DOI: 10.1111/j.1475-6773.2007.00811.x
RESEARCH ARTICLE

Medicaid Managed Care and the Unmet Need for Mental Health Care among Children with Special Health Care Needs

Michael H. Tang, Kristen S. Hill, Alexy A. Boudreau, Recai M. Yucel, James M. Perrin, and Karen A. Kuhlthau

Objective. To determine the association between Medicaid managed care pediatric behavioral health programs and unmet need for mental health care among children with special health care needs (CSHCN).

Data Source. The National Survey of CSHCN (2000–2002), using subsets of 4,400 CSHCN with Medicaid and 1,856 CSHCN with Medicaid and emotional problems. Additional state-level sources were used.

Study Design. Multilevel models investigated the association between managed care program type (carve-out, integrated) or fee-for-service (FFS) and reported unmet mental health care need.

Data Collection/Extraction Methods. The National Survey of CSHCN conducted telephone interviews with a sample representative at both the national and state levels.

Principal Findings. In multivariable models, among CSHCN with only Medicaid, living in states with Medicaid managed care (odds ratio [OR] = 1.81; 95 percent confidence interval: 1.04–3.15) or carve-out programs (OR = 1.93; 1.01–3.69) were associated with greater reported unmet mental health care need compared with FFS programs. Among CSHCN on Medicaid with emotional problems, the association between managed care and unmet need was stronger (OR = 2.48; 1.38–4.45).

Conclusions. State Medicaid pediatric behavioral health managed care programs were associated with greater reported unmet mental health care need than FFS programs among CSHCN insured by Medicaid, particularly for those with emotional problems.

Key Words. Medicaid, children with special needs, mental health, managed care, carve-out

The proportion of the Medicaid population enrolled in managed care rose from 9.5 percent in 1991 to 60.7 percent in 2004 (Mitchell and Gaskin 2004; CMS 2005), reflecting states' decisions to convert Medicaid programs from

traditional fee-for-service (FFS) to managed care. As part of this trend, many states have switched their pediatric mental health programs to managed care; for example, 42 states adopted Medicaid behavioral health managed care by 2000 (Stroul, Pires, and Armstrong 2001). These programs can be subdivided into two major types: (1) carve-out managed care in which mental and physical health services are financed and/or administered separately, and (2) integrated managed care in which these services are together (Hanson and Huskamp 2001; Stroul, Pires, and Armstrong 2001).

While the organization of a managed care program has been shown to influence children with special health care needs' (CSHCN's) utilization of health care services (Shenkman et al. 2003), the theoretical association between behavioral health managed care and unmet mental health care need is unclear. Behavioral health managed care programs could lead to cost savings which could be used to improve services, but may also result in adverse selection, restrictions on choosing providers, and other barriers that could reduce access to care (Kastner 2004). Managed care carve-outs could improve management and enhance mental health services (Inkelas 2005), but may also create fragmented care (Kastner 2004). Integrated approaches would be expected to facilitate coordination between physical and mental health services (Hutchinson and Foster 2003).

Despite the rising importance of Medicaid managed care, and its theoretical effects, there have been few empirical studies on the association between behavioral health managed care and any unmet need for pediatric mental health services. Some research has suggested managed care improved access to mental health care compared with FFS models (Burns et al. 1999; Hutchinson and Foster 2003), while others found reduced access (Mandell, Boothroyd, and Stiles 2003) or no changes (Mitchell and Gaskin 2004). One study suggested the degree of managed care penetration within a community can improve access to care (Stockdale et al. 2007). There is also a lack of data on the effect of behavioral health managed care on the mental health needs of CSHCN. CSHCN are an important population for research because they are particularly vulnerable to the effects of managed care due to their increased

---

Address correspondence to Karen A. Kuhlthau, Ph.D., Center for Child and Adolescent Health Policy, Massachusetts General Hospital, Harvard Medical School, 50 Staniford Street, Suite 901, Boston, MA 02114. Michael H. Tang, M.D., is with Harvard Medical School, Boston, MA. Kristen S. Hill, M.P.H., Alexy Arauz Boudreau, M.D., M.P.H., and James M. Perrin, M.D., are with the Center for Child and Adolescent Health Policy, Massachusetts General Hospital, Harvard Medical School, Boston, MA. Recai M. Yucel, Ph.D., is with the Division of Epidemiology and Biostatistics, University at Albany, State University of New York, Albany, NY.

service utilization and expenses compared with the general pediatric population (Newacheck et al. 1996).

An insufficient supply of mental health providers, including trained psychiatrists, psychologists, and social workers, likely contributes to reduced access to care (Flisher et al. 1997; U.S. Department HHS Report of the Surgeon General 2000a). Studies show reimbursement rates influence the participation of these providers in Medicaid programs (Berman et al. 2002). Sturm et al. (2003) found unmet mental health care need differed significantly by state, speculating the design of state Medicaid programs and primary care and mental health provider supply contributed to this state variation.

Given the higher prevalence of mental health conditions among CSHCN compared with other children (Bennett 1994), mental health services are critical for CSHCN. Studies from the 1994 National Health Interview Survey on Disability (NHIS-D) indicated 1.2 percent of children with chronic conditions had unmet mental health care need (Silver and Stein 2001) and 58.2 percent of those with poor psychosocial adjustment had unmet need (Witt, Kasper, and Riley 2003). Studies from the 2000–2001 NHIS found 3 percent of CSHCN with health insurance coverage had unmet mental health care need due to excessive out-of-pocket costs (Davidoff 2004a). Using the National Survey of CSHCN, Ganz and Tendulkar (2006) showed that the unmet mental health need among CSHCN was related to nonmetropolitan area residence, non-Hispanic, older age, lower income, uninsured (versus private), mildly severe to severe conditions, not having a usual source of care, other family members having unmet mental health needs, and having an emotional, developmental, or behavioral disability. We propose to focus on key state-level factors in the Medicaid population that influence the unmet need for mental health care.

