

# **A Multi-site Study of Medicaid-funded Managed Care Versus Fee-for-Service Plans' Effects on Mental Health Service Utilization of Children With Severe Emotional Disturbance**

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## Abstract

*Although Medicaid-funded managed care arrangements are commonly used in the delivery of mental health and substance abuse services to low-income children and youth, little is known about the effectiveness of such efforts. This article examines differences in mental health services utilization between children and youth with severe emotional disturbance covered by Medicaid-funded managed care behavioral health plans and those covered by fee-for-service plans. Data are from a federally funded multi-site study. In multivariate analyses controlling for child and caregiver demographic and clinical factors, enrollment in a managed care behavioral health plan was associated with lower inpatient/residential, psychiatric medication, and nontraditional services utilization. No difference was found in outpatient services utilization. Medicaid-funded managed care behavioral health plans appear to reduce use of some types of mental health services, but it is important to address the question of whether low-income children's enrollment in such programs deprives them of needed services.*

## Introduction

In recent decades, Medicaid-funded managed care (MC) arrangements have been used to reduce the costs of treatment for mental health and substance abuse (SA) problems among low-income children and youth. However, few studies have addressed the effectiveness of such efforts in the public sector, especially whether MC helps reduce the use of more restrictive and expensive mental health services. The purpose of this analysis was to determine whether the service utilization of children and youth with severe emotional disturbance (SED) covered by Medicaid-funded managed behavioral healthcare plans differed significantly from that of low-income children covered under fee-for-service (FFS) plans.

## Review of the Literature

Writing in 2003, Hutchinson and Foster<sup>1</sup> noted that relatively little is known about the effects of introducing managed behavioral healthcare arrangements on the experiences of children with mental health and SA problems. This is especially the case among children receiving Medicaid-funded rather than privately-funded behavioral healthcare services. Following an exhaustive literature review of articles published as of November 2001, these authors identified only 8 studies that focused on MC for children with behavioral healthcare needs and included a non-MC comparison group. Along with these studies, the research that has been conducted has been confined to single rather than multiple state systems, has focused on only one MC waiver or set of contracts, and has typically involved relatively simple predictive models and types of analyses.

Attkisson and his colleagues<sup>2</sup> studied 3 California counties using managed behavioral health along with systems of care for children's mental health and SA disorders, and found reductions in all types of more costly, out-of-home placements, as well as lower per capita expenditures for group home placements. In Massachusetts, with a similar wraparound integrated system of care approach for children, MC savings were estimated at \$47 million, the largest share of savings coming from the SA treatment system by shifting from high-cost hospital-based detoxification care to a lower-cost community detoxification system.<sup>3</sup>

An evaluation of a Medicaid managed behavioral healthcare carve-out for a youth demonstration program in North Carolina found that the capitated system resulted in reductions in inpatient care and slowed growth in behavioral healthcare costs, compared to the existing Medicaid FFS system.<sup>4</sup> In studies of child and adolescent Medicaid enrollees in Colorado,<sup>5,6</sup> behavioral health inpatient utilization and costs were lower among children who were served in MC than those in FFS settings.

In a study of the first year of statewide MC in Massachusetts,<sup>7</sup> children's hospitalization rates declined by 7% as compared to rates in the pre-MC period. In another study of the effects of Medicaid

MC on decision making during emergency mental health screening of children in Massachusetts,<sup>8</sup> inpatient admissions decreased significantly after MC implementation for Medicaid-funded children as compared to the prior year, whereas no corresponding reduction was observed among those who were not covered by Medicaid. However, the total volume of screening episodes increased significantly during the year after MC implementation as compared to the year prior, and significant changes were noted in the pattern of dispositions following emergency screening. After MC implementation, the proportion of dispositions to the child's home decreased significantly whereas the proportion of dispositions to crisis stabilization settings increased significantly. Thus, an increased number of children received more restrictive and costly crisis services, rather than family care in their communities.

In research on a recently introduced utilization management program on patterns of medical care among children and youth,<sup>9</sup> adolescents with depression or alcohol/drug dependence accounted for a disproportionate share of reductions in inpatient utilization. Moreover, those admitted for inpatient mental healthcare, whose stay was restricted by concurrent review, were significantly more likely to be readmitted within 60 days after discharge. This latter finding led the authors to question the effects of cost-containment strategies on the quality of care received by children and youth, especially in the mental health area.

At the same time, some studies find significant variations in the impact of MC on inpatient utilization among different subgroups of children and youth with behavioral healthcare needs. For example, rates of inpatient admission actually increased significantly among children with the most serious mental illnesses in Massachusetts,<sup>10</sup> whereas, in Colorado, the largest reductions in inpatient use occurred among children in the juvenile justice and child welfare systems.<sup>6</sup> Moreover, reductions in inpatient use were sometimes accompanied by increases rather than decreases in outpatient mental health treatment, a phenomenon observed among children in North Carolina<sup>4</sup> and Massachusetts.<sup>11</sup> On the other hand, some studies find decreases in the utilization of outpatient treatment under MC,<sup>6</sup> or find increases in outpatient use only in certain settings, such as for-profit treatment centers.<sup>5</sup> Finally, some studies find that MC increases the use of "intermediate care" services,<sup>1</sup> defined as alternatives to both inpatient and traditional outpatient treatment. For example, both Burns et al<sup>4</sup> and Nicholson et al<sup>8</sup> found increased use of group homes and therapeutic foster care under MC.

### **Model tested in the analysis**

Given the relative lack of research and often-contradictory findings, the present analysis uses a multi-site design, focuses on MC arrangements in 4 different states, and applies a well-documented theoretical model to explore the effects of MC arrangements on Medicaid-funded children with mental health and SA difficulties. In this model, based on the Behavioral Model of Health Services Use,<sup>12</sup> characteristics of the sample population are thought of as predisposing, enabling, and need factors which, together with environmental factors, affect utilization behavior. Two major research questions guided the analysis. First, does the likelihood of utilization of behavioral health services vary according to whether the child receives services in a MC versus FFS setting? Second, does receipt of services under a MC arrangement decrease the likelihood of receiving more restrictive and expensive inpatient services while increasing the use of outpatient, medication, and nontraditional (ie, intermediate) community services? The following section describes the procedures used to address these questions.

## **Methods**

### **Study background**

Data come from the Substance Abuse and Mental Health Services Administration-funded Managed Behavioral Health Care in the Public Sector Study. Principal investigators (PIs) from 5 sites (Pennsylvania, New York, Ohio, Oregon, and Tennessee/Mississippi), a PI from the University of Illinois at Chicago (UIC) data Coordinating Center, and a consumer representative from the Federation

for Families comprised the study's Steering Committee (SC). The SC was charged with developing, administering, and overseeing the analysis of a common protocol (CP) of research instruments. At each site, Medicaid-eligible children with SED were enrolled in MC or FFS behavioral health plans. Interviews with the children's caregivers elicited information about services used by these children in the 6 months prior to study enrollment and during the period between enrollment (baseline) and 6-month followup, as well as the caregivers' ratings of the child's mental health status at baseline and followup.

