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Evaluating Readmission Rates for a Statewide In-Home Ecosystemic Family-Based Treatment Program for Youth with Serious Emotional Disturbance

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Abstract
Family Based Mental Health Services (FBMHS) with an embedded clinical model, Ecosystemic Structural Family Therapy, is an intervention designed for youth with a serious emotional disturbance (SED) who are at risk of out-of-home placement. The current evaluation examines the association between receipt of FBMHS and rates of out-of-home and community-based care during and after an episode of FBMHS. We identified 25,016 Medicaid-enrolled youth ages 3 to 17 years with receipt of a new FBMHS episode from 1/1/2015 to 6/30/2021. 14% of youth received out-of-home services. Rates of out-of-home service decreased during receipt of FBMHS (14.25–6.98%, $p < .0001$) and remained lower 6 months following discharge (to 6.95%, $p < .0001$). Short and longer doses of service were both associated with decreased rates of out-of-home services. FBMHS has been scaled across a large geographic area and is associated with lower rates of out-of-home placement for youth with SED.

Keywords Medicaid · Behavioral Health Managed Care · Ecosystemic Structural Family Therapy · Youth with SED, out of home Placement · Community Based in-home Treatment

Efforts to reduce repeated psychiatric hospitalizations, admissions to residential treatment facilities, and unsupported foster care placements rely on the development of effective family and community-based care options for children and youth presenting with serious behavioral health needs (Garland et al., 2013; Goldman et al., 2020). Since at least the mid-1980s (Knitzner, 1982; Stroul & Friedman, 1994), it has been a federal priority for United States (US) communities to offer a comprehensive array of services for families including community-based services. One type of community-based service holding considerable promise and proliferating across the country is intensive home-based treatment. Components of intensive home-based treatment include crisis response and safety planning, skill building with children and caregivers, trauma-informed approaches for cognitive and emotional support, resiliency support, and family systems therapy (Bruns et al., 2021). These programs are now implemented across all 50 US states. Although these intensive home-based treatment programs utilize different approaches, they all serve as a first line of intervention to support, stabilize, and treat children and adolescents with serious emotional and behavioral problems in their homes and community with a goal of reducing the risk of out of home placement (Bruns et al., 2021; Moffett et al., 2018). Despite the availability of community-based programs, youth may receive treatment in out-of-home placements (e.g., inpatient psychiatric hospital, residential treatment facilities), which is sometimes necessary, but can be costly and disruptive to youth and families.

A relatively recent review of randomized controlled trials by Moffett and colleagues (2018) highlights the limited

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number of published empirical findings on the efficacy of intensive home-based treatment for youth with serious emotional disturbances (SED) and their families, despite the widescale implementation of these programs across the US. The focus of this study is on a clinically oriented, in-home family treatment service. Therefore, studies related to short-term family preservation or crisis oriented home based programs such as Homebuilders (Littell & Schuerman, 2002) and Home-Based Crisis Intervention are not included. Our review of the literature, like Moffett et al. (2018), revealed a paucity of studies testing the efficacy of home-based family treatment programs targeting youth with SED. In contrast, there are more empirical studies available to support the efficacy of home-based family treatment approaches that target other populations, such as youth involved in the child welfare or juvenile justice systems. These approaches include Family Centered Treatment (Bright et al., 2017), Multi-Systemic Therapy (Vidal et al., 2017), and Functional Family Therapy (Sexton & Turner, 2011). Youth with SED are sometimes excluded from studies of these clinical approaches which focus on a defined clinical population. In part this is because youth with SED are a diverse group, with a wide range of diagnoses and clinical problems.

The experimental and quasi-experimental studies that do exist suggest that clinically focused intensive in-home family treatment approaches are promising and can be effective for youth with SED and their families (Moffett et al., 2018) with respect to cost, clinical, and service utilization outcomes, particularly from caregiver perspectives. The outcome of most interest in this study is the prevention of future out-of-home placement. In an experimental study of an intensive in-home approach using an adaptation of Multisystemic Therapy with enhanced crisis management (often referred to as MST-Psychiatric) that focused on preventing youth hospitalization, MST-Psychiatric was associated with reduced days in out of home care (Henggeler et al., 1999). Intensive in-home child and adolescent psychiatric service (IICAPS) has also been shown to be associated with lower inpatient and emergency department utilization in pre to post service comparisons (Adnopoz et al., 2012). Studies of intensive home-based models versus standard treatment have also found improved child functioning and reduced mental health symptoms. These include studies of Children's Psychosocial Rehabilitation (CPSR; Williams, 2009) and IICAPS (Barbot et al., 2016) and a family preservation program incorporating cognitive behavioral therapy (Wilmshurst, 2002).

In response to the need to develop intensive community-based care, Pennsylvania developed an intensive home-based level of care in 1985 within the Medicaid system, Family Based Mental Health Service (FBMHS). FBMHS is time-limited, 32-week, community-based, family-centered intervention that was designed for children and youth under the age of 21 diagnosed with a Serious Emotional Disturbance (SED) who are at risk of psychiatric hospitalization or out-of-home placement. Through this team-delivered service, FBMHS works with caregivers as partners to help families enhance relationships, reduce symptoms and level of distress, increase participation in community activities, and reduce the risk for psychiatric hospitalization, out of home placement, and other restrictive social services consistent with the National Institute of Mental Health's Child and Adolescent Service System Program (CASSP) philosophy (Lindblad-Goldberg et al., 2004). FBMHS is facilitated in Pennsylvania for Medicaid-enrolled youth in 43 of 67 counties by Community Care Behavioral Health Organization of the UPMC Insurance Services Division (Community Care; https://www.ccbh.com/), a not-for-profit behavioral health managed care organization (BHMCO). Careful attention has been paid to the scaling of FBMHS. In fact, over 4,000 youth in 42 of Pennsylvania's counties within Community Care's network at the time of this study received FBMHS each year in 2020 ($n = 4{,}371$) and 2021 ($n = 4{,}043$).

The clinical model used within FBMHS is Ecosystemic Structural Family Therapy (ESFT; Jones, 2019; Lindblad-Goldberg et al., 1998). ESFT is a trauma-informed model adapted from structural family therapy (Minuchin, 1974) for intensive, in-home family-based programs serving youth and families with complex needs. Grounded in systems theory, this clinical model assumes that what caregivers and their children feel, think, and do impact, and are impacted by, relationship patterns in the family. Six stages guide treatment, including: (1) constructing a therapeutic system, (2) stabilizing the child and family, (3) assessing pattern, (4) establishing a relational focus, 4) facilitating functional family relationships, and 6) solidifying change and preparing for discharge (Simms et al., 2021).