This study uses the National Survey of CSHCN (NSCSHCN), a cross-sectional survey representative on both the national and state levels, providing a unique opportunity to analyze state policies and unmet need for health care. Analyzing a subsample of CSHCN with only Medicaid for insurance, and a further subsample of CSHCN with only Medicaid and an emotional, developmental, or behavioral (EDB) disorder, we use multilevel logistic regression models to assess potential differences in reported unmet need among Medicaid-receiving CSHCN living in states with Medicaid managed care pediatric behavioral health programs compared with those living in states with Medicaid FFS programs. We hypothesize that states with Medicaid managed care, including both the carve-out and integrated types, will be associated with higher rates of unmet mental health care need compared with FFS programs,

for both the overall Medicaid population and for children insured by Medicaid with parent-reported EDB problems. We hypothesize that among state-level variables, low reimbursement rates, short supply of primary care pediatricians, and fewer number mental health professionals will be associated with unmet mental health care need.

METHODS

Samples

The NSCSHCN was conducted from April 2000 to October 2002, by the National Center for Health Statistics at the Centers for Disease Control and Prevention, using the State and Local Area Integrated Telephone Survey of list-assisted random digit dialing. The Children with Special Health Care Needs Screener, the current standard for identifying CSHCN (Davidoff 2004b), asks respondents whether any child in the household needed or used more medical care, mental health, or educational services; therapies or counseling; prescription medicines; or had limitations compared with other children their age due to a medical, behavioral, or other health condition that lasted or was expected to last longer than 12 months (Bethell et al. 2002). If the household had multiple children who were reported to have special needs, one child was randomly selected. The respondent (over 95 percent of whom was a parent of a child with special needs) then answered multiple questions about that child's health, service needs, and utilization. The final national sample included 38,866 CSHCN, with approximately 750 CSHCN in each state and the District of Columbia (except for 1,500 CSHCN from Missouri).

Parents were asked, "What kind of health coverage does the child have?" and to choose all that applied from a list that included Medicaid, Medicare, Title V, State Children's Health Insurance Program (SCHIP), Medigap, Military and Private Insurance. Given our goal to isolate the effects of Medicaid, we defined the insurance variable as Medicaid only, Medicaid with other insurance, Private only, Other Public (such as SCHIP) alone or with Private, and uninsured. We limited the sample to children with only Medicaid for insurance; those with Medicaid and other insurance were excluded because private insurance is typically the primary payer for these children. Three states were excluded due to the absence of reimbursement rate data. We also restricted the sample to ages 3 and older, because of limited use of mental health services by younger children (Zito et al. 2000). This led to a sample of

4,400 subjects in our analysis. Further analyses restricted this sample to the 1,856 CSHCN >3-year-old with only Medicaid whose parents reported they had a child with an "emotional, developmental or behavioral problem for which s/he need[s] treatment or counseling."

We used several additional sources of state-level information from 2000 to 2001 to coincide with the NSCSHCN's initiation. The number of primary care pediatricians in each state in 2001 was measured using the American Medical Association's Physician Masterfile (AMA 2001). The number of psychiatrists, psychologists, and social workers was obtained from the National Center for Health Workforce Analysis, a division of the U.S. Department of Health and Human Services (U.S. Department HHS 2000b). Data from the United States Census on the number of children under 21 years old in each state were used to calculate per capita numbers (U.S. Census 2001). State Medicaid pediatric behavioral health managed care penetration rates were calculated using data from the United States Substance Abuse and Mental Health Services Administration (SAMHSA 2001).

Data on reimbursements were obtained from the AAP's Medicaid Reimbursement Survey (AAP; Medicaid Reimbursement Survey 2001a). This survey was distributed to state Medicaid Directors and documented the reimbursement rate for several Current Procedural Terminology (CPT) billing codes. We used the 2001 reimbursement rate in each state for a Psychiatry Diagnostic interview exam (CPT #90801). Data were not available for seven states, but after directly obtaining the 2001 information from the Medicaid offices in four states (Colorado, New York, Oregon, Wisconsin), only three states were missing from our final analysis (Delaware, Pennsylvania, Tennessee). To compare payment levels to the local costs of practicing medicine, state reimbursement rates were adjusted using a Geographic Adjustment Factor, which is derived from the Health Care Financing Administration's Geographic Practice Cost Indices (Menges et al. 2001).

Medicaid pediatric behavioral health managed care systems were categorized using data from the Health Care Reform Tracking Project (HCRTP). Based at the University of South Florida, the HCRTP annual survey asks state mental health directors to classify their managed care reform type as either carve-out or integrated (Stroul, Pires, and Armstrong 2001). To correspond to the NSCSHCN's initiation, we primarily used data from the HCRTP 2000 edition, and as described below, we used supplemental data from the HCRTP 2003 edition and the Center for Medicare and Medicaid Services' National Summary of State Medicaid Managed Care Programs (CMS 2000).

Unmet Mental Health Care Need

Our dichotomous dependent variable was defined using two questions in the survey. The parent of a child with special needs was asked, "During the past 12 months, was there any time when [your child] needed mental health care or counseling?" If the parent answered affirmatively, he or she was asked, "Did [your child] receive all the mental health care or counseling that he/she needed?" (CDC 2002). We thus operationalized unmet mental health care need as respondents who said their child needed mental health care or counseling during the previous 12 months, but did not receive all needed care.

