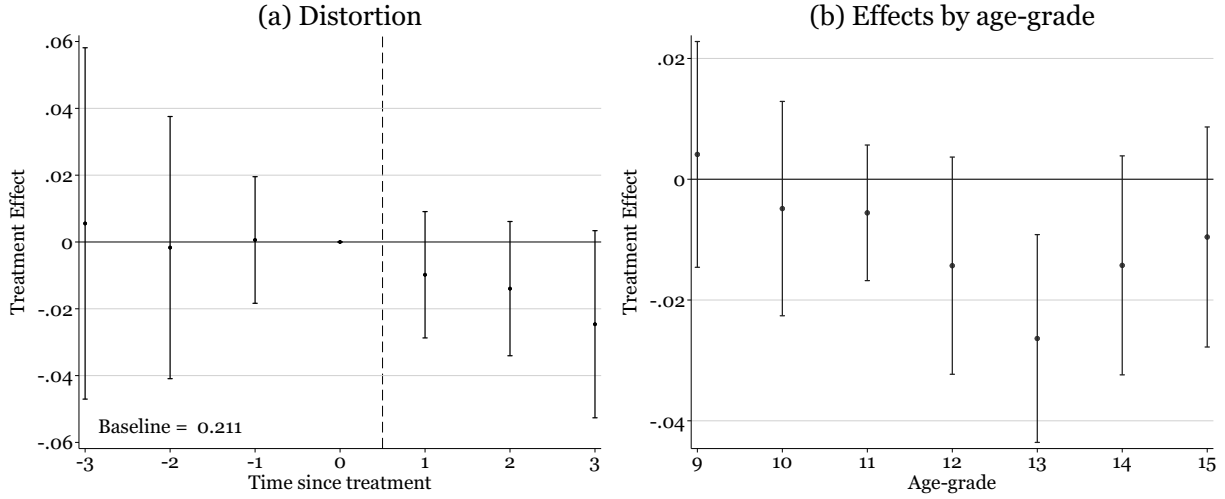


Note: The figure presents the effect of juvenile CAPS opening on boys' school enrollment. The left graph shows the dynamic treatment effects based on Equation (1) with 95% confidence intervals. The right graph shows the average treatment effect after juvenile CAPS opening by the students' age-grade prior to the opening, as estimated separately from Equation (2) for each age-grade. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.

5.3 Effects on Age-Grade Distortion

We next study the effects of a juvenile CAPS opening on age-grade distortion for children. The outcome is an indicator of whether the child is over-age for her current grade level or has dropped out of school. The results in the left graph in Figure 7 show an imprecise decline in age-grade distortion, while the right graph reveals that the effects are concentrated among children aged 12–15, with a nearly 2 p.p. reduction overall (14% relative to baseline) and a statistically significant 3 p.p. decline for those aged 13. These results are consistent with the observed rise in school enrollment among children aged 11–15, which gradually reduces the likelihood of age-grade distortion as retention improves.

FIGURE 7: EFFECTS OF JUVENILE CAPS ON AGE-GRADE DISTORTION



Note: The figure presents the effect of juvenile CAPS opening on children's age-grade distortion. The left graph shows the dynamic treatment effects based on Equation (1) with 95% confidence intervals. The right graph shows the average treatment effect after juvenile CAPS opening by the students' age-grade prior to the opening, as estimated separately from Equation (2) for each age-grade. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.

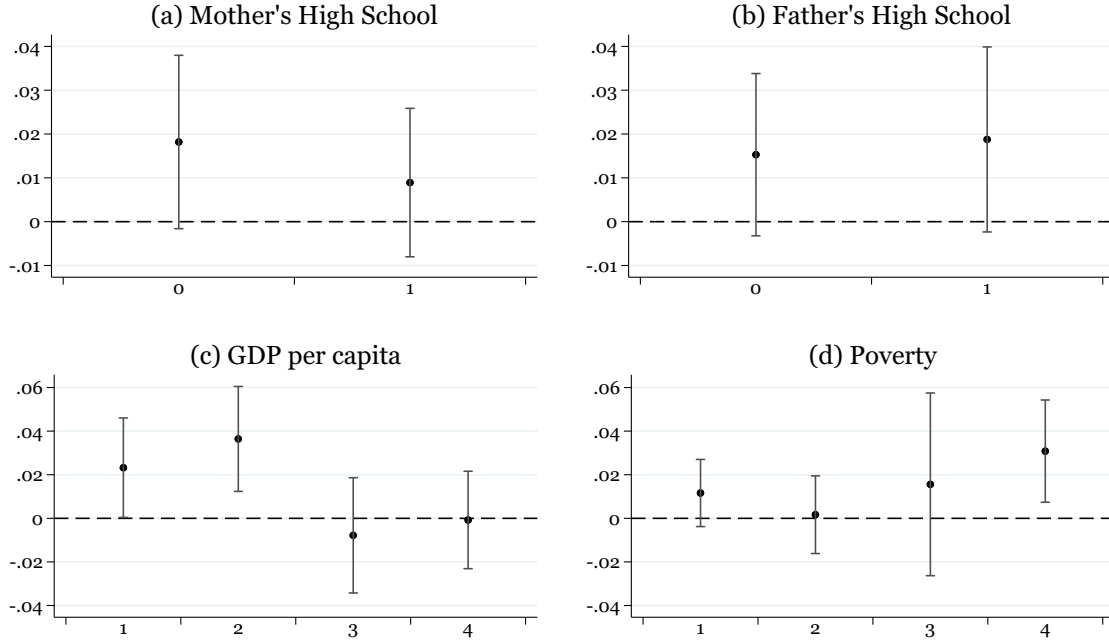
Appendix Figures A8 and A9 show that reductions in age-grade distortion are larger for boys and emerge at earlier ages, with statistically significant effects beginning at age 11 and persisting through ages 12 and 13. These results are in line with the findings that boys increase their use of mental health services and experience greater gains in school enrollment at younger ages. The rise in enrollment among boys subsequently leads to improvements in school retention, reducing age-grade distortion.

5.4 Heterogeneity

We next examine heterogeneous treatment effects of public outpatient mental healthcare on educational outcomes. Figure 8 shows that the impact on school enrollment is somewhat concentrated among more disadvantaged groups by family and municipality characteristics. Specifically, treatment effects are particularly pronounced in municipalities with lower GDP per capita, and they are also slightly larger in areas with higher poverty. In addition, the effects are slightly higher in families where the mother did not complete high school, with no significant differences across father's

education. Overall, these results suggest that improving access to public mental health services benefit relatively more disadvantaged populations living in lower income areas of Brazil.

FIGURE 8: EFFECTS OF JUVENILE CAPS ON SCHOOL ENROLLMENT, HETEROGENEITY ANALYSIS



Note: The figure presents the effect of juvenile CAPS opening on children's school enrollment after dividing the sample by several family and municipality characteristics, estimated by Equation (2) with 95% confidence intervals. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. Standard errors are clustered at the municipality level.