FBMHS was designed for and is part of the behavioral health system; as such, (a) it must be delivered by extensively trained behavioral health professionals; (b) it is funded by the PA Behavioral HealthChoices program, PA's Medicaid program (http://services.dpw.state.pa.us/oimpolicymanuals/ma/index.htm#t=309_Health_Care_Services_Benefits_for_Children%2F309_5_MA_Services_for_Children.htm); (c) it is regulated and routinely monitored by the BHMCO and state. Accordingly, there is a clearly defined clinical model and implementation plan. Youth may be eligible for Medicaid with household income at or above 133% of the federal poverty level for ages 6 to 18 years and 157% of the poverty level for youth ages 1 to 5 years (https://www.medicaid.gov/state-overviews/stateprofile.html?state=Pennsylvania). Rates

of insured Pennsylvanians have continuously increased. Pennsylvania's Behavioral HealthChoices program covers all mental health and substance use disorder services for US citizens residing in PA enrolled in Medicaid. As a result of this combination of health care access and full-service continuum, specialized services such as FBMHS exist in PA and serve families with financial and healthcare needs that may not be possible or similarly supported in other areas.

An initial evaluation of FBMHS by Pennsylvania's Children's Bureau of the Office of Mental Health and Substance Abuse Services including 1,968 youth and families over a study period from 1988 to 1995 indicated statistically significant improvements in youths' psychosocial functioning and family members' self-report of family functioning (Dore, 1995, 1996). At one-year post-treatment, families reported that gains were maintained on problems addressed and they continued to report high satisfaction with FBMHS. Few youths resided in out-of-home placements during the year. Since this initial evaluation, three case studies have been published highlighting the clinical utility of ESFT within FBMHS with fragile families (Jones, 2017), families with chronic medical issues (Simms & Hawkins, 2015) and with couples (Lindblad-Goldberg et al., 2010). An additional study found longer lengths of stay in FBMHS for caregivers experiencing adversity using archival data from a convenience sample (Byers et al., 2022).

While there has been considerable attention to documenting the practice-based evidence of the model (Lindblad-Goldberg & Northey, 2013), training standards, and statewide scalability, there is a lack of studies on effectiveness to understand if FBMHS is doing what it was intended to do – to provide effective care that keeps children and youth in their communities, rather than placing them in more intensive, restrictive, and costly inpatient and residential settings. Typically, once a youth has experienced an inpatient hospitalization, the likelihood of re-hospitalization is 20% within a year of discharge, with most readmissions occurring within three months (Edgcomb et al., 2019). The primary goal of FBMHS is to avoid out-of-home placements. Accordingly, the questions addressed in this study were: (1) to describe the youth who receive FBMHS in a large, geographically diverse area (urban, rural) as well as parameters of their treatment (e.g., amount, length), and (2) to compare the association between receipt of FBMHS and rates of community-based and residential care before, during, and after FBMHS. Based on prior research, it was expected that FBMHS would be associated upon discharge with higher rates of utilization of community-based services and lower rates of inpatient and residential care.

Methods

Participants

We identified Medicaid-enrolled youth ages 0–17 years receiving FBMHS between 1/1/2015 and 6/30/2021 who were new to the service defined as service initiated on or before 1/1/2015 and ended on or before 6/30/2021 with no FBMHS within 60 days prior. This time-period provided an adequate sample of youth in service spanning 6.5 years of current data while still allowing for 180 days of follow up and additional lag in claims processing at the time of evaluation.

Procedures

Eligibility

Youth who are eligible to receive FBMHS: (1) are under 21 years of age, (2) meet medical necessity criteria according to the Pennsylvania Department of Human Services as assessed by a physician, psychiatrist, licensed psychologist, or Certified Registered Nurse Practitioner, and (3) are eligible for Medicaid (Community Care Behavioral Health Organization, 2022). Youth who are appropriate for FBMHS often also meet the following criteria: (a) have a serious mental illness or emotional disturbance; (b) are at high risk for out-of-home placement; (c) are involved with multiple systems. At least one adult member of the family must agree to actively participate in the service. Currently, 58 provider organizations across Pennsylvania are contracted with Community Care to provide FBMHS service.

Structure

Treatment is intensive, involving multiple highly focused sessions each week with the child, caregivers, and family. Treatment is team delivered in the family home and community. The team may consist of two master's level clinicians, one master's level and one bachelor's level clinician, or one bachelor's level clinician with FBMHS certification and either a master's level or bachelor's level clinician. At least 60% of direct service time must be team delivered. Treatment length is expected to be 32 weeks but can be shorter or longer depending on family needs.

Content

FBMHS programs are expected to provide assessment, crisis planning and intervention (available 24 h per day, 7 days per week), therapy, and case management support (Community Care Behavioral Health Organization, 2022). Treatment

should address mental health and substance use disorders. Therapists coordinate care among multiple service agencies and facilitate collaborative home-school relationships. Components of treatment include that therapists must: (a) put safety and stability first, using collaboratively constructed safety plans and 24/7 on-call crisis availability; (b) attend to the intersection between the family's social location, their unique cultural norms, and values/beliefs to create a collaborative team; (c) empower caregivers as primary change agents; (d) facilitate enactments of new interactional patterns targeted for agreed-upon changes; (e) build on strengths, promote resilience, and contain blame; (f) build on and expand the family's naturally occurring resources within the community and extended family.

Implementation Across the State

Training Procedures

Training in FBMHS is conducted by three groups across Pennsylvania who provide a common curriculum: the Center for Family Based Training, Family Based Mental Health Training Institute at UPMC's Western Psychiatric Hospital, and the Philadelphia Child and Family Therapy Training Center. All FBMHS staff participate in an extensive, intensive three-year clinical training program with Ecosystemic Structural Family Therapy, which includes workshop-style days and individual presentation of clinical cases with videotapes three to four times each year. Extensive feedback is provided to clinicians on how to improve fidelity in delivery of the model and effectiveness. Quality control and assurance of fidelity to the clinical model in FBMHS are maintained through three interlocking levels of oversight. This involves local level clinical supervision in each FBMHS program, reviews of clinical work by subject matter experts from the state approved FBMHS training programs, and annual program audits by the state Office of Mental Health and Substance Abuse Services and BHMCOs. To maintain fidelity to the ESFT treatment model, supervisors are responsible for administering the FBMHS Treatment Adherence Scale to every child and family twice during treatment (two months and four months into treatment). The Treatment Adherence Scale is used as a clinical tool and is not routinely collected for evaluation/research questions.