Individual-Level Control Variables

Throughout the study, we controlled for several individual-level categorical variables, including reported age, sex, race/ethnicity, unmet need for coordinated ongoing comprehensive care within a medical home, adequacy of insurance, and the severity, stability, and type of condition. These control variables were selected based on their use and significance in previous studies of unmet need for health care services among CSHCN (e.g., Van Dyck et al. 2004). Having already excluded ages 0–2 because of their low-utilization of mental health care and counseling, we grouped the remaining ages into 3–8, 9–12, and 13–17 years old, with an approximately equal number of respondents in each age group. To reflect commonly used categorizations (e.g., Van Dyck et al. 2004), parent-reported race and ethnicity were combined into the variables non-Hispanic white, non-Hispanic black, Hispanic, and Other.

Care coordination in a medical home and adequacy of insurance were defined and operationalized by the Centers for Disease Control based on the Maternal and Child Health Bureau's (MCHB) six core objectives for CSHCN (CDC 2001; see http://www.cdc.gov/nchs/data/slaits/CSHCN%20Progress%20Tables1.pdf for operationalization). Care coordination in a medical home was defined by the MCHB as having a parent-reported usual source of care, personal doctor, no problems with referrals to specialists, professional care coordination, and family-centered care. Adequate insurance was based on having insurance without gaps over the past year, with a reasonable amount of costs covered by insurance and the ability to see needed providers. Of note, the questions defining this study's outcome (on needing and receiving mental health care or counseling) were not part of the MCHB variables' operationalization. Additional analyses (not shown) confirmed the study variables were not colinear with the MCHB's definitions. Altering the MCHB's variables to omit the questions on problems with a "referral to a specialist" or

having insurance that allowed seeing "the health care provider [the child] needs" also did not substantively change this study's outcomes. We thus used the MCHB's core objective variables as originally defined to ensure consistency with other studies (e.g., Oswald et al. 2007).

Other variables included the parents' perception of the amount of time their child was affected by the condition ("Never," "Sometimes," and "Usually" with "Always"); the stability of the child's health care needs ("changes all the time," "changes only once in a while," "usually stable"); and whether the child had "any kind of emotional, developmental or behavioral problem for which he/she needs treatment or counseling" ("Yes" or "No").

State-Level Study Variables

State-level continuous variables included primary care pediatrician supply; mental health provider supply; the state Medicaid reimbursement rate for a psychiatric diagnostic evaluation; and the state Medicaid pediatric behavioral health managed care penetration rate. A state-level categorical variable was the state Medicaid mental health program type (carve-out managed care, integrated managed care, or FFS). To determine the primary care provider supply, the number of primary care pediatricians in each state in 2001 was divided by the number of children under 21 years old in each state in 2001. The supply of mental health providers was indicated by the sum of the number of psychiatrists, psychologists, and social workers in the state divided by the number of children under 21 years old in each state. The state reimbursement rate (per 10 dollars) was obtained for a psychiatric diagnostic evaluation (CPT #90801) and adjusted by multiplying the rate by the Geographic Adjustment Factor. Each of these continuous variables was then recentered around their respective means.

A state typically had several Medicaid behavioral health programs that accepted children. To calculate the managed care penetration rate, we took the sum number of children enrolled for each program that reported data, and divided by the total number of children under 18 years old on Medicaid within each state (AAP; Medicaid State Reports 2001b). For states without managed pediatric behavioral health care the penetration rate was assumed to be zero. These continuous results were then recentered around the mean.

Using data from the HCRTP 2000 Survey, we classified the states without behavioral health managed care in 2000 as FFS systems (M. Armstrong, written communication, February 9, 2005). Of the states using mental health managed care, states that planned but never implemented programs in 2000

were recoded based on updated information from the HCRTP 2003 Survey, and states without data about the managed care type were coded using information from the Center for Medicare and Medicaid Services. Overall 22 states were classified as carve-out managed care, 18 states as integrated managed care, and 11 states as FFS.

Analysis

To obtain accurate estimates of the standard errors, we used *MLWIN* statistical software (Version 2.02; Rasbash et al. 2004) to fit a two-level logistic regression model of 4,400 CSHCN with Medicaid (at level 1) nested within 47 states and the District of Columbia. Multilevel modeling is appropriate for this study given the hierarchical structure of individual CSHCN with Medicaid within each state's Medicaid policy, managed care penetration, reimbursement rate, and provider supply. The individual-level sampling weights for the NSCSHCN were incorporated throughout. To understand the variation between states and to make inferences on the effects of state policies and provider supply on CSHCN, we built a random intercept multilevel model. Using SAS-embedded *SUDAAN* software (Research Triangle 2005), we first calculated descriptive percentages of overall prevalence, need for mental health care, and unmet need for all CSHCN and for CSHCN by presence of an EDB or by insurance type. We then used *SUDAAN* to calculate prevalence and unmet mental health care need among CSHCN with only Medicaid for insurance. We next used *MLWIN* for bivariate analyses of the state variables, followed by four multivariable analyses: (1) CSHCN with Medicaid only, comparing managed care and FFS (Table 3, Model #1); (2) CSHCN with Medicaid only, separating managed care into the carve-out and integrated types (Table 3, Model #2); (3) CSHCN with Medicaid only and an EDB problem, comparing managed care and FFS (Table 4, Model #1); and (4) CSHCN with Medicaid only and an EDB problem, separating managed care into the carve-out and integrated types (Table 4, Model #2). The variation partition coefficients were calculated using a simulation method coded within the *MLWIN* VPC.txt macro (Rasbash et al. 2004).

