

# Child Outpatient Mental Health Service Use: Why Doesn't Insurance Matter?

Sherry Glied<sup>1\*</sup>, A. Bowen Garrett<sup>2</sup>, Christina Hoven<sup>3</sup>, Maritza Rubio-Stipec<sup>4</sup>, Darrel Regier<sup>5</sup>, Robert E. Moore<sup>3</sup>, Sherryl Goodman<sup>6</sup>, Ping Wu<sup>3</sup> and Hector Bird<sup>3</sup>

<sup>1</sup>Columbia School of Public Health, New York, USA

<sup>2</sup>Robert Wood Johnson Foundation Scholars in Health Policy Program, UC Berkeley School of Public Health, Berkeley, CA, USA

<sup>3</sup>Columbia University and New York State Psychiatric Institute, New York, USA

<sup>4</sup>University of Puerto Rico, San Juan, PR, USA

<sup>5</sup>NIMH, Rockville, MD, USA

<sup>6</sup>Emory University, Atlanta, GA, USA

## Abstract

**Background:** Several recent studies of child outpatient mental health service use in the US have shown that having private insurance has no effect on the propensity to use services. Some studies also find that public coverage has no beneficial effect relative to no insurance.

**Aims:** This study explores several potential explanations, including inadequate measurement of mental health status, bandwagon effects, unobservable heterogeneity and public sector substitution for private services, for the lack of an effect of private insurance on service use.

**Methods:** We use secondary analysis of data from the three mainland US sites of NIMH's 1992 field trial of the Cooperative Agreement for Methodological Research for Multi-Site Surveys of Mental Disorders in Child and Adolescent Populations (MECA) Study. We examine whether or not a subject used any mental health service, school-based mental health services or outpatient mental health services, and the number of outpatient visits among users. We also examine use of general medical services as a check on our results. We conduct regression analysis; instrumental variables analysis, using instruments based on employment and parental history of mental health problems to identify insurance choice, and bivariate probit analysis to examine multiservice use.

**Results:** We find evidence that children with private health insurance have fewer observable (measured) mental health problems. They also appear to have a lower unobservable (latent) propensity to use mental health services than do children without coverage and those with Medicaid coverage. Unobserved differences in mental health status that relate to insurance choice are found to contribute to the absence of a positive effect for private insurance relative to no coverage in service use regressions. We find no evidence to suggest that differences in attitudes or differences in service availability in children's census tracts of residence explain the non-effect of insurance. Finally, we find that the lack of a difference is not a consequence of substitution of school-based for office-based services. School-based and office-based specialty

mental health services are complements rather than substitutes. School-based services are used by the same children who use office-based services, even after controlling for mental health status.

**Discussion:** Our results are consistent with at least two explanations. First, limits on coverage under private insurance may discourage families who anticipate a need for child mental health services from purchasing such insurance. Second, publicly funded services may be readily available substitutes for private services, so that lack of insurance is not a barrier to adequate care. Despite the richness of data in the MECA dataset, cross-sectional data based on epidemiological surveys do not appear to be sufficient to fully understand the surprising result that insurance does not enable access to care.

**Implications for Policy and Research:** Limits on coverage under private mental health insurance combined with a relatively extensive system of public mental health coverage have apparently generated a situation where there is no observed advantage to the marginal family of obtaining private mental health insurance coverage. Further research using longitudinal data is needed to better understand the nature of selection in the child mental health insurance market. Further research using better measures of the nature of treatment provided in different settings is needed to better understand how the private and public mental health systems operate. © 1998 John Wiley & Sons, Ltd.

Received 24 May 1998; accepted 14 October 1998.

## Introduction

An estimated 20 percent of American children and adolescents meet criteria for a serious and diagnosable emotional or behavioral disorder each year. Mental health care for children and adolescents was the fastest growing component of private mental health spending during the mid-1980s.<sup>1</sup> Nonetheless, as is the case among adults, relatively few children who meet mental health diagnostic criteria actually seek services. Only about one in seven children and adolescents with serious emotional disorders used specialty mental health services in 1987, a figure just slightly higher than among adults.<sup>2–4</sup>

In the US, as elsewhere, mental health service use by children has features that make it quite different from both mental health service use by adults with mental health

\*Correspondence to: Sherry Glied, 600 West 168th St., 6th Floor, New York, NY 10032, USA. E-mail: sag1@columbia.edu Tel: 212–305–0299; fax: 212–305–3405

Contract grant sponsor: NIMH

Contract grant number: MH#52698–01

Contract grant sponsor: NIMH Mental Health Clinical Research Center

Contract grant number: MH#30906

Contract grant sponsor: Robert Wood Johnson Foundation

problems and general health service use by children. Many children with mental health disorders have problems in school or are in foster care or under the care of child welfare agencies or of the juvenile justice system. In consequence, these children may obtain mental health services from providers who do not fall into the traditional mental health service system. In the US, these agencies, which are usually publicly funded, are important providers of mental health services to children (as well as providers of related services). Furthermore, the class of mental health services themselves may encompass a range of providers, some of whose services are covered by public insurance and some of whose services are not. In the US, mental health services are provided both through a publicly funded mental health service system and through private providers who may be paid out of pocket or through public or private health insurance. Some low-income children obtain public health insurance through the Medicaid program, while higher income families may purchase private insurance coverage to cover the cost of child mental health services.

The overlaps among these various services, and the problems of coordination among them, have been an important concern for US policy makers, and are a significant issue in any mental health service system. During the 1980s and 1990s several major US initiatives focused on coordinating the care provided to children with problems by these various social service agencies. While coordination of mental health and wraparound care is important for adults with mental health problems too, the critical roles played by school systems and child welfare agencies are unique to children with mental health problems.

Ideally, the overlapping array of service providers who offer mental health services should generate a situation where those who fail to obtain care in one setting, for one reason or another, are likely to receive it in another venue. In the US, one reason that children may not receive services through the traditional private mental health service system is that they lack insurance coverage to help pay for care. In the US context, tracing out the empirical consequences of different types of insurance status provides an opportunity to understand how these various systems interact. As we show below, perhaps as a consequence of the significant roles of the school and child welfare systems, private insurance does not seem to play the same enabling role for children in gaining access to mental health services as it does in the general health sector. In the general health sector, children with health insurance are much more likely to use medical services than are their uninsured counterparts. For example, among 12–14 year olds, the insured were almost 40% more likely to have visited a doctor in 1990 than were the uninsured.<sup>5</sup> Yet, four separate studies each using a different dataset have not found *any* positive effect of private insurance on child outpatient mental health service utilization in the US.<sup>6–9</sup>

Evidence on the role of public Medicaid insurance in providing access is mixed, with two of the studies finding positive effects<sup>6,8</sup> and the other two finding no effects.<sup>7,9</sup> By contrast, prior research using similar data sets and

exploring the effect of insurance on mental health service use for adults has tended to find positive and significant results for both Medicaid and private coverage.<sup>10</sup>

This article uses a range of statistical techniques to explore alternative explanations for the persistent anomalous result that health insurance has little effect on mental health service use using data from the three mainland US sites of NIMH's 1992 field trial of the Cooperative Agreement for Methodological Research for Multi-Site Surveys of Mental Disorders in Child and Adolescent Populations (MECA) Study. As we discuss below, this lack of an observed effect is consistent with several explanations. First, children with private insurance may be healthier than other children and have less need of services. Second, since families with private health insurance may be ineligible for free or reduced-cost publicly funded mental health services, and private coverage often imposes stringent limits on mental health service, families of children with mental health problems may actually be less likely to seek private coverage. Finally, service providers in other systems may compensate for any lack of access experienced by children without private insurance.

The next section of the paper describes in more detail the theoretical reasons for insurance to affect (or not affect) service utilization. Subsequent sections describe the MECA data; the relationship between insurance status and mental health service use, controlling for an array of potentially confounding variables; the role of selection in the insurance choice decision in generating the observed insurance effects and substitutions and complementarities in service use between school and office-based use and the last section concludes.