Supervisors attend 30 h of supervision training each year with training faculty where they present videotapes of their therapists' clinical work and their supervision of it. Certification of therapists and supervisors requires completion of 285 h of ESFT training in addition to a rigorous evaluation of their clinical work by training faculty. They also must pass a certification exam administered by the state. To prevent drift, certified therapists must attend 30 h of booster training in ESFT each year if they are working in an FBMHS program. FBMHS provider agencies must provide 90 min of individual and team video-based supervision weekly, plus 90 min of group supervision.

Measures

Demographic data including age, gender, race, and ethnicity were received from Medicaid eligibility data from the Pennsylvania Department of Health and Human Services. Service utilization was derived from paid claims data from the BHMCO and defined as at least one paid claim in a service category. Diagnoses were obtained from paid service claims as designated by the service provider. A service claim may contain up to three diagnoses and are not indicated on the claim as primary, secondary, or tertiary diagnoses; thus, all diagnoses for a child during the study period were included. Services within the 6 months prior to the start of FBMHS, during the episode of FBMHS, and 6 months following the last claim for FBMHS are presented. A transition period was included when examining services during the episode of FBMHS such that concurrent services within the first 14 days of initiating FBMHS service were not included in the service counts.

Data Analyses

Descriptive statistics were used to report demographic characteristics, diagnoses, length of time in FBMHS, and the amount of service received for youth with a new FBMHS episode. Pearson chi-square test of significance was used to analyze behavioral health service utilization within group across the three time points with post-hoc pairwise comparisons adjusted for multiple comparisons using the Tukey-Kramer correction values. To examine the effect of amount of service received on service utilization outcomes, we utilized the SAS PROC GLIMMIX procedure with AR(1) covariance structure with Time and Group factors for youth with 32 weeks or less of FBMHS versus youth with 33 weeks or more of FBMHS. These categories were selected upon noticing that a substantial number of youth remain in service much longer than the recommended 32 weeks. Analyses were performed using SAS 9.4.

Results

Participants

During the study period, 25,119 youth received FBMHS. Given that there were few children under age three ($n = 103$)

and their characteristics were different than the remaining sample, they were excluded from analyses, leaving a total sample size of 25,016. The average age for youth was 11.62 years (± 3.79 years; range 3–17 years; Table 1). The age distribution of children receiving FBMHS (Fig. 1) shows that there is a trend for children to enter service in their teens and pre-teens, peaking at age 14 years. Characteristics of the sample are presented in Table 1. Half of the youth served were males (50.4%) and the majority were White race (78.6%) and non-Hispanic ethnicity (94.9%). The most common diagnoses for youth receiving FBMHS were Anxiety Disorder (49.9%), Adjustment Disorder (47.4%), Attention Deficit Hyperactivity Disorder (ADHD) (46.0%), Major Depressive Disorder (44.7%), and Conduct Disorder (38.9%).

Treatment Parameters

The total number of units of service received during the study period was 5,717,452. One unit is equal to 15 min of treatment, representing 1,429,363 h of service. Medians are reported given that data were skewed. The median number of units received during the study period was 80 (Q1 - Q3 range: 21–390) units or 20 (5.25–97.50) hours per youth. Median (Q1 - Q3) length in service was 20 (12–32) weeks. Almost one-quarter (22.56%) of youth received service beyond the recommended 32 weeks (Fig. 2). For those, the median (Q1 - Q3) number of units received was 354.50 (104–654) or 88.63 (26.00–163.50) hours and the median (Q1 - Q3) length in service was 44 (36–60) weeks. For youth whose length of stay was 32 weeks or less, the median (Q1 – Q3) number of units was 44 (16–287) or 11.00 (4.00

Table 1 Demographic characteristics of youth with a new FBMHS episode from 1/1/2015 to 6/30/2021 by length of time in service

Characteristic	0–32 weeks in treatment ($n=19,372$)	0–33 + weeks in treatment ($n=5,644$)	Total ($n=25,016$)		
	n (%)	n (%)	n (%)	*t-test*	*p*-value
Age (years at start; M (SD))	11.69 (3.81)	11.40 (3.70)	11.62 (3.79)	5.04	< 0.0001*
				X^2	*p*-value
Gender (male)	9,841 (50.8%)	2,770 (49.1%)	12,611 (50.4%)	5.18	0.0228*
Race				41.32	< 0.0001*
White	15,043 (77.7%)	4,608 (81.6%)	19,651 (78.6%)		
Black	2,566 (13.3%)	573 (10.2%)	3,139 (12.6%)		
Asian	138 (0.7%)	39 (0.7%)	177 (0.7%)		
Native American/Pacific Islander	84 (0.4%)	20 (0.4%)	104 (0.4%)		
Other	1,541 (8.0%)	404 (7.2%)	1,945 (7.8%)		
Ethnicity (non-Hispanic)	18,336 (94.7%)	5,397 (95.6%)	23,733 (94.8%)	8.48	0.0036*
Diagnosis[a]					
ADHD	8,596 (44.4%)	2,907 (51.5%)	11,503 (46.0	89.52	< 0.0001*
Alcohol Use Disorder	295 (1.5%)	78 (1.4%)	373 (1.5%)	0.59	0.4424
Opioid Use Disorder	122 (0.6%)	32 (0.6%)	154 (0.6%)	0.28	0.5956
Adjustment Disorder	9,042 (46.7%)	2,805 (49.7%)	11,847 (47.4%)	16.02	< 0.0001*
Anxiety Disorder	9,144 (47.2%)	3,329 (59.0%)	12,473 (49.9%)	242.64	< 0.0001*
Autism Spectrum Disorder	2,622 (13.5%)	1,121 (19.9%)	3,743 (15.0%)	137.50	< 0.0001*
Intellectual Disability	382 (2.0%)	173 (3.1%)	555 (2.2%)	24.08	< 0.0001*
Bipolar Disorder	1,974 (10.2%)	775 (13.7%)	2,749 (11.0%)	56.04	< 0.0001*
Depression	3,594 (18.6%)	1,315 (23.3%)	4,909 (19.6%)	62.43	< 0.0001*
Major Depression	8,305 (42.9%)	2,878 (51.0%)	11,183 (44.7%)	116.61	< 0.0001*
Conduct Disorder	7,291 (37.6%)	2,447 (43.4%)	9,738 (38.9%)	60.13	< 0.0001*
Eating Disorder	174 (0.9%)	65 (1.2%)	239 (1.0%)	2.97	0.0850
Schizophrenia	369 (1.9%)	121 (2.1%)	490 (2.0%)	1.30	0.2541
Oppositional Defiant Disorder	5,327 (27.5%)	1,833 (32.5%)	7,160 (28.6%)	53.03	< 0.0001*
Dual MH and SUD	1,355 (7.0%)	350 (6.2%)	1,705 (6.8%)	4.33	0.0374*
Other**	3,685 (19.02%)	1,449 (25.7%)	5,134 (20.5%)	118.53	< 0.0001*