RESULTS

Prevalence of Unmet Mental Health Care Need

Parents of CSHCN reported that over 25 percent (95 percent confidence interval [CI]: 24.6–26.2 percent) needed mental health care or counseling

Table 1: Prevalence of Need and Unmet Need for CSHCN by Insurance Type

	Percent of CSHCN (Population Estimate in Thousands)	*Percent Needing Mental Health Care (Population Estimate in Thousands)*	*Percent among Those Needing Care with Unmet Mental Health Care Need (Population Estimate in Thousands)*
All CSHCN	100% (9,360)	25.4 (2,367)	18.1 (423)
Emotional, developmental, or behavioral problem			
With	29.1 (2,680)	66.7 (1,787)	20.0 (352)
Without	70.9 (6,544)	8.0 (522)	11.2 (58)
Insurance type			
Uninsured	5.2 (488)	29.8 (145)	46.0 (66)
Medicaid only	15.5 (1,450)	37.4 (542)	20.0 (106)
Medicaid and other insurance	10.3 (967)	33.6 (325)	15.4 (49)
Other public and other public and private	6.5 (607)	25.1 (152)	23.4 (35)
Private only	62.5 (5,848)	20.6 (1.203)	14.0 (166)

CSHCN, children with special health care needs.
All population estimates rounded to nearest thousand.
Missing values not included in calculations.
Calculated using individual-level sample weights.
Sample $n = 38{,}866$.

(Table 1). Overall over 18 percent (16.6–19.8 percent) of those reporting the need for care and 4.5 percent (4.1–4.9 percent) of all CSHCN did not receive the necessary mental health care. Unmet need was particularly acute among children with EDB problems; among those whose parents reported needing mental health care, those children had nearly twice the unmet need as those without EDB problems (20.0 versus 11.2 percent; 95 percent CI: 18.1–22.0 versus 9.1–13.6 percent). Medicaid (alone and with other insurance) is an important payer for CSHCN, serving 25.8 percent (24.5–27.1 percent) of the total CSCHN population. An estimated 106,000 CSHCN (89,000–126,000) insured only by Medicaid, and overall 155,000 CSHCN (127,000–188,000) insured by Medicaid, had unmet mental health care needs.

Table 2 describes demographic characteristics and the perceived unmet need among children older than 3 years with only Medicaid. There was greater reported unmet mental health care need among black and less among Hispanic children compared with white CSHCN (28.5 versus 10.6 versus

Table 2: Population Characteristics of CSHCN on Medicaid Only and 3 Years or Older

	Percent of Total Population (95% CI)	*Percent of Each Category with Unmet Need for Mental Health Care (95% CI)*
Individual-level categories		
Age		
3–8 years old	39.8 (37.2–42.5)	21.2 (14.8–29.5)
9–12 years old	34.2 (31.7–36.8)	15.6 (11.8–20.5)
13–17 years old	26.0 (23.8–28.2)	24.4 (18.2–31.7)
Sex		
Male	58.5 (55.9–61.1)	19.0 (15.5–23.0)
Female	41.5 (38.9–44.1)	21.6 (15.5–29.2)
Race		
White	47.6 (45.0–50.2)	18.9 (14.8–24.0)
Black	27.6 (25.3–30.1)	28.5 (20.7–37.8)
Hispanic	18.6 (16.3–21.0)	10.6 (6.2–17.3)
Other	6.3 (5.2–7.5)	22.5 (10.8–40.9)
Coordinated care in medical home		
Yes	42.7 (40.1–45.4)	10.2 (6.0–17.0)
No	57.3 (54.6–59.9)	23.6 (19.1–28.8)
Adequate insurance		
Yes	55.7 (52.9–58.4)	12.5 (8.8–17.4)
No	44.3 (41.6–47.1)	27.2 (21.5–33.8)
Time affected by condition, past 12 months		
Never	23.9 (21.8–26.0)	14.7 (7.7–26.2)
Sometimes	44.5 (41.9–47.2)	16.8 (12.3–22.6)
Usually or always	31.6 (29.2–34.2)	25.5 (20.2–31.7)
Description of child's needs		
Change all the time	10.8 (9.4–12.4)	28.6 (19.6–39.8)
Needs change only once in a while	35.6 (33.2–38.2)	23.7 (18.0–30.4)
Needs are usually stable	53.6 (50.9–56.2)	15.0 (10.9–20.2)
Emotional/developmental/behavioral problem		
Yes	46.1 (43.4–48.8)	22.0 (18.1–26.5)
No	53.9 (51.2–56.6)	10.7 (6.1–18.2)
State-level categories		
State pediatric Medicaid mental health program type		
Managed care (carve-out or integrated)	86.1 (84.7–87.4)	21.0 (17.3–25.3)
Fee-for-service	13.9 (12.6–15.3)	12.9 (8.5–19.1)
State pediatric Medicaid mental health program type		
Carve-out managed care	53.2 (50.7–55.7)	22.7 (17.6–28.8)
Integrated managed care	32.9 (30.6–35.2)	18.2 (13.8–23.6)
Fee-for-service	13.9 (12.6–15.3)	12.9 (8.5–19.1)
State Medicaid managed care penetration rate		
State below median	51.3 (48.7–53.8)	22.6 (17.4–29.0)
State above median	48.7 (46.2–51.3)	17.6 (13.8–22.1)

continued

Table 2. *Continued*

	Percent of Total Population (95% CI)	*Percent of Each Category with Unmet Need for Mental Health Care (95% CI)*
Primary care pediatricians per 1,000 children in state		
State below median	33.3 (31.1–35.6)	17.2 (13.6–21.4)
State above median	66.7 (64.4–68.9)	21.4 (16.9–26.7)
Mental health providers per 1,000 children in state		
State below median	66.6 (64.3–68.8)	21.2 (16.8–26.2)
State above median	33.4 (31.2–35.7)	17.9 (13.3–23.6)
Adjusted state Medicaid reimbursement rate for psychiatric evaluation per $10		
State below median	50.6 (47.9–53.2)	16.9 (13.0–21.7)
State above median	49.4 (46.8–52.1)	22.3 (17.0–28.8)