### **Types of MC plans studied**

*Managed Care* is a general term for a set of strategies for controlling service utilization and cost, usually involving payment capitation. In behavioral health services, MC has often been implemented across systems of care, but in a variety of ways. Each of the 5 sites studied a somewhat unique form of MC. In rural southwestern Pennsylvania, behavioral health services were carved out, several MC organizations (MCOs) served the region and all were independent-practice associations. In Tennessee, the state's MC entity TennCare contracted with 12 MCOs to replace Medicaid FFS statewide; behavioral health services were carved out and provided through a number of behavioral health organizations. Oregon's MCO was the Greater Oregon Behavioral Health Inc, a single program serving 19 rural eastern and southern counties through a carve-out. In New York, children in Westchester County received Medicaid MC in which some services were carved out whereas others remained the responsibility of FFS Medicaid. In Ohio, MC services were integrated through Families and Children First, a pilot collaborative effort between major public child service systems, nonprofit agencies, the private sector, and state government for the most difficult-to-treat children in a single southern county; approximately 75% of those enrolled were Medicaid-eligible and served as the study population.

Sites varied according to the specifics of their MC arrangements regarding 5 basic characteristics: risk sharing, payor status, eligibility, enrollment choice, and covered services. Regarding risk sharing, private organizations assumed full risk at 3 of the study sites (Pennsylvania, New York, and Tennessee), whereas a private entity with a narrower risk corridor operated in Ohio, and a quasi-governmental organization assumed full risk in the fifth site (Oregon). Regarding payor, Medicaid was the sole funder in Oregon, Pennsylvania, and Tennessee, while in New York, MC was funded by 2 entities (the State Department of Health Office of Managed Care and the County Medicaid Managed Care Provider Relations Protocol), and MC in Ohio was funded by 6 separate sources (County Department of Human Services, County Mental Health Authority, County Mental Retardation/Developmental Disabilities [MR/DD], County Juvenile Justice, County SA, and Medicaid/third party and other County funds). Regarding the types of children who were covered by MC, Oregon covered all Medicaid-eligible children and adolescents; Pennsylvania covered the same group, excluding those in custody with the exception of children residing in foster care; New York covered children with SED, SA disorders, and those with MR/DD; Tennessee covered all Medicaid-eligible children and adolescents, uninsured children, and children at up to 200% of the federal poverty level; and Ohio covered the most frequent and most expensive service utilizers in the county. Regarding enrollment choice, MC was mandatory at 4 of the sites, except Pennsylvania, where enrollment was voluntary and recipients could disenroll on a monthly basis. Finally, a variety of different services were covered under the different MC arrangements: mental health outpatient treatment was covered in every state; psychiatric inpatient care was covered in every state except Ohio; SA services were covered in every state except Oregon; case management was covered by all states except Pennsylvania; in-home supports were covered in all states except New York; residential treatment was covered only in Tennessee and Ohio; and psychiatric medications were covered only in New York. Further information about each site's MC arrangements is available at the study's website: <http://www.psych.uic.edu/mhsrp/managedcarecc.htm>.

## **Inclusion and exclusion criteria**

Children and youth with SED were defined as those meeting the following inclusion criteria: being age 4 through 17 at the time of study enrollment; being a Medicaid beneficiary; having a DSM-IV diagnosis of mental disorder; and use in the past year of intensive mental health services including inpatient, residential, day treatment, partial hospitalization, in-home support, rehabilitation, therapeutic foster care, special school, crisis services, intensive outpatient (at least 3 days per week), and intensive case management. Exclusion criteria for the SED sample were as follows: a DSM-IV mental disorder diagnosis consisting solely of the category "adjustment disorder" (to exclude children with transitory and/or nonsevere emotional and behavioral problems), a diagnosis of MR/DD, and being served primarily through the MR/DD system. Additional inclusion criteria for the adult respondents were as follows: being the child's parent or other primary caregiver, and ability to give informed consent. In the large majority of cases (88%), the respondent was a parent or other family member. Professional caregivers served as respondent if no family members were involved in the child's day-to-day care (eg, incarcerated or institutionalized parents, parents whose custody had been terminated). This occurred very infrequently at 4 of the 5 sites (Oregon = 0.04%, Pennsylvania = 0.0%; New York = 0.03%; Tennessee = 0.06%). In Ohio, slightly more than half (55.3%) of adult respondents were professional caregivers. For the youth interviews, additional inclusion criteria were as follows: being willing and able to give informed consent, and caregiver consent for the child to participate. Each site used a different method of recruitment, depending on its state's way of recording who was Medicaid eligible and who was enrolled in MC versus FFS plans. In addition, unique human subjects protection requirements imposed by different site PIs' Institutional Review Boards also led to somewhat different recruitment strategies, as described on the study website cited above.

## **Features associated with study attrition**

Of the 1724 families interviewed at baseline, 88% ( $n = 1517$ ) completed follow-up interviews. Follow-up completers were compared to noncompleters ( $n = 207$ ) to identify potential biases resulting from differential attrition rates. There were no differences found between the follow-up group and those not followed in terms of child age, gender, functional impairment, health status, symptomatology, and adult caregiver burden. The only statistically significant differences between the follow-up group and those not followed were in the proportions of ethnicity/race groupings among the respondents. Caucasian children's caregivers were more likely to complete a follow-up interview (54.2% of those successfully followed up were Caucasian while 44.4% of those who were not followed up were Caucasian), while caregivers of Hispanic children were less likely (8.5% of those followed vs 13.2% of those not followed). This difference was entirely attributable to ethnicity/race differences in response rates in the FFS group, where Caucasian children were significantly more likely to be in the follow-up group than in the baseline-only group (53.7% of those followed vs 34.8% not followed), and African American children were less likely (33.9% of those followed vs 46.4% of those not followed). In the MC group, the only significant difference between the follow-up and baseline-only groups was a somewhat higher mean monthly household income for those who were successfully followed (\$1872.40 among those followed vs \$1608.43 among those not followed). These variables are controlled for in all of the multivariate analyses that follow.

## **Interviewer training**

All sites attended the "train-the-trainer" CP interviewer training conducted by the UIC Coordinating Center in Chicago at the initiation of the study in the spring of 1997. Project managers and interviewer trainers participated in this full-day seminar to ensure that identical interviewing techniques

and research protocols were employed across the sites. Participants were trained in general research interviewing procedures, as well as techniques specific to research interviews conducted with children. Human subjects protection and confidentiality for both children and adults were specifically addressed. The group was then trained on the administration of the study's CP as well as how to handle typical procedural issues that might arise. Sections of the CP were simulated with role plays and audience feedback was elicited throughout. Sites also conducted additional ongoing trainings for their interviewers based on the seminar conducted by UIC.

## Research instruments

Five preexisting research instruments were selected for use in the CP: 3 were child assessments and 2 were caregiver measures. The first child measure was the Child Behavior Checklist (CBCL),<sup>13</sup> an 118-item scale covering the behavioral and mental health symptoms of children and adolescents as reported by an adult who knows the child well. In studies of clinically referred and nonreferred boys and girls aged 4 through 18, the CBCL achieved good internal reliability ( $\alpha = .96$ ) and test-retest reliability ( $r = 0.89$ ). Child functioning was assessed using the adult-response version of the Columbia Impairment Scale (CIS),<sup>14</sup> a 13-item instrument that measures a child's interpersonal (peer) relations and functioning in school (or work) and at home. The internal consistency reliability for the CIS is excellent ( $\alpha = .88$ ). The third child measure assessed physical health using the Child Health Questionnaire (CHQ) Parent Form,<sup>15</sup> a 50-item scale designed to measure the physical and psychosocial functioning and well-being of children. In studies of US population samples, the CHQ achieved excellent internal reliability ( $\alpha = .93$ ). In the present analysis, the 6-item "general health perceptions" subscale was used to assess the caregiver's perception of the child's health.