5.5 Effects on Test Scores

We now analyze the effect of the psychiatric reform on educational outcomes at the intensive margin, focusing on test scores. Poor mental health can impair cognitive functioning, attention, and emotional regulation, which are inputs that are essential for learning and achievement. Existing evidence shows that children with ADHD symptoms score significantly lower on standardized tests and are more likely to repeat grades (Currie and Stabile 2006, 2009). While early physical health interventions have been shown to improve test scores and grade progression (Bharadwaj et al. 2013), we know little about the effects of mental health interventions on academic achievement.

Figure 9 shows the effects of juvenile CAPS opening on children’s test scores by estimating Equation (1). We use data from *Prova Brasil*, which is the main standardized test evaluating student performance in all Brazilian public schools, taken at grades 5 and 9.¹⁷ Panels A and B present the Portuguese and math test scores averaging fifth and ninth grades, panels C and D present them for fifth grade only, and panels E and F present them for ninth grade. We find no evidence that the reform had a significant impact on Portuguese or math scores for either fifth or ninth grade students, or when the two grades are combined.

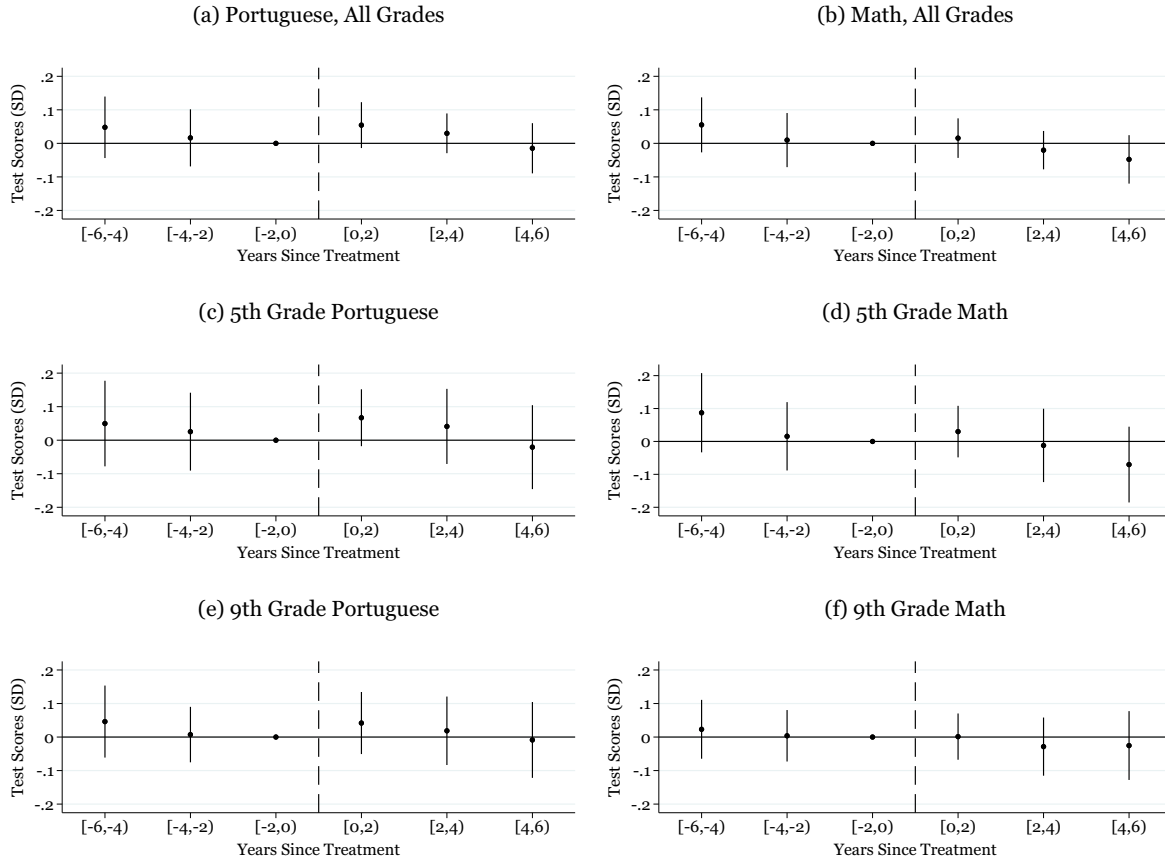
5.6 Robustness

We conduct several robustness checks to ensure that our findings are not sensitive to different estimators, sample selections, and reweighting schemes. First, we use an alternative estimator proposed by De Chaisemartin and D’Haultfoeuille (2020) to address potential heterogeneity in treatment effects that could yield biased estimates. Reassuringly, Appendix Figure A2 shows that our results remain notably similar when the estimates are produced using this alternative estimator. Second, we exclude outlier municipalities in terms of population size to address potential differences in school enrollment rates that could be driven by larger or smaller municipalities. Appendix Table A2 shows that our results are robust to excluding the largest two municipalities by population size (Panel B), the smallest two municipalities (Panel C), and both the two largest and two smallest municipalities (Panel D) from the sample. The findings remain robust when we include additional controls: municipality covariates¹⁸ (Panel E), indicators for the implementation of *Programa Saúde da Família* (PSF) in a given municipality-year (Panel F), per capita spending under *Programa Bolsa da Família* (PBF) (Panel G), and both PSF and PBF simultaneously (Panel H).

¹⁷For our analysis, scores have been standardized by exam type and year and weighted by the municipality population in 2010.

¹⁸These include log GDP per capita, and age-by-gender composition of municipal population (the share of residents within each nine-year-by-gender bracket, from 10-19 up to 79 years), state-year fixed effects, and initial municipality characteristics interacted with time trend, including poverty rate, Gini index, unemployment rate, illiteracy rate, rural share, number of mental health providers, municipality area, temperature, rainfall.

FIGURE 9: EFFECTS OF JUVENILE CAPS ON TEST SCORES



Note: The figure presents the effect of juvenile CAPS opening on test scores, estimated from Equation (1) with 95% confidence intervals. The outcomes are student-level Portuguese and math scores on the 2007, 2009, 2011, 2013, 2015, 2017, 2019, and 2021 Prova Brasil exams, standardized against the 1997 exam by the *Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira* (Inep) to ensure compatibility across exam years. The treatment group municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching later-treated municipalities that did not have a juvenile CAPS in the same year. Standard errors are clustered at the municipality level.

6 Conclusion

Our study provides new insights into the critical role of community-based mental health centers, specifically juvenile CAPS, in enhancing the well-being and educational outcomes of children and adolescents in Brazil. We exploit the municipality-level rollout of these community-focused psychosocial care centers mandated by the 2002 psychiatric reform and leverage several sources of administrative data to conduct a matched difference-in-differences analysis. Our results reveal that the implementation of juvenile CAPS markedly increases the availability and utilization of mental

health services, particularly through public outpatient care. This enhanced service provision is crucial in addressing the mental health needs of children and adolescents in a timely and effective manner.

The improved access to mental health services provides significant benefits for children. We show that there is a notable increase in children's school enrollment, particularly among boys who receive more treatment at younger ages due to the earlier onset of conditions such as ADHD and other hyperkinetic disorders. These findings indicate substantial gains on the extensive margin of education, by increasing the likelihood that children remain enrolled and avoid dropout. However, we find no evidence of improvements along the intensive margin, as measured by standardized test scores, suggesting that while mental health support increases school participation, complementary pedagogical or instructional interventions may be needed to translate participation gains into learning gains.