CSHCN, children with special health care needs; OR, odds ratio; CI, confidence interval.
Missing values not included in calculations.
Calculated using individual-level sample weights.
Sample $n = 4,400$.

18.9 percent, respectively); more unmet need among those who reported having insufficient care coordination in a medical home (23.6 versus 10.2 percent); inadequate insurance compared with those who do (27.2 versus 12.5 percent); CSHCN whose needs "change all the time" compared with those who are "usually stable" (28.6 versus 15.0 percent); and those with EDB problems (22.0 versus 10.7 percent). More unmet mental health care need was noted for children living in states with managed behavioral health care compared with those with FFS (21.0 versus 12.9 percent). Among the managed care programs, greater unmet need was found in both carve-out (22.7 percent) and integrated (18.7 percent) programs than FFS programs.

Characteristics Associated with Unmet Mental Health Care Need for Medicaid Only

To isolate the association between state Medicaid managed care programs and unmet need for mental health services, bivariate analyses (not shown) were conducted for state-level variables. There was a statistically significant association between managed behavioral health care programs and a higher level of perceived unmet mental health care need (odds ratio [OR] = 1.67; 1.10–2.52). Among the managed care program types, living in a state with a carve-out managed care program was also associated with greater unmet mental health care need (OR = 1.86; 1.14–3.03). The remaining state-level variables, including living in a state with an integrated program, Medicaid managed care

Table 3: State-Level Characteristics Associated with Unmet Need for Mental Health Care among CSHCN with Medicaid Only Ages 3 Years and Older (Multivariable Analyses)

	Model #1 OR (95% CI)	*Model #2 OR (95% CI)*
State level		
State pediatric Medicaid mental health program type		
Managed care	1.81 (1.04–3.15)*	
Fee-for-service	1.00	
State pediatric Medicaid mental health program type		
Carve-out managed care		1.93 (1.01–3.69)*
Integrated managed care		1.70 (0.95–3.03)
Fee-for-service		1.00
Intercept	0.01 (0.00–0.04)	0.01 (0.00–0.04)
Variance components	1.89 (1.44–2.47)	1.87 (1.45–2.41)
Variance partition coefficient	11.2%	11.1%

CSHCN, children with special health care needs; OR, odds ratio; CI, confidence interval.

*$p < .05$.

State-level variables shown. Multivariable analysis adjusted for age, sex, race/ethnicity, professional coordinated care in a medical home, adequate insurance, time affected by condition, changing needs of condition, and presence of emotional, developmental, or behavioral problems.

Calculated using individual-level sample weights.

Sample $n = 4{,}400$.

penetration rates, adjusted reimbursement rate for a psychiatric diagnostic evaluation, mental health provider supply, and primary care provider supply were not significantly associated with perceived unmet mental health care need.

Because the state-level variables—except for managed care program type—were nonsignificant in bivariate analyses, they were not included in the multivariable analyses. When these nonsignificant variables were included (analyses not shown), the results did not substantively change, except that in Table 3, Model #2, an integrated managed care program became statistically significantly associated with perceived unmet mental health care need (OR = 2.33; 1.31–4.15).

Table 3 shows multilevel analyses for CSHCN with only Medicaid for insurance that needed mental health care. Model #1 compares managed care (either carve-out or integrated models) with FFS, while Model #2 compares carve-out managed care and integrated managed care separately with FFS. Model #1 shows that living in a state with a Medicaid behavioral health managed care program was associated with greater perceived unmet mental health care need (OR = 1.81; 1.04–3.15) compared with living in a state with

a FFS program. Model #2 shows that living in a state with a carve-out pediatric behavioral health managed care program was associated with nearly twice (OR = 1.93; 1.01–3.69) the reported unmet mental health care need as compared with living in a state with a FFS program.

The variance partition coefficient in Model #1 equaled 11.2 percent and Model #2 equaled 11.1 percent (Table 3). This suggests that among CSHCN with the same individual-level traits (the reference population), approximately 11 percent of their variation in unmet mental health care need is due to differences between their states' Medicaid managed care policies. The reference population in this study are 3–8-year-old white males whose parents report adequate professional care coordination in a medical home and insurance, who over the past 12 months have never been affected by their condition, have usually stable health with no EDB problems, and live in a state with a FFS Medicaid behavioral health program.