Among the measures of caregivers, parental stress was assessed by the Caregiver Strain Questionnaire (CSQ),<sup>16</sup> a 21-item scale designed to measure difficulties experienced by parents and other caregivers who have primary responsibility for the needs of children with SED who are younger than 18 years. In studies of caregivers of a clinical child population, the CSQ achieved excellent internal reliability ( $\alpha = .93$ ). Caregivers' physical health was assessed using the 12-Item Short-Form (SF-12) Health Survey,<sup>17</sup> designed to measure an adult's physical and mental health. In studies of a general outpatient population with a longer version of the SF-12 called the SF-36, good internal reliability was reported, with alphas ranging from .76 to .86. In a study of the SF-12, test-retest reliability was excellent ( $r = 0.89$ ).

The study's dependent variables were constructed from information elicited by a Services Utilization Instrument (SUI), which was designed specifically to measure children's receipt of health, mental health, and SA services as reported by a parent or primary caregiver. The SUI was adapted by the project SC from 2 preexisting measures: the Service Assessment for Children and Adolescents (SACA), and the Child and Adolescent Services Assessment (CASA). Psychometric analyses of the SACA show good to excellent validity (agreement between parent report and case record), with kappas generally ranging from .50 to 1.0; however, for some services, such as school-based treatment and case management, agreement was significantly lower ( $\kappa = 0.31$ ). The SACA also demonstrated excellent test-retest reliability regarding both lifetime and service utilization in the last 12 months.<sup>18</sup> The validity of the CASA has been shown to be similar to that of the SACA,<sup>19</sup> with the lowest accuracy on least restrictive services (58% agreement). The CASA also has been shown to have good to excellent test-retest reliability regarding both lifetime service utilization and that of the last 3 months.<sup>20</sup> Because of its similarity to these 2 instruments, test-retest reliability was not evaluated for the SUI. The SUI includes 186 items composed of sections regarding residential, nonresidential, general medical, MR/DD, child welfare, school-based (school counseling, classroom aides), medication, general, and prevention services.

## **Cross-site versus single-site analyses**

As described previously, the types of MC plans operating at the 5 sites varied widely, drawing from different funding streams, employing different risk sharing mechanisms, focusing on somewhat different types of populations of children, and covering different types of services. However, an additional major difference concerned the Ohio site. At that site, children in the MC condition were served by a single agency and were defined as those children and youth who were the most expensive to serve across the entire county. The MC entity was a private, not-for-profit agency that was established by county officials for the purpose of providing managed, wrap-around behavioral health services to youth who were being served by multiple human service agencies and/or the juvenile justice system. Funds from 6 county agencies, including the Medicaid agency, were pooled to serve the youth on a case-rate basis. Over the course of the study, the MC entity began sharing fiscal risk with some of its providers. Perhaps because of this, as well as other factors, analysis results indicated that unusually high proportions of children in Ohio's MC condition received services, relative to children in MC conditions at the other sites. It became evident through subsequent analyses that MC in Ohio operated much differently than did at other sites, where MC had been introduced to a much wider range of children over a larger geographical area, and delivered by a more diverse provider constituency. In cross-site analyses, the uniqueness of the Ohio site masked consistencies among the remaining sites that were evident once data from the Ohio children were excluded. Because of this, the SC decided to restrict the cross-site analysis to 4 sites, excluding Ohio, but to conduct single-site analyses using the same predictive model (described below) for each of the sites individually, including Ohio.

## **Dependent variables: Service utilization**

Four types of child service utilization variables were selected for analysis. The first service type was conceptualized at the most expensive, intensive, and restrictive services and included treatment in a hospital inpatient unit or residential center. The second type of service consisted of outpatient services typically considered as "traditional" for reimbursement purposes, including treatment in the office of a psychiatrist, psychologist or counselor, or at a community mental health center. The third type included services that are essential elements of the system of care approach,<sup>2</sup> but are often viewed as "nontraditional" for reimbursement purposes. The services included in this category were day treatment, partial hospitalization, in-home therapy, school-based mental health services, case management, and group home care. The most frequently used nontraditional services were school-based therapy (39%), comprehensive case management (37%), in-home therapy (26%), and partial hospitalization/day treatment (14%). The fourth service type included any prescribed psychotropic medication along with nonpsychotropic medications prescribed specifically for psychiatric purposes (eg, antihistamines prescribed for anxiety or panic disorders). All 4 types of service utilization were measured between baseline and 6-month follow-up.

## **Model tested in the analysis**

To predict service utilization, control and explanatory variables were entered into the multiple logistic regression (MLR) analysis hierarchically, in 6 blocks. Block 1 included a group of 3 "need" variables defined by children's mental health status scores at baseline (high versus low functional impairment; high versus low total psychiatric symptomatology; and use versus nonuse ever of alcohol, drugs or tobacco, as reported by youth themselves). Block 2 included 5 child characteristics: age, gender, minority status, contact with the juvenile justice system, and physical health. Block 3 included 7 adult caregiver characteristics: age, gender, education, physical health, mental health, caregiver strain, and satisfaction with child's behavioral healthcare plan. Block 4 included 4 household characteristics: household income, number of coresidents, and 2 population density measures

of urban and rural geographic area. For the latter, respondents' zip codes were matched to county level census data and areas classified as more than 75% urban were designated as such, areas that were more than 75% rural were designated as such, and remaining areas ("mixed" geographic areas) were used as the reference category. Block 5 included the study's independent variable of MC versus FFS. Finally, block 6 included 3 of the 4 sites to control for site variation (Tennessee, Oregon, and Pennsylvania, with New York as the reference site).

## Analysis

The initial analysis involved comparison of differences in child and caregiver characteristics across sites and within sites by study condition. Next, cross-site, MLR analyses were run to predict the likelihood of utilization of the 4 types of services described above. To test the appropriateness of pooling data, Allison's method was used to compare differences in sites' logit coefficients in the presence of heterogeneous variances.<sup>21</sup> Likelihood ratio tests of differences between interactions of site and study condition indicated that the effect of MC did not differ by site even allowing for disturbance variance in the estimating equation. Thus, blocks of explanatory and control variables were entered hierarchically in the MLR, to examine the successive effects of each block on the cumulative model.<sup>22</sup> The Ohio site was excluded from these analyses. Finally, identical MLR models were run for each site individually, using data collected by all 5 sites including Ohio.

## Results

Table 1 provides information about the children's ( $N = 1206$ ) demographic characteristics at the 4 sites (Oregon,  $n = 249$ , Pennsylvania,  $n = 354$ , New York,  $n = 294$ , Tennessee,  $n = 309$ ) included in the cross-site analysis, (ie, excluding Ohio,  $n = 311$ ). The mean age was 12 years, with 66% male and 34% female. Just over half (58%) of the children were Caucasian, 27% African American, 10% Hispanic/Latino, and 5% members of other racial or ethnic groups. The average monthly household income was \$1469.

Regarding children's level of functional impairment, 79% scored above the CIS clinical cutoff of 16, indicating significant impairment in level of psychosocial functioning. Regarding psychiatric symptomatology, over half scored above the average for children in a mental health clinical population (58%), indicating the presence of serious psychiatric symptomatology characteristic of children receiving treatment for mental health disorders.