Our research contributes to the existing literature by providing one of the first causal studies that examines the effects of a large-scale public mental healthcare intervention on children's lives. It also offers new evidence from a middle-income country with high rates of school dropout and persistent regional inequalities in educational achievement. The context of our study underscores the broader applicability of community-based mental health interventions in diverse socioeconomic settings. This evidence supports the expansion of similar programs in other countries facing comparable challenges.

Furthermore, our findings emphasize the importance of integrating mental health support into community frameworks to tackle broader social and educational challenges. By investing in mental health services, particularly at the community level, policymakers can address the widespread issue of mental health stigma, ensure that children and adolescents receive timely and effective care, and foster their overall development and future success. This investment not only supports the immediate well-being of young individuals but also contributes to long-term economic benefits by enhancing human capital development.

References

- Apicella, Massimo, Elisa Andracchio, Giorgia Della Santa, Caterina Lanza, Clotilde Guidetti, Monia Trasolini, Maria Elena Iannoni, Gino Maglio, Stefano Vicari, and Giulia Serra,** “Sex differences in pediatric major depressive episodes: a cross-sectional study on psychiatric symptoms in early-onset mood disorders,” *Frontiers in Psychiatry*, 2025, *16*, 1503794.
- Araujo, Jacyra, Elisângela da Silva Rodrigues, Luis Fernando Silva Castro de Araujo, Dariane Borges Machado, and Maurício L Barreto,** “Characteristics of mental health service use of Brazilian children using routine health records.,” *International Journal of Population Data Science*, 2022, *7* (2).
- Arenberg, Samuel, Seth Neller, and Sam Stripling,** “The impact of youth Medicaid eligibility on adult incarceration,” *American Economic Journal: Applied Economics*, 2024, *16* (1), 121–156.
- Bachmann, Christian J, Oliver Scholle, Mette Bliddal, Susan Dosreis, Ingvild Odsbu, Svetlana Skurtveit, Rikke Wesselhoeft, Annika Vivirito, Chengchen Zhang, and Stephen Scott,** “Recognition and management of children and adolescents with conduct disorder: a real-world data study from four western countries,” *Child and Adolescent Psychiatry and Mental Health*, 2024, *18* (1), 18.
- Bald, Anthony, Eric Chyn, Justine Hastings, and Margarita Machelett,** “The causal impact of removing children from abusive and neglectful homes,” *Journal of Political Economy*, 2022, *130* (7), 1919–1962.
- Barbanchon, Thomas Le, Diego Ubfal, and Federico Araya,** “The effects of working while in school: Evidence from employment lotteries,” *American Economic Journal: Applied Economics*, 2023, *15* (1), 383–410.
- Bhalotra, Sonia, Rudi Rocha, Rodrigo R Soares et al.,** “Can universalization of health work? evidence from health systems restructuring and expansion in brazil,” *IZA DP*, 2019, *12111*.
- Bharadwaj, Prashant, Katrine Vellesten Løken, and Christopher Neilson,** “Early life health interventions and academic achievement,” *American Economic Review*, 2013, *103* (5), 1862–1891.
- Bolton, Paul, Joyce West, Claire Whitney, Mark JD Jordans, Judith Bass, Graham Thornicroft, Laura Murray, Leslie Snider, Julian Eaton, Pamela Y Collins et al.,** “Expanding mental health services in low-and middle-income countries: a task-shifting framework for delivery of comprehensive, collaborative, and community-based care,” *Cambridge Prisms: Global Mental Health*, 2023, *10*, e16.
- Borusyak, Kirill, Xavier Jaravel, and Jann Spiess,** “Revisiting event-study designs: robust and efficient estimation,” *Review of Economic Studies*, 2024, p. rdae007.
- Cabral, Marika, Bokyoung Kim, Maya Rossin-Slater, Molly Schnell, and Hannes Schwandt,** “Trauma at School: The Impacts of Shootings on Students’ Human Capital and Economic Outcomes,” Technical Report, National Bureau of Economic Research 2021.

- Callaway, B. and P. H. C. Sant’Anna**, “Difference-in-Differences with multiple time periods,” *Journal of Econometrics*, 2021, 225, 200–230.
- Campbell, Olympia LK, David Bann, and Praveetha Patalay**, “The gender gap in adolescent mental health: A cross-national investigation of 566,829 adolescents across 73 countries,” *SSM-population health*, 2021, 13, 100742.
- Ceballos, Grey Y, Cristiane S Paula, Edith L Ribeiro, and Darci N Santos**, “Child and adolescent psychosocial care center service use profile in Brazil: 2008 to 2012,” *Brazilian Journal of Psychiatry*, 2018, 41, 138–147.
- Chaisemartin, C. De and X. D’Haultfoeuille**, “Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects,” *The American Economic Review*, 2020, 110, 2964–2996.
- Chorniy, Anna and Leah Kitashima**, “Sex, drugs, and ADHD: The effects of ADHD pharmacological treatment on teens’ risky behaviors,” *Labour Economics*, 2016, 43, 87–105.
- Coker, Kendell L, Philip H Smith, Alexander Westphal, Howard V Zonana, and Sherry A McKee**, “Crime and psychiatric disorders among youth in the US population: An analysis of the national comorbidity survey–adolescent supplement,” *Journal of the American Academy of Child & Adolescent Psychiatry*, 2014, 53 (8), 888–898.
- Cubas, J. M., V. G. Bonamigo, R. Alvarenga, and D. R. Carvalho**, “Acesso infantojuvenil à saúde mental: do CAPSi às Conferências de Saúde,” *Argumentum*, 2022, 14 (1), 211–228.
- Currie, Janet**, “Investing in children to address the child mental health crisis,” Technical Report, National Bureau of Economic Research 2025.
- **and Mark Stabile**, “Child mental health and human capital accumulation: the case of ADHD,” *Journal of health economics*, 2006, 25 (6), 1094–1118.
- **and —**, “Mental health in childhood and human capital,” in “The problems of disadvantaged youth: An economic perspective,” University of Chicago Press, 2009, pp. 115–148.
- , — , **and Lauren Jones**, “Do stimulant medications improve educational and behavioral outcomes for children with ADHD?,” *Journal of health economics*, 2014, 37, 58–69.
- , — , **Phongsack Manivong, and Leslie L Roos**, “Child health and young adult outcomes,” *Journal of Human resources*, 2010, 45 (3), 517–548.
- Dahis, Ricardo, Joao Carabetta, Fernanda Scovino, Frederico Israel, and Diego Oliveira**, *Data Basis (Base dos Dados): Universalizing Access to High-Quality Data*, SSRN, 2022.
- Dalsgaard, Søren, Helena Skyt Nielsen, and Marianne Simonsen**, “Consequences of ADHD medication use for children’s outcomes,” *Journal of health economics*, 2014, 37, 137–151.
- DATASUS**, “Sistema de Informações Ambulatoriais de Saúde,” <https://datasus.saude.gov.br/transferencia-de-arquivos/> 2023. Accessed: 2024-03-01.