[a] Diagnosis categories are not mutually exclusive; diagnoses occurring in < 1% of the sample were excluded from this table; degrees of freedom = 1

*$p < .05$; ** Other can include: Childhood disorder, Dementia, Developmental delays, Dissociative disorder, Factitious General med, Neurologic disorder, Organic mental disorder, Other non-organic psychotic disorder, Paranoid state disorder, Personality disorder, Psych med, Sexual disorder, Sleep disorder, Somatoform disorder, Eating disorder

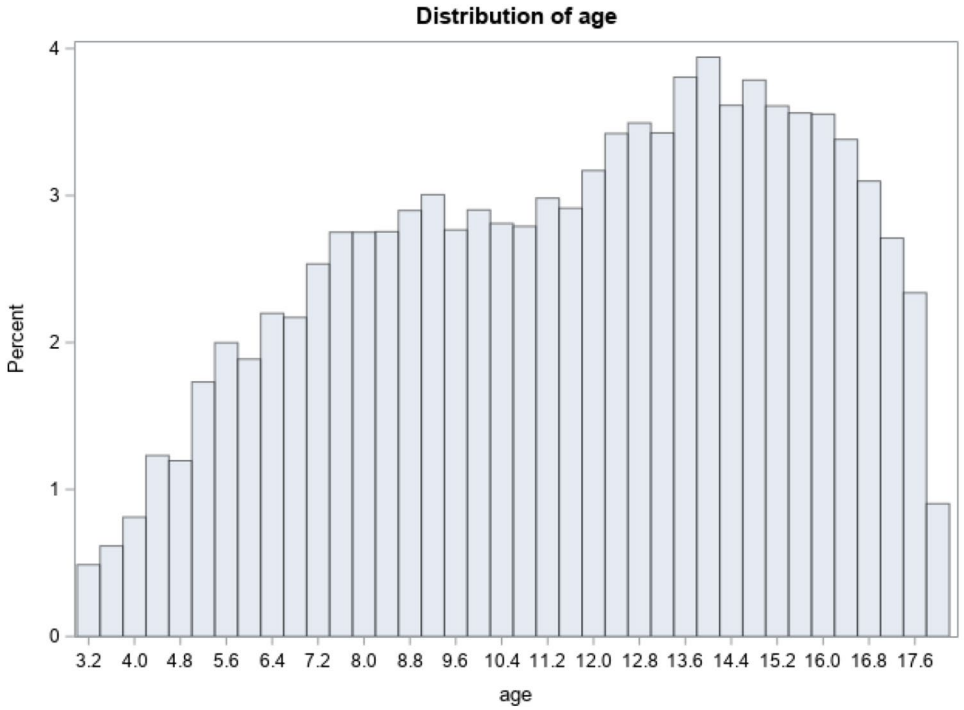

Fig. 1 Distribution of age

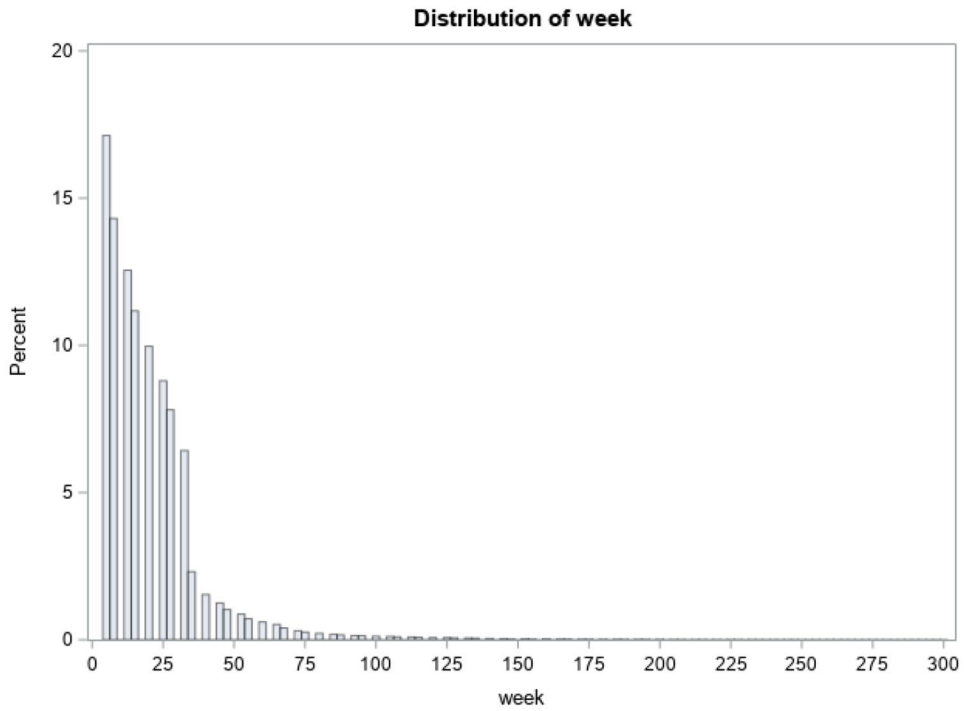

Fig. 2 Distribution of length of service (Weeks in Service)

to 71.75) hours, and median (Q1 – Q3) length in service was 16 (8–28) weeks, respectively.

Utilization of Behavioral Health Services over Time

Behavioral health service utilization is presented in Table 2. Significant changes over time were observed in utilization rates for any (composite) out-of-home, $X^2(2) = 986.30$, $p < .0001$, intensive community-based, X^2 $(2) = 2129.27$, $p < .0001$, and community-based services, $X^2(2) = 1843.62$, $p < .0001$.