## The Role of Economic Factors

Economic theory and common sense suggest that health insurance should make it easier for children and adolescents to obtain mental health services, by reducing the price paid for visits. A review of the literature concludes that mental health service use is at least as responsive to reductions in the price of services, such as those caused by insurance, as is ambulatory medical care utilization.<sup>11</sup> Indeed, some studies find that mental health service use is far more responsive to insurance coverage than are other types of service use.<sup>12,13</sup> The RAND health insurance experiment, conducted in the late 1970s, provides experiment-based evidence showing that the demand for mental health service utilization is, in general, more price elastic than the demand for physical health service utilization.<sup>14</sup> Mental health service utilization among children randomly assigned to plans with free care in this experiment was four times as high as among those assigned to full cost plans, while general health service use was twice as high in the free care group.

In non-experimental analysis, the apparent responsiveness of mental health service demand should, if anything, be even greater than under the conditions of the RAND experiment. A family's choice of whether or not to obtain insurance coverage, and of the type of coverage to select,

is likely to depend on the family's anticipated need for services. This process of adverse selection reinforces the result that utilization is higher among those with insurance than among those without coverage. Studies of insurance where choices are offered find evidence that adverse selection drives up the cost of more generous insurance plans and reduces the cost of coverage in HMOs.<sup>15,16</sup> Some recent evidence from Switzerland suggests that there may be substantial adverse selection against fee-for-service insurance in the market for private mental health insurance benefits.<sup>17</sup>

There are several reasons why the strong predictions of economic theory might not be borne out in empirical analyses of the child mental health service market. A first set of explanations depends on differences in the observable characteristics of children and families with different types of insurance coverage. Children and adolescents with private insurance may have characteristics that reduce their demand for mental health services, relative to children and adolescents with public insurance or no insurance. Epidemiological research has shown that disadvantaged socioeconomic status and family disruption are risk factors for mental health disorders.<sup>18,19</sup> Furthermore, disorders that have external effects, such as conduct disorder, have been shown to be more likely to lead to service utilization than 'internalizing' disorders, such as depression.<sup>20</sup> If children without private insurance are more likely to have mental health disorders or to have 'externalizing' disorders, the measured effect of insurance will be biased downward.

Mental health service utilization may also depend on exposure to mental health services and attitudes toward such services. Children and adolescents with insurance coverage may come from families with different attitudes toward service use than those from families with public coverage or those without coverage.<sup>21</sup> If attitudinal barriers were more common among those with private insurance coverage, failure to include these barriers in analysis would lead to underestimates of the effect of insurance on service use.

A second explanation relies on differences generated by the insurance market. Differences between the characteristics of children with private insurance and those with public insurance or no insurance may be related to characteristics of insurance plans. Private insurance policies often require higher co-payments for mental health services than for medical services, limit the number of visits to mental health service providers, exclude some conditions altogether or deny coverage to people with certain pre-existing conditions. These limitations on insurance policies may be a response to adverse selection in the market for mental health insurance. If they are effective, they may discourage less healthy children from joining and may substantially limit utilization by those children who do enroll. These restrictions on coverage could undo the effects of adverse selection, so that, holding other factors constant, children with private insurance have no greater need for services than those without insurance. Conversely, under the Federal Supplemental Security Income (SSI) program, some children qualify for Medicaid *because* they have a mental health problem. During the late 1980s and early 1990s, the regulations

governing SSI changed in a way that increased the number of children receiving Medicaid through SSI by more than 300 000 children. By 1992, over 600 000 children received Medicaid through SSI, with more than half of these children qualifying for SSI due to a mental disorder.<sup>22</sup> Furthermore, public sector health and social service providers who serve children with disorders may identify potential Medicaid recipients and assist them in applying for coverage. This set of influences suggests that children on Medicaid are likely to be less healthy than are those with private insurance or no coverage.

A third set of explanations suggests that the design of public programs for children with mental health problems may erase the effects of insurance. Many states provide direct outpatient mental health benefits through community mental health centers, which often charge sliding scale rates. Children with private health insurance may also lose eligibility for these free or reduced-fee mental health services. Public mental hospitals provide inpatient treatment services. In addition, state child welfare agencies and other service providers often also include mental health treatment within the range of services they provide. In States with generous public mental health benefits, care may be more accessible to children with Medicaid or without insurance than to children with private insurance coverage. In economic terms, public benefits may have crowded out private insurance.

The most important of these public benefits are school-based services, which are *never* funded by insurance. Virtually all children between the ages of nine and 14, and most 15, 16 and 17 year olds attend school, so educational systems have the potential to be the most efficient vehicles for the identification and initiation of treatment of children with serious emotional disorders. Recognizing this, public school systems are legally obligated by US Department of Education Public Law 94-142 to assess, provide services to and regularly monitor children with serious emotional disorders.

Schools may provide services to all children who have disorders that impede their progress. Children who are already receiving services outside the school system may have less need for school services, and schools may target their services to those who have no other source of care. In either case, school-based services would substitute for privately purchased services, neutralizing the effect of insurance on access. Alternatively, children who are identified by the school system as needing services may be more likely to seek out services elsewhere (or children receiving services elsewhere may be more likely to apply for school-based services). School-based services may act as substitutes for services that families would otherwise purchase in the private insurance market.

In the empirical analyses below, we examine the effect of insurance status on any mental health service use, specialty mental health service use and school-based service use. Examining the net effect of insurance status on any mental health service use can give us a better sense of how mental health services are used in combination by children.

If publicly provided services (including school-based services) and specialty mental health services are used as substitutes, we would expect no net effect of insurance on overall mental health service utilization. If public and private services are typically used by children in conjunction, however, we would expect an even larger net effect of insurance on overall service utilization than on specialty mental health utilization. Receipt of school-based services should not be directly affected by a child's insurance status. However, we may estimate an indirect effect of insurance status on school-based services if such services are substitutes or complements for office-based services.

## Data

We use data from the MECA study to explore the determinants of child mental health service utilization. The study's field trial was conducted in 1992 in four geographic areas in the United States: (1) Hamden, East Haven and West Haven, CT ( $N = 314$ ); (2) DeKalb, Rockdale and Henry Counties, GA ( $N = 299$ ); (3) Westchester County, NY ( $N = 360$ ) and (4) San Juan, Puerto Rico ( $N = 312$ ). For sampling methods and interview procedures of the MECA data, see Lahey *et al.*<sup>23</sup> Because Puerto Rico represents an outlier in several respects, such as household income, rates of certain disorders and levels of impairment, we do not include these observations in the analyses reported below\*. **Table 1** presents summary statistics for the MECA sample.

The MECA target population included all youths 9–17 years of age at the time of household enumeration who resided in randomly selected housing units in defined geographic areas (census tracts). Excluding Puerto Rico, a total of 6514 selected household units were enumerated (99% of selected units) and, overall, 19% of enumerated units contained at least one eligible youth. Lay interviewers conducted simultaneous structured direct interviews with both an adult caretaker, usually the biological mother (90–95% across all sites), and a child 9–17 years of age selected at random in households with more than one age eligible youth. Interviews were completed for 81% of eligible youth–caretaker pairs. The samples are ethnically and culturally diverse (approximately 75% White, 20% African American and 5% Hispanic), include approximately equal numbers of girls (47%) and boys and have an equal distribution across the sampled age span.

The MECA sample is not representative of children and youth in the nation as a whole, although each site's sample is representative of an area within a large metropolitan region. More MECA children live in two-parent families than the US average; MECA families in each family type category have higher incomes than the average for that family type<sup>†25</sup>; more MECA children have employer-

provided health insurance than average and fewer MECA children are uninsured.<sup>9</sup>

NIMH's Diagnostic Interview Schedule for Children (DISC, version 2.3) was used to assess six-month prevalence of most major child and adolescent psychiatric disorders, including major depression, generalized anxiety disorder and attention deficit/hyperactivity disorder.<sup>24</sup> The Non-Clinician Child Global Assessment Scale (NC-CGAS), based on an assessment made by a lay interviewer, was used to estimate functional impairment during the preceding six months.<sup>25</sup> To simplify interpretation of the summary statistics, we coded a child as having a diagnosable emotional disorder if the child met criteria for *any* psychiatric disorder. We coded a child as having a mental health related functional impairment if the child had an NC-CGAS score less than 69. Approximately 38% of our sample met criteria for a diagnosis and 16% had a functional impairment. In our regression analyses, we use the continuous scores for the NC-CGAS and the number of DISC symptoms.