- , “Sistema de Informações Hospitalares,” <https://datasus.saude.gov.br/transferencia-de-arquivos/> 2023. Accessed: 2024-03-01.
- Deshpande, Manasi and Michael Mueller-Smith**, “Does welfare prevent crime? The criminal justice outcomes of youth removed from SSI,” *The Quarterly Journal of Economics*, 2022, 137 (4), 2263–2307.
- Dias, Mateus and Luiz Felipe Fontes**, “The Effects of a Large-Scale Mental Health Reform: Evidence from Brazil,” *forthcoming in American Economic Journal: Economic Policy*, 2024.
- dos Santos, Vagner and Anna Fernández**, “Child and adolescent mental health services in Brazil: structure, use and challenges,” *Revista Brasileira de Saúde Materno Infantil*, 2014, 14, 319–329.
- Edmonds, Eric V, Priya Mukherjee, Nikhilesh Prakash, Nishith Prakash, and Shwetlena Sabarwal**, “Talk Therapy and Human Capital in Adolescence: Evidence from Nepal,” Technical Report, National Bureau of Economic Research 2025.
- Fletcher, Jason M**, “Adolescent depression and educational attainment: results using sibling fixed effects,” *Health economics*, 2010, 19 (7), 855–871.
- Gelber, Alexander, Adam Isen, and Judd B Kessler**, “The effects of youth employment: Evidence from New York City lotteries,” *The Quarterly Journal of Economics*, 2016, 131 (1), 423–460.
- Glewwe, Paul and Ana Lucia Kassouf**, “The impact of the Bolsa Escola/Familia conditional cash transfer program on enrollment, dropout rates and grade promotion in Brazil,” *Journal of development Economics*, 2012, 97 (2), 505–517.
- Goodman-Bacon, A.**, “Difference-in-differences with variation in treatment timing,” *Journal of Econometrics*, 2021, 225, 254–277.
- Imbens, Guido W and Jeffrey M Wooldridge**, “Recent developments in the econometrics of program evaluation,” *Journal of economic literature*, 2009, 47 (1), 5–86.
- Jr, Joseph J Doyle**, “Child protection and child outcomes: Measuring the effects of foster care,” *American Economic Review*, 2007, 97 (5), 1583–1610.
- , “Child protection and adult crime: Using investigator assignment to estimate causal effects of foster care,” *Journal of political Economy*, 2008, 116 (4), 746–770.
- Kessler, Ronald C, Matthias Angermeyer, James C Anthony, RON De Graaf, Koen Demeyttenaere, Isabelle Gasquet, Giovanni De Girolamo, Semyon Gluzman, OYE Gureje, Josep Maria Haro et al.**, “Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization’s World Mental Health Survey Initiative,” *World psychiatry*, 2007, 6 (3), 168.
- , **Patricia Berglund, Olga Demler, Robert Jin, Kathleen R Merikangas, and Ellen E Walters**, “Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication,” *Archives of general psychiatry*, 2005, 62 (6), 593–602.

- Lamb, H Richard**, “Does deinstitutionalization cause criminalization?: The penrose hypothesis,” *JAMA psychiatry*, 2015, 72 (2), 105–106.
- Lund, Crick, Kate Orkin, Marc Witte, John H Walker, Thandi Davies, Johannes Haushofer, Sarah Murray, Judy Bass, Laura Murray, Wietse Tol et al.**, “The effects of mental health interventions on labor market outcomes in low-and middle-income countries,” Technical Report, National Bureau of Economic Research 2024.
- Ministério da Saúde do Brasil**, “Unpublished data on CAPS openings and closures until October 11, 2022,” Obtained directly 2022. Obtained: 10-11-2022.
- OECD.**, *Education in Brazil An International Perspective*, OECD Publishing, 2021.
- Patel, Vikram, Neerja Chowdhary, Atif Rahman, and Helen Verdeli**, “Improving access to psychological treatments: lessons from developing countries,” *Behaviour research and therapy*, 2011, 49 (9), 523–528.
- , **Ricardo Araya, Sudipto Chatterjee, Dan Chisholm, Alex Cohen, Mary De Silva, Clemens Hosman, Hugh McGuire, Graciela Rojas, and Mark Van Ommeren**, “Treatment and prevention of mental disorders in low-income and middle-income countries,” *The lancet*, 2007, 370 (9591), 991–1005.
- Patton, George C, Susan M Sawyer, John S Santelli, David A Ross, Rima Afifi, Nicholas B Allen, Monika Arora, Peter Azzopardi, Wendy Baldwin, Christopher Bonell et al.**, “Our future: a Lancet commission on adolescent health and wellbeing,” *The Lancet*, 2016, 387 (10036), 2423–2478.
- Ridley, Matthew, Gautam Rao, Frank Schilbach, and Vikram Patel**, “Poverty, depression, and anxiety: Causal evidence and mechanisms,” *Science*, 2020, 370 (6522), eaay0214.
- Salari, Nader, Hooman Ghasemi, Nasrin Abdoli, Adibeh Rahmani, Mohammad Hossain Shiri, Amir Hossein Hashemian, Hakimeh Akbari, and Masoud Mohammadi**, “The global prevalence of ADHD in children and adolescents: a systematic review and meta-analysis,” *Italian journal of pediatrics*, 2023, 49 (1), 48.
- Sampaio, Mariá Lanzotti and José Patrício Bispo Júnior**, “Towards comprehensive mental health care: experiences and challenges of psychosocial care in Brazil,” *BMC Public Health*, 2021, 21 (1), 1–12.
- Seedat, Soraya, Kate Margaret Scott, Matthias C Angermeyer, Patricia Berglund, Evelyn J Bromet, Traolach S Brugha, Koen Demyttenaere, Giovanni De Girolamo, Josep Maria Haro, Robert Jin et al.**, “Cross-national associations between gender and mental disorders in the World Health Organization World Mental Health Surveys,” *Archives of general psychiatry*, 2009, 66 (7), 785–795.
- Smith, James Patrick and Gillian C Smith**, “Long-term economic costs of psychological problems during childhood,” *Social science & medicine*, 2010, 71 (1), 110–115.

- Sun, L. and S. Abraham**, “Estimating dynamic treatment effects in event studies with heterogeneous treatment effects,” *Journal of Econometrics*, 2021, 225, 175–199.
- Taño, B. L. and T. S. Matsukura**, “Saúde mental infantojuvenil e desafios do campo: reflexões a partir do percurso histórico,” *Cadernos Brasileiros de Terapia Ocupacional*, 2015, 23 (2), 439–447.
- Vickers, Mark L, Yoon Kwon Choi, Lars Eriksson, Yekaterina Polyakova-Nelson, Zorica Jokovic, Stephen D Parker, Vikas Moudgil, Judith A Dean, Joseph Debattista, and James G Scott**, “Sexual and reproductive health in adolescents and young adults with psychotic disorders: A scoping review,” *Schizophrenia Bulletin*, 2023, 49 (1), 108–135.
- WHO**, “World mental health report: transforming mental health for all,” *World Health Organization*, 2022.
- World Bank**, “School enrollment, primary (% gross) - Brazil,” 2023. Retrieved from World Bank World Development Indicators.