Table 2 Service utilization for youth receiving FBHMS during service and 6 months pre and post FBHMS ($N = 25{,}016$)

BH Service[a]	180 days prior		During		180 days post		Overall Test		Prior vs. during		During vs. post		Prior vs. post	
	\n	*%*	*n*	*%*	*n*	*%*	X^2	*p-value*	*z-value*	*Adj p-value*	*z-value*	*Adj p-value*	*z-value*	*Adj p-value*
Out-of-Home Placements														
Inpatient Mental Health	3,038	12.14%	1,521	6.08%	1,234	4.93%	1004.29	< 0.0001*	23.14	< 0.0001*	5.62	< 0.0001*	27.97	< 0.0001*
PRTF	709	2.83%	426	1.70%	701	2.80%	92.43	< 0.0001*	8.41	< 0.0001*	8.20	< 0.0001*	0.22	0.9746
Non-Hospital SUD WM	1	0.00%	1	0.00%	1	0.00%	0.00	0.9999(F)	0.00	0.9999 (F)	0.00	0.9999(F)	0.00	0.9999(F)
Non-Hospital SUD Rehab	58	0.23%	28	0.11%	80	0.32%	26.35	< 0.0001*	3.17	0.0044*	4.79	< 0.0001*	1.87	0.1482
Composite	3,566	14.25%	1,747	6.98%	1,738	6.95%	986.30	< 0.0001*	25.89	< 0.0001*	0.16	0.9863	26.03	< 0.0001*
Intensive Community-Based Services														
Crisis	4,057	16.22%	1,505	6.02%	1,446	5.78%	1967.09	< 0.0001*	34.97	< 0.0001*	1.12	0.5020	35.83	< 0.0001*
Partial Hospitalization	2,530	10.11%	1,327	5.30%	1,041	4.16%	782.89	< 0.0001*	19.84	< 0.0001*	6.01	< 0.0001*	25.07	< 0.0001*
SUD Partial Hospitalization	8	0.03%	4	0.02%	2	0.01%	4.00	0.1353	1.13	0.4943	0.80	0.7028	1.75	0.1854
Community Res Respite	105	0.42%	68	0.27%	109	0.44%	11.52	0.0043*	2.80	0.0143*	3.06	0.0063*	0.27	0.9595
Composite	5,624	22.48%	2,596	10.38%	2,303	9.21%	2129.27	< 0.0001*	35.76	< 0.0001*	4.41	< 0.0001*	39.51	< 0.0001*
Community-Based Services														
Outpatient Mental Health	13,175	52.67%	7,617	30.45%	8,745	34.96%	2872.53	< 0.0001*	49.91	< 0.0001*	10.74	< 0.0001*	39.68	< 0.0001*
Outpatient SUD	1,196	4.78%	691	2.76%	755	3.02%	170.70	< 0.0001*	11.71	< 0.0001*	1.71	0.2024	10.10	< 0.0001*
BHRS[c] Wraparound	3,764	15.05%	1,537	6.14%	2,718	10.87%	1077.44	< 0.0001*	31.38	< 0.0001*	18.69	< 0.0001*	13.87	< 0.0001*
Case Management	3,697	14.78%	3,302	13.20%	3,467	13.86%	26.16	< 0.0001*	5.09	< 0.0001	2.16	0.0788	2.94	0.0093*
Peer Support	24	0.10%	23	0.09%	25	0.10%	0.08	0.9592	0.15	0.9883	0.29	0.9551	0.14	0.9888
Psych Rehab	5	0.02%	5	0.02%	6	0.02%	0.12	0.9394	0.00	0.9999	0.30	0.9512	0.30	0.9512
Composite	14,032	56.09%	9,400	37.58%	10,696	42.76%	1843.62	< 0.0001*	41.24	< 0.0001*	11.81	< 0.0001*	29.73	< 0.0001

[a] Services utilized by < 1% of youth (Community Residential Rehabilitation Host Home, substance use disorder partial hospital, rehabilitation, peer support, psychiatric rehabilitation) were excluded from this table

(F) = Fisher's Exact Test; degrees of freedom = 2

BHRS = behavioral health rehabilitation service; SUD = substance use disorder; PRTF = Psychiatric Residential Treatment Facility for youth; WM = withdrawal management

*$p < .05$

Out-of-Home Services

A small but substantial portion of youth utilized any residential, out-of-home behavioral health services before FBMHS (14.25%). During the FBMHS episode of care, fewer youth utilized out-of-home residential services (6.98%, $z = 25.89$, $p < .0001$) compared to utilization before FBMHS. Following discharge, rates of out-of-home services remained steady (6.95%, $z = 0.16$, $p = .9863$). Specifically, a small portion of youth utilized inpatient mental health (12.14%) and psychiatric residential treatment facility (PRTF; 2.83%) before FBMHS initiation. Utilization was significantly lower during FBMHS for inpatient mental health (6.08%) and PRTF (1.70%), with continued decrease following discharge for inpatient mental health (4.93%) but rebounded for PRTF (2.80%). Utilization of inpatient mental health following discharge was significantly lower than utilization before initiation of FBMHS, $z = 27.97$, $p < .0001$.

Intensive Community-Based Services

22% of youth utilized any intensive community-based service before FBMHS, primarily crisis services (16.22%) and mental health partial hospitalization (10.11%). Utilization for any intensive community-based service was lower during FBMHS (10.38%, $z = 35.76$, $p < .0001$), and following discharge (9.21; $z = 39.51$, $p < .0001$) compared to these services used before FBMHS. Specifically, crisis and partial mental health hospitalization showed continued decreases over time.

Community-Based Services

A moderate number of youth utilized any community-based service (56.09%) before FBMHS; 52.66% utilized outpatient mental health services, 15.05% wraparound services for youth, 14.78% case management, and 4.78% outpatient SUD. Utilization of any community-based service was lower during FBMHS versus prior to FBMHS (37.58%, $z = 41.24$, $p < .0001$) including outpatient mental health, outpatient SUD, and wraparound. Following discharge, rates of community-based service were higher (42.76%, $z = 11.81$, $p < .0001$) than during FBMHS. Utilization of outpatient mental health increased as did case management, and wraparound. Utilization of any community-based service following discharge from FBMHS was lower than the rate prior to FBMHS ($z = 29.73$, $p < .0001$).

Examination of Length of Time in FBMHS Service

Further analyses compared youth with 32 or fewer weeks of FBMHS, versus youth with longer time in FBMHS utilizing an intent-to-treat design. As shown in Table 1, youth with 32 or fewer weeks of service versus youth with longer time in service were more likely to be male and varied in race, with lower rates of White race and higher rates of Black race. Youth with 32 or fewer weeks of service also had lower rates of non-Hispanic ethnicity. More diagnoses were reported at a higher rate for youth with longer time in service including the most reported diagnoses of Adjustment Disorder, ADHD, Major Depressive Disorder, Conduct Disorder, and Oppositional Defiant Disorder.

Tables of service utilization are presented separately for both groups (Tables 3 and 4). Both groups reported lower rates of out-of-home and intensive community-based service during FBMHS compared to before FBMHS. For youth with 32 or fewer weeks in FBMHS, utilization of inpatient mental health and PRTF were lower during FBMHS. Rates of PRTF utilization following discharge compared to during FBMHS were higher while rates of inpatient mental health remained lower following discharge from FBMHS. For intensive community-based services such as crisis and partial hospitalization, utilization rates of both services were lower during FBMHS and remained lower following discharge from FBMHS compared to rates before FBMHS. Rates of crisis service were higher following discharge from FBMHS while rates of partial hospitalization continued to decrease.