Regarding service utilization during the 6 months between baseline and follow-up, only a tenth of all children (10.8%) received inpatient or residential services, close to two thirds (64.8%) received traditional outpatient services, more than half (56.2%) received psychotropic medications, and more than two thirds (67%) received nontraditional services. On average, children received 1.97 services: 13% received none; 20%, 1; 29%, 2; 32%, 3; and 6%, all 4 types of services. The most common service combination, received by 29% of all children, consisted of medications, traditional outpatient, and nontraditional services. More than a tenth of all children (12%) received traditional outpatient and nontraditional services, another tenth (10%) received medication and outpatient services, and a tenth (10%) received medication and outpatient services.

The results of the cross-site multivariate logistic regression models, designed to test for MC versus FFS differences in service utilization, are presented in Table 2. Hierarchical MLR analysis involved the sequential addition of 6 blocks of variables, each representing a dimension of the Behavioral Model of Health Services Use.<sup>12</sup> The blocks are listed down the left side of Table 2, as are the variables comprising each block. For example, child's mental health symptoms, functional impairment, and SA comprise the variables of the Child Need block (block 1); child's age, gender, minority status, juvenile justice involvement, and health comprise the Child Characteristics block (block 2); and so on through



**Table 1**  
Child, caregiver, and household characteristics (*N* = 1206)\*

<i>Child characteristics</i>	
Age (mean), y	11.5
Gender	
Female	33.8
Male	66.2
Race/ethnicity	
Caucasian (not Hispanic)	58.3
African American (not Hispanic)	26.7
Hispanic	10.0
Asian/Pacific Islander	<1.0
Other/Mixed (not Hispanic)	5.0
Prior contact with juvenile justice system	
Yes	18.5
No	81.5
Columbia Impairment Scale	
Below clinical cutoff	20.7
At or above clinical cutoff	79.3
Child Behavior Checklist total score	
Below clinical cutoff	42.5
At or above clinical cutoff	57.5
Study site	
Tennessee/Mississippi	25.6
Oregon	20.6
Pennsylvania	29.4
New York	24.4
Study condition	
Managed Care	45.4
Fee-For-Service	54.6
<i>Caregiver characteristics</i>	
Age (mean), y	39.4
Gender	
Male	5.0
Female	95.0
Education	
High school/GED <sup>†</sup> or above	72.1
Less than high school	27.9
Caregiver Strain Scale (Range 1–5, Higher = More strain)	2.51
Caregiver SF-12 Physical Health Subscale Score (Range 0–100, Higher = Better physical health)	43.29
Caregiver SF-12 Mental Health Subscale Score (Range 0–100, Higher = Better mental health)	41.33
Caregiver Satisfaction with Health Plan Score (Range 1–10, Higher = More satisfied)	7.5
<i>Household characteristics</i>	
Monthly household income (median), \$	1469
Community type	
Urban	35.8
Mixed rural-urban	52.1
Rural	12.1
Household size, members in addition to child	
2	10.3
3	23.1
4 or more	66.7

\*All values are in percentage except those indicated otherwise.

<sup>†</sup>GED indicates General Equivalency Diploma.

**Table 2**

Cross-site hierarchical logistic regression analyses predicting receipt of services between T1 and T2: odds ratios at each analysis step\*

Service receipt T1-T2	Block 1		Block 2		Block 3		Block 4		Block 5		Block 6									
	Inp/Res	NonTr	Inp/Res	NonTr	Inp/Res	NonTr	Inp/Res	NonTr	Inp/Res	NonTr	Inp/Res	NonTr								
CIS T1	1.84	2.00†	1.48‡	1.47‡	1.16	1.87†	1.56†	1.40	1.25	1.87†	1.53‡	1.37	1.27	1.87†	1.55†	1.39	1.28	1.84†	1.52†	1.36
	2.19‡	1.45‡	1.53‡	1.50‡	1.18	1.16	2.09†	1.45†	1.16	1.17	2.07†	1.46†	1.13	1.17	2.05†	1.43†	1.14	1.17	2.05†	1.57‡
	2.30†	0.67‡	0.81	0.91	1.70‡	0.92	0.85	0.92	1.51	0.90	0.80	0.89	1.67	0.90	0.82	0.93	1.70	0.87	0.88	0.87
Substance use	1.04	0.69†	0.92	0.90	1.07	0.67†	0.91	0.90	1.05	0.67†	0.90	0.89	1.04	0.67†	0.89	0.88	1.02	0.67†	0.80‡	0.88
	0.75	1.06	0.53†	0.80	0.78	1.07	0.51†	0.79	0.78	1.06	0.51†	0.79	0.80	1.06	0.52†	0.81	0.80	1.06	0.56†	0.80
	0.97	0.52†	0.39†	1.17	1.06	0.55†	0.40†	1.20	0.85	0.52†	0.46†	1.28	0.79	0.52†	0.44†	1.18	0.76	0.61‡	0.53†	1.37
	2.16‡	1.37	0.79	1.69†	1.90†	1.34	0.76	1.68†	1.89†	1.33	0.76	1.66†	1.97†	1.33	0.80	1.79‡	2.02†	1.28	0.87	1.63†
Child health	0.63†	0.70	0.83	1.06	0.67	0.68‡	0.81	1.03	0.65	0.68‡	0.82	1.04	0.65	0.68‡	0.83	1.06	0.65	0.67‡	0.84	1.05
	1.22	1.02	1.34	1.07	1.40	0.99	1.31	1.02	1.42	0.99	1.31	1.02	1.42	0.99	1.31	1.02	1.46	0.95	1.30	1.03
	0.57	0.94	0.89	0.83	0.51	0.96	0.89	0.86	0.48	0.96	0.91	0.88	0.48	0.96	0.91	0.88	0.48	0.99	0.93	0.91
	1.14	1.17†	1.13	1.11	1.24	1.15	1.14	1.08	1.24	1.15	1.13	1.08	1.24	1.15	1.13	1.08	1.25	1.16†	1.15	1.11
	2.17†	1.18	1.32‡	1.11	2.15†	1.18	1.33‡	1.11	2.18†	1.18	1.34‡	1.13	2.21†	1.17	1.32‡	1.19	2.21†	1.17	1.32‡	1.19
Adult mental health	1.11	0.94	0.85	1.09	1.10	0.92	0.87	1.08	1.10	0.92	0.87	1.08	1.10	0.92	0.87	1.08	1.10	0.91	0.89	1.03
	0.97	1.19	1.36	1.08	0.98	1.17	1.36	1.07	0.96	1.17	1.37†	1.09	0.95	1.18	1.33	1.10	1.34	1.06	1.21	1.14
	1.41	0.79	1.20	1.09	1.34	0.80	1.20	1.12	1.35	0.80	1.18	1.09	1.34	0.82	1.21	1.14	1.34	0.82	1.21	1.14
Household income/Mo	0.74†	1.09	0.98	1.10	0.75†	1.09	0.98	1.11	0.75†	1.09	0.98	1.11	0.75†	1.09	0.98	1.11	0.75†	1.08	1.03	1.10
	1.40†	0.94	1.02	0.96	1.39‡	0.93	1.01	0.95	1.39‡	0.93	1.01	0.95	1.39‡	0.93	1.01	0.95	1.39‡	0.93	0.99	0.96
	1.65	1.12	0.71†	0.86	1.82‡	1.12	0.76	0.95	1.51	1.67†	1.26	0.87	1.78	0.99	0.95	0.83	1.66	1.60	1.06	0.83
Rural	0.57†	0.98	0.69‡	0.58†	0.57†	0.98	0.69‡	0.58†	0.57†	0.98	0.69‡	0.58†	0.57†	0.98	0.69‡	0.58†	0.57†	0.97	0.77¶	0.64‡
	0.79	1.34	2.61†	0.48‡	0.64	2.11†	1.85	0.86	0.80	1.94‡	3.58†	1.20								
Managed care																				
TN/MS site																				
OR site																				
PA site																				

\*Inp/Res indicates inpatient/residential treatment facility; Outpt, outpatient; Meds, psychiatric medications; NonTr, nontraditional psychiatric services; CIS, functional impairment; CBCL, psychiatric symptom severity; JJS, juvenile justice system; TN/MS, Tennessee/Mississippi; OR, Oregon; and PA, Pennsylvania.