APPENDIX

TABLE A1: THE GROUPS OF ICD-10 CODES FOR MENTAL DISORDERS

ICD-10 Codes	Category of mental disorders
F00-F09	Organic, including symptomatic, mental disorders
F10-F19	Mental and behavioural disorders due to psychoactive substance use
F20-F29	Schizophrenia, schizotypal and delusional disorders
F30-F39	Mood disorders
F40-F48	Neurotic, stress-related and somatoform disorders
F50-F59	Behavioural syndromes associated with physiological disturbances and physical factors
F60-F69	Disorders of adult personality and behaviour
F70-F79	Mental retardation
F80-F89	Disorders of psychological development
F90-F98	Behavioural and emotional disorders with onset usually occurring in childhood and adolescence
F99	Unspecified mental disorder

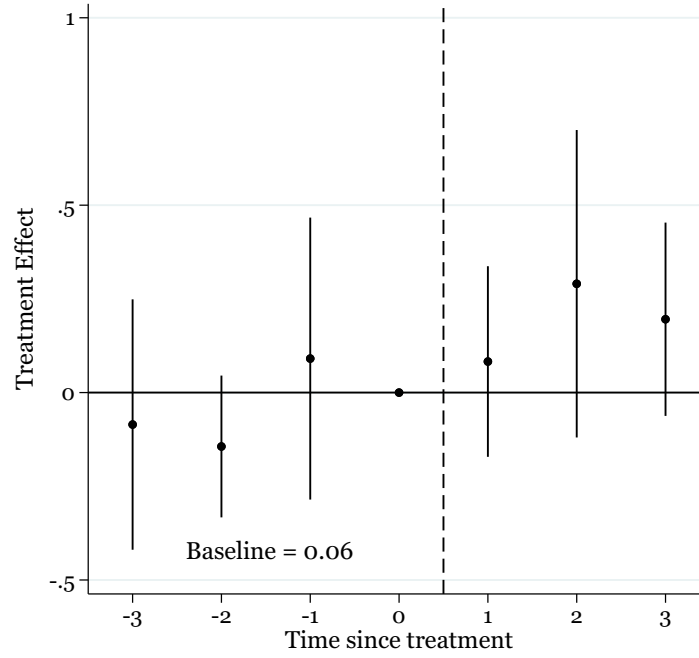
Note: The table shows the groups of International Classification of Diseases, 10th Revision (ICD-10) codes used for categorizing mental disorders.

TABLE A2: ROBUSTNESS CHECKS

	Total enrollment (1)	Girls' enrollment (2)	Boys' enrollment (3)
A. Baseline Results			
Juvenile CAPS	0.0160 (0.0099)	0.0096 (0.0095)	0.0226** (0.0105)
Observations	8,368,108	4,221,376	4,146,732
B. Removing outliers: top two municipalities with highest population			
Juvenile CAPS	0.0186* (0.0100)	0.0142 (0.0087)	0.0231** (0.0114)
Observations	6,710,814	3,386,124	3,324,690
C: Removing outliers: bottom two municipalities with lowest population			
Juvenile CAPS	0.0161 (0.0100)	0.0097 (0.0095)	0.0227** (0.0105)
Observations	8,353,889	4,214,911	4,138,978
D: Removing outliers: top two and bottom two municipalities with lowest population			
Juvenile CAPS	0.0187* (0.0100)	0.0143* (0.0087)	0.0232** (0.0114)
Observations	6,696,595	3,379,659	3,316,936
E: Adding municipality controls			
Juvenile CAPS	0.0323** (0.0165)	0.0292* (0.0155)	0.0353** (0.0175)
Observations	8,353,659	4,213,872	4,139,787
F: Controlling for Programa Saúde da Família (PSF)			
Juvenile CAPS	0.0167* (0.0099)	0.0103 (0.0095)	0.0233** (0.0105)
Observations	8,368,108	4,221,376	4,146,732
G: Controlling for Programa Bolsa da Família (PBF)			
Juvenile CAPS	0.0159* (0.0091)	0.0091 (0.0088)	0.0229** (0.0096)
Observations	8,368,108	4,221,376	4,146,732
H: Controlling for PSF and BF			
Juvenile CAPS	0.0166* (0.0091)	0.0098 (0.0088)	0.0235** (0.0096)
Observations	8,368,108	4,221,376	4,146,732

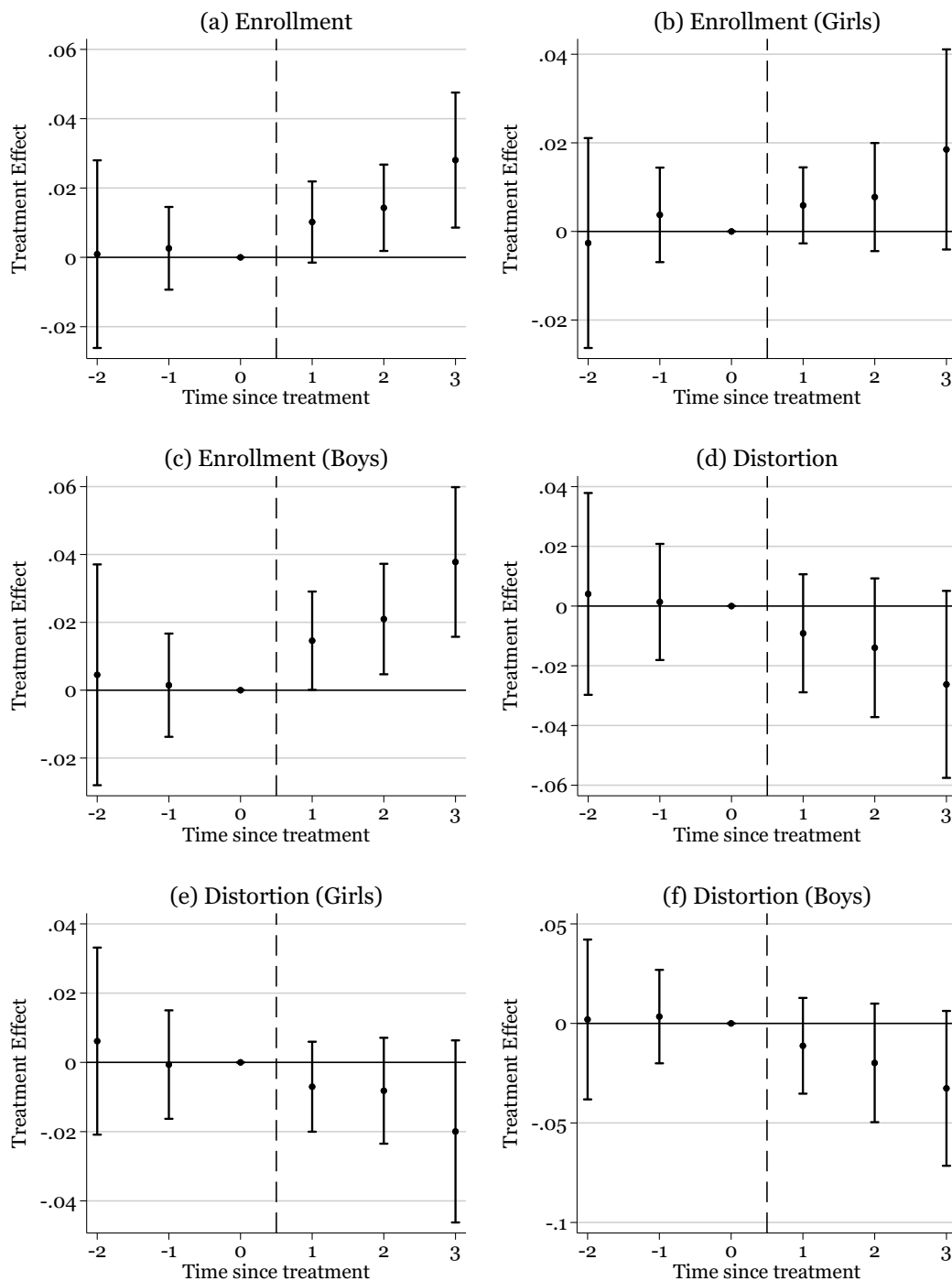
Notes: The table presents the effect of juvenile CAPS opening on main outcomes of interest in the pooled difference-in-differences specification using Equation (2). The dependent variables are displayed at the top. Panel A presents baseline results. Panel B excludes the top two outlier municipalities with highest population. Panel C excludes the bottom two outlier municipalities with lowest population. Panel D excludes both the top two outlier municipalities with highest population and the bottom two outlier municipalities with lowest population. Panel E adds municipality covariates as specified in Equation (3). Panel F includes indicator variables for the implementation of *Programa Saúde da Família* (PSF) in a given municipality and year. Panel G adds *Programa Bolsa da Família* (PBF) spending per capita. Panel H adds indicators for PSF and per capita spending for PBF. Standard errors are clustered at the municipality level. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