Connection to other community-based services was lower during and following FBMHS versus prior to FBMHS for outpatient mental health, outpatient SUD, and BHRS Wraparound. Rates for all three services were higher following discharge from FBMHS. For youth with less than 32 weeks of service, utilization of case management was lower during FBMHS versus prior to FBMHS, but utilization following discharge was similar to rates prior to FBMHS.

Youth with greater than 32 weeks of FBMHS continued to use inpatient mental health during FBMHS but had lower rates of inpatient versus before and during FBMHS and lower PRTF following discharge versus before FBMHS. Rates of intensive community-based services such as crisis and partial hospitalization also decreased across measurement points. Rates of other community-based services declined across measurement points, specifically outpatient mental health, outpatient SUD, and BHRS Wraparound. Case management service utilization was lower following discharge from FBMHS compared with rates prior to FBMHS.

Examination of Amount of FBMHS Received by Length of Time in Service

Mixed model results were produced for each service category (Table 5). For out-of-home, intensive, and other

Table 3 Service Utilization During Service and 6 Months Pre and Post FBMHS among Youth Receiving FBMHS for 0–32 Weeks ($N = 19,372$)

BH Service	180 days prior	During	180 days post	Overall Test		Prior vs. during		During vs. post		Prior vs. post	
	n (%)	n (%)	n (%)	X^2	*p*-value	*z-value*	*Adj p*-value	*z-value*	*Adj p*-value	*z-value*	*Adj p*-value
			Out-of-Home Placements								
Inpatient Mental Health	2,315 (11.95%)	854 (4.41%)	922 (4.76%)	1005.48	< 0.0001*	26.06	< 0.0001*	1.65	0.2242	24.75	< 0.0001*
PRTF	503 (2.60%)	285 (1.47%)	547 (2.82%)	97.12	< 0.0001*	7.74	< 0.0001*	9.02	< 0.0001*	1.38	0.3534
Non-Hospital SUD WM	1 (0.01%)	1 (0.01%)	0 (0.00%)	1.62	0.6065	0.00	0.9999(F)	1.41	0.9999(F)	1.41	0.9999(F)
Non-Hospital SUD Rehab	49 (0.25%)	20 (0.10%)	69 (0.36%)	28.89	< 0.0001*	3.38	0.0021*	4.88	< 0.0001*	1.84	0.1582
Composite	2,695 (13.91%)	1,017 (5.25%)	1,322 (6.82%)	995.88	< 0.0001*	27.93	< 0.0001*	6.49	< 0.0001*	22.45	< 0.0001*
			Intensive Community-Based Services								
Crisis	2,874 (14.84%)	836 (4.32%)	1,078 (5.56%)	1594.99	< 0.0001*	33.18	< 0.0001*	5.66	< 0.0001*	29.06	< 0.0001*
Partial Hospitalization	1,807 (9.33%)	856 (4.42%)	765 (3.95%)	584.66	< 0.0001*	18.69	< 0.0001*	2.31	0.0547	20.66	< 0.0001*
SUD Partial Hospitalization	7 (0.04%)	3 (0.02%)	2 (0.01%)	3.34	0.1737	1.23	0.4366	1.56	0.8970	0.44	0.2620
Community Res Respite	66 (0.34%)	38 (0.20%)	75 (0.39%)	13.37	0.0019*	2.71	0.0182*	3.42	0.0018*	0.76	0.7283
Composite	4,023 (20.77%)	1,571 (8.11%)	1,696 (8.75%)	1694.88	< 0.0001*	34.31	< 0.0001*	2.28	0.0579	32.43	< 0.0001*
			Community-Based Services								
Outpatient Mental Health	9,543 (49.26%)	4,870 (25.14%)	6,589 (34.01%)	2503.03	< 0.0001*	48.42	< 0.0001*	19.08	< 0.0001*	30.31	< 0.0001*
Outpatient SUD	855 (4.41%)	450 (2.32%)	598 (3.09%)	135.43	< 0.0001*	11.22	< 0.0001*	4.62	< 0.0001*	6.84	< 0.0001*
BHRS Wraparound	2,553 (13.18%)	933 (4.82%)	1,878 (9.69%)	864.48	< 0.0001*	27.66	< 0.0001*	18.16	< 0.0001*	10.74	< 0.0001*
Case Management	2,505 (12.93%)	2,165 (11.18%)	2,381 (12.29%)	28.85	< 0.0001*	5.30	< 0.0001*	3.41	0.0019*	1.90	0.1394
Peer Support	14 (0.07%)	13 (0.07%)	17 (0.09%)	0.58	0.7440	0.19	0.9798	0.73	0.7466	0.54	0.8525
Psych Rehab	3 (0.02%)	3 (0.02%)	2 (0.01%)	0.26	0.8825	0.00	0.9999(F)	0.44	0.8970	0.44	0.8970
Composite	10,223 (52.77%)	6,295 (32.50%)	7,964 (41.11%)	1653.25	< 0.0001*	40.03	< 0.0001*	17.55	< 0.0001*	22.94	< 0.0001*

(F) = Fisher's Exact Test; degrees of freedom = 2

BHRS = behavioral health rehabilitation service; SUD = substance use disorder; PRTF = Psychiatric Residential Treatment Facility for youth; WM = withdrawal management

*$p < .05$

Table 4 Service utilization during service and 6 months pre and post FBMHS among youth receiving FBMHS for greater than 32 weeks ($N = 5{,}644$)