†  $P < .001$ .  
‡  $P < .05$ .  
§  $P < .01$ .  
¶  $P < .10$ .

Caregiver Characteristics (block 3), Environmental Features (block 4), Study Condition (block 5), and Study Site (block 6). The 4 service utilization outcomes are shown in columns across the top of the table, repeated for each step in the analysis: inpatient/residential, traditional outpatient, psychotropic medication, and nontraditional services. By following each outcome and moving progressively to the right with the addition of each block, it is possible to see how each set of variables altered the significance of variables already entered, as well as the effect of those in the newly added block. Thus, by the final step, the results indicate the effect of study condition on service utilization after controlling for children's prior level of service need, as well as characteristics of the child, the adult caregiver, the household/region, and study site.

In the model predicting likelihood of use of inpatient/residential services at follow-up, results of step 1 indicated that utilization was more likely for children with greater mental health symptomatology at baseline, and for those with any history of SA at baseline. These remained significant with the addition of child characteristics at step 2, where utilization of inpatient services was more likely for children ever involved in the juvenile justice system, and those in poorer physical health. The addition of caregiver characteristics in step 3 caused the need variables and child physical health to become nonsignificant while caregiver strain was significant, with higher strain associated with greater likelihood of inpatient/residential treatment of the child. Caregiver strain and involvement with the juvenile justice system remained associated with greater likelihood of inpatient use at step 4 with the following significant environmental characteristics: higher likelihood of utilization among children with lower household incomes and more coresidents. With the addition of study condition in step 5, children in the MC condition were significantly less likely than those in FFS to be hospitalized or to receive residential treatment. In addition, children from urban areas were more likely than those in mixed areas to receive this service. The significance of study condition did not change with the addition of study site in step 6. Thus, at the model's final step, children more likely to receive inpatient or residential treatment were those with a history of juvenile justice system involvement ( $OR = 2.02, P < .05$ ), those whose caregivers reported greater caregiving strain ( $OR = 2.21, P < .001$ ), and those living with more coresidents ( $OR = 1.39, P < .01$ ). Children less likely to receive inpatient or residential treatment were those enrolled in MC ( $OR = 0.59, P < .05$ ), and those with higher household incomes ( $OR = 0.75, P < .05$ ).

In the model predicting likelihood of use of traditional outpatient services at follow-up, all 3 baseline need variables were significantly associated with likelihood of outpatient service use. With the addition of child characteristics in step 2, only high baseline functional impairment remained significant, along with child age and minority status. Throughout the remaining steps, outpatient service likelihood was greater for younger children, children in poorer physical health, Caucasian children, and those with low functional impairment. The addition of caregiver characteristics in step 3 did not change these relationships and older caregiver age was associated with significantly greater likelihood of outpatient service to the child (although this relationship became nonsignificant with the addition of household characteristics and study condition in steps 4 and 5). Study condition was not significant in step 5. With the addition of study site at step 6, the final model showed a greater likelihood of outpatient service utilization for children with poorer functional status ( $OR = 1.84, P < .001$ ), older caregivers ( $OR = 1.16, P < .05$ ), those living in urban geographic settings ( $OR = 1.67, P < .05$ ), and those at the Oregon ( $OR = 2.11, P < .05$ ) or Pennsylvania ( $OR = 1.94, P < .05$ ) sites. Lesser likelihood of outpatient service utilization was associated with children's older age ( $OR = 0.67, P < .001$ ), minority status ( $OR = 0.61, P < .01$ ), and better health ( $OR = 0.67, P < .01$ ).

In the model predicting likelihood of use of psychiatric medications at 6-month follow-up, 2 child need variables—functional impairment and mental health symptoms—remained significant throughout all steps of the analysis. Two child characteristics introduced at step 2 also were significant throughout the remainder of the model: utilization of medications was more likely for male and for Caucasian children. One caregiver characteristic was significant from step 3 throughout the remaining

steps; higher caregiver strain was associated with greater likelihood of the child's use of medications. Addition of environmental characteristics in step 4 did not influence variables found to be significant in prior steps; in addition, the urban variable was significant, indicating that children from urban areas were less likely to receive medications. Study condition was significant in step 5; here, children in the MC condition were only two-thirds as likely as those in the FFS condition to be on medication. Better adult mental health was also associated with children's use of medications. With the addition of study site in the final step, the effect of MC diminished to being three-quarters as likely (OR = 0.77), and fell just short of statistical significance ( $P < .08$ ). Other children less likely to use psychiatric medications were those who were older (OR = 0.80,  $P < .01$ ), female (OR = 0.56,  $P < .001$ ), and minority (OR = 0.53,  $P < .001$ ). Children more likely to use psychiatric medications were those with higher levels of functional impairment (OR = 1.52,  $P < .05$ ) and mental health symptoms (OR = 2.02,  $P < .001$ ), those whose caregivers had higher levels of strain (OR = 1.32,  $P < .01$ ), and those at the TN (OR = 2.61,  $P < .001$ ) and PA (OR = 3.58,  $P < .001$ ) sites.

In the model predicting likelihood of use of nontraditional "system of care" services at 6-month follow-up, results of step 1 indicated that utilization was more likely for children with high functional impairment and mental health symptoms. At step 2, children ever involved in the juvenile justice system also were more likely to use nontraditional services. Addition of caregiver characteristics in step 3 caused the functional impairment variable to become nonsignificant, but no other changes were evident at this step or the following one. At step 5, study condition also was significant, with children in MC only two thirds as likely as those in FFS to receive nontraditional services. These relationships did not change in the final step (addition of site), in which children with higher levels of mental health symptoms (OR = 1.57,  $P < .01$ ) and with a history of involvement with the juvenile justice system (OR = 1.63,  $P < .05$ ) were more likely to use nontraditional services. Children in MC were less likely to use nontraditional services (OR = 0.64,  $P < .01$ ), as were children in Tennessee (OR = 0.48,  $P < .001$ ).

In the cross-site analyses, controlling for all other variables, MC study condition was significantly associated with lower utilization of inpatient and nontraditional services, and with a trend toward lower utilization of psychiatric medications. Managed care condition was not a significant predictor of traditional outpatient services use between baseline and follow-up.