FIGURE A1: EFFECTS OF JUVENILE CAPS ON ADULT CAPS OPENINGS



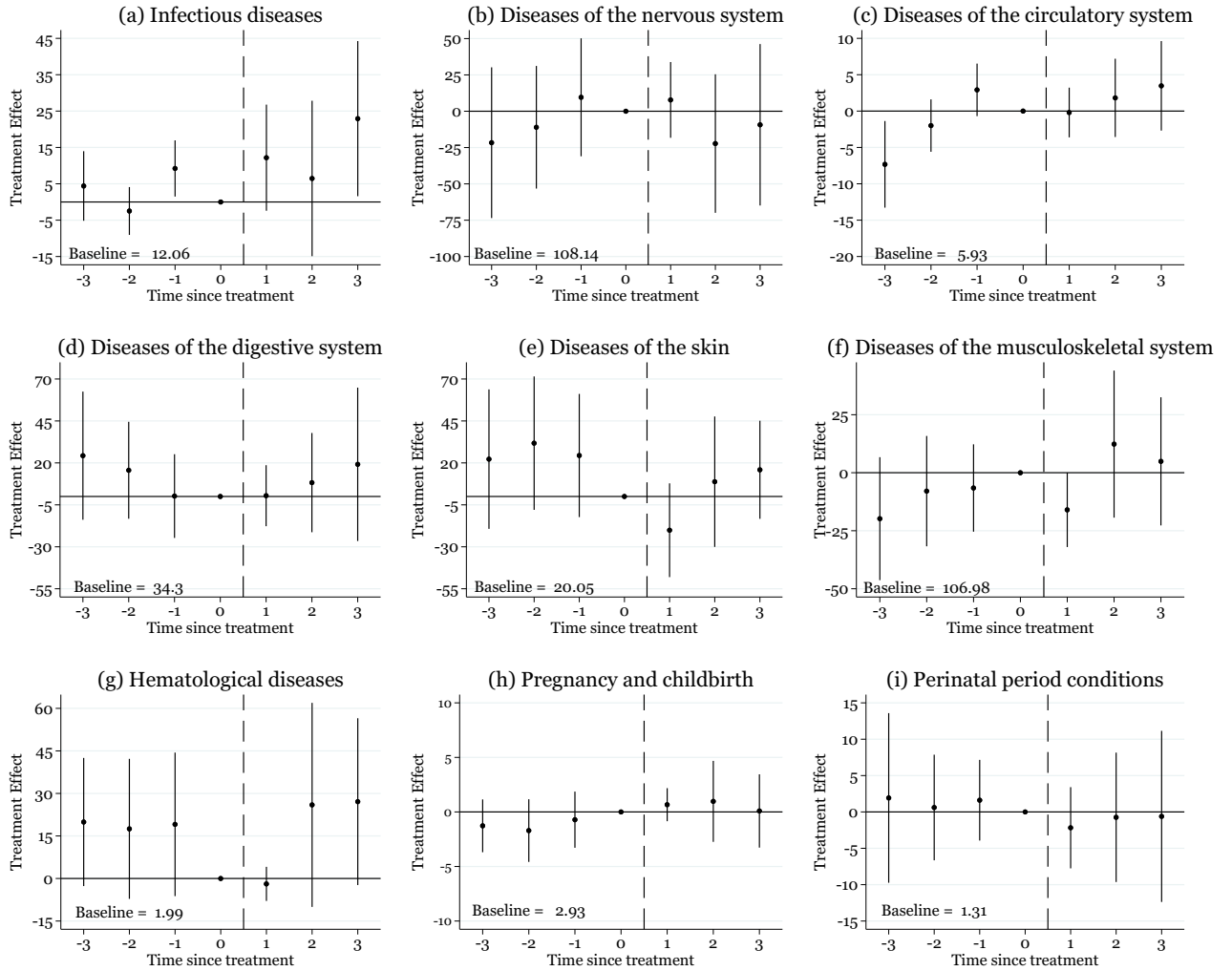
Note: The figure presents the effect of juvenile CAPS opening on the openings of adult CAPS in the same municipality. The graph shows the dynamic treatment effects based on Equation (1) with 95% confidence intervals. The treatment group are municipalities for which there was an opening of a juvenile CAPS facility between 2008 and 2015. The control group are municipalities that did not have an opening. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.

FIGURE A2: EFFECTS OF JUVENILE CAPS ON MAIN OUTCOMES, ALTERNATIVE ESTIMATORS



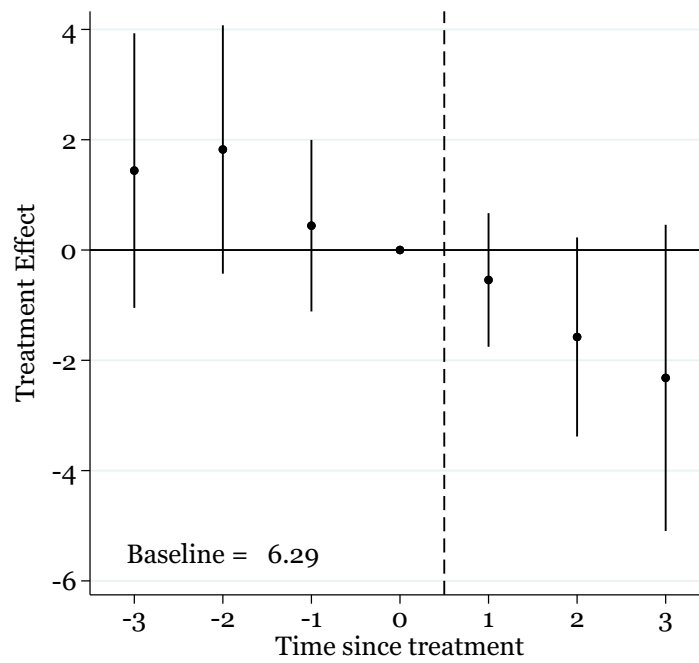
Note: The figure presents the effect of juvenile CAPS opening on main outcomes of interest in dynamic specification estimating Equation (1) by using the estimator proposed by [De Chaisemartin and D'Haultfoeuille \(2020\)](#), with 95% confidence intervals. The dependent variable is shown at the top of each column. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. Standard errors are clustered at the municipality level.