BH Service	180 days prior	During	180 days post	Overall Test		Prior vs. during		During vs. post		Prior vs. post	
	n (%)	n (%)	n (%)	X^2	*p*-value	*z-value*	*Adj p*-value	*z-value*	*Adj p*-value	*z-value*	*Adj p*-value
		Out-of-Home Placements									
Inpatient Mental Health	723 (12.81%)	667 (11.82%)	312 (5.53%)	212.81	< 0.0001*	1.60	0.2440	11.61	< 0.0001*	13.05	< 0.0001*
PRTF	206 (3.65%)	141 (2.50%)	154 (2.73%)	14.22	0.0008*	3.52	0.0012*	0.77	0.7235	2.78	0.0152*
Non-Hospital SUD WM	0 (0.00%)	0 (0.00%)	1 (0.02%)	2.20	0.3679	0.00	---0.9999(F)	0.00	0.3173(F)	0.00	0.3173(F)
Non-Hospital SUD Rehab	9 (0.16%)	8 (0.14%)	11 (0.19%)	0.49	0.7785	0.24	0.9681	0.69	0.7717	0.45	0.8958
Composite	871 (15.43%)	730 (12.93%)	416 (7.37%)	193.42	< 0.0001*	3.80	0.0004*	9.67	< 0.0001*	13.20	< 0.0001*
		Intensive Community-Based Services									
Crisis	1,183 (20.96%)	669 (11.85%)	368 (6.52%)	530.76	< 0.0001*	12.91	< 0.0001*	9.68	< 0.0001*	21.18	< 0.0001*
Partial	723 (12.81%)	471 (8.35%)	276 (4.89%)	227.93	< 0.0001*	7.66	< 0.0001*	7.40	< 0.0001*	14.29	< 0.0001*
SUD Partial Hospitalization	1 (0.02%)	1 (0.02%)	0 (0.00%)	1.62	0.6065	0.00	---0.9999(F)	1.42	0.3173(F)	1.42	0.3173(F)
Community Res Respite	39 (0.69%)	30 (0.53%)	34 (0.60%)	1.19	0.5511	1.08	0.5242	0.50	0.8708	0.59	0.8273
Composite	1,601 (28.37%)	1,025 (18.16%)	607 (10.75%)	577.81	< 0.0001*	12.75	< 0.0001*	11.08	< 0.0001*	22.82	< 0.0001*
		Community-Based Services									
Outpatient Mental Health	3,631 (64.33%)	2,747 (48.67%)	2,156 (38.20%)	790.65	< 0.0001*	16.71	< 0.0001*	11.20	< 0.0001*	27.45	< 0.0001*
Outpatient SUD	341 (6.04%)	241 (4.27%)	157 (2.78%)	72.94	< 0.0001*	4.24	< 0.0001*	4.26	< 0.0001*	8.23	< 0.0001*
BHRS Wraparound	1,211 (21.46%)	604 (10.70%)	840 (14.88%)	249.99	< 0.0001*	15.29	< 0.0001*	6.62	< 0.0001*	9.01	< 0.0001*
Case Management	1,192 (21.12%)	1,137 (20.15%)	1,086 (19.24%)	6.18	0.04548	1.28	0.4070	1.21	0.0449	2.49	0.0346*
Peer Support	10 (0.18%)	10 (0.18%)	8 (0.14%)	0.29	0.8667	0.00	0.9999(F)	0.47	0.8850	0.47	0.8850
Psych Rehab	2 (0.04%)	2 (0.04%)	4 (0.07%)	0.94	0.6064	0.00	---0.9999(F)	0.80	0.7026(F)	0.80	0.7026(F)
Composite	3,808 (67.47%)	3,105 (55.01%)	2,732 (48.41%)	436.91	< 0.0001*	13.54	< 0.0001*	7.02	< 0.0001*	20.37	< 0.0001*

(F) = Fisher's Exact Test; degrees of freedom = 2

BHRS = behavioral health rehabilitation service; SUD = substance use disorder; PRTF = Psychiatric Residential Treatment Facility for youth; WM = withdrawal management

*$p < .05$

Table 5 Linear mixed effects models

	Estimate	SE	DF	t-value	Adj Pr > |t| / Pr > F
Out-of-Home Placements					
Time (all groups)					< 0.0001*
180 days prior vs. During	0.0558	0.0025	50,028	22.34	< 0.0001*
180 days prior vs. 180 days post	0.0758	0.0029	50,028	26.06	< 0.0001*
During vs. 180 days post	0.0199	0.0025	50,028	7.99	< 0.0001*
Time (0–33 + group)					
180 pre vs. During	0.0250	0.0044	50,028	5.68	< 0.0001*
During vs. 180 days post	0.0556	0.0044	50,028	12.66	< 0.0001*
Time (0–32 group)					
180 pre vs. During	0.0866	0.0024	50,028	36.51	< 0.0001*
During vs. 180 days post	− 0.0157	0.0024	50,028	-6.64	< 0.0001*
Group (0–33 + vs. 0–32)	0.0325	0.0032	25,014	10.27	< 0.0001*
Group (0–33 + vs. 0–32) by time comparison					< 0.0001*
180 days prior	0.0152	0.0044	50,028	3.46	0.0072*
During	0.0768	0.0044	50,028	17.48	< 0.0001*
180 days post	0.0055	0.0044	50,028	1.24	0.8156
Intensive Community-Based Services					
Time (all groups)					< 0.0001*
180 days prior vs. During	0.1143	0.0026	50,028	44.79	< 0.0001*
180 days prior vs. 180 days post	0.1481	0.0031	50,028	47.08	< 0.0001*
During vs. 180 days post	0.0338	0.0026	50,028	13.24	< 0.0001*
Time (0–33 + group)					
180 pre vs. During	0.1021	0.0045	50,028	22.72	< 0.0001*
During vs. 180 days post	0.0741	0.0045	50,028	16.49	< 0.0001*
Time (0–32 group)					
180 pre vs. During	0.1266	0.0024	50,028	52.20	< 0.0001*
During vs. 180 days post	− 0.0065	0.0024	50,028	-2.66	0.0832
Group (0–33 + vs. 0–32)	0.0655	0.0041	25,014	15.93	< 0.0001*
Group (0–33 + vs. 0–32) by time comparison					< 0.0001*
180 days prior	0.0760	0.0052	50,028	14.60	< 0.0001*
During	0.1005	0.0052	50,028	19.31	< 0.0001*
180 days post	0.0200	0.0052	50,028	3.84	0.0001*
Community-Based Services					
Time (all groups)					< 0.0001*
180 days prior vs. During	0.1637	0.0033	50,028	50.22	< 0.0001*
180 days prior vs. 180 days post	0.1536	0.0041	50,028	37.13	< 0.0001*
During vs. 180 days post	− 0.0100	0.0033	50,028	-3.08	0.0021*
Time (0–33 + group)					
180 pre vs. During	0.1246	0.0057	50,028	21.72	< 0.0001*
During vs. 180 days post	0.0661	0.0057	50,028	11.52	< 0.0001*
Time (0–32 group)					
180 pre vs. During	0.2028	0.0031	50,028	65.50	< 0.0001*
During vs. 180 days post	− 0.0862	0.0031	50,028	-27.83	< 0.0001*
Group (0–33 + vs. 0–32)	0.1484	0.0061	25,014	24.18	< 0.0001*
Group (0–33 + vs. 0–32) by time comparison					< 0.0001*
180 days prior	0.1470	0.0074	50,028	19.87	< 0.0001*
During	0.2252	0.0074	50,028	30.45	< 0.0001*
180 days post	0.0730	0.0074	50,028	9.86	< 0.0001*

*$p < .05$; degrees of freedom = 2

community-based services, significant main effects of Group and Time were found. In general, service utilization decreased over time for both groups with rates at all time points higher in youth with greater than 32 weeks of service. Sharper declines in service utilization from before FBMHS to during FBMHS were observed in youth with greater than 32 weeks of service versus youth with fewer weeks of service, resulting in a significant Group X Time interaction. Utilization rates between groups following discharge from FBMHS were higher in youth with longer time in service but were comparable between groups, 7.37% vs. 6.82% out-of-home services, 10.75% vs. 8.75% intensive community-based services, and 48.41% vs. 41.11% community-based services.