Tables 3 to 6 present the results of the same multivariate model run for each of the 5 sites individually, including Ohio. In instances where there was no variation on certain variables at some sites, it was not possible to include these variables in the individual site models. This was the case, for example, in New York, where all children resided in an urban county. The intent of this phase of the analysis was not to create the "best" model for each site, but to determine how the cross-site model performed at each site individually. In other words, this was a confirmatory rather than an explanatory MLR analysis.

The results of the model predicting child's use of psychiatric inpatient/residential treatment are presented in Table 3. The greatest consistency among the 5 sites was in the caregiver strain variable, which was associated with greater likelihood of utilization at 4 out of 5 sites (Oregon, Pennsylvania, New York, and Ohio). Another noteworthy finding concerns the child's prior juvenile justice system experience, which was associated with utilization at 2 sites (Oregon, Tennessee/Mississippi [trend only]). At 2 sites, there was a trend toward Caucasian children being more likely to utilize inpatient services (Tennessee/Mississippi and Ohio). Also noteworthy is the fact that the study condition variable was significantly related to utilization at 3 of the sites, with MC associated with lower likelihood of inpatient service use in Oregon and Pennsylvania, but with higher likelihood in Ohio. This divergence reflects the previously described unique nature of the Ohio site, and the reason it was excluded from the cross-site models. Thus, all other things being equal, children in MC at 2 of the 5 sites were significantly less likely to have received inpatient care or residential treatment (Oregon, OR = 0.14,  $P < .05$  and Pennsylvania, OR = 0.19,  $P < .05$ ), while those at 1 site were more likely to have received these services (Ohio, OR = 5.07,  $P < .05$ ).

**Table 3**

Individual site hierarchical logistic regression analyses predicting receipt of inpatient/residential services between T1 and T2: odds ratios at final step\*

Variable name	OR	PA	NY	TN/MS	OH†
High functional impairment T1	0.91	0.92	0.39	2545.42	2.56
High MH symptoms T1	0.61	1.58	1.02	0.99	0.97
Substance use ever T1	0.89	1.59	6.42†	1.54	0.76
Child age T1	1.32	1.22	0.69	0.57‡	1.74
Female child	0.20	1.04	0.32‡	1.34	1.16
Minority child	2.56	1.62	0.43	0.32‡	0.29‡
JJS child T1	71.06§	0.88	1.94	3.24‡	1.74
Child health T1	0.08	0.68	1.90	0.52	1.16
Adult high school + T1	1.49	1.33	1.22	1.49	0.95
Female adult	0.21	0.31	1.38	4933.96	1.12
Adult age T1	0.40‡	1.34	1.39	1.45	0.84
Caregiver strain T1	3.23†	2.55	5.12§	1.68	3.72†
Adult health T1	1.31	1.24	0.42	1.49	1.87
Adult mental health T1	11.33†	0.45	2.39	0.42	6.94†
Plan satisfaction T1	1.67	1.25	2.42	1.88	3.04
Monthly household income T1	1.15	0.82	0.42†	0.56‡	1.11
Household size T1	1.16	2.23§	1.05	1.49‡	0.88
Urban T1	...	1.01	...	2.43	0.66
Rural T1	18.19†	1.76	...	2.05	...
Managed care	0.14†	0.19†	0.83	0.64	5.07†

\*OR indicates Oregon; PA, Pennsylvania; NY, New York; TN/MS, Tennessee/Mississippi; OH, Ohio; MH, mental health; and JJS, juvenile justice system.

†  $P < .05$ .

‡  $P < .10$ .

§  $P < .001$ .

||  $P < .01$ .

The results of the model predicting child's likelihood of traditional outpatient treatment at each of the 5 sites are presented in Table 4. Here, again, the most consistent variable was caregiver strain, which significantly increased the likelihood of utilization in New York and Tennessee/Mississippi, with a trend in Pennsylvania. However, none of the other independent variables were significant at more than 2 sites: younger children were more likely to receive traditional outpatient services in Pennsylvania and New York; and there was a trend for children who were more functionally impaired to be more likely to utilize this service in Pennsylvania and New York. Finally, there were divergent trends toward significant associations with study condition in Oregon and New York, with MC condition subjects being more likely to utilize outpatient services in Oregon (OR = 1.88,  $P < .10$ ), but less likely in New York (OR = 0.63,  $P < .10$ ).

The results of the model predicting child's likelihood of using psychotropic medication at each of the 5 sites are presented in Table 5. Here, as might be expected, the most consistent variable was the child's mental health symptomatology: higher symptoms were significantly associated with greater likelihood of medication utilization at 4 out of 5 sites (Oregon, Pennsylvania, Tennessee/Mississippi, Ohio), with a trend toward greater utilization in New York. Another relatively consistent variable was study condition, in which MC decreased likelihood of medication utilization at 2 sites (Pennsylvania,

**Table 4**

Individual site hierarchical logistic regression analyses predicting receipt of outpatient services between T1 and T2: odds ratios at final step\*

Variable name	OR	PA	NY	TN/MS	OH <sup>†</sup>
High functional impairment T1	1.28	2.02 <sup>‡</sup>	1.98 <sup>‡</sup>	1.11	...
High MH symptoms T1	2.98 <sup>§</sup>	1.21	0.60	1.56	...
Substance use ever T1	0.48	1.05	0.92	0.77	...
Child age T1	1.05	0.53 <sup>  </sup>	0.58 <sup>  </sup>	0.78	...
Female child	1.42	0.55 <sup>‡</sup>	1.71 <sup>‡</sup>	1.37	...
Minority child	0.53	0.64	0.86	0.62	...
JJS child T1	1.65	1.72	0.93	0.47	...
Child health T1	0.67	0.52 <sup>§</sup>	0.82	0.63	...
Adult high school + T1	1.16	0.64	1.08	1.39	...
Female adult	1.92	0.69	1.28	1.65	...
Adult age T1	1.24	1.16	1.45	1.28 <sup>‡</sup>	...
Caregiver strain T1	1.00	0.73 <sup>‡</sup>	1.75 <sup>§</sup>	1.90 <sup>¶</sup>	...
Adult health T1	1.02	0.88	0.75	1.25	...
Adult mental health T1	5.44 <sup>¶</sup>	0.85	1.56	0.74	...
Plan satisfaction T1	0.95	0.72	0.95	0.76	...
Monthly household income T1	0.93	0.81	1.51 <sup>§</sup>	1.18	...
Household size T1	0.92	0.95	1.04	0.82	...
Urban T1	...	1.50	...	2.13 <sup>§</sup>	...
Rural T1	2.08	1.13	...	0.69	...
Managed care	1.88 <sup>‡</sup>	0.71	0.63 <sup>‡</sup>	0.80	...

\*OR indicates Oregon; PA, Pennsylvania; NY, New York; TN/MS, Tennessee/Mississippi; OH, Ohio; MH, mental health; and JJS, juvenile justice system.

<sup>†</sup>Maximum number of iterations exceeded at Block 5 for Ohio. Final solution not found.

<sup>‡</sup> $P < .10$ .

<sup>§</sup> $P < .05$ .

<sup>||</sup> $P < .001$ .

<sup>¶</sup> $P < .01$ .

OR = 0.44,  $P < .01$  and New York, OR = 0.48,  $P < .05$ ) but increased its likelihood at a third site (Ohio, OR = 7.87,  $P < .01$ ). Several variables were significant in models at 2 sites: child's age, caregiver education, and plan satisfaction. Additional variables showed trends toward significance at 2 or more sites: child's gender, child's minority status, child's physical health, adult age, and caregiver strain.