FIGURE A3: EFFECTS OF JUVENILE CAPS ON OTHER PUBLIC HEALTH PROCEDURES (PER 10,000 POPULATION, UNDER AGE 18)



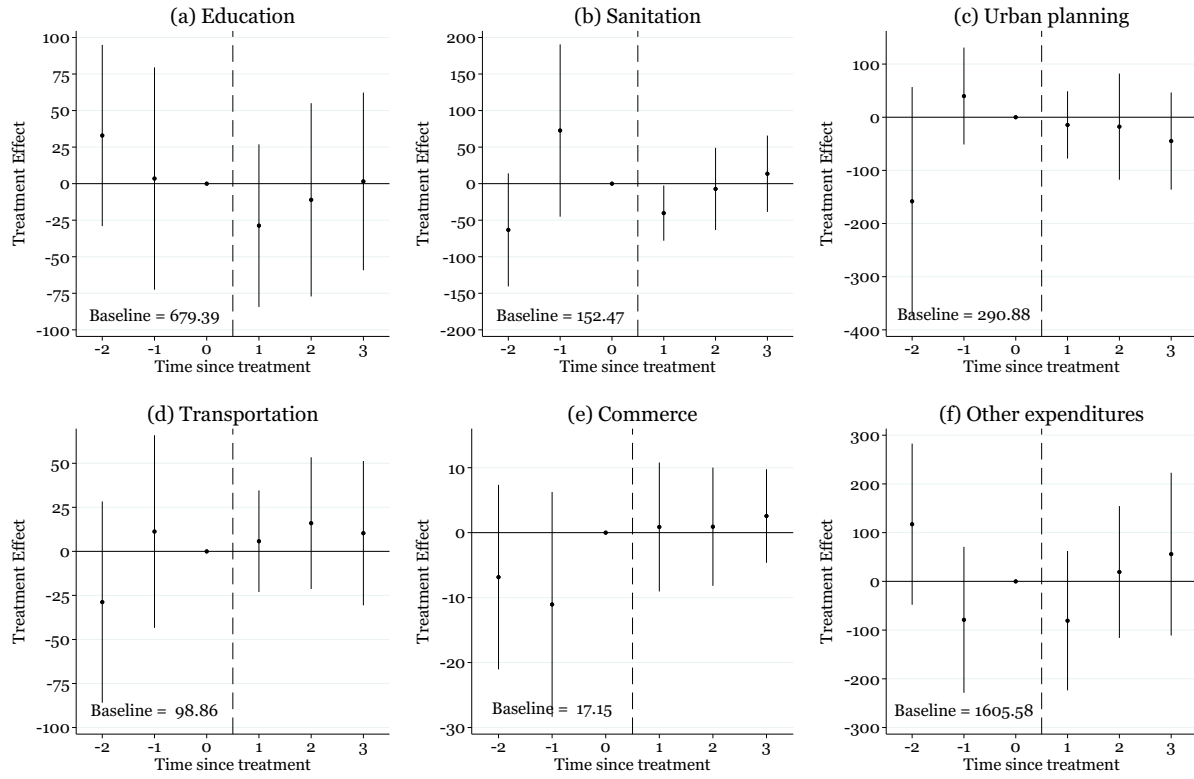
Note: The figure presents the effect of juvenile CAPS opening on the number of other health procedures provided to children under age 18 through public outpatient care as a share of 10,000 population under age 18 at the municipality level, estimated from Equation (3) with 95% confidence intervals. The treatment group municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline is the pre-treatment mean outcome in the treatment group (i.e., $E[Y_i | Pre == 1, Treat == 1]$). Standard errors are clustered at the municipality level.

FIGURE A4: EFFECTS OF JUVENILE CAPS ON MENTAL HEALTH HOSPITALIZATIONS (PER 10,000 POPULATION, UNDER AGE 18)



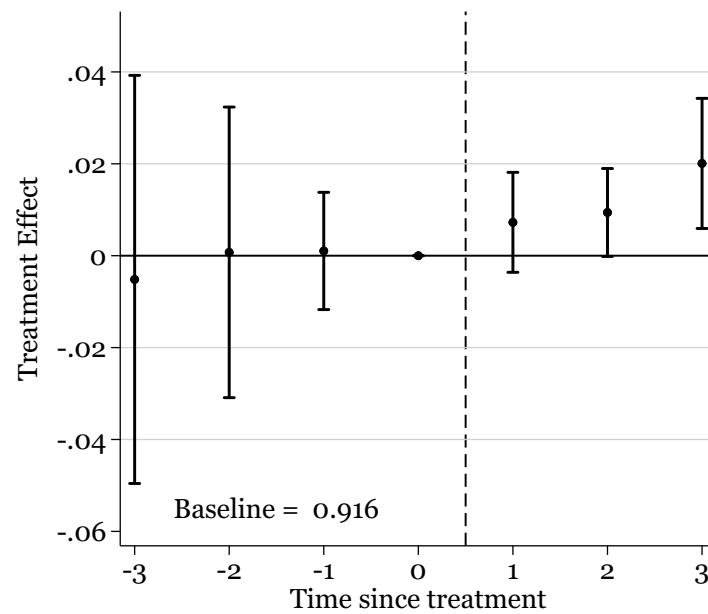
Note: The figure presents the effect of juvenile CAPS opening on the number of mental health hospitalizations for children under age 18 through public outpatient care as a share of 10,000 population under age 18 at the municipality level, estimated from Equation (3) with 95% confidence intervals. The treatment group municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline is the pre-treatment mean outcome in the treatment group (i.e., $E[Y_i|Pre == 1, Treat == 1]$). Standard errors are clustered at the municipality level.