Parents were asked about a child's use of mental health and medical services in a variety of settings, including offices of mental health professionals, psychiatric outpatient departments, schools, primary care, emergency rooms, the justice system, social service systems, inpatient hospitals and other types of use.<sup>4</sup> Subjects were asked about use of services in the preceding year, lifetime use of services and age at first use of services. In this study, we examine the use of services in any setting (including primary care, emergency rooms etc), in mental health specialty offices and psychiatric outpatient facilities and in schools, focusing on use in the 12 months preceding the interview. Seventeen percent of children surveyed had used mental health services in the preceding year, mainly through the school system (10%). Six percent had used specialty mental health services in the preceding year. Relatively few children received services from other sectors. Only 3% (30 observations) sought treatment for mental health disorders in primary care and emergency room settings combined. Twenty-one percent had used mental health services at some time during their lives prior to the current year. Eighty-three percent of children had a visit to the office of a health professional (outside of school) in the last year. The survey also collected data on parents' use of mental health services and parental history of mental health problems. Parents who have used mental health services may be more likely to obtain them for their children. About 32% of the children in our sample had a parent who had ever used mental health services for any problem. About 7% had a parent who ever had a *serious* mental health problem, 5% had a parent who ever had a drug problem and 10% had a parent who ever had an alcohol problem.

Adult respondents (parents or guardians) were asked about the surveyed child's health insurance coverage and whether that coverage included inpatient and outpatient mental health benefits. Respondents were asked whether their insurance covered inpatient and outpatient mental health services for their child. Many respondents (25%) were unsure about the mental health provisions of their coverage. We coded

\* When we run the analyses in Table 2 separately for Puerto Rico, we obtain similar insignificant point estimates for Medicaid and no insurance.

† Comparable US population figures are derived from the *Statistical Abstract of the United States: 1994*.

Table 1. Summary of the 1992 MECA data

Variable	Mean N=912*	Standard deviation
Demographic variables		
Child's age	12.83	2.63
Male	0.53	0.50
Black	0.19	0.39
Hispanic	0.05	0.23
Mother's years of schooling	13.87	2.98
Father's years of schooling	14.60	3.11
Father's age	39.70	5.82
Mother's age	42.24	5.88
Father present	0.81	0.39
Divorced—mother is separated or divorced	0.21	0.40
Household size	4.34	1.31
Atlanta site	0.31	0.46
New York site	0.37	0.48
New Haven site	0.33	0.47
Parent's mental health		
Parent ever used mental health services	0.32	0.47
Parent ever had mental health problem	0.07	0.26
Parent ever had drug problem	0.05	0.23
Parent ever had alcohol problem	0.10	0.30
Child health and mental health status		
Parent-reported child physical health (good)	0.32	0.47
Parent-reported child physical health (fair or poor)	0.04	0.19
CGAS—Child Global Assessment Scale	82.2	13.6
Number of DISC symptoms	50.2	32.9
Any DISC diagnosis	0.38	0.49
Mental health service use		
Any service use—any visit to a mental health provider in the last year	0.17	0.38
Specialty service use—any office visit to a psychiatrist or psychologist or an outpatient facility in the last year	0.06	0.24
Visits—number of office visits to a psychiatrist or psychologist or an outpatient facility in the last year — conditional on any use	15.6 (N=56)	18.4
School service use	0.10	0.29
Any service use prior to current year	0.21	0.41
Any specialty service use prior to current year	0.10	0.30
Any school-based service use prior to current year	0.13	0.33
Any visit to the office of a health professional (outside of school)	0.83	0.38
Income and insurance coverage for mental health services		
Log family income	10.63	0.95
Income top code	0.11	0.31
Private fee-for-service insurance	0.73	0.44
Private HMO insurance	0.12	0.33
No mental health coverage	0.09	0.28
Medicaid	0.06	0.25
Mother is self-employed	0.11	0.32
Father is self-employed	0.17	0.37

\*Except where noted.

their insurance as including mental health coverage. This assumption is quite reasonable since only about 2.1% of those with general health insurance in 1991 lacked mental health insurance.<sup>26</sup> In the MECA data, of those with some form of private insurance who knew whether or not their insurance provides coverage for mental health services, 3% indicated that their insurance did not cover mental health problems. As a sensitivity analysis, we repeated the analyses we present below in **Table 2**, restricting our sample to those who know whether or not their insurance covered mental health services. These results did not differ in any qualitative way from those we report here.

Overall, 73% of the sample had private fee-for-service insurance, 12% had private HMO insurance and 6% had Medicaid or other public coverage, leaving 9% uninsured. For the empirical analyses below, we pool private fee-for-service insurance and HMO insurance because we find no differential effect for HMO insurance when kept as a separate category in analyses parallel to those we report below. Information about family income and family composition was also collected from all respondents. Survey respondents selected their level of income from a classification of 23 income categories. We used the midpoint income level of each category as our income measure

(scaled to \$10 000) and use its log in our analyses. Eleven percent of respondents fell in the top income category (>\$100 000). We included a variable to indicate that the response was top coded.

To assess attitudes toward mental health services, all adults were asked a set of questions about possible reasons for not using mental health services: either their reasons for not using such services once referred, going less often than advised by a professional or, hypothetically, if services have never been used or considered, what problems could be anticipated. These attitudinal variables include attitudes of self-sufficiency and perceptions of the inefficacy of treatment. We code a family as having a negative attitude toward mental health services if they respond positively to either of these questions. About 30% of families reported negative attitudes toward mental health service use. Attitudes toward mental health services may be endogenous to child current mental health service use if they are formed through experience in receiving treatment. Controlling for family history of service use should reduce, but may not eliminate, the potential for endogeneity bias. We repeated our analyses with and without attitudinal barriers and found that our results were not sensitive to the inclusion of attitudes. Because attitudinal barriers are of substantive interest, we chose to leave them in our final model.

## Observable Characteristics and Service Utilization

The MECA data provide an extremely comprehensive picture of children's mental health needs and of factors that might encourage or discourage their families from seeking services. This section utilizes the richness of the MECA dataset to perform simple analyses of the relationship between insurance coverage and child mental health service utilization net of other observable characteristics.

**Table 2** provides the results of regression analyses of service use for all children in the MECA data. We include all children in this analysis, rather than just the subset of children with a DISC diagnosis of mental disorder, because over a third of children who had used any mental health services in the last year did not have a DISC diagnosis. We examine children with and without DISC diagnoses separately in the next section. The first column reports marginal effects from probit analyses of whether a child used any mental health services, regardless of type or site, in the prior 12 months. Controlling for mental health problems (which increase with a child's age), older children are less likely to have used any mental health services. Family income has a significant positive impact on service use. The estimated coefficient indicates that a 1% increase in family income leads to a 4.8 percentage point increase in mental health service use. Consistent with prior research, we find no effect of insurance variables on service use. The insurance variables are not jointly significant at conventional levels, relative to no insurance. Indeed, the point estimates for Medicaid and no mental health coverage are both positive, suggesting that lack of health insurance coverage is associated with about

a 0.07 percentage point increase in the probability of mental health service use, relative to private insurance. Mental health need, measured by impairment and the number of DISC symptoms, and parental service use are strongly related to child service use.

Column 2 repeats this analysis focusing on the use of office or outpatient specialty mental health services. Minority children are less likely to have had mental health specialty service use, as are children without a father present in the household. Children of older mothers and children from higher income families are more likely to have had specialty use. The effect of income on specialty service is significant and indicates that a 1% increase in income leads to a 1.2 percentage point increase in specialty service use. Again, the coefficients on the insurance variables are neither individually nor jointly significantly different from zero, and the point estimate for no mental health coverage is very close to zero. The mental health need variables have the expected signs and are significant. Parental service use significantly increase, and attitudinal barriers significantly reduce, the probability of using specialty mental health services.

Column 3 reports results of regression analyses on the log of visits to a specialty provider conditional on having any visits. While the degrees of freedom in the regressions on conditional visits are few (31), we do obtain sensible coefficient estimates. In addition, our standard error estimates are sufficiently small to suggest that multicollinearity is not a problem in this analysis. We address this issue further below. We find that Medicaid has a significant effect on the log of visits to a specialty provider, which translates to about a 10% increase in the number of visits relative to private insurance. Again, private insurance has no effect relative to no insurance.