Finally, the results of the model predicting child's likelihood of using nontraditional "system of care" services at each of the 5 sites are presented in Table 6. There was limited consistency among variables across the sites regarding use of this service. Greater likelihood of nontraditional services was associated with greater functional impairment (Oregon and Ohio) and mental health symptoms (Pennsylvania and Tennessee/Mississippi). Children in MC were less likely to use nontraditional service utilization at one site (Pennsylvania, OR = 0.52,  $P < .05$ ) with the same trend at another (New York, OR = 0.59,  $P < .10$ ).

In summary, regarding the major study independent variable, MC, the individual and cross-site analyses confirmed one another. While some additional variables acted differently at different sites,

**Table 5**

Individual site hierarchical logistic regression analyses predicting receipt of psychiatric medication services between T1 and T2: odds ratios at final step\*

Variable name	OR	PA	NY	TN/MS	OH
High functional impairment T1	0.60	1.58	2.98 <sup>†</sup>	0.91	2.94
High MH symptoms T1	2.89 <sup>†</sup>	2.01 <sup>‡</sup>	1.95 <sup>§</sup>	3.68 <sup>†</sup>	5.41 <sup>†</sup>
Substance use ever T1	0.74	1.34	0.91	0.72	1.38
Child age T1	1.08	0.58 <sup>†</sup>	0.93	0.57 <sup>†</sup>	0.89
Female child	0.30 <sup>  </sup>	0.75	0.57 <sup>§</sup>	0.67	1.22
Minority child	0.52	0.23 <sup>  </sup>	1.18	0.54 <sup>§</sup>	0.33
JJS child T1	0.90	0.81	0.48	0.82	0.12 <sup>†</sup>
Child health T1	0.54 <sup>‡</sup>	0.81	1.04	0.70	0.34 <sup>§</sup>
Adult high school + T1	2.74 <sup>‡</sup>	0.75	2.00 <sup>‡</sup>	1.39	0.35 <sup>§</sup>
Female adult	1.31	0.41	0.62	3.27	4.31
Adult age T1	1.02	0.93	1.34 <sup>§</sup>	1.40 <sup>‡</sup>	1.52 <sup>§</sup>
Caregiver strain T1	1.33	1.21	1.46	1.56 <sup>‡</sup>	0.42 <sup>§</sup>
Adult health T1	0.97	0.88	0.74	1.10	1.74
Adult mental health T1	1.03	2.04 <sup>‡</sup>	1.67	1.10	0.34
Plan satisfaction T1	1.38	2.02 <sup>‡</sup>	1.14	0.90	0.19 <sup>‡</sup>
Monthly household income T1	1.11	0.97	0.85	1.06	1.31 <sup>§</sup>
Household size T1	1.01	1.16	1.20	0.70 <sup>‡</sup>	0.83
Urban T1	...	0.99	...	1.67	1.59
Rural T1	2.76	0.28 <sup>  </sup>	...	1.09	...
Managed care	1.58	0.44 <sup>†</sup>	0.48 <sup>‡</sup>	0.79	7.87 <sup>†</sup>

\*OR indicates Oregon; PA, Pennsylvania; NY, New York; TN/MS, Tennessee/Mississippi; OH, Ohio; MH, mental health; and JJS, juvenile justice system.

<sup>†</sup>  $P < .01$ .

<sup>‡</sup>  $P < .05$ .

<sup>§</sup>  $P < .10$ .

<sup>||</sup>  $P < .001$ .

this is exactly what one would expect. In the individual site analyses, it was possible to control for within-site differences, while the cross-site analyses could only control for between-site differences. However, the major research purpose in this article was not to explain differences between the sites, but to determine whether there were any similarities in the effects of the MC condition across the sites. This existence of such similarities was confirmed by the analysis results.

## Discussion

This study is unique in its focus on publicly funded, managed mental healthcare for children across multiple state systems, under a variety of MC waivers and contractual arrangements, and controlling for a number of well-recognized behavioral health services utilization predictors. The major finding, that the likelihood of 3 out of 4 types of mental health service use was lower among children with SED who were enrolled in MC versus FFS plans, has now been subjected to a more rigorous test than in any previously published studies.

**Table 6**

Individual site hierarchical logistic regression predicting receipt of nontraditional services between T1 and T2: odds ratios at final step\*

Variable name	OR	PA	NY	TN/MS	OH
High functional impairment T1	3.38 <sup>†</sup>	0.88	1.23	0.72	236.29 <sup>‡</sup>
High MH symptoms T1	1.68	1.97 <sup>†</sup>	1.34	2.61 <sup>†</sup>	0.07
Substance use ever T1	0.67	1.47	0.78	0.84	0.81
Child age T1	1.04	0.76	0.85	0.74 <sup>§</sup>	5.38 <sup>†</sup>
Female child	0.64	0.69	0.68	1.19	0.11 <sup>§</sup>
Minority child	4.42 <sup>‡</sup>	0.72	1.44	1.42	2.32
JJS child T1	3.51 <sup>†</sup>	1.49	0.71	1.70	0.24
Child health T1	0.68	1.48	1.53	0.79	0.14
Adult high school + T1	1.05	0.83	1.07	1.56	13.81 <sup>§</sup>
Female adult	0.45	1.92	0.22	2.52	2.28
Adult age T1	0.89	0.94	1.33 <sup>§</sup>	1.24	0.56
Caregiver strain T1	0.75	1.27	2.03 <sup>‡</sup>	1.18	0.67
Adult health T1	1.43	0.97	0.69	1.78 <sup>§</sup>	0.36
Adult mental health T1	1.40	1.22	1.17	0.74	0.98
Plan satisfaction T1	1.23	0.95	1.74 <sup>§</sup>	0.97	3.99
Monthly household income T1	1.31 <sup>†</sup>	1.16	0.83	0.94	1.14
Household size T1	1.02	1.09	0.98	0.80 <sup>§</sup>	0.61
Urban T1	...	1.14	...	0.76	1.19
Rural T1	2.99	0.50 <sup>§</sup>	...	0.77	...
Managed care	0.71	0.52 <sup>†</sup>	0.59 <sup>§</sup>	0.58	0.67

\*OR indicates Oregon; PA, Pennsylvania; NY, New York; TN/MS, Tennessee/Mississippi; OH, Ohio; MH, mental health; and JJS, juvenile justice system.

<sup>†</sup>  $P < .05$ .

<sup>‡</sup>  $P < .01$ .

<sup>§</sup>  $P < .10$ .

Also noteworthy is the fact that the effect of study condition remained significant even controlling for children's need for treatment, as defined by their degree of mental health symptoms, level of functional impairment, and use of drugs and alcohol. This suggests that factors other than children's service needs are influencing their receipt of mental healthcare, which may be cause for concern if needed services are denied because of attempts to control costs. In addition, study condition effects persisted despite controlling for household and environmental features, suggesting that contextual features such as lack of resources (ie, because of income or family size) and geographic variations in service availability (ie, urban vs rural) do not explain lower utilization under MC. Finally, this study controlled for a wide variety of child and caregiver characteristics that have been found to influence utilization in prior research. Thus, regardless of age, gender, ethnicity, or juvenile justice system involvement, and despite parents' levels of education, caregiver strain, or mental/physical health, low-income children with SED were less likely to receive services if they were enrolled in MC behavioral health plans.