FIGURE A5: EFFECTS OF JUVENILE CAPS ON FEDERAL SPENDING ON OTHER PUBLIC EXPENDITURES PER 10,000 POPULATION



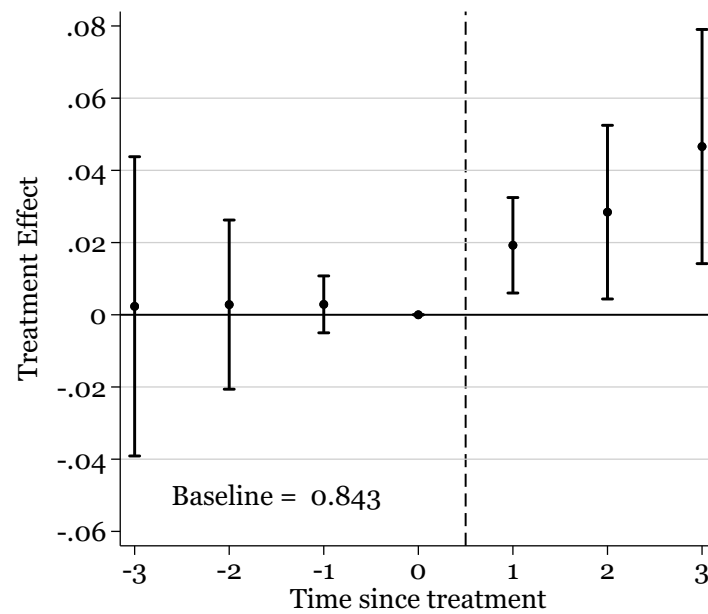
Note: The figure presents the effect of juvenile CAPS opening on the federal spending on different expenditure categories per 10,000 population at the municipality level estimated from Equation (3) with 95% confidence intervals. The data comes from the FINBRA dataset (2013–2019), and the treatment group municipalities where juvenile CAPS facilities were implemented between 2014 and 2018, while the control group is defined via matching later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline is the pre-treatment mean outcome in the treatment group (i.e., $E[Y_i | Pre == 1, Treat == 1]$). Standard errors are clustered at the municipality level.

FIGURE A6: EFFECTS OF JUVENILE CAPS ON SCHOOL ENROLLMENT OF CHILDREN EXPOSED AT AGES 9–15



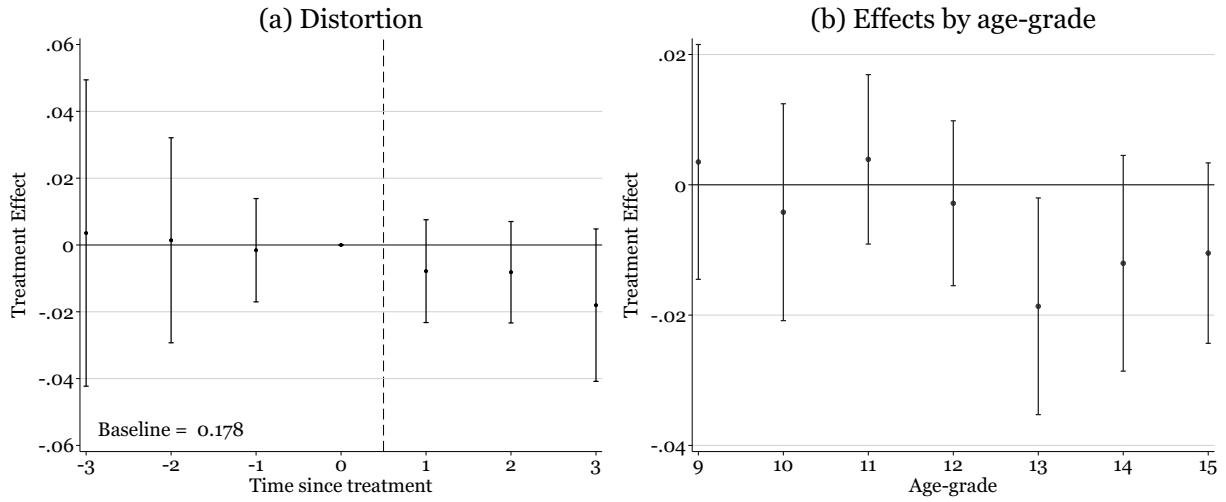
Note: The figure presents the dynamic treatment effect of juvenile CAPS opening on children's school enrollment for the sample of children exposed at ages 9–15, based on Equation (1) with 95% confidence intervals. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.

FIGURE A7: EFFECTS OF JUVENILE CAPS ON SCHOOL ENROLLMENT OF CHILDREN EXPOSED AT AGES 14–15



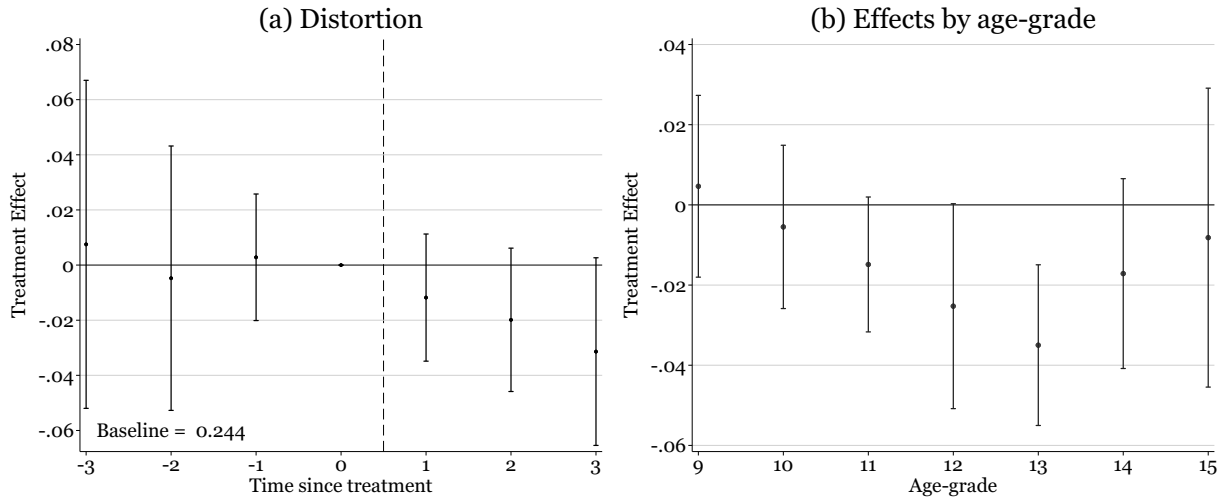
Note: The figure presents the dynamic treatment effect of juvenile CAPS opening on children's school enrollment for the sample of children exposed at ages 14–15, based on Equation (1) with 95% confidence intervals. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.

FIGURE A8: EFFECTS OF JUVENILE CAPS ON AGE-GRADE DISTORTION OF GIRLS



Note: The figure presents the effect of juvenile CAPS opening on female students' age-grade distortion. The left graph shows the dynamic treatment effects based on Equation (1) with 95% confidence intervals. The right graph shows the average treatment effect after juvenile CAPS opening by the students' age-grade prior to the opening, as estimated separately from Equation (2) for each age-grade. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.

FIGURE A9: EFFECTS OF JUVENILE CAPS ON AGE-GRADE DISTORTION OF BOYS



Note: The figure presents the effect of juvenile CAPS opening on male students' age-grade distortion. The left graph shows the dynamic treatment effects based on Equation (1) with 95% confidence intervals. The right graph shows the average treatment effect after juvenile CAPS opening by the students' age-grade prior to the opening, as estimated separately from Equation (2) for each age-grade. The treatment group comprises children in municipalities where juvenile CAPS facilities were implemented between 2008 and 2015, while the control group is defined via matching among children in later-treated municipalities that did not have a juvenile CAPS in the same year. The baseline indicates the counterfactual mean outcome in the treatment group in the post-treatment period ($E[Y_i^0 | Post = 1, Treat = 1]$). Standard errors are clustered at the municipality level.