The results in column 4 are marginal effects from probit analyses of school-based service use. Boys have higher rates of school-based service use than do girls. Mental health need variables are strongly significant predictors of service use. Insurance variables are not predictive of school-based service use. The estimated effect of income suggests that a 1% increase in income leads to a 2.9 percentage point increase in school-based service use. Since school-based services are (mainly) free, this result suggests either that higher income children attend schools that are more likely to provide services or that income is a proxy for another determinant of service use. For example, prior research using this dataset suggests that higher income families are more likely to report that their child has a need for mental health services, controlling for other measures of mental health problems.<sup>21</sup>

One concern about the results in column 4 is that these results may be a consequence of mismeasurement of the insurance variable or small sample size. To confirm the validity of our mental health analysis, we repeat the analysis using general health service use as the dependent variable. Slightly over 80% of the sampled population had visited a health professional outside of school in the preceding year, so that the extent of variation in this outcome is close to

Table 2. Effect of child and family characteristics on mental health services use

	Any MH service use	Specialty MH service use	Log visits if >0	School use	Any visit to health professional
<i>N</i>	912	912	56	912	912
Child's age	-0.0093* (0.0049)	-0.0012 (0.0014)	0.010 (0.073)	-0.0043 (0.0032)	-0.0011 (0.0053)
Male	0.022 (0.023)	0.0046 (0.0064)	0.126 (0.294)	0.036** (0.015)	0.015 (0.025)
Black	0.037 (0.034)	-0.018** (0.0063)	0.379 (0.575)	0.015 (0.023)	-0.075** (0.038)
Hispanic	-0.0079 (0.049)	-0.013** (0.0060)	-1.07 (0.937)	-0.0082 (0.029)	0.00010 (0.059)
Mother's years of schooling	0.0031 (0.0051)	0.0021 (0.0015)	0.158** (0.062)	-0.0039 (0.0033)	0.0098* (0.0055)
Father's years of schooling	-0.0045 (0.0048)	0.0011 (0.0014)	-0.038 (0.067)	0.0019 (0.0032)	-0.0022 (0.0051)
Mother's age	0.0044 (0.0029)	0.0015* (0.00087)	-0.066 (0.044)	0.0028 (0.0019)	-0.0074** (0.0032)
Father's age	0.0023 (0.0026)	0.00019 (0.00078)	0.081* (0.045)	-0.00051 (0.0017)	0.0067** (0.0030)
Father present	-0.055 (0.044)	-0.030* (0.022)	-0.343 (0.507)	-0.036 (0.032)	0.016 (0.041)
Divorced	0.048 (0.036)	0.00012 (0.0089)	-0.856* (0.471)	0.0052 (0.021)	-0.043 (0.038)
Household size	-0.0015 (0.0094)	0.0012 (0.0029)	0.082 (0.132)	0.0028 (0.0060)	-0.012 (0.0099)
Parent-reported child health (good)	-0.025 (0.024)	-0.0035 (0.0069)	-0.030 (0.367)	-0.019 (0.015)	0.077** (0.025)
Parent-reported child health fair or poor	0.032 (0.062)	0.014 (0.023)	1.81** (0.506)	0.037 (0.047)	0.142** (0.025)
Log income	0.048** (0.023)	0.012* (0.0073)	0.736* (0.432)	0.029* (0.015)	0.027* (0.014)
Medicaid	0.040 (0.066)	0.044 (0.044)	2.09** (0.688)	0.0084 (0.039)	0.015 (0.058)
No mental health/insurance coverage	0.070 (0.055)	0.014 (0.021)	0.333 (0.630)	0.037 (0.037)	-0.091* (0.055)
CGAS	-0.0081** (0.0011)	-0.0012** (0.00038)	-0.034** (0.012)	-0.0038** (0.00068)	-0.0023* (0.0012)
Number of DISC symptoms	0.0013** (0.00041)	0.00036* (0.00013)	-0.010 (0.0062)	0.00063* (0.00026)	-0.00080* (0.00047)
Parental service use	0.072** (0.027)	0.027** (0.011)	-0.301 (0.342)	0.023 (0.017)	0.040 (0.026)
Attitudinal barriers	-0.0093 (0.024)	-0.018** (0.0064)	0.028 (0.375)	0.0015 (0.016)	-0.011 (0.028)
Probability at mean of independent variables	0.115	0.015	-5.40	0.053	0.848
Pseudo <i>R</i> <sup>2</sup>	0.273	0.354	0.684	0.237	0.071

Note: Probit marginal effects are reported in columns one, two and four. Regression coefficients are reported in column three. Standard errors are reported in parentheses. Regressions also controlled for a constant, income top code and MECA site. Significance levels are based on original probit coefficients and their standard errors.

\*Significant at 10%.

\*\*Significant at 5%.

that in our overall mental health service utilization variable (where just under 20% had used services). As discussed above, based on the RAND experiment results, we would expect the size of the effect of insurance in the mental health analysis to be considerably larger than the effect of insurance in the general health analysis. Thus, this analysis provides a conservative estimate of the potential effects of miscoding and limited power on our results.

In column 5, we report probit marginal effects for any visit to a health professional outside of school. Parent-reported child health has large effects in the expected

direction. The results for log income are significant; a 1% increase in income increases the likelihood of visiting a health professional by 2.7 percentage points. Lacking insurance coverage reduces the likelihood of seeing a health professional by a large and statistically significant nine percentage points relative to holding private insurance. These results confirm that patterns of mental health service utilization differ substantially from general health service utilization and suggest that the results for mental health service use are not simply a consequence of miscoding or lack of power. If we replace our variable for no mental

health coverage with a variable for no insurance coverage, we obtain nearly identical results. This is not surprising since the variables differ for only 17 observations.

**Table 3** presents the results of analyses of service use that modify the specification in Table 2. Panel 1 presents results that omit mental health need variables from the specification. When mental health variables are omitted, children on Medicaid and children without mental health coverage have significantly higher rates of overall service use than children with private health insurance do. They also have higher rates of specialty mental health service use and higher rates of school-based use than in specifications that control for mental health status. This finding suggests that failure to fully control for mental health status may be one of the reasons that the effects of insurance are often weak in analyses of child mental health service use.

Some support for this hypothesis is provided by the results of panel 2, which control for a child's history of mental health service use (in any service system) prior to the year of the survey (as well as current mental health status and all the other variables in **Table 2**). A history of service use is strongly correlated with later service use of each type examined. Controlling for service use further reduces the estimated effects of Medicaid and no coverage on service use, relative to private insurance coverage. One exception is the effect of Medicaid on log visits which increases slightly.

Panel 3 controls for a child's mental health problem type (mood disorder, anxiety disorder, disruptive disorder, substance use disorder or no diagnosis). Children with substance use or mood disorders were more likely to have used services than are children with other disorders\*. Controlling for disorder type, however, had little effect on insurance variables.

Socioeconomic variables may be so positively correlated with insurance status that there is little independent effect of insurance status left to identify insurance effects on mental health service use. To test this possibility, we dropped variables for family income, income top-code, the mother's education, the father's education and the presence of the father in the household from the models of service use. This also helps to reduce the potential for multicollinearity problems in our analysis of log visits. We report these results in the fourth panel of **Table 3**. Point estimates for Medicaid become slightly negative for any service use and school-based service. The effect of having no insurance becomes closer to zero, but remains positive for all types of service use. All insurance variables remain insignificant, except for the Medicaid effect on log visits found above. For log visits, the point estimate of Medicaid is still positive and significant, although of smaller magnitude than in **Table 2**. These results indicate that multicollinearity of income, education and the presence of the father with the insurance variables is not the reason for our results for insurance in **Table 2**.

\* For brevity, results for specific diagnoses are not presented in the table.

Another family characteristic that may affect service use is the nature of the surrounding neighborhood. Prior research has identified the existence of 'bandwagon' effects in mental health service use, through which people are more likely to use mental health services if others around them use such services.<sup>12</sup> Alternative explanations for geographic region effects in child mental health service use may include differences in the services provided in local schools and public clinics and ease of access to service settings (distance, public transportation etc). We control for such bandwagon or neighborhood effects by including a child's census tract of residence in the regressions (in addition to the site dummies included in all analyses). These results are reported in Panel 5. Census tracts of residence are not jointly significant predictors of any type of service use. Including them changes the sign of the point estimate for no mental health coverage in the specialty service use regression, and increases the size of the Medicaid coefficient in the school-based service use regression. Including census tract of residence has no effect on the positive and significant coefficient of income in the school-based service use regressions (not reported in table), suggesting that individual income measures are not simply picking up more school-based service provision in localities with higher incomes.

