The Effect of Medicaid Policies on the Diagnosis and Treatment of Children's Mental Health Problems in Primary Care

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1. Introduction

Poor children and children covered by public health insurance disproportionately suffer from mental health disorders. Although Medicaid is the largest payer for children's mental health services (Howell, 2004), many conditions remain undiagnosed, and up to 70 percent of Medicaid children with a mental health disorder do not receive treatment (Kataoka *et al.*, 2002). Untreated mental health conditions adversely affect children across a multitude of outcomes, from behavior to childhood cognitive development to human capital accumulation in adulthood (Kessler *et al.*, 1995; Currie and Stabile, 2009). Undiagnosed conditions may even have negative spillovers on the peers of untreated youth (Aizer, 2009).

This paper examines how different arrangements of Medicaid managed care (MMC) affect the provision of children's mental health services within primary care. I test whether specific Medicaid behavioral health managed care policies – such as the presence of a behavioral carve-out program or primary care case management program – affect primary care diagnosis and treatment of mental health problems using data containing patient and provider-level information from the universe of child Medicaid recipients in three states.

I show that MMC policies generally affect behavior consistently with the incentives provided to physicians – reducing diagnosis and treatment rates relative to fee-for-service (FFS) plans when physicians bear partial or full risk for costs. I estimate that, relative to FFS Medicaid, HMO coverage reduces diagnosis of mental health disorders by close to 30 percent. Although primary care case management policies do not affect the overall rate of mental health diagnoses, these policies lead to a shift in diagnosis and treatment from within primary care to specialist providers such as psychiatrists, where serious mental health conditions are more likely to be identified. Finally, I provide evidence that provider selection into MMC plans is less important in explaining differences in children's mental health outcomes than the direct incentives provided to physicians by specific MMC policies.

Primary care physicians play an increasingly important role in diagnosing and treating children's mental health disorders (Kelleher *et al.*, 2000; Glied and Cuellar, 2003). Three-quarters of all children eventually diagnosed with a mental health condition are initially seen in primary care (Ginsburg and Foster, 2009). However, managed care rules and payment policies may hinder the ability of PCPs to formally diagnose and treat mental health conditions. Primary

care gatekeeper requirements, such as requiring patients to gain approval before seeing a specialist, may delay access to specialty care (Klinkman *et al*., 1998; Mechanic, 1990). Some plans carve-out mental health benefits to another payer, and under these arrangements, PCPs may not be reimbursed for diagnosing and treating mental health problems (Mauch *et al*., 2008; Ginsburg and Foster, 2009). Finally, MMC policies may affect access to mental health services by influencing providers' decisions to accept Medicaid patients with different types of coverage.

To address concerns of endogenous sorting by families into different Medicaid policies, I take advantage of policy variation created by the roll-out of mandatory MMC. During the period I examine, the three study states – Massachusetts, New York, and North Carolina – were in the process of implementing mandatory MMC across counties and Medicaid eligibility groups. My approach is most similar to that used by Duggan (2004) and Duggan and Hayford (2013), although I do not observe specific MMC mandates. Instead, I use the penetration of MMC policies at the eligibility group-county-year level as an instrument for individual plan choices while controlling for numerous observable patient-level characteristics and unobservable time-invariant county- and eligibility group-level factors. I focus on children eligible for Medicaid that fall into three categories: low-income children, children in families that receive cash assistance through their state's Temporary Assistance for Needy Families (TANF) program, and foster children.

I show that the penetration of MMC plans is uncorrelated with county mental health resources, such as psychologists, psychiatrists, and outpatient facilities. Given the identifying assumption that no other changes at the county-eligibility group level varied concurrently with the roll-out of MMC, my results represent the causal effect of managed care policies on the mental health outcomes for Medicaid children whose families were induced to enroll in a specific MMC plan due to state policy changes.

The existing literature examining MMC and children's mental health outcomes suggests that capitation arrangements and carve-outs generally reduce costs and use of inpatient services (Hutchinson and Foster, 2003). However, the majority of papers examining MMC and mental health outcomes only compare outcomes of adult patients enrolled in a HMO to outcomes for

those in a traditional FFS plan (e.g., Keeler *et al.*, 1986; Norton *et al.*, 1999).[1] Relative to FFS arrangements, MMC reduces spending and inpatient hospital care for adult beneficiaries, with no clear impacts on access or quality (Frank and McGuire, 2000). This paper is the first to examine how these policies affect primary care diagnosis and treatment of children's mental health conditions across different "flavors" of managed care.[2]

In addition to examining how MMC policies affect diagnosis rates, I examine whether these policies impact treatment for children who receive a mental health diagnosis. I estimate the impact of MMC policies on the probability of drug and non-drug treatment, where the latter includes follow-up visits and referrals to specialty mental health providers. I find suggestive evidence that relative to FFS, HMO coverage reduces the probability of follow-up appointments for children who receive a mental health diagnosis by 8 percent while increasing the probability of drug treatment by 9 percent. I show that physicians do not appear to respond to restrictions on primary care reimbursement of mental health diagnosis by treating children without diagnosing them. Finally, I find no evidence that managed care policies increase the probability of mental health treatment in the absence of a diagnosis.