An exception to these findings was the likelihood of use of traditional outpatient services, defined as visiting a mental health professional in a community mental health center or other office setting. This service was equally likely to be used by children enrolled in MC and FFS plans, suggesting



that this comparatively lower cost service may be more equitably available to children who need it, regardless of behavioral health plan membership. This confirms prior research findings that children's outpatient mental health service utilization is not reduced in Medicaid MC arrangements.<sup>4,11</sup>

Another exception was the Ohio site, where a unique form of MC targeting the most difficult-to-serve children and involving a service-intensive wraparound approach and risk sharing was associated with higher rather than lower utilization. The Ohio site diverged from these findings, perhaps as a result of its unique population, lack of emphasis on limitation of services via utilization review and assumption of full risk, and the fact that MC in Ohio was not delivered county- or state-wide. The Ohio results suggest that lower service utilization may not be inherent in the concept of MC itself, but instead in its intended uses and implementation. This finding that a relatively unique form of MC in Ohio increased service "penetration" or the proportion of eligible children receiving needed services, confirms the results of several prior studies.<sup>10,4</sup>

The Hutchinson and Foster review of the literature,<sup>1</sup> cited at the beginning of this article, found that only 8 published studies have examined the effects of Medicaid-funded MC. Since many of these studies examined the same MC plans, there is evidence in the literature for only 4 states in the United States. While data from these 4 states indicate that MC is associated with reduced use of inpatient services, this analysis contributes to the evidence base by showing the same effect in several additional states. Second, the Hutchinson and Foster review demonstrated that there is little consistency or understanding of the effect of MC on traditional outpatient services. For example, in 2 of the studies cited in this review, MC increased rather than decreased the use of traditional outpatient services. In a third study, traditional outpatient services under MC initially decreased and then increased. The current study makes a significant contribution to this unresolved question by showing that MC lowered the likelihood of use of *nontraditional outpatient services* but did not affect the use of *traditional outpatient services*.

The study also found that some individual characteristics of children were associated with the likelihood of mental health service use. For example, highly symptomatic children were more likely to use medications and nontraditional services, and those with high levels of functional impairment were more likely to use medications and outpatient services. Both findings support the "need" dimension of the Behavioral Model of Health Services Use.<sup>12</sup> The association of children's service need with greater utilization of some types of services suggests that some needs are met with services, regardless of type of financing arrangement. Moreover, children with prior juvenile justice system involvement were more likely to use expensive and restrictive inpatient and residential services, which may be related to greater scrutiny of children who have come to the attention of legal authorities. Finally, children who were members of ethnic and racial minority groups were less likely to use medication and outpatient services, as found in prior research on private payor MC children's utilization.<sup>23</sup>

Another study finding was an association between levels of strain associated with caregiving for the child and the child's likelihood of service utilization. Children whose caregivers reported greater strain were significantly more likely to use medication and receive inpatient treatment. While the design of the study makes it impossible to draw causal inferences, this relationship calls attention to the service needs of caretakers and to the fact that those under more strain may indeed be caring for more impaired children.<sup>16</sup> If this is the case, failure to provide adequate services to the child may have a doubly pernicious effect on the well-being of the caregiver. Equally important is the imperative of addressing the behavioral healthcare needs of low-income parents, especially those coping with children with psychiatric disabilities.

In the individual-site models, results largely mirrored those of the cross-site analyses. The same variables emerged as significant predictors (eg, child physical health, caregiver strain, caregiver physical health, study condition) but these variables were not always significant at every site, nor did they always act in a consistent manner. This is most likely due to small sample sizes at the individual sites, and speaks to the advantages of a multi-site research design in investigating questions such as those addressed in this study.

A number of caveats to the study findings are in order. Although the SUI was based on 2 valid and reliable measures of children service use, and all service categories were queried using standardized definitions, it is difficult to assess the extent to which adult respondents were accurately able to recall the child's receipt of services. In addition, measures of service utilization were relatively imprecise, since they consisted of any report of service regardless of its content or quality. Further research is needed to determine whether the patterns identified in this study also reflect the intensity and nature of service use.

Another study limitation concerns the potential sampling bias among the children and sites included in this study, given that there were large differences in both settings and service availability within those settings, as well as between the severity of problems as well as demographic characteristics of the children studied. Because of this, the study's findings cannot necessarily be considered representative of all children and youth with SED enrolled in Medicaid-financed behavioral health-care plans.

Finally, in a longitudinal cohort study, it is not possible to evaluate competing explanations for the service use patterns observed in the analysis. Particularly elusive is evidence supporting or refuting any causal assertions about the effects of capitated MC on service utilization, as well as their potentially interactive influence.

The absence of randomized control groups, reliance on parental reports of children's service utilization, and unknown sample generalizability point to the need for further rigorous research in this area. Also noteworthy was the study's relatively brief follow-up time period, given that prior research has shown that the effects of MC arrangements on service utilization change over time, in the years following implementation.<sup>6</sup>

## **Implications for Behavioral Health**

This study has critical and novel relevance to the field of behavioral health services because it represents a state-of-the-art Multi-site Evaluation (MSE), a design being used with greater frequency in federally funded behavioral health program evaluations. For example, Jaycox and colleagues<sup>24</sup> recently published the results of an MSE evaluating service use among adolescent substance abusers in 6 different states that were enrolled in a variety of treatment programs. Another example is a recently published article<sup>25</sup> on the National Institute of Mental Health (NIMH) Treatment for Adolescents with Depression Study, which recruited patients from 13 states through avenues such as clinics, primary care physicians, schools, juvenile justice facilities, and newspaper advertisements. To the authors' knowledge, this article is the first MSE focusing on Medicaid MC and mental health services for children and youth, representing an important contribution to the knowledge base of this field.

In addition, this study is the first to show how MC influences children's likelihood of receiving the full spectrum of services comprising the system of care approach. No prior study has explored the effects of MC on a group of services typically considered to be "nontraditional" (and nonreimbursable) but also essential elements of the system of care, such as case management, respite care, in-home therapy, and school-based services. Study findings demonstrated that MC had a negative effect on the likelihood of the utilization of these nontraditional services. This is a very important new finding with significant ramifications for researchers, policymakers, and advocates concerned with whether MC will dismantle systems of care.

The fact that enrollment in a MC behavioral health plan was a noteworthy predictor of all but outpatient services utilization has important policy ramifications. Poor children's enrollment in state- or county-wide MC programs is now the rule rather than the exception. It is important to ask whether this vulnerable group is being made more vulnerable by efforts to control spiraling costs of healthcare. If the answer is affirmative, then policy controls should be put into place to prevent a plethora of potentially negative outcomes, not only for children and their caregivers but for society as a whole.

The notion that MC should involve increased monitoring and reporting of health outcomes and quality of care<sup>1</sup> is one approach to detecting unintended negative consequences for children and their families. Another is the establishment and support of family and consumer involvement in the design and implementation of MC arrangements, as well as continuing consumer involvement in formal quality assurance and appeals processes. Additionally important is encouragement from the federal government, particularly the Centers for Medicare and Medicaid Services, for states with Medicaid waivers to monitor quality of care more closely, and to report their findings for public scrutiny. These practices can help to ensure that attempts to control costs do not occur at the expense of the nation's poorest and most at-risk children and families.

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