The sixth panel of this table presents results that restrict the sample to those children who come from families with incomes below 250% of the federal poverty standard. This level is chosen to capture poor and near-poor families while allowing a sufficient sample size to obtain reliable estimates. Insurance might be expected to have the strongest effects on the service use decisions of these children. For these children, the effect of lacking mental health coverage on overall service use is closer to zero, but still positive. The estimated marginal effects we report for specialty service use are small due to the very low service use rates predicted at the means of the independent variables for this sample. Even for poor children, however, we find that private health insurance has no enabling effect relative to no health insurance.

We split the sample into those with a DISC diagnosis and those without a DISC diagnosis, and estimate separate effects for these groups in panels seven and eight, respectively. Notably, for those children with a DISC diagnosis, lacking mental health coverage has a significant and large *positive* effect on overall mental health service use. A possible explanation for this surprising result is that uninsured individuals who seek mental health services outside of the private system readily find services that those with private insurance would not seek out. Another possibility is that mental health providers may offer their services at significantly reduced rates (e.g. sliding scale fees) to those who are unable to pay full price for these services, making such coverage less costly, at the margin, than co-payments in private insurance plans.

For those children without a DISC diagnosis, lacking mental health insurance coverage is associated with a reduced likelihood of using services. This effect is not quite significant at 10% ( $z$ -statistic =  $-1.58$ ), but is significant



Table 3. Effect of alternative specifications on insurance variables: child mental health services use

	Any MH service use	Specialty MH service use	Log visits if >0	School use
<b>1. Mental health measures excluded</b>				
<i>N</i>	912	912	56	912
Medicaid	0.130* (0.082)	0.081* (0.067)	2.17** (0.712)	0.060 (0.063)
No mental health coverage	0.102* (0.059)	0.036 (0.039)	0.435 (0.643)	0.068* (0.048)
<b>2. Child's history of service use included</b>				
<i>N</i>	912	912	56	912
Child's history of service use	0.274** (0.043)	0.080** (0.026)	0.718 (0.469)	0.066** (0.026)
Medicaid	0.035 (0.065)	0.028 (0.032)	2.20** (0.678)	0.0086 (0.039)
No mental health coverage	0.045 (0.050)	0.013 (0.016)	0.630 (0.646)	0.035 (0.036)
<b>3. Mental health diagnosis type included</b>				
<i>N</i>	912	912	56	912
( <i>F</i> -test stat)	8.24*	3.26	1.04	1.69
	$p > \chi^2 = 0.08$	$p > \chi^2 = 0.52$	$p > \chi^2 = 0.41$	$p > \chi^2 = 0.79$
Medicaid	0.035 (0.065)	0.038 (0.041)	1.98** (0.796)	0.0069 (0.039)
No mental health coverage	0.077 (0.056)	0.010 (0.019)	-0.130 (0.715)	0.038 (0.037)
<b>4. Income, education, and presence of father excluded</b>				
<i>N</i>	912	912	56	912
Medicaid	-0.022 (0.040)	0.018 (0.023)	1.31** (0.555)	-0.013 (0.025)
No mental health coverage	0.026 (0.045)	0.0077 (0.018)	0.034 (0.638)	0.021 (0.031)
<b>5. Census tracts included</b>				
<i>N</i> <sup>a</sup>	902	728		822
<i>F</i> -test of census tract dummies	41.1	20.2		27.3
	$p > \chi^2 = 0.15$	$p > \chi^2 = 0.69$		$p > \chi^2 = 0.55$
Medicaid	0.039 (0.068)	0.029 (0.042)	—	0.049 (0.061)
No mental health coverage	0.062 (0.054)	0.006 (0.017)	—	0.044 (0.041)
<b>6. Sample limited to &lt;250% Poverty</b>				
<i>N</i> <sup>b</sup>	248	248		248
Medicaid	0.119 (0.092)	0.0022** (0.0051)	—	0.141** (0.093)
No mental health coverage	0.041 (0.073)	0.000 90 (0.0026)	—	-0.022 (0.041)
<b>7. Sample with DISC diagnosis</b>				
<i>N</i>	350	350	39	350
Medicaid	0.146 (0.138)	0.131 (0.111)	2.30** (0.900)	-0.054 (0.069)
No mental health coverage	0.230** (0.107)	0.069 (0.060)	1.19 (0.754)	0.139 (0.090)
<b>8. Sample with no DISC diagnosis</b>				
<i>N</i>	562			562
Medicaid	-0.035 (0.022)	—	—	0.035 (0.058)
No mental health coverage	-0.045 (0.017)	—	—	-0.010 (0.013)

*Note:* Probit marginal effects are reported in columns one, two and four. Regression coefficients are reported in column three. Standard errors are reported in parentheses. Regressions also control for all variables in Table 2, unless otherwise stated. Significance levels are based on original probit coefficients and their standard errors. Empty cells indicate insufficient variation in the dependent variable to obtain reliable estimates.

\*Significant at 10%.

\*\*Significant at 5%.

<sup>a</sup>Observations dropped from census tracts with no variation in the dependent variable.

<sup>b</sup>285 observations fell below 250% of poverty. In addition, Hispanic perfectly predicted no service use, resulting in an additional 37 observations being dropped for this analysis.

in a specification that drops the income variables. Service use in this population is rare, which reduces the statistical power of this analysis. This suggests that insurance may play a role in providing access to mental health services for children who have mental disorders that do not meet diagnostic thresholds.<sup>27</sup>

The results in **Table 3** exploit the broad scope of the MECA epidemiologic data. Of the several hypotheses we examine, only two come close to explaining the anomalous result that private health insurance has little effect on child mental health service use relative to no insurance or Medicaid. First, the results in **Table 3** suggest that better controls for mental health status help drive the estimated positive effects for no insurance toward zero, but they provide no indication that the effect of private insurance is positive. Second, we find evidence that the effect of private insurance varies substantially for those with and without DISC diagnosis, suggesting that insurance improves access to services the most for those without clear indications of disorder. This latter finding is consistent with the existence of a system of public coverage that targets those most in need.

### Unobservable Characteristics and Choice of Insurance

We next examine whether the lack of an effect of private insurance is a consequence of the characteristics of children and parents who obtain such coverage. We examine the relationship between insurance choices, child mental health status and family attitudes toward mental health services and then use instrumental variables estimates to see whether unobserved characteristics of children holding different types of insurance are a factor in the private insurance results.

We first examine the observable characteristics of children with different types of insurance. The first six rows of each panel in **Table 4** describe the mental health related characteristics of children with different types of mental health insurance coverage. Children with Medicaid have much higher rates of impairment than do children without insurance coverage and those with private insurance coverage. Children with Medicaid have significantly higher rates of any, mood and anxiety diagnoses than children with private insurance. Children with no mental health coverage have higher rates of mood and disruptive diagnoses. Differences among children from poorer families are somewhat smaller but suggest that, even in this population, children with Medicaid have significantly higher rates of impairment than children with no insurance. In addition, families with no mental health insurance were the most likely to report negative attitudes towards mental health service use.

Are families of children with mental health problems less likely than others to purchase private insurance, perhaps because such coverage skimps on mental health benefits? The ability to self-select in this way may appear limited, since 92% of those in our sample with private coverage obtained it through their employers. In 1993, however, 12% of all employees who were offered health insurance for themselves through their employer declined it, and many

others did not select coverage for their children, suggesting that the potential for such behavior is substantial.<sup>28</sup> The correlations with current need reported in **Table 4** provide some indication of such selection. Child mental health insurance coverage decisions, however, depend not on current need but on expectations at the time of the purchase of insurance about the likelihood of future use of mental health services. Measures of current mental health status describe current need for mental health services, not need for services at the time of the coverage decision. Since private insurance contracts typically run for one year periods, the decision to obtain insurance might have been made as much as one year before the time that mental health status was measured. Current need may be a poor proxy for expected need. Treatment, if effective, would reduce current need relative to need at the time of coverage choice.

We examine the correlation between insurance choice and characteristics that would be known to the family a year or more in advance using a multinomial logit model. This model serves two purposes. First, it allows us to examine the relationship between expected need for mental health services and subsequent insurance status. Second, we use the predicted values for insurance status from the estimated model as instruments in service use regressions similar to those in **Table 2**. In this way, we obtain estimates of the effect of insurance status on mental health service use that adjust for selection in insurance choice.

A child's prior history of service use, attitudinal barriers and parental history of mental health, drug use and alcohol problems should all increase, and thereby serve as proxies for, a family's latent expected need for mental health services. Family risk factors are correlated with need for services,<sup>29</sup> but these risk factors, especially family history of mental illness, are unaffected by the treatment received by a child in the period *after* the insurance decision is made.

The results of multinomial logistic analyses of insurance choice are reported in **Table 5**. The table reports only the results for selected variables, which include the family risk factors listed above as well as variables for self-employment of the mother and father. Self-employment makes it more costly to obtain private insurance because of higher selling costs and limited tax deductibility in this market. The regression also includes all family and child demographic variables in **Table 2**. The current mental health status variables, CGAS and the number of DISC symptoms, are excluded. We also exclude the family income measures and parental mental health service use, both of which are likely to be endogenous to insurance choice.

Families who report negative attitudes towards mental health services are less likely to hold mental health coverage. Families that include a parent with a prior mental health or substance abuse problem are more likely to be enrolled in Medicaid. In general, these results suggest that families with private health insurance expect fewer mental health problems or a lower need for services for their children than do families who are Medicaid covered or who lack coverage. Families in which the mother is self-employed are significantly more likely to have no insurance.

Table 4. Rates of mental health related characteristics of children by insurance status

	Private coverage	Medicaid	No coverage
<i>N</i> = 912	773	58	81
Impairment (CGAS<69)	0.13 (0.01)	0.41** (0.07)	0.20 (0.04)
Any diagnosis	0.36 (0.02)	0.55** (0.07)	0.44 (0.06)
Mood disorder	0.08 (0.01)	0.17** (0.05)	0.15** (0.04)
Disruptive disorder	0.15 (0.01)	0.22 (0.06)	0.23* (0.05)
Anxiety disorder	0.27 (0.02)	0.43** (0.07)	0.32 (0.05)
Substance use disorder	0.03 (0.01)	0.03 (0.02)	0.02 (0.02)
Child's history of MH service	0.20 (0.01)	0.28 (0.06)	0.23 (0.05)
Attitudinal barriers	0.28 (0.02)	0.34 (0.06)	0.40** (0.05)
Parental history of MH service use	0.34 (0.02)	0.31 (0.06)	0.25 (0.05)
Sample limited to <250% poverty <i>N</i> = 285	172	57	56
Impairment (CGAS<69)	0.18 (0.03)	0.40** (0.07)	0.20 (0.05)
Any diagnosis	0.45 (0.04)	0.56 (0.07)	0.38 (0.07)
Mood disorder	0.10 (0.02)	0.18 (0.05)	0.16 (0.05)
Disruptive disorder	0.20 (0.03)	0.23 (0.06)	0.18 (0.05)
Anxiety disorder	0.35 (0.04)	0.44 (0.07)	0.29 (0.06)
Substance use disorder	0.04 (0.02)	0.04 (0.03)	0.04 (0.03)
Child's history of MH service	0.19 (0.03)	0.26 (0.06)	0.20 (0.05)
Attitudinal barriers	0.26 (0.03)	0.35 (0.06)	0.43** (0.07)
Parental history of MH service use	0.29 (0.03)	0.30 (0.06)	0.27 (0.06)

Note: Standard errors in parentheses.

\*Significantly different from private insurance coverage at 10%.

\*\*Significantly different from private insurance coverage at 5%.

These results suggest that there may be unobservable differences in child mental health status that affect the correlation between service use and insurance coverage. To obtain better sense of these effects, we use instrumental variables methods. We conduct analyses of the four types of mental health service use in **Table 2** using instrumental variable predictions of health insurance coverage in place of actual insurance coverage. The instruments that provide identification are parental history of mental health, drug and alcohol problems and parental self-employment. To be valid instruments, these must be strong predictors of insurance status but should not be correlated with the error term in the second stage regressions. Our chosen instruments conform to both of these criteria.

Parental mental health and substance use problems are significant predictors of Medicaid coverage as indicated by the *F*-tests reported in **Table 5** for the Medicaid equation.

Net of parental service use, these variables are not expected to have an independent effect on child service use, justifying their exclusion from the service utilization regressions. Similarly, self-employment variables are significant predictors of no mental health coverage, as indicated by *F*-tests reported in Table 5 for the private insurance equation. We do not expect self-employment status to have any relation to child's use mental health service use after controlling for insurance status, justifying the exclusion of this variable from the service utilization regressions. To test the assumption that the instruments are not correlated with the error terms of the service use regressions, we conduct the formulation of the Hausman specification test of overidentifying restrictions described by Greene.<sup>30</sup> Only in the school service use regression do we reject the null hypothesis (at the 10% level) that the instruments are not correlated with the error term.

Table 5. The relationship between child and family characteristics (at  $t=-1$ ) and insurance choice: multinomial logit regressions

$N = 912$	Medicaid	No coverage
Child's history of MH service use	1.65 (0.72)	1.42 (0.47)
Attitudinal barriers	1.07 (0.45)	1.70* (0.46)
Parent's mental health problem	3.01* (1.92)	1.03 (0.53)
Parent's drug problem	1.93 (1.42)	1.56 (0.84)
Parent's alcohol problem	3.60* (2.43)	0.95 (0.43)
Mother is self-employed	0.30 (0.34)	2.82** (0.97)
Father is self-employed	1.70 (1.49)	1.44 (0.53)
<i>F</i> -test for parent's mental health, drug and alcohol problem	10.5 $p > \chi^2 = 0.015$	—
<i>F</i> -test for mother and father self-employment	—	12.6 $p > \chi^2 = 0.002$

Note: Odds ratios (relative to private insurance) are reported. Standard errors are reported in parentheses. Regressions also control for all variables in Table 2 except CGAS score, number of DISC symptoms, log income, income top coded and parental service use. Significance levels are based on original multinomial logit coefficients and their standard errors.

\*Significant at 10%.  
\*\*Significant at 5%.

In **Table 6**, we report instrumental variable results of the effect of insurance status on the use of child mental health services, in order to correct for selection in insurance choice. These regressions include predicted values for insurance status from the regressions reported in **Table 5**, all variable in **Table 2** (except Medicaid and no mental health coverage) and also the child's history of mental health service use. We correct the standard errors in these analyses using the method suggested by Murphy and Topel.<sup>31</sup> This method adjusts standard errors to account for the use of first-stage predicted variables in the second-stage analysis. The results using corrected standard errors differ only slightly from those obtained using unadjusted errors (we describe the only instance in which this correction made a substantive difference below). The results are reported in **Table 6**.

Table 6. The effect of insurance status on services use, correcting for selection in insurance choice

	Any service use	Specialty service use	Log visits if >0	School use
<i>N</i>	912	912	56	912
Predicted Medicaid	-0.149 (0.124)	-0.038* (0.026)	2.49 (2.07)	-0.095 (0.080)
Predicted no mental health coverage	-0.319 (0.203)	-0.039 (0.037)	-0.21 (3.42)	-0.161 (0.127)

Note: Probit marginal effects are reported in columns one, two, four and five. OLS coefficients are reported in column three. Two-step corrected standard errors are reported in parentheses. Significance levels are based on original probit coefficients and their two-step corrected standard errors. Regressions control for all variables in Table 2 (except Medicaid and no mental health coverage), and also control for child's history of mental health service use. Predicted insurance status is computed from the regressions reported in Table 5.

\*Significant at 10%.

The results in **Table 6** show negative, but statistically insignificant, point estimates for the effects of no coverage on each type of service use. While not statistically different from zero at conventional levels (the  $z$ -statistic is  $-1.56$ ), the result for any mental health service use is much lower than our original estimate in **Table 2**. These results also show negative effects for Medicaid on overall and specialty mental health service use (the effect is significant for specialty use only). The original significant positive effect for Medicaid on log visits loses significance. The results in **Table 6**, although tentative, suggest that, even after controlling for the full range of variables in the MECA, unobserved factors correlated with insurance coverage remain that tend to create a downward bias on the estimated effect of private insurance on mental health service use.

### Substitution Between School-Based Services and Office-Based Specialty Services

The results above focus on the demand side of mental health service use. An alternative possibility is that service providers target services to uninsured children, replacing the services they would otherwise forego. We next examine this possibility.

Children who need mental health care often receive it through public providers, such as community mental health clinics, or through the school system. Unfortunately, the MECA data, like most other epidemiologic data, do not distinguish between publicly sponsored specialty providers and specialty providers in private practice. Since many mental health service providers charge sliding scale fees, it is very difficult to distinguish between provider types. The MECA data do, however, contain information on school-based service use. We explore substitution between school-based and office-based services as a first cut at the general issue of substitution of public for private mental health services.

As **Table 7** shows, among children in the MECA sample who had a mental health problem and used any services, most used mental health services in school only, including special classes. About half as many used office-based services only. Nearly as many as used only office-based services had used both types of service in a given year.

Table 7. Cross-tabulation of specialty and school-based mental health service use of children diagnosed or impaired with a mental health problem

N=375	Specialty use	No specialty use
School-based use	20 5.3%	47 12.5%
No school-based use	23 6.1%	285 76.0%

Note: Chi-squared test rejects independence with  $p$ -value < 0.001.

The relatively large proportion of dual service users suggests that the choice of service type among children is best modeled as a seemingly unrelated probit model.

The seemingly unrelated probit model allows a two-by-two choice of possibilities: no service use, office-based service use only, school-based service use only, service use in both systems. The model allows for correlation in unobservable characteristics between office-based and school-based use decisions ( $\rho$ ). Indicating underlying latent indexes of binary service use variables with an asterisk and suppressing individual subscripts, we specify the model as follows:

$$\begin{aligned} \text{office-based use}^* &= X'_1\beta_1 + \epsilon_1 \\ \text{school-based use}^* &= X'_2\beta_2 + \epsilon_2 \end{aligned} \quad (1)$$

where  $X_1$  and  $X_2$  are vectors of explanatory variables for office-based and school-based service use and,  $\beta_1$  and  $\beta_2$  are parameter vectors to be estimated. The error terms of the model ( $\epsilon_1$ ,  $\epsilon_2$ ) have the following bivariate normal distribution:

$$\begin{bmatrix} \epsilon_1 \\ \epsilon_2 \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}\right) \quad (2)$$

This model is the bivariate probit model in the special case in which  $X_1 = X_2$ . Using  $\phi$  to denote the standard normal c.d.f. and  $\Phi$  to denote the bivariate normal c.d.f.,

$$\begin{aligned} \text{Prob}(\text{office}=1) &= \text{Prob}(\epsilon_1 > -X'_1\beta_1) = \Phi(X'_1\beta_1) \\ \text{Prob}(\text{school}=1) &= \text{Prob}(\epsilon_2 > -X'_2\beta_2) = \Phi(X'_2\beta_2) \\ \text{Prob}(\text{office}=1, \text{school}=1) &= \text{Prob}(\epsilon_1 > -X'_1\beta_1, \epsilon_2 > -X'_2\beta_2) \\ &= \Phi_2(X'_1\beta_1, X'_2\beta_2, \rho) \end{aligned} \quad (3)$$

This model allows us to examine whether insurance variables (and other variables) have similar effects on both office- and school-based use. It also allows us to examine the extent of substitution or complementarity in service choice due to unobservable characteristics through the estimate of  $\rho$ . Evidence of substitution (or complementarity) on unobservables would support the tentative conclusion of the insurance choice section that such unobservable characteristics may be important.

Table 8 presents the results of the seemingly unrelated (bivariate) probit analyses. In general, the results suggest that office-based and school-based service use are complements. Children with Medicaid or no insurance coverage are more likely to use both types of service than are children with private coverage. The correlation between unobservable characteristics in the office and school probit regressions,  $\rho$ , is positive and significant in column one. This suggests that, in addition to the observable characteristics noted above, unobservable characteristics that lead to more office use also lead to more school-based use<sup>†</sup>.

Next, we examine whether this observed complementarity arises from a pattern where children first use services in one sector and then are referred to the other sector. In column two of Table 8, we report results that control for a child's history of service use in the complementary sector (e.g., history of school-based use in the office regression and vice versa). We do not find significant effects for the history of service use variables. However, adding history of service use to the regressions diminishes the complementarity on unobservables ( $\rho$ ) to insignificance.

These results do not suggest that school-based providers step in to take care of children who cannot afford services outside school. Instead, school-based services have a tendency

Table 8. Seemingly unrelated probit model of specialty and school-based mental health service use

N=912	I.	II.
Specialty service use		
Medicaid	0.049 (0.047)	0.044 (0.045)
No mental health coverage	0.013 (0.021)	0.012 (0.020)
Log income	0.012* (0.007)	0.011* (0.007)
Child used school-based mental health	—	0.013 (0.015)
School-based use		
Medicaid	0.011 (0.041)	0.013 (0.041)
No mental health coverage	0.036 (0.037)	0.038 (0.037)
Log income	0.030** (0.015)	0.029* (0.015)
Child used specialty mental health services a year or more ago	—	0.040 (0.036)
$\rho$	0.317** (0.116)	0.134 (0.170)
Pseudo- $R^2$	0.26	0.26

Note: Regression included all variables from Table 3. Significance levels are based on original bivariate (seemingly unrelated) probit coefficients and their standard errors.

\*Significant at 10%.

\*\*Significant at 5%.

<sup>†</sup>In analyses not reported here, we find that  $\rho$  remains positive and significant even when controlling for census tract and disorder type, as in Table 3.

to go to the same children who use outside services, even after controlling for mental health status.

## Conclusion

In the MECA data, as in several previously studied datasets, children with private health insurance are no more likely to use mental health services than are their uninsured peers. Children with Medicaid coverage appear more likely to use mental health services than poor children without mental health insurance, but much of this result is a consequence of greater use of school-based services. These results persist even after controlling for the very broad array of characteristics of children and their families available in these dataset. In order to better understand this perplexing result, we have used several statistical techniques in order to learn as much about the relationship between child mental health service use and insurance as our data will allow. We find some evidence that these counterintuitive results stem from differences in the observed and *unobserved* characteristics of children with different types of health insurance. In particular, we find that unobserved characteristics related to insurance status and child mental health status help to explain the non-result of insurance. This finding suggests that further study of the process by which families obtain insurance and the effects of insurance on subsequent child mental health status, particularly studies using longitudinal data, are important areas for future research.

We find only limited and mixed evidence to suggest that supply side differences of the type measured in these data explain the results. Our results do suggest that the public system targets care to those uninsured children who have diagnosable problems, while insurance affects use among those with less severe problems. On the other hand, differences in the availability of services in different small geographic regions (census tracts) do not seem to matter. Furthermore, for most children, public and private services are complements, not substitutes.

Child outpatient mental health coverage, a costly component of health insurance, does not, according to this large epidemiological survey, appear to yield *any* benefits in terms of access to services for children with serious disorders (insurance may still protect these families from out-of-pocket risk). Why then, do families willingly purchase it? One reason may be differences in the nature of mental health treatment received by children with different types of insurance coverage. The system of public child mental health services may provide services to one set of children, while private mental health providers offer services to a different set of children. Although the MECA data include considerable information about provider characteristics, they do not identify provider characteristics in enough detail to allow us to assess whether children with private insurance use a different set of providers. If the public mental health system is sufficiently large, and the private system is sufficiently distinct, families who prefer private services might willingly choose insurance that pays for it. Nonetheless, children in these families may have no greater likelihood

of using any mental health services than children in families without such coverage. This hypothesis suggests that data that include even more detailed information about provider type might help in disentangling the continuing paradoxes of child mental health insurance and service use.

## Acknowledgments

Data analysis was funded by NIMH grant No. 401 MH 52698-01. Computer support for this study was provided by NIMH Mental Health Clinical Research Center grant No. MH 30906. Bowen Garrett recognizes assistance from the Robert Wood Johnson Foundation, Princeton, NJ. We would like to thank Anne Libby, Richard Frank and Richard Scheffler for very helpful comments. We thank the original MECA collaborators for the use of these data. The MECA Program is an epidemiologic methodology study performed by four independent research teams in collaboration with staff of the Division of Clinical Research, which was reorganized in 1992 with components now in the Division of Epidemiology and Services Research and the Division of Clinical and Treatment Research, of the NIMH, Rockville, MD. The NIMH Principal Collaborators are Darrel A. Regier, MD, MPH, Ben Z. Locke, MSPH, Peter S. Jensen, MD, William E. Narrow, MD, MPH, Donald S. Rae, MA, John E. Richters, PhD, Karen H. Bourdon, MA, and Margaret T. Roper, MS. The NIMH Project Officer was William J. Huber. The Principal Investigators and Coinvestigators from the four sites are as follows: Emory University, Atlanta, GA, U01 MH 46725: Mina K. Dulcan, MD, Benjamin B. Lahey, PhD, Donna J. Brogan, PhD, Sherryl Goodman, PhD, and Elaine W. Flagg, PhD; Research Foundation for Mental Health and New York State Psychiatric Institute (Columbia University), New York, NY, U01 MH46718: Hector R. Bird, MD, David Shaffer, MD, Myrna Weissman, PhD, Patricia Cohen, PhD, Denise Kandel, PhD, Christina Hoven, DrPH, Mark Davies, MPH, Madelyn S. Gould, PhD, and Agnes Whitaker, MD; Yale University, New Haven, CT, U01 MH46717: Mary Schwab-Stone, MD, Philip J. Leaf, PhD, Sarah Horwitz Phd, and Judith H. Lichtman, MPH; University of Puerto Rico, San Juan, Puerto Rico, U01 MH46732: Glorisa Canino, PhD, Maritza Rubio-Stipec, MA, Milagros Bravo, PhD, Margarita Alegria, PhD, Julio Ribera, PhD, Sara Huertas, MD, Michael Woodbury, MD, and Jose Bauermeister.

## References

1. Frank RG, Salkever DS, Sharfstein SS. A look at rising mental health insurance costs. *Health Affairs* 1991; **10** (2): 116-123.
2. Weller EB, Cook SC, Hendren RL, Woolston JL. *On the use of mental health services by minors: report of the American Psychiatric Association Task Force*. American Psychiatric Association, 1994.
3. Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshlemon S, Wittchen HU, Kindlerk S *et al.* Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the U.S. *Arch. Gen. Psychiatry* 1994; **51**: 8-19.
4. Leaf P, Alegria ME, Cohen P, Goodman SH, Horwitz SM, Hoven CW, Narrow WE, Vanden-Lierman M, Regier D. Mental health

- service use in the community and schools: Results from the Four Site Community MECA Study *J. Am. Acad. Child Adolescent Psychiatry* 1996; **35** (7): 889–896.
5. Bloom B. *Health Insurance and Medical Care (National Center for Health Statistics Advance Data 188)*. US Department of Health and Human Services, Public Health Service, Washington, D.C. 1990.
  6. Taube CA, Rupp A. The effect of Medicaid on access to ambulatory mental health care for the poor and near-poor under 65. *Med. Care*. 1986; August **24** (8): 677–686.
  7. Cunningham PJ, Freiman MP. Determinants of ambulatory mental health services use for school-age children and adolescents. *Health Services Res.* 1996; October **31** (4): 409–27.
  8. Burns BJ, Costello EJ, Erkanli A, Tweed D, Farmer EM, Angold A. Insurance coverage and mental health service use by adolescents with serious emotional disturbance. *J. Child Family Studies* 1997; **6** (1): 89–111.
  9. Glied S, Moore RM, Hoven CH, Garrett AB, Regier D. Children's access to mental health care: does insurance matter? *Health Affairs* 1997; **16** (1): 167–174.
  10. Frank RG, Kamlet MS. Determining provider choice for the treatment of mental disorder: the role of health and mental health status. *Health Services Res.* 1989; **24**: 1.
  11. Frank RG, McGuire TG. A review of studies of the impact of insurance on the demand and utilization of specialty mental health services. *Health Services Res.* 1986; **21**:2.
  12. McGuire TG. Financing psychotherapy: costs, effects, and public policy. *J. Risk Insurance* 1981; **53** (3), 484–491.
  13. Frank RG. Pricing and location of physician services in mental health. *Econ. Inquiry* 1985; **23**: 115–33.
  14. Manning WG Jr, Wells KB, Buchanan JL, Keeler RB, Valdez JP, Newhouse JP. *Effects of Mental Health Insurance; Evidence from the Health Insurance Experiment*. RAND Report R-3815-NIMH/HCFA. Santa Monica, CA: RAND, 1989.
  15. Price J, Mays J. Biased selection in the federal employee's health benefit program. *Inquiry* Spring 1985; **22**: 66–77.
  16. Luft H. Patient selection in a competitive health care system. *Health Affairs*, Summer; 1988; **7** (3) 97–119.
  17. Perneger TV, Allaz AF, Etter JF, Rougemont A. Mental health and choice between managed care and indemnity insurance. *Am. J. Psychiatry* 1995; **152** (7): 1020–5.
  18. Offord DR, Boyle MH, Racine MH. Ontario Child Health Study: Correlates of disorder. *J. Am. Acad. Child Adolescent Psychiatry* 1989; **28** (6): 856–860.
  19. Jensen PS, Bloedau L, DeGroot J, Ussery T, Davis H. Children at risk: I. Risk factors and child symptomatology. *J. Am. Acad. Child Adolescent Psychiatry* 1990; **29** (1): 51–59.
  20. McLoughlin JA, Lewis RB. *Assessing Special Students*. Columbus, OH: Merrill 1986.
  21. Glied S, Hoven CW, Garrett AB, Moore RM, Leaf P, Bird HR, Goodman S, Regier D, Alegria M. Measuring child mental health status for services research. *J. Child Family Studies*, 1997; **6** (2): 177–190.
  22. Mashaw JL, Perrin JM and Reno VP (eds). *Restructuring the SSI Disability Program for Children and Adolescents: Report of the Committee on Childhood Disability of the Disability Policy Panel*. Washington, DC: National Academy of Social Insurance, 1996.
  23. Lahey BB, Flagg EW, Bird HR, Schwab-Stone M, Canino G, Dulcan MK, Leaf PJ, Davies M, Brogan D, Bourdon K, Horwitz SM, Rubio-Stipec M, Freeman DH, Lichtman J, Shaffer D, Goodman SH, Narrow WE, Weissman MM, Kandel DB, Jensen PS, Richters JE, Regier DA. The NIMH Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) Study: background and methodology. *J. Am. Acad. Child Adolescent Psychiatry* 1996; **35** (7): 855–864.
  24. Shaffer D, Fisher P, Dulcan MK, Davies M, Piacentini J, Schwab-Stone ME, Lahey BB, Bourdon K, Jensen PS, Bird HB, Canino G, Regier DA. The NIMH Diagnostic Interview Schedule for Children Version 2.3 (DISC-2.3): description, acceptability, prevalence rates, and performance in the MECA study. *J. Am. Acad. Child Psychiatry* 1996; **35** (7): 865–877.
  25. Bird HR, Schwab-Stone M, Andrews H, Goodman S, Dulcan M, Richters J, Rubio-Stipec M, Moore RE, Chiang P-H, Hoven C, Canino G, Fisher P, Gould MS. The Columbia Impairment Scale (CIS): pilot findings on a measure of global impairment for children and adolescents. *Int. J. Methods Psychiatric Res.* 1993; **3**: 167–176.
  26. Frank RG, McGuire TG. Health care reform and financing of mental health services: distributional consequences. In: Manderschied RW, Sonnenschein MA, eds. *Mental Health, United States, 1994*. DHHS publication (SMA) 94–3000. Washington, DC: US Government Printing Office, 1994: 8–21
  27. For a similar result, see Kessler RC, Frank RG, Edlund M, Katz SJ, Lin E, Leaf P. Differences in the use of psychiatric outpatient services between the United States and Ontario. *New Engl. J. Med.* 1997; **336** (8): 551–7
  28. Nichols LM, Blumberg LJ, Acs GP, Uccello CE, Marsteller JA. *Small Employers: Their Diversity and Health Insurance*. Washington, DC: Urban Institute, 1997.
  29. Lish JD, Weissman MM, Adams PB, Hoven CW, Bird HR. Family psychiatric screening instrument for epidemiologic studies: pilot testing and validation. *Psychiatry Res.* 1995; **57** (2): 169–180.
  30. Greene WH. *Econometric Analysis* 3rd edn. Upper Saddle River, NJ: Prentice-Hall, 1996.
  31. Murphy K, Topel R. Estimation and inference in two-step econometric models. *J. Bus. Econ. Stat.* 1985; **3** (4): 370–379.