Table 4 shows multivariable analyses for CSHCN whose parents reported EDB problems, Medicaid only for insurance, and an age greater than 3 years old. Model #1 shows that for this subpopulation of children with

Table 4: State-Level Characteristics Associated with Unmet Need for Mental Health Care among CSHCN with Educational, Developmental, or Behavioral Problems, on Medicaid Only, and Ages 3 Years and Older (Multivariable Analyses)

	Model #1 OR (95% CI)	*Model #2 OR (95% CI)*
State level		
State pediatric Medicaid mental health program type		
Managed care	2.48 (1.38–4.45)*	
Fee-for-service	1.00	
State pediatric Medicaid mental health program type		
Carve-out managed care		2.69 (1.37–5.29)*
Integrated managed care		2.28 (1.20–4.33)*
Fee-for-service		1.00
Intercept	0.03 (0.01–0.10)	0.03 (0.01–0.10)
Variance components	2.11 (1.56–2.87)	2.10 (1.57–2.82)
Variance partition coefficient	12.9%	12.8%

CSHCN, children with special health care needs; OR, odds ratio; CI, confidence interval.

*$p < .05$.

State-level variables shown. Multivariable analysis adjusted for age, sex, race/ethnicity, professional coordinated care in a medical home, adequate insurance, time affected by condition, and changing needs of condition.

Calculated using individual-level sample weights.

Sample $n = 1{,}856$.

EDB problems, living in a state with managed care was associated with a greater perceived unmet mental health care need compared with a state with a FFS program (OR = 2.48; 1.38–4.45), which was an even greater magnitude association than for other CSHCN (Table 3: OR = 1.81; 1.04–3.15). Model #2 demonstrates both carve-out (OR = 2.69; 1.37–5.29) and integrated (OR = 2.28; 1.20–4.33) managed care program types were associated with greater unmet need compared with FFS programs.

COMMENT

This study used data representative on both national and state levels, and a multilevel model accounting for both individual- and state-level variables, to show that living in a state with a Medicaid managed care pediatric behavioral health program was associated with greater reported unmet need for mental health care among CSHCN. Furthermore, carve-out programs were associated with greater unmet mental health care need as compared with FFS models. The 11 percent residual variance suggests that the type of state Medicaid managed care policy has a substantial impact on the unmet mental health care needs of CSHCN. This association was particularly strong among CSHCN on Medicaid with EDB problems.

Nationwide, over 400,000 CSHCN are estimated to have an unmet need for mental health care. Medicaid serves nearly 2.5 million CSHCN—more than 25 percent of the population—and over 150,000 are reported to have an unmet mental health care need, demonstrating that a state Medicaid program is a key service provider to CSHCN. Despite this need, evidence suggests Medicaid is an effective insurance at providing mental health care for children, perhaps even better than private insurance (Minkovitz et al. 2002). Given the increasing costs of Medicaid, and the prospect of reductions in both state and federal funding, Medicaid's ability to provide needed mental health services to CSHCN should be emphasized.

Possible explanations for the association between carve-out programs and unmet need include reduced access to behavioral health services due to increased administrative complexity and a lack of a single point of accountability. Because carve-outs have been shown to shift mental health services from the inpatient to the outpatient setting, it may also be due to a shortage of outpatient mental health providers (Callahan et al. 1995; Chang et al. 1998; Hutchinson and Foster 2003; Baker and Afendulis 2005). The greater unmet need for integrated programs and overall Medicaid managed care may be due

to insufficient funding, poor capitation systems, inadequate risk adjustment, a reduction in the level of services, or barriers that could lead to low Medicaid participation rates among providers (Greene, Blustein, and Remler 2005).

Both carve-out and integrated managed care programs are particularly associated with unmet mental health care need for children with EDB problems. It is particularly concerning that children already known to have EDB problems have less access to needed mental health services compared with other CSHCN. Managed care programs should identify and eliminate the barriers facing children with known mental health and behavioral disorders.

Limitations to this study should be noted. This survey relies on parent reported need for mental health care that is not independently verified. However, the survey does allow for a consumer-driven understanding of need and utilization, and the level of need and unmet need in the NSCSHCN is comparable with other studies of CSHCN (Silver and Stein 2001; Davidoff 2004a). Any bias in the NSCSHCN is likely to be an underestimation of unmet need since parents underreport their children's need for mental health care (Teagle 2002). This study's definition of CSHCN was developed by the MCHB and has had use in multiple research studies. It has the advantage of including any child with an elevated need for health services, but the disadvantage of grouping multiple primary diagnoses together, including both physical and behavioral disorders. The increased rate of mental health need among CSHCN likely explains how some parents in the study reported having a child who required mental health care but did not have an EDB disorder. We defined unmet mental health care need as those children whose parents reported need but not receipt of care. Although other research may use simple absence of services as an indicator of need, the definition used here has had substantial use in the child health literature.

The state variables used, particularly the Medicaid managed care program type, allow for important national-level conclusions, but may simplify distinctions within and between states. Multilevel modeling helps control for some of this variation, but residual factors may include the distribution of financial risk, mandatory versus voluntary enrollment, types of provider networks, and regulations on eligibility and use (Hutchinson and Foster 2003). The findings presented here are based on analyses of cross-sectional data, allowing us to show association, but not demonstrate causation. In terms of directionality, cost containment is typically cited as the primary motivation for switching to Medicaid managed care, so the preexisting level of need is less likely to bias a state's choice of managed care plan (Bailit and Burgess 1999; Burns et al. 1999). While our interests were on the Medicaid-only population,

future research should investigate the impact of managed care programs on SCHIP enrollees and children with both private and public insurance.

Overall there remains significant unmet mental health care need reported among CSHCN. Medicaid serves 25 percent of all CSHCN and Medicaid coverage may improve access to mental health care. However, as states face fiscal crises and choose among Medicaid mental health programs, they must consider the impact of their policies on children. Medicaid managed care programs, including both behavioral health carve-outs and integrated models, may be attractive because of potential cost savings. But state Medicaid directors, legislators, and child advocates must assure that these managed care programs adequately meet the mental health care needs of children with special needs, particularly those with EDB problems.

ACKNOWLEDGMENTS

The authors wish to acknowledge Diane Romm, Jennifer Dezarn, Sangeeth Gnanasekaran, Christina Fluet, Mary Armstrong, and Suk-fong Tang for their support. This research was funded in part by the Centers for Disease Control and Prevention through the Association of American Medical Colleges, grant number U36/CCU319276, AAMC ID number MM-0701-04/04.

Disclosures: None.

Disclaimers: The sponsors had no role in the design, conduct, analysis, and interpretation of the data; or the preparation, review, or approval of the manuscript.

REFERENCES

American Academy of Pediatrics. 2001a. "Medicaid Reimbursement Survey" [accessed on October 24, 2006]. Available at http://www.aap.org/research/medreimPDF01/all_states.pdf

———. 2001b. "Medicaid State Reports: FY2001" [accessed on October 24, 2006]. Available at http://www.aap.org/research/pdf01/FY2001FullReport.pdf

American Medical Association. 2001. *Physician Characteristics and Distribution in the US, 2001–2002 Edition.* Chicago: AMA Press.

Bailit, M. H., and L. L. Burgess. 1999. "Competing Interests: Public-Sector Managed Behavioral Health Care." *Health Affairs* 18 (5): 112–4.

Baker, L. C., and C. Afendulis. 2005. "Medicaid Managed Care and Health Care for Children." *Health Services Research* 40 (5): 1466–88.

Bennett, D. S. 1994. "Depression among Children with Chronic Medical Problems: A Meta-Analysis." *Journal of Pediatrics Psychology* 19 (2): 149–69.

Berman, S., J. Dooms, S. Tang, and B. Yudkowsky. 2002. "Factors That Influence the Willingness of Private Primary Care Pediatricians to Accept More Medicaid Patients." *Pediatrics* 110 (2): 239–48.

Bethell, C. D., D. Read, R. E. K. Stein, S. J. Blumberg, N. Wells, and P. W. Newacheck. 2002. "Identifying Children with Special Health Care Needs: Development and Evaluation of a Short Screening Tool." *Ambulatory Pediatrics* 2: 38–48.

Burns, B. J., S. E. Teagle, M. Schwartz, A. Angold, and A. Holtzman. 1999. "Managed Behavioral Health Care: A Medicaid Carve-Out for Youth." *Health Affairs* 18 (5): 214–26.

Callahan, J. J., D. S. Shepard, R. H. Beinecke, M. J. Larson, and D. Cavanaugh. 1995. "Mental Health/Substance Abuse Treatment in Managed Care: The Massachusetts Medicaid Experience." *Health Affairs* 14 (3): 173–85.

Center for Medicare and Medicaid Services. 2000. "National Summary of State Medicaid Managed Care Programs as of June 30, 2000" [accessed on February 14, 2005]. Available at http://www.cms.hhs.gov/medicaid/managedcare/mmcns600.asp

———. 2001. "Progress toward Implementing Community-Based Systems of Services for Children with Special Health Needs: Summary Tables from the National Survey of Children with Special Health Care Needs" [accessed on November 11, 2004]. Available at http://www.cdc.gov/nchs/data/slaits/CSHCN%20Progress%20Tables1.pdf

———. 2002. "SLAITS National Survey of Children with Special Health Care Needs: Complete Interview" [accessed on May 14, 2006]. Available at http://www.cdc.gov/nchs/data/slaits/NS-CSHCN%20Questionnaire%20(website)1.pdf

———. 2005. "2005 Medicaid Managed Care Enrollment Report" [accessed on January 15, 2006]. Available at http://www.cms.hhs.gov/MedicaidDataSourcesGenInfo/Downloads/mmcer04.pdf

Chang, C. F., L. J. Kiser, J. E. Bailey, M. Martins, W. C. Gibson, K. A. Schaberg, D. M. Mirvis, and W. B. Applegate. 1998. "Tennessee's Failed Managed Care Program for Mental Health and Substance Abuse Services." *Journal of the American Medical Association* 279 (11): 864–9.

Davidoff, A. J. 2004a. "Insurance for CSHCN: Patterns of Coverage and Burden on Families to Provide Adequate Insurance." *Pediatrics* 114: 394–403.

———. 2004b. "Identifying Children with Special Health Care Needs in the National Health Interview Survey: A New Resource for Policy Analysis." *Health Services Research* 39 (1): 53–71.

Flisher, A. J., R. A. Kramer, R. C. Grosser, M. Alegria, H. R. Bird, K. H. Bourdon, S. H. Goodman, S. Greenwald, S. M. Horwitz, R. E. Moore, W. E. Narrow, and C. W. Hoven. 1997. "Correlates of Unmet Need for Mental Health Services by Children and Adolescents." *Psychological Medicine* 27 (5): 1145–54.

Ganz, M. L., and S. A. Tendulkar. 2006. "Mental Health Care Services for Children with Special Health Care Needs and Their Family Members: Prevalence and Correlates of Unmet Need." *Pediatrics* 117 (6): 2138–48.

Greene, J., J. Blustein, and D. Remler. 2005. "The Impact of Medicaid Managed Care on Primary Care Physician Participation in Medicaid." *Medical Care* 43 (9): 911–20.

Hanson, K. W., and H. A. Huskamp. 2001. "Behavioral Health Services under Medicaid Managed Care: The Uncertain Implications of State Variation." *Psychiatric Services* 52 (4): 447–50.

Hutchinson, A. B., and E. M. Foster. 2003. "The Effect of Medicaid Managed Care on Mental Health Care for Children: A Review of the Literature." *Mental Health Services Research* 5 (1): 39–54.

Inkelas, M. 2005. "Incentives in a Medicaid Carve-Out: Impact on Children with Special Health Care Needs." *Health Services Research* 40 (1): 79–101.

Kastner, T. A. and the Committee on Children with Disabilities. 2004. "Managed Care and Children with Special Health Care Needs." *Pediatrics* 114 (6): 1693–8.

Mandell, D. S., R. A. Boothroyd, and P. G. Stiles. 2003. "Children's Use of Mental Health Services in Different Medicaid Insurance Plans." *Journal of Behavioral Health Services Research* 30 (2): 228–37.

Menges, J., C. Park, J. Babcock, L. Chimento, R. Haught, and S. Ho. 2001. "Comparing Physician and Dentist Fees among Medicaid Programs. Prepared for the Medi-Cal Policy Institute by the Lewin Group" [accessed on July 2, 2007]. Available at http://www.chcf.org/topics/medi-cal/index.cfm?itemID=20412

Minkovitz, C. S., P. J. O'Campo, Y. H. Chen, and H. A. Grason. 2002. "Associations between Maternal and Child Health Status and Patterns of Medical Care Use." *Ambulatory Pediatrics* 2: 85–92.

Mitchell, J. M., and D. J. Gaskin. 2004. "Do Children Receiving Supplemental Security Income Who Are Enrolled in Medicaid Fare Better under a Fee-for-Service or Comprehensive Capitation Model?" *Pediatrics* 114 (1): 196–204.

Newacheck, P. W., R. E. K. Stein, D. K. Walker, S. L. Gortmaker, K. A. Kuhlthau, and J. M. Perrin. 1996. "Monitoring and Evaluating Managed Care for Children with Chronic Illnesses and Disabilities." *Pediatrics* 98: 952–8.

Oswald, D. P., J. N. Bodurtha, J. H. Willis, and M. B. Moore. 2007. "Underinsurance and Key Health Outcomes for Children with Special Health Care Needs." *Pediatrics* 119: e341–7.

Rasbash, J., F. Steele, W. Browne, and B. Prossner. 2004. *A User's Guide to MLwiN Version 2.0, Centre for Multilevel Modeling.* London: Institute of Education, University of London.

Research Triangle Institute. 2005. *SUDAAN (Release 9.01) Statistical Software.* Research Triangle Park, NC: Research Triangle Institute.

Shenkman, E., S. S. Wu, J. Nackashi, and J. Sherman. 2003. "Managed Care Organizational Characteristics and Health Care Use among Children with Special Health Care Needs." *Health Services Research* 38 (6, part 1): 1599–624.

Silver, E. J., and R. E. K. Stein. 2001. "Access to Care, Unmet Health Needs, and Poverty Status among Children with and without Chronic Conditions." *Ambulatory Pediatrics* 1: 314–20.

Stockdale, S. E., L. Tang, L. Zhang, T. R. Belin, and K. B. Wells. 2007. "The Effects of Health Sector Market Factors and Vulnerable Group Membership on Access to Alcohol, Drug, and Mental Health Care." *Health Services Research* 42 (3, part 1): 1020–41.

Stroul, B. A., S. A. Pires, and M. I. Armstrong. 2001. "Health Care Reform Tracking Project: Tracking State Health Care Reforms as They Affect Children and Adolescents with Behavioral Health Disorders and Their Families—2000 State Survey." Research and Training Center for Children's Mental Health, Louis de la Parte Florida Mental Health Institute, University of South Florida.

Sturm, R., J. S. Ringel, and T. Andreyeva. 2003. "Geographic Disparities in Children's Mental Health Care." *Pediatrics* 112 (4): e308–15.

Substance Abuse and Mental Health Services Administration. 2001. "State Profiles, 2000, on Public Sector Managed Behavioral Health Care" [accessed on July 2, 2007]. Available at ftp://ftp.hrsa.gov/TPR/2000ProfilesNationalSum.pdf

Teagle, S. E. 2002. "Parental Problem Recognition and Child Mental Health Service Use." *Mental Health Services Research* 4 (4): 257–66.

U.S. Census Bureau. 2001. "Age 2000: Census 2000 Brief" [accessed July 2, 2007]. Available at http://www.census.gov/prod/2001pubs/c2kbr01-12.pdf

U.S. Department of Health and Human Services. 2000a. *Mental Health: A Report of the Surgeon General.* Washington, DC: U.S. Government Printing Office.

———. 2000b. "National Center for Health Workforce Analysis: State Health Workforce Profiles" [accessed November 22, 2004]. Available at http://bhpr.hrsa.gov/healthworkforce/reports/profiles

Van Dyck, P. C., M. D. Kogan, M. G. McPherson, G. R. Weissman, and P. W. Newacheck. 2004. "Prevalence and Characteristics of Children with Special Health Needs." *Archives of Pediatrics and Adolescent Medicine* 158: 884–90.

Witt, W. P., J. D. Kasper, and A. W. Riley. 2003. "Mental Health Services Use among School-Aged Children with Disabilities: The Role of Sociodemographics, Functional Limitations, Family Burdens and Care Coordination." *Health Services Research* 38 (6, part 1): 1441–66.

Zito, J. M., D. J. Safer, S. dosReis, J. F. Gardner, M. Boles, and F. Lynch. 2000. "Trends in the Prescribing of Psychotropic Medications to Preschoolers." *Journal of American Medical Association* 283 (8): 1025–30.