2. Medicaid Managed Care

Over the past two decades, most states dramatically altered the administration of their Medicaid programs, in many cases shifting a large portion of recipients into managed care (Glied, 2000). The number of states with MMC tripled between 1996 and 1999 (Substance Abuse and Mental Health Services, 2000) and as of December 2010, 72 percent of all Medicaid recipients were enrolled in some type of managed care plan.[3] MMC policies range from fully capitated plans, where prescription drug and dental coverage are included in the capitation fee, to plans where a particular entity is paid a nominal amount to coordinate care for patients, with

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[1] Keeler *et al.* (1986) find a negative impact of HMOs on adult mental health diagnosis and treatment rates, while Norton *et al.* (1999) show evidence of cost shifting away from psychiatric care in favor of drug treatment for adult patients with mental health disorders.

[2] Although research suggests that primary care case management programs have little impact on physical health outcomes relative to FFS coverage, to date, no studies have focused on the impacts of this arrangement on mental health outcomes (Garrett and Zuckerman, 2005). Service fragmentation is one risk of carve-out arrangements (Frank and McGuire, 2000). There is some evidence that behavioral health carve-out policies reduce mental health services provided to privately insured children, especially those with more severe conditions such as schizophrenia (Leslie et al., 2001).

[3] Centers for Medicare and Medicaid Services, Medicaid Managed Care Penetration Rates and Expansion Enrollment by State. Available at: http://www.cms.gov/Research-Statistics-Data-and-Systems/Computer-Data-and-Systems/MedicaidDataSourcesGenInfo/Downloads/2010December31f.pdf.

other services provided on a fee for service basis. In this paper, I focus on three distinct managed care arrangements – the traditional health maintenance organization (HMO), primary care case management (PCCM), and behavioral carve-outs (BHCO).

Managed care arrangements may have both direct and indirect effects on providers' behavior. Policies directly affect service receipt through reimbursement rules. For instance, when a patient's plan carves out mental health services to a behavioral health organization, her PCP may not be reimbursed for any mental health related visits, providing a direct incentive to avoid such visits. Indirectly, Medicaid policies will affect the characteristics of physicians patients can access if pediatricians, general practitioners, or mental health specialists opt out of seeing MMC patients in response to reimbursement policies or administrative hurdles. The impacts of MMC on provider selection are theoretically ambiguous, as they depend on capitation fees, relative reimbursement rates for FFS services, and the composition of the managed care population.[4]

Panel A of Table provides the key institutional details for the three types of MMC policies I examine. Under HMO and BHCO arrangements, state Medicaid agencies generally are not at risk for mental health related costs. Conversely, under a PCCM contract, a PCP is paid to serve as a patient's medical home, managing patient care and coordinating services received by other physicians. The PCP typically receives a monthly case-management fee from the insurer and is reimbursed for medical services and treatment on a FFS basis; thus, the physician bears little or no financial risk. The Medicaid agencies of the three study states bear the full risk for PCCM patient costs. HMO and BHCO patients generally must gain permission from a gatekeeper before visiting providers. Although BHCOs may offer the advantage of organizing networks of specialty providers (Hutchins and Foster, 2003), often PCPs are excluded from the carve-out network and face incentives to avoid providing mental health evaluation or treatment services that will not be reimbursed.

Panel B provides predictions of the direct impact of MMC on mental health diagnoses and treatment within primary care. While PCCM policies should increase mental health diagnoses within primary care, HMO and BHCO policies have ambiguous and negative

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[4] A substantial proportion of physicians limit their participation in Medicaid as a whole. Currie and Fahr (2005) report that 20 percent of pediatricians do not participate in any Medicaid program, while 40 percent limit the number of Medicaid patients they accept. Cunningham and May (2006) report a decrease in the proportion of providers that accept Medicaid and increased concentration of Medicaid patients among a smaller proportion of physician practices.

predicted impacts on primary care diagnosis rates, respectively. Patients covered by an HMO may experience lower rates of specialist referrals, relative to FFS patients.

Although the doctors of PCCM and FFS patients theoretically face the same reimbursement policies, PCCM patients may be required to receive a referral from their PCP before seeing a specialist. Thus, if PