


## Characterizing the use of home-based behavioral health services among children in foster care

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### ABSTRACT

**Background:** Children in foster care (FC) experience disproportionately high rates of mental health (MH) needs and frequently use behavioral health services. They are overrepresented in restrictive MH settings and are more likely to be prescribed psychotropic medications. Home-based behavioral health services (HBHS) offer a less restrictive alternative for addressing the complex needs of children in FC, but their use and effectiveness remain understudied.

**Methods:** Using Medicaid data from 28 states, we examined MH service utilization among children aged 3–18 with primary MH diagnoses across three eligibility groups: FC ( $n = 128,180$ ), disability ( $n = 214,959$ ), and low-income ( $n = 1,054,426$ ). We summarized utilization patterns, estimated multivariable models of HBHS take-up, and assessed associations between HBHS and other MH-related care.

**Results:** About 60% of children in FC had a MH diagnosis, compared with 65% of children with disabilities and 19% of children with income-based eligibility. HBHS use was highest among children in FC (29%), exceeding use among children with disabilities (15%) and low-income children (10%). Among children in FC, HBHS use was associated with greater MH diagnostic complexity, Black and Hispanic race/ethnicity, and certain MH diagnoses. HBHS use (vs. no use) was associated with lower odds of hospitalization (aOR = 0.82), ED visits (aOR = 0.75), and new psychotropic prescriptions (antipsychotics aOR = 0.76; SSRIs aOR = 0.80; ADHD medications aOR = 0.77), and higher odds of school-based MH service use (aOR = 1.47).

**Conclusions:** HBHS are widely used within FC and serve clinically complex populations. Their use was linked to reduced reliance on restrictive and pharmaceutical care, suggesting that expanding access may enhance MH services for children.

### 1. Introduction

Children in foster care (FC) are disproportionately exposed to adverse childhood experiences and have a higher prevalence of mental and behavioral health needs than children in the general population (Engler et al., 2022; Turney and Wildeman, 2016; Keefe et al., 2022). FC system involvement is associated with a broad range of mental health (MH) diagnoses, including attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder/conduct disorder, major depressive disorder (MDD), substance use disorder, post-traumatic stress

disorder (PTSD), and reactive attachment disorder (Engler et al., 2022; Greiner and Beal, 2017). In prior studies, children in FC have high rates of behavioral health service use among Medicaid-enrolled children, with 34% receiving such services compared to 27% of SSI/disability group and 6% of TANF aid category (Pires et al., 2018). They have 6.8 times greater odds of being prescribed psychotropic medication, even after adjusting for demographics and diagnoses (Keefe et al., 2023). In addition, they are overrepresented in restrictive behavioral health care settings, such as inpatient hospitalizations and psychiatric residential treatment facilities (Harman et al., 2000; Lanier et al., 2023; Rose and

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Lanier, 2017).

Children in FC are categorically eligible for Medicaid and thus entitled to a comprehensive set of services to address their MH needs, including home- and community-based services (Ferdinand, 2020; Medicaid and CHIP Payment). Because children in FC account for a substantial share of Medicaid spending on pediatric MH care (Pires et al., 2018), a clear understanding of the behavioral health services they utilize is critical for assessing program effectiveness and identifying areas for improvement. Recent studies document a growing reliance on high-acuity settings, such as emergency departments and hospitals, for managing MH needs (Bommersbach et al., 2023; Vish et al., 2024). Yet there remains limited evidence on the use of Medicaid-funded home-based behavioral health services (HBHS).

HBHS are provided in the home setting and range from individual therapy to intensive models used as step-downs or alternatives to inpatient or residential care (e.g., assertive community treatment). As a less-restrictive care option, HBHS can be applied across a wide spectrum of behavioral health conditions with varying levels of severity and acuity (Pires et al., 2018.; Frederick et al., 2002; Kwok et al., 2016; Moffett et al., 2018). Prior literature on the effectiveness of HBHS is limited but suggests benefits in treatment engagement and reduced need for institutional care (Frederick et al., 2002; Liu et al., 2022; Cummings et al., 2022). Randomized trials show that home- and community-based alternatives achieve similar or better clinical outcomes compared to inpatient pediatric psychiatric care, often with higher family satisfaction and lower costs (Kwok et al., 2016; Lamb, 2009). An analysis of Georgia Medicaid data found that youth receiving in-home MH treatment had longer treatment durations and more psychosocial visits than peers who did not (Cummings et al., 2022). A smaller study of Missouri Medicaid recipients of all ages similarly showed that home-based treatment following psychiatric hospitalization improved engagement in follow-through care (Frederick et al., 2002). Certain HBHS, such as multi-systemic therapy, have also been shown to reduce rates of out-of-home placement (Littell et al., 2021). Despite these benefits, HBHS remain likely underutilized: national spending on home- and community-based services represented less than one-quarter of Medicaid pediatric behavioral health expenditures in 2011 (Pires et al., 2018), the most recent publicly available estimate.

While HBHS represent an accessible and versatile option for addressing the MH needs of children with MH diagnoses, our understanding of their use remains limited. This study aimed to: (1) describe the spectrum of MH service utilization by service location among children in FC with MH diagnoses compared to other Medicaid-enrolled children; (2) identify sociodemographic and health factors associated with HBHS use; and (3) examine the relationship between HBHS use and other types of MH-related healthcare utilization, including pharmacotherapy. Based on the existing literature, we hypothesize that HBHS use is associated with a lower likelihood of subsequent acute and intensive mental health service utilization. A central contribution of our study is to examine whether this protective association holds within the Medicaid foster care population, where the evidence base remains sparse.

## 2. Methods

### 2.1. Administrative records

The Medicaid Analytic eXtract (MAX) files are administrative datasets containing person-level information on Medicaid eligibility, service utilization, and payments, collected by the Centers for Medicare & Medicaid Services (CMS) from individual states. Each Medicaid enrollee is assigned a unique, de-identified ID that links enrollment records to claims both within and across years. Although MAX files are available through 2015, the most recent and complete data used for this study were obtained through a data use agreement with CMS and include records through 2012. The Johns Hopkins Medicine Institutional Review

Board determined that this study does not constitute human subjects research (IRB00302492).

### 2.2. Study sample

Our study sample consists of a 40% random draw of all children aged 0–18 who were enrolled in Medicaid for at least one year between 2010 and 2012. We included 28 states with the most complete and reliable records during this period: AL, AR, CT, DE, GA, IA, IN, KY, LA, MD, MN, MO, MS, MT, NC, NE, NH, ND, OH, OK, SD, TN, TX, VA, VT, WI, WV, and WY (see Appendix A). Reliability was assessed based on factors such as the proportion of missing observations across file types and the completeness and plausibility of claims volume and service utilization, which we benchmarked against state-level prevalence estimates for common childhood chronic conditions (e.g., asthma, ADHD) in each available year (Maternal and Child Health Bureau).

FC and comparison groups (disability- and income-based) were defined using Medicaid enrollment categories documented in the MAX uniform eligibility code (Appendix B). We combined these codes into three categories. The FC group, our primary focus, includes children with any FC experience during the study period. The two comparison groups explicitly exclude children with FC experience: (1) children ever enrolled due to a disability, and (2) children enrolled due to income-based eligibility with no records of disability.

### 2.3. Mental health diagnoses

Children with MH diagnoses were identified using International Classification of Diseases, 9th Revision (ICD-9) Chapter V codes (290–319) (Frayne et al., 2010). Because our study period (2010–2012) predates the October 1, 2015 transition to ICD-10-CM, all diagnoses in the MAX data during our study years are uniformly coded using ICD-9. To be included in the analytic sample, a child was required to have at least one primary MH diagnosis. Condition-specific prevalence estimates were calculated at the three-digit ICD-9 level. As a proxy for the severity or complexity of behavioral health needs, we counted the number of distinct three-digit MH diagnoses assigned to each child, reflecting the presence of multiple co-occurring conditions. As codes were captured at the 3-digit level, they may underestimate total number of diagnoses as more than one diagnosis could fall within a related 3-digit code. Our study period predates the publication of DSM-5 in 2013; therefore, diagnostic practices during our sample years reflect DSM-IV criteria and are consistent throughout the study period.

### 2.4. Sociodemographic data

Sociodemographic characteristics were obtained from the MAX Personal Summary file, including age, race/ethnicity, sex, state, ZIP code, and county of residence. Rural-urban status was classified using the U.S. Department of Agriculture 2010 Rural-Urban Commuting Area (RUCA) codes and grouped into five categories: metropolitan area, metropolitan with commuting, micropolitan, small town, and rural (Sanders & Dobis, 2020). Additional ZIP code and county-level contextual measures were linked from external sources. These included median household income, percentage of residents below the federal poverty level (FPL), and educational attainment (share of adults with a high school diploma or college degree). We also incorporated Chetty's mobility score, defined as the predicted national income percentile at age 27 for children born in 1992, which serves as a measure of inter-generational mobility (Chetty et al., 2014).

### 2.5. Outcome measures: MH service utilization

MH service utilization was measured using Medicaid claims from 2010 to 2012. Binary indicators were constructed for any MH service utilization during the study period. The primary outcome was utilization

of home-based behavioral health services (HBHS), identified by claims with a place-of-service code for “patient’s home” and a service type classified as “psychiatric services.” Related Current Procedural Terminology (CPT) and Healthcare Common Procedure Coding System (HCPCS) codes were grouped into broader service categories, with input from a child and adolescent psychiatrist (author SB). For example, time-based CPT codes for individual therapy were collapsed into a single “individual therapy” category.

MH service utilization in non-home settings, including outpatient clinics, emergency departments, and psychiatric facilities, was also captured. Only services linked to a primary MH diagnosis were included.

Medication utilization was assessed with the American Hospital Formulary Service (AHFS) drug classification system, focusing on antipsychotics, selective serotonin reuptake inhibitors (SSRIs), and medications for attention-deficit/hyperactivity disorder (ADHD) (American Society of Health System Pharmacists). We hypothesized that greater utilization of HBHS may reduce reliance on the use of acute care settings and these medications.

## 2.6. Statistical analysis

We first calculated the frequency and proportion of children with MH diagnoses in each eligibility group: FC, disability-based eligibility, and low-income eligibility. For each group, we summarized the number of distinct diagnoses as a proxy for complexity and identified the five most common primary diagnoses based on three-digit ICD-9 codes. We also described sociodemographic characteristics (sex, race/ethnicity), enrollment details (age at entry, duration of Medicaid enrollment), and patterns of MH service utilization, including HBHS, inpatient hospital stays, outpatient visits, and prescription drugs (Tables 1 and 2). Pairwise differences in means between the FC group and each comparison group were assessed using two-sample t-tests.

We then estimated regression models to (a) identify factors associated with HBHS utilization and (b) assess associations between HBHS and other types of MH service utilization. To evaluate the relationship between the use of HBHS and other types of MH services, including psychotropic medications, we first estimated unconditional associations between HBHS utilization in the prior year and subsequent healthcare utilization among children in FC. Because HBHS may be initiated in response to prior intensive service use (e.g., inpatient hospitalization or ED visits), reverse causation is a potential issue. To address this concern, we estimated conditional models restricting the sample to children without prior use of a given service in the year before HBHS utilization. These models allow assessment of whether HBHS is associated with a new onset of service utilization and better isolate the direction of the association. Although still subject to bias (e.g., from unobserved complexity), conditional models provide a more conservative test.

All models were adjusted for complexity (number of distinct diagnoses), presence of the five most common diagnoses, sex, race/ethnicity, age at entry, duration of enrollment, and neighborhood socioeconomic characteristics (Table 1). State indicators were included to account for time-invariant state-level factors such as health policies and economic conditions that may affect access to services, including HBHS. Robust standard errors were used in all estimations. All analyses were conducted in Stata 17 (StataCorp, College Station, TX). The Johns Hopkins School of Medicine Institutional Review Board determined that this study did not constitute human subjects research.

## 3. Results

The study sample included 216,282 children in FC, 331,796 children with disabilities, and 5,605,997 children in the low-income group, based on Medicaid eligibility categories. Children in FC ( $n = 128,100$ ; 59%) and children with disabilities ( $n = 214,959$ ; 65%) were substantially more likely to have at least one primary MH diagnosis compared with children in the low-income group ( $n = 1,054,426$ ; 19%).

**Table 1**

Mental health, socio-demographic and enrollment characteristics for children 3–18 y.o. with MH diagnoses on Medicaid, 2010–2012.

	Comparison groups		
	Foster care (N = 128,180)	Disability (N = 214,959)	Low-income (N = 1,054,426)
<b>Child Mental Health</b>			
N MH diagnoses: <sup>a</sup> 1	50,328 (39%)	94,692 (44%)	685,562 (65%)
2	32,533 (25%)	57,907 (27%)	229,504 (22%)
3	20,087 (16%)	31,494 (15%)	86,936 (8%)
4	11,901 (9%)	16,181 (8%)	33,377 (3%)
5+	13,331 (10%)	14,685 (7%)	19,047 (2%)
Share of children with primary: <sup>b</sup>			
Adjustment Reaction (309)	59,549 (47%)	26,640 (12%)	249,529 (24%)
ADHD (314)	58,821 (46%)	105,500 (49%)	420,654 (40%)
Episodic Mood Disorders (296)	33,871 (26%)	41,116 (19%)	131,479 (12%)
Disturbance of Emotions (313)	30,995 (24%)	29,235 (14%)	115,833 (11%)
Disturbance of Conduct (312)	29,992 (23%)	34,431 (16%)	138,719 (13%)
Developmental Delays (315)	20,349 (16%)	83,189 (39%)	211,851 (20%)
Pervasive Developmental Disorders (299)	7,207 (6%)	37,235 (17%)	22,694 (2%)
<b>Demographics</b>			
Age first in sample <sup>c</sup>	10.6 ± 4.6	10.3 ± 4.5	9.8 ± 4.4
Male	69,430 (54%)	148,619 (69%)	606,083 (57%)
Race: White	67,100 (52%)	66,787 (31%)	581,031 (55%)
Black	36,484 (28%)	60,120 (28%)	258,499 (25%)
Hispanic	13,806 (11%)	17,170 (8%)	159,183 (15%)
Other <sup>d</sup>	10,790 (8%)	70,882 (33%)	55,713 (5%)
Years in sample	2.8 ± 0.5	2.8 ± 0.5	2.8 ± 0.5
Av. N months enrolled, year	11.3 ± 1.3	11.6 ± 1.1	11.1 ± 1.4
<b>Neighborhood characteristics<sup>e</sup></b>			
Residence: Metro-area	76,569 (60%)	137,838 (64%)	621,817 (59%)
Metro-area, commuting	14,771 (12%)	21,380 (10%)	119,800 (11%)
Micropolitan area	18,903 (15%)	31,295 (15%)	170,763 (16%)
Small town	11,228 (9%)	16,435 (8%)	90,723 (9%)
Rural	6,504 (5%)	7,879 (4%)	50,445 (5%)
Public coverage, %	30.5 ± 6.8	31.5 ± 7.0	31.3 ± 6.8
Household median income (\$2012)	48,408 ± 11,344	46,921 ± 11,678	47,982 ± 12,595
Below poverty, %	16.4 ± 5.5	18.0 ± 6.4	17.1 ± 6.4
Unemployment, %	8.7 ± 2.7	9.3 ± 2.7	9.1 ± 2.6
College degree+, %	24.6 ± 10.3	24.0 ± 10.3	23.9 ± 10.5
Chetty's score <sup>f</sup>	43.4 ± 4.0	42.6 ± 3.7	43.1 ± 3.8

**Notes:** The overall study sample included 216,282 children in foster care (CFC), 331,796 children with disabilities, and 5,605,997 children in the low-income group, based on Medicaid eligibility categories. Statistics were reported as mean ± st.d. or n (%). We used pairwise independent samples t-tests and chi-squared tests, as appropriate, to compare CFC with the disability and low-income groups. All mean differences between groups were statistically significant at 1% level, with the exception of certain residential characteristics, which differed at 10% level or below. We excluded fewer than 2% of the original sample due to missing data on neighborhood and/or demographic characteristics.

<sup>a</sup> Mental health (MH) status is determined using both inpatient (IP) and outpatient (OP) files to identify children with primary MH diagnoses.

<sup>b</sup> Includes top-5 primary MH diagnoses (3-digit ICD-9 mental health codes) for each eligibility group, sorted starting from the most common among CFC. Column percentages sum to more than 100% because children can have more than one diagnosis.

<sup>c</sup> Age is calculated as of 12/31/year when patient is first time in sample (2010 for most).

<sup>d</sup> “Other” race/ethnicity includes American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, more than one race, and unknown. The high proportion of children with disabilities categorized as “Other” is driven

by a small number of states (AR, GA, KY, MS, NC, TN, TX, and WI). This pattern likely reflects state-specific enrollment procedures, automated enrollment through other administrative programs (e.g., SSI), and differences in reporting requirements.

<sup>e</sup> Neighborhood characteristics taken when first in sample and are based on the 2012 American Community Survey data. All measures are county-level, except for the residence type (zipcode). Residence rurality is determined based on zip code and the 2010 Rural-Urban Commuting Area Codes (USDA).

<sup>f</sup> Chetty score is the predicted percentile rank in the national distribution of household income at age 27 for children in the 1992 birth cohort (Chetty et al., 2014).

**Table 2**  
MH-related services utilization by children 3–18 y.o. with primary MH conditions on Medicaid, 2010–2012.

Children with primary MH diagnosis utilizing services	Foster care (N = 128,180)	Comparison groups	
		Disability (N = 214,959)	Low-income (N = 1,054,426)
<b>HBHS<sup>a</sup></b>	37,485 (29%)	32,432 (15%)	103,361 (10%)
Individual psychother.	19,030 (51%)	2,416 (7%)	9,276 (9%)
Diagnostic assessment	17,811 (48%)	8,569 (26%)	33,271 (32%)
Family therapy	11,736 (31%)	7,168 (22%)	22,181 (21%)
Community psychiatric supportive treatment	8,677 (23%)	10,863 (33%)	28,799 (28%)
Substance-use services	6,339 (17%)	5,754 (18%)	22,403 (22%)
Comprehensive community support	3,642 (10%)	5,659 (17%)	7,641 (7%)
Psychosocial/vocational rehab	1,534 (4%)	2,564 (8%)	5,096 (5%)
Community wrap around services	1,449 (4%)	2,824 (9%)	8,120 (8%)
Health & behavior	1,311 (3%)	827 (3%)	3,267 (3%)
Other therapies (e.g. art)	1,221 (3%)	2,023 (6%)	4,510 (4%)
Respite services	24 (0.1%)	6,855 (21%)	22,374 (22%)
<b>Inpatient hospital stays &amp; ED visits</b>			
All hospitalizations	7,677 (6%)	8,490 (4%)	19,553 (2%)
Total N days in hospital:			
Up to 1	157 (2%)	383 (5%)	1,367 (7%)
2–3 days	700 (9%)	1,166 (14%)	3,434 (18%)
4–7 days	2,193 (29%)	2,743 (32%)	7,847 (40%)
8–30 days	3,398 (44%)	3,190 (38%)	5,872 (30%)
more than 30 days	1,229 (16%)	1,008 (12%)	1,033 (5%)
ED or Urgent care visits	13,765 (11%)	25,676 (12%)	67,117 (6%)
<b>Outpatient visits, by place of service</b>			
Community MH center	22,310 (17%)	33,225 (15%)	126,356 (12%)
Psychiatric residential treatment center	3,054 (2%)	923 (0.4%)	1,555 (0.1%)
Office visit	103,523 (81%)	159,079 (74%)	773,713 (73%)
School-based services	10,547 (8%)	33,237 (15%)	90,350 (9%)
<b>1+ Rx</b>			
ADHD	57,277 (45%)	105,200 (49%)	371,778 (35%)
Antipsychotics	35,122 (27%)	61,654 (29%)	97,904 (9%)
SSRIs	27,525 (21%)	37,098 (17%)	128,368 (12%)

**Notes:** Statistics were reported as n (%). We used pairwise independent samples t-tests and chi-squared tests, as appropriate, to compare FC with the disability and low-income groups. All mean differences between groups were statistically significant at 1% level. Prior to the analysis, all claims with revenue codes associated with birth/newborn from IP stays were dropped.

<sup>a</sup> HBHS categories do not sum to 100% because patients may access services from multiple categories.

### 3.1. Mental health, sociodemographic characteristics, and Medicaid enrollment

Table 1 summarizes clinical, demographic, and enrollment characteristics of children aged 3–18 with at least one MH diagnosis, stratified by Medicaid eligibility group: FC, and two comparison groups, children with disability and children in the low-income group. With few exceptions in residential characteristics, nearly all differences between groups were statistically significant at  $p < 0.01$ . However, many effect sizes were small, particularly for enrollment length and neighborhood characteristics, and were similar across groups, suggesting that some statistically significant findings reflect the large sample size rather than clinically or economically meaningful differences. We emphasize the magnitude and practical relevance of differences below.

Children in FC were more likely to have complex MH needs, as indicated by multiple distinct three-digit ICD-9 MH diagnoses. Nineteen percent of children in FC had  $\geq 4$  diagnoses, compared with 15% of children with disability-based eligibility. By contrast, most children in the low-income group (65%) had only one MH diagnosis during the study period. The most common diagnoses among children in FC were adjustment reaction (47%) and ADHD (46%), with ADHD also the most prevalent condition in both comparison groups.

Sociodemographic and enrollment characteristics were broadly similar across groups. Age at first enrollment (approximately 10 years) and total enrollment duration (about 3 years) did not differ meaningfully, alleviating concerns that group differences in diagnoses or service utilization reflected differential Medicaid exposure. Most children resided in metropolitan areas, with similar urban–rural distributions across groups. Neighborhood-level characteristics were also comparable. On average, children in FC lived in slightly more advantaged areas based on household median income, unemployment, Medicaid participation, and Chetty's mobility score.

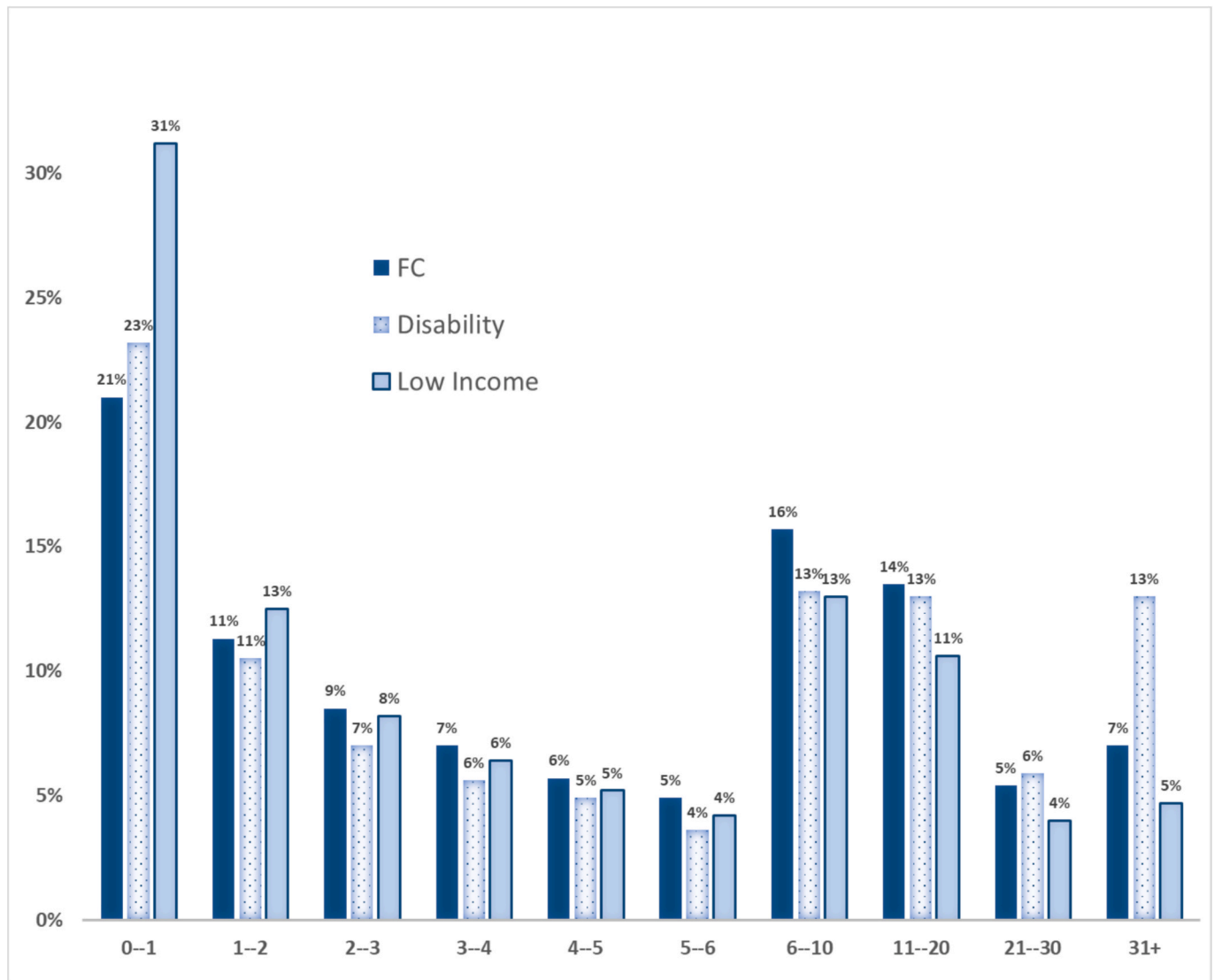
### 3.2. Mental healthcare utilization

Table 2 summarizes MH service utilization among children with a primary MH diagnosis, stratified by Medicaid eligibility group. Children in FC had the highest rates of HBHS utilization: 29% received such services, compared with 15% of children with disabilities and 10% of children in the low-income group. Utilization of specific HBHS also differed substantially across groups. Among children in FC, 51% received individual psychotherapy and 48% received diagnostic services, compared with 7% and 26% of children with disabilities and 9% and 32% of children in the low-income group, respectively. In contrast, respite services were almost never utilized by children in FC ( $< 0.1\%$ ) but were frequently utilized among children with disabilities (21%) and children in the low-income group (22%).

Among HBHS users, children in FC and those with disabilities had higher average visit volumes than children in the low-income group (Fig. 1). Over the three-year study period, 31% of children in the low-income group had one visit or fewer, compared with 23% of children with disabilities and 21% of children in FC. At the higher end of the distribution, 34% of children in FC had more than eight visits, compared with 25% of children in the low-income group and 39% of children with disabilities.

Children in FC had higher utilization across all outpatient MH settings compared with the other groups, with the exception of school-based services. Only 8% of children in FC received school-based MH services, compared with 15% of children with disabilities and 9% of children in the low-income group, suggesting potential missed opportunities for school-based support. Office visits were the most common outpatient MH setting across all groups, with more than 70% of children in each group receiving at least one MH-related office visit during the study period.

Children in FC were also more likely to receive MH care in restrictive settings. Six percent had inpatient stays, compared with 4% of children



**Fig. 1. Distribution of children by average number of HBHS visits over the full 2010–2012 sample period.** Notes: The figure shows, by eligibility group, the share of children whose mean number of HBHS visits over the entire sample period falls into each visit-frequency category. The sample is restricted to children with ≥1 HBHS visit in at least one observed year; because the mean is averaged across years, values can fall between zero and one if services were received in only some years.

with disabilities and 2% of children in the low-income group. Two percent received care in psychiatric residential treatment centers, compared with 0.4% and 0.1% in the disability and low-income groups, respectively. Children in FC also had the highest proportion of psychiatric hospitalizations lasting longer than 30 days (16% vs. 12% and 5%). Although their emergency department (ED) utilization was slightly lower than that of children with disabilities (11% vs. 12%), it remained higher than that of children in the low-income group (6%).

Medication utilization patterns were broadly similar between children in FC and those with disabilities, with both groups showing substantially higher use than children in the low-income group. ADHD medication was the most commonly prescribed across all groups (45% for FC, 49% for disability, 35% for low-income). Compared with children with disabilities, children in FC had slightly lower antipsychotic use (27% vs 29%) but higher SSRI use (21% vs 17%). Relative to children in the low-income group, children in FC were high utilizers of both classes: 27% vs 9% for antipsychotics and 21% vs 12% for SSRIs, which is roughly two- to threefold higher.

### 3.3. Factors associated with HBHS utilization

Table 3 presents adjusted odds ratios (aORs) from multivariable logistic regression models examining associations between sociodemographic and clinical characteristics and HBHS utilization among children with a primary MH diagnosis. Controlling for covariates, children in FC were significantly more likely (aOR = 2.68, 95% CI: 2.63–2.72) to utilize HBHS compared with children in the low-income group (reference group). Children with disabilities also had higher odds of HBHS utilization (aOR = 1.59, 95% CI: 1.56–1.62).

Because the associations estimated in the full cohort and the FC subgroup were directionally and substantively similar (Table 3), we describe subsequent analyses for the FC subgroup only to avoid redundancy. Clinical complexity, as indicated by number of MH diagnoses, was strongly associated with HBHS utilization among children in FC. Children with ≥ 5 diagnoses had more than twice the odds of HBHS utilization compared with those with only one diagnosis (aOR = 2.32, 95% CI: 1.99–2.71). Associations were consistently positive and statistically significant across increasing diagnosis counts.

Black and Hispanic children were more likely to use HBHS. Among

**Table 3**  
Multivariable models of HBHS use by children 3–18 years old with MH diagnosis, 2010–2012.

	All children (N = 1,397,565)			Children in FC (N = 128,180)				
	aOR	95% CI	P	aOR	95% CI	P		
<b>Eligibility (ref: low-income):</b>								
Child in FC	2.68	2.63	2.72	<.001				
Child with disabilities	1.59	1.56	1.62	<.001				
<b>N different MH diagnoses (ref: 1):</b>								
2	1.72	1.69	1.76	<.001	1.69	1.61	1.78	<.001
3	2.06	1.99	2.13	<.001	2.12	1.96	2.29	<.001
4	2.26	2.15	2.38	<.001	2.29	2.05	2.55	<.001
5+	2.43	2.27	2.61	<.001	2.32	1.99	2.71	<.001
<b>Age (ref: 3–5 years old):</b>								
6–11 years old	1.02	1.01	1.04	0.010	1.02	0.98	1.06	0.410
12–18 years old	0.86	0.84	0.88	<.001	0.84	0.82	0.86	<.001
<b>Race (ref: White):</b>								
Black	1.64	1.62	1.66	<.001	1.35	1.30	1.40	<.001
Hispanic	1.22	1.19	1.25	<.001	1.89	1.04	1.15	<.001
Other	0.95	0.93	0.97	<.001	0.89	0.84	0.93	<.001
<b>Sex (ref: female):</b>								
Male	1.08	1.05	1.11	<.001	1.01	0.98	1.04	0.572
<b>Years in sample</b>	1.11	1.08	1.14	<.001	0.98	0.95	1.01	0.145
<b>Residence (ref: metro):</b>								
Metro-area, commuting	0.91	0.89	0.93	<.001	0.85	0.81	0.90	<.001
Micropolitan area	0.99	0.97	1.01	0.273	0.90	0.85	0.94	<.001
Small town	1.19	1.16	1.22	0.194	0.97	0.91	1.03	0.284
Rural	1.26	1.21	1.30	0.010	1.07	0.95	1.19	0.258
<b>MH diagnoses:<sup>a</sup></b>								
Mood disorders	1.60	1.57	1.64	<.001	1.40	1.33	1.48	<.001
Autism/PDD	1.68	1.66	1.71	<.001	1.13	1.05	1.23	<.001
Anxiety disorders	1.10	1.08	1.13	<.001	1.13	1.08	1.19	<.001
Other psych. symptoms	1.34	1.32	1.37	<.001	0.86	0.79	0.92	<.001
Adjustment reaction	2.66	2.02	2.70	<.001	2.48	2.38	2.59	<.001
Unspecified depression	1.15	1.12	1.19	<.001	1.25	1.19	1.32	<.001
Disturb. of conduct	1.51	1.48	1.54	<.001	1.39	1.33	1.46	<.001
Disturb. of emotions	2.64	2.58	2.69	<.001	2.40	2.17	2.65	<.001
ADHD	2.08	2.06	2.10	<.001	1.03	0.98	1.08	0.222
Developmental Delays	0.61	0.60	0.62	<.001	0.73	0.69	0.77	<.001

**Notes:** All models include county-level controls and state FEs. Robust standard errors are reported.

<sup>a</sup> Regression models include MH diagnoses that accounted for at least 5% of the population. Diagnosis labels have been shortened for space and readability.

children in FC, Black children had 35% higher odds and Hispanic children 89% higher odds of HBHS use than White children. Other socio-demographic factors had more modest effects. Compared to children aged 3–5 years, those aged 12–18 were less likely to use HBHS (aOR = 0.84; 95% CI: 0.82–0.86). Sex was not statistically significant in the FC subsample (males: aOR = 1.01; 95% CI: 0.98–1.04).

Specific diagnoses were also associated with HBHS utilization. Adjustment reaction (ICD-9: 309), the most common diagnosis among children in FC, was strongly associated (aOR = 2.48, 95% CI: 2.38–2.59). Emotional disturbance (ICD-9: 313), although less prevalent, showed an association of similar magnitude (aOR = 2.40, 95% CI: 2.17–2.65). By contrast, ADHD, the second most common diagnosis in FC, was not significantly associated with HBHS utilization (aOR = 1.03, 95% CI: 0.98–1.08).

### 3.4. Association between HBHS utilization and other MH services among children in FC

Table 4a shows unconditional and conditional estimates of the associations between HBHS utilization in the prior year and subsequent healthcare utilization among children in FC, controlling for clinical complexity, a full set of socio-demographic and Medicaid enrollment

related variables, as well as county-level characteristics and state fixed effects. The conditional models represent our preferred specification.

HBHS utilization was associated with significantly lower odds of subsequent hospitalization (aOR = 0.82, 95% CI: 0.76–0.88,  $p < 0.001$ ). Reductions were largest for hospitalizations lasting 8–30 days, the most common duration among children in FC (aOR = 0.77, 95% CI: 0.69–0.86,  $p < 0.001$ ). ED utilization was also significantly lower among HBHS users (aOR = 0.75, 95% CI: 0.71–0.80,  $p < 0.001$ ), suggesting HBHS may help prevent acute or crisis-related care.

HBHS utilization was positively associated with school-based MH services (aOR = 1.47, 95% CI: 1.36–1.60,  $p < 0.001$ ), potentially reflecting improved school engagement among HBHS users. Conversely, HBHS use was negatively associated with community mental health center utilization (aOR = 0.79, 95% CI: 0.74–0.86,  $p < 0.001$ ), consistent with HBHS serving as an alternative to clinic-based outpatient care. No significant association was observed with psychiatric residential treatment centers.

Regarding medications, HBHS utilization was associated with significantly reduced odds of newly observed prescriptions (defined as no such prescription in the prior year) for antipsychotics (aOR = 0.76, 95% CI: 0.71–0.80,  $p < 0.001$ ), SSRIs (aOR = 0.80, 95% CI: 0.76–0.84,  $p < 0.001$ ), and ADHD medications (aOR = 0.77, 95% CI: 0.73–0.81,  $p <$

**Table 4a**  
Associations between HBHS utilization in the past year and other types of healthcare use in the current year in children in FC population (28 states).

	Unconditional			Conditional				
	aOR	95% CI	P	aOR	95% CI	P		
<b>Inpatient hospital stays &amp; ED visits</b>								
All hospitalizations:	0.89	0.83	0.95	<.001	0.82	0.76	0.88	<.001
Total N days in hospital:								
Up to 1	0.91	0.59	1.39	0.654	0.87	0.55	1.40	0.580
2-3 days	0.89	0.73	1.08	0.241	0.85	0.68	1.06	0.150
4-7 days	0.94	0.84	1.04	0.240	0.90	0.80	1.02	0.100
8-30 days	0.87	0.79	0.95	<.005	0.77	0.69	0.86	<.001
more than 30 days	0.95	0.79	1.14	0.556	0.89	0.70	1.14	0.360
ED or Urgent care visits	0.85	0.80	0.89	<.001	0.75	0.71	0.80	<.001
<b>Outpatient visits</b>								
Community MH center	1.08	1.03	1.14	<.001	0.79	0.74	0.86	<.001
Psychiatric residential treatm. center	1.00	0.91	1.10	0.955	0.92	0.81	1.05	0.210
School-based services	1.96	1.85	2.08	<.001	1.47	1.36	1.60	<.001
<b>1 + Rx</b>								
Antipsychotics	1.15	1.11	1.19	<.001	0.76	0.71	0.80	<.001
SSRIs	0.99	0.95	1.02	0.440	0.80	0.76	0.84	<.001
ADHD	1.03	1.00	1.07	<.005	0.77	0.73	0.81	<.001

**Notes:** The table shows coefficients on HBHS from multivariate logistic regressions, conditional and unconditional on each outcome of interest. Conditional specifications estimate the effects of HBHS in the previous year on the outcome in the current year, conditional on no incidence of each respective outcome in the previous year. All models include a full set of socio-demographic and Medicaid enrollment related controls, as well as county-level controls and state FEs. Robust standard errors are reported.

0.001). These findings suggest that HBHS may help manage behavioral health needs in ways that reduce the need for newly initiating or reinitiating pharmacologic treatment.

Because our analysis includes a longitudinal component, changes in state Medicaid programs during the study period could confound estimates of the association between HBHS and other MH service use. A key policy change during this time was shifts in payment models, most commonly from fee-for-service (FFS) to managed care. Seven states in our sample experienced such changes: CT, KY, LA, NE, OH, TX, and VA. For example, Kentucky implemented mandatory managed care enrollment beginning in November 2011, whereas Connecticut transitioned from managed care to FFS in 2012. These shifts could have affected both

data reporting processes and completeness and utilization patterns.

To assess whether our findings were driven by these payment model changes, we conducted two sensitivity analyses. First, we excluded only the specific state-years directly affected by the transitions. For example, because Kentucky’s shift to mandatory managed care was fully implemented in 2012 and Connecticut’s transition from managed care to fee-for-service also occurred in 2012, only calendar year 2012 was excluded for those two states in the state-year analysis, while other years for KY and CT remained in the sample. Second, more conservatively, we excluded all seven states that experienced payment model transitions during the study period.

Results were substantively unchanged across both approaches. Effect

**Table 4b**  
Associations between HBHS utilization in the past year and other types of healthcare use in the current year in children in FC population; sensitivity analysis.

	Unconditional			Conditional				
	aOR	95% CI	P	aOR	95% CI	P		
<b>Inpatient hospital stays &amp; ED visits</b>								
All hospitalizations:	0.92	0.86	0.99	0.027	0.85	0.78	0.92	<.001
Total N days in hospital:								
Up to 1	1.03	0.67	1.60	0.882	1.00	0.62	1.63	0.996
2-3 days	0.92	0.74	1.14	0.448	0.88	0.69	1.13	0.317
4-7 days	0.97	0.87	1.09	0.622	0.93	0.81	1.06	0.265
8-30 days	0.90	0.82	1.00	0.043	0.79	0.70	0.89	<.001
more than 30 days	0.96	0.80	1.17	0.700	0.93	0.73	1.19	0.573
ED or Urgent care visits	0.90	0.85	0.96	<.001	0.78	0.73	0.84	<.001
<b>Outpatient visits</b>								
Community MH center	1.04	0.99	1.10	0.113	0.75	0.70	0.82	<.001
Psychiatric residential treatm. center	1.00	0.89	1.12	0.953	0.96	0.82	1.11	0.548
School-based services	1.85	1.75	1.97	<.001	1.44	1.33	1.57	<.001
<b>1 + Rx</b>								
Antipsychotics	1.15	1.11	1.20	<.001	0.75	0.70	0.80	<.001
SSRIs	1.01	0.98	1.05	0.489	0.83	0.78	0.88	<.001
ADHD	1.04	1.00	1.08	0.026	0.78	0.73	0.83	<.001

**Notes:** The table shows coefficients on HBHS from multivariate logistic regressions, conditional and unconditional on each outcome of interest in state-years that did not experience significant shifts in payment system. Conditional specifications estimate the effects of HBHS in the previous year on the outcome in the current year, conditional on no incidence of each respective outcome in the previous year. All models include a full set of socio-demographic and Medicaid enrollment related controls, as well as county-level controls and state FEs. Robust standard errors are reported.

sizes were nearly identical to the main estimates, though less precise due to the reduced sample size. [Table 4b](#) presents results from the state-year exclusion analysis using the full sample framework; additional sensitivity results are available upon request.

#### 4. Discussion

In this extensive 28-state analysis of Medicaid claims, we characterized HBHS utilization among children in FC and examined how HBHS use relates to other types of MH care. Children in FC were more likely than those with disability- or income-based eligibility to utilize HBHS, even after adjustment for demographic and clinical characteristics. HBHS utilization was also more common among children with greater diagnostic complexity and among Black and Hispanic children. HBHS were frequently used in combination with other MH services such as individual and group therapy. Moreover, children in FC accessed MH services across the continuum of care, with HBHS serving as one component alongside outpatient therapies as well as more intensive, restrictive settings. Importantly, HBHS use was associated with decreased initiation of psychotropic medications, which tend to be overprescribed in the FC population, ([Keefe, 2021](#); [Zima et al., 2005](#)) and decreased use of more acute and costly care (i.e., ED visits, prolonged hospitalizations).

Our adjusted analyses confirmed that children in FC had higher overall MH service utilization, consistent with prior literature. ([Pires et al., 2018](#)) Nearly one-third of children in FC with MH diagnoses received HBHS, compared with substantially lower rates in other Medicaid populations. After accounting for demographic and clinical characteristics, children in FC were more than 2.6 times as likely to utilize HBHS as children in the low-income group. These findings align with prior studies documenting elevated MH needs among children in FC. ([Pires et al., 2018](#); [Cummings et al., 2022](#)) It may also suggest that contact with child welfare and out-of-home placement facilitates access to MH services, as staff in these systems are expected to understand the full range of Medicaid-reimbursable services including HBHS. ([Leslie et al., 2005](#); [Laukkanen et al., 2013](#); [Horwitz et al., 2012](#)).

Contrary to prior studies showing that Black and Hispanic children face greater barriers to MH service access than White children ([Horwitz et al., 2012](#); [Gudiño et al., 2012](#); [Garland et al., 2000](#); [Wells et al., 2009](#)), our findings show that this was not the case for HBHS use among children in FC. Black children enrolled in Medicaid with MH diagnoses were 1.6 times as likely to utilize HBHS as White children, and Hispanic children were 1.2 times as likely. Among children in FC specifically, Black children were 1.4 times and Hispanic children 1.9 times more likely to utilize HBHS compared with White children. One possible explanation is differential referral patterns by diagnosis or symptom presentation. Externalizing behaviors, which may be more likely to prompt HBHS referrals, are also more subject to racial bias in perception and diagnostic labeling ([Gudiño et al., 2012](#)). In our study, the diagnostic category most strongly associated with HBHS utilization was emotional disturbance, which includes oppositional defiant disorder, an externalizing condition. These findings underscore the need for further investigation into the role of implicit bias and structural differences in referral pathways.

As the home represents the least restrictive setting for MH care, one might expect HBHS to be more commonly utilized by children with lower clinical complexity. However, our adjusted regression models showed that children with a greater number of MH diagnoses were significantly more likely to receive HBHS. We recognize that number of diagnoses does not always equate with complexity, but rather could be due to mislabeling or surveillance bias ([Engler et al., 2022](#)). Nonetheless, our findings do highlight the role HBHS can play in treatment plans for children across a broad range of MH diagnoses and severity. Viewed along a continuum of MH care, HBHS may serve as an entry point, a step-down from inpatient or residential care, or one component within a broader individualized therapeutic plan.

Overall, the conditional models indicate that HBHS may play a protective role in preventing escalation to more intensive, restrictive, or pharmacologic forms of care for children in FC. Our results support prior literature on the benefits of HBHS by demonstrating that HBHS was associated with reduced odds of subsequent hospitalization, ED visits, and psychotropic medication initiation, suggesting that HBHS may help prevent escalation to more intensive, restrictive, or pharmacologic forms of care among children in FC. These findings align with the goal of delivering behavioral health support in the least restrictive setting. Future research is warranted to leverage causal designs to determine if HBHS can prevent the use of higher levels of care as well as using additional measures to more definitively estimate effectiveness and identify which components (e.g., service intensity or modality) drive these benefits.

This study has several limitations. Administrative claims data restrict our ability to assess service quality, appropriateness, or clinical effectiveness, and exclude services delivered outside Medicaid and outcomes beyond utilization. For example, as some states have shifted toward more decentralized foster care service delivery models, certain community-based or wraparound services may not be fully captured in Medicaid claims. Future research could examine differences along the continuum of centralized versus decentralized service delivery and how these models shape observed utilization patterns. Also, our claims-based measure of clinical complexity of behavioral health needs is an imperfect proxy for the underlying severity.

These data also only cover the pre-ACA period (2010–2012), similar to several recent pediatric studies that look at multistate Medicaid data across-eligibility groups ([Gondhi et al., 2020](#); [Corr et al., 2021](#); [Dounnik et al., 2021](#); [Fontanella et al., 2020](#)). Although the prevalence of diagnosed mental health conditions among youth has increased since our study period, our estimates reflect within-period associations, adjusting for individual sociodemographic characteristics, specific mental health diagnoses, and state fixed effects. Conceptually, our study population can be viewed as corresponding to a subset of children within today's broader population of youth with mental health conditions. Thus, while overall utilization levels may have shifted, the relationships between HBHS use and subsequent service utilization are likely to map onto a comparable subgroup in the current population, if not the full population. Despite the earlier time period, this available multi-state dataset offers unique advantages over the single-state studies that dominate FC literature. The large sample size enables more reliable estimation of factors driving HBHS use and, critically, a glimpse into how HBHS relates to other services, such as inpatient admissions, ED visits, and psychotropic medication use. Establishing these associations using complete, high-quality administrative data fills an important gap in the literature and provides a foundation for future work with newer cohorts.

#### 5. Conclusion

HBHS are widely utilized by children in FC and appear to reach a clinically complex and diverse population. Conditional analyses indicate that HBHS may reduce subsequent escalation to restrictive or pharmacologic care, including hospitalization and psychotropic medication use. These findings highlight the importance of HBHS within the MH service continuum for children in FC and suggest that expanding access to HBHS may be a promising strategy to reduce reliance on institutional care. Future research should evaluate the clinical effectiveness of specific HBHS models and identify best practices for integrating them into coordinated systems of care for vulnerable youth.

#### 6. Contributorships

[Dr. Anna Chorniy](#) conceptualized and designed the study, had full access to all the data in the study and takes responsibility for the integrity of the data in the study and the accuracy of the data analysis. She also critically reviewed and revised the manuscript, and approved

the final manuscript as submitted.

Michelle A. Moffa carried out the literature review, critically reviewed and revised the manuscript, and approved the final manuscript as submitted.

Dr. Shannon Barnett critically reviewed and revised the manuscript for important intellectual content, and approved the final manuscript as submitted.

Dr. Matthew M. Davis contributed to study design, critically reviewed and revised the manuscript for important intellectual content, and approved the final manuscript as submitted.

Dr. Rebecca R. Seltzer conceptualized and designed the study, drafted the initial manuscript, critically reviewed and revised the manuscript, and approved the final manuscript as submitted.

## Ethics statement

On October 3, 2021, the Johns Hopkins Medicine Institutional Review Board determined that this study does not constitute human subjects research (IRB00302492).

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chilyouth.2026.108891>.

## Data availability

Medicaid data used for these analyses are restricted-use, publicly available data obtained from the Centers for Medicare & Medicaid Services (CMS) under a data use agreement (DUA).

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