Discussion

Youth receiving FBMHS had similar demographic characteristics to youth across the regions of the state from which this sample was obtained (https://www.census.gov/library/stories/state-by-state/pennsylvania-population-change-between-census-decade.html). Half the youth were male, and the majority were White race. Youth entered FBMHS at a range of ages, most often towards mid to late adolescence. Youth also had a wide variety of diagnoses; the five most common diagnoses included internalizing (Anxiety, Major Depressive Disorder), externalizing (Adjustment Disorder, Conduct Disorder), and neurodevelopmental conditions (ADHD). Taken together, these characteristics indicate that FBMHS serves a diverse population of youth at differing developmental stages with a wide variety of intensive clinical needs. Accordingly, the clinical model within FBMHS (ESFT), must be flexible, applicable to a wide variety of clinical conditions, and intensive enough to meet the needs of youth at risk of out of home placement. This is in contrast to evidence-based practices that have strict criteria for inclusion related to age and presenting concerns and is more in line with current evidence-based practices efforts that are transdiagnostic (Loevass et al., 2020) or focus on common elements (Barth et al., 2012) or family characteristics (Al et al., 2012).

Within the utilization data, it is understandable that utilization of services other than FBMHS during receipt of FBMHS would be small given that FBMHS is meant to serve as a health home for the family during receipt of services (SAMHSA, 2012). What is notable is that utilization rates for out-of-home services declined over time except PRTF, which were equivalent pre and post service. The most notable decline was in inpatient service utilization; 12% of youth experienced an inpatient hospitalization prior to FBMHS, while slightly less than 5% experienced an inpatient hospitalization 6 months (180 days) after being discharged from FBMHS. These results are consistent with (Moffett et al., 2018) yet slightly greater in magnitude (Adnopoz et al., 2012) to findings reported for other intensive home-based models. The primary goal of FBMHS is to avoid out-of-home placements. These data suggests that FBMHS with the embedded clinical family treatment model, Ecosystemic Structural Family Therapy, has accomplished that goal and is effective.

While out-of-home services decreased, so did the use of community-based services. Given the level of need within the population, that might be a concern. It also may reflect the tenets of the ESFT model that emphasize building and relying on natural supports to increase social integration and decrease reliance on other types of support that are in a paid role. Natural supports are "emotional or instrumental support clients receive on a non-professional basis from people they interact with in natural social settings, such as support from friends, family members, romantic partners, neighbors, spiritual counselors, landlords and others, as opposed to professional support which is support received from mental health service organizations and staff" (Tsai et al., 2012, p. 144).

Youth with longer lengths of stay and additional hours of service compared to youth with shorter lengths of stay and fewer hours of service seemed to be more clinically complex, as evidenced by higher rates of primary and concurrent diagnoses of Adjustment Disorder, ADHD, Major Depressive Disorder, Conduct Disorder, and Oppositional Defiant Disorder. The model is flexible and able to address the needs of youth with varying levels of high concerns by increasing the dosage of FBMHS.

Strengths and Limitations

The present study demonstrated several strengths including the size and longevity of effort as well as inclusion of administrative claims data from a BHMCO and state. It is also one of the first evaluations of a real-world, intensive family-based treatment with a clearly defined treatment model that has been scaled across a state encompassing a large geographic area, delivered over a long time, and serving a large number (over 4,000) of diverse youth each year. FBMHS, with its embedded trauma-informed family treatment clinical model, Ecosystemic Structural Family Therapy is unique to PA and is part of its larger continuum of care. The ability for an intensive, yet flexible, service for youth and families is possible due to the aspects of the behavioral health system in PA, and this larger context should be considered.

However, there also are several limitations that should be noted. The use of claims and administrative data limits the variables that could be included in analyses. It would have been ideal to have data on clinical outcomes reported by family members and youth, as well as data on family structure. However, that was not possible. While fidelity to ESFT within

FBMHS is monitored, fidelity data resulting from a systematic auditing process accessible to investigators were not available. Information about child involvement in the school or other community-based services is limited and could not be included in these analyses but might be impactful. For example, some residential services (e.g., therapeutic foster care) are funded by other child-serving systems so they would not be accounted for in this data set. Impact of FBMHS on all family members could not be assessed in the current study and results showing decreased psychiatric hospitalization in any family member reported in prior studies could not be validated (Lindblad-Goldberg et al., 2004). Finally, claims data are meant for billing purposes and while diagnoses should be accurate, there can be error in claims diagnostic data.

For this study, it was difficult to obtain a comparison condition. Youth were not randomized to condition because of the real-world conditions in which this study was completed. Other comparison conditions (e.g., other community-based child-oriented services, such as Wraparound and outpatient) were considered; however, these other community-based services are not as intensive, were designed for different groups, have different expectations for family involvement, and require different medical necessity guidelines to be met. Also, in comparing data, those populations were substantially different than the FBMHS sample. We also considered propensity score matching (Austin, 2011; Moffett et al., 2018; Wang, 2021); however, it was determined that the approach likely would not yield a fair comparison condition given that propensity score matching relies so heavily on baseline characteristics and there is a high degree of heterogeneity in the group of youth served by FBMHS.

Future Directions

Additional studies are needed to understand the clinical effectiveness of FBMHS and its clinical model, ESFT, as well as to replicate the findings of this study. Randomized controlled trials, the gold standard for drawing causal inferences, would be ideal. However, given the real-world nature of this work and that the model has already been implemented across a wide geographic area with over 4,000 youth per year receiving FBMHS, a robust evaluation using quasi-experimental methods including outcomes beyond service utilization that focus on the mental health of the child (e.g., clinical symptoms, functioning at home and school, and peer relationships) as well as family functioning (household structure, parent-child relationships, ability to de-escalate conflict and solve problems). Ongoing measurement of these important treatment outcomes would help to better understand meaningful benefits of the program on youth and their families as well as identify areas for further refinement and improvement from different stakeholder perspectives (e.g., youth, caregiver, clinician). Much could also be learned from studying the implementation of FBMHS as well as adaptations to the clinical model. For example, some clinical groups have adapted FBMHS to use it with specialty populations (e.g. Problematic Sexual Behavior). It would also be interesting to understand more about these model adaptations.

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Declarations

Ethics Approval All study activities were approved as quality improvement by the [blinded for review] Quality Review Committee.

Conflict of Interest The authors have no conflicts of interest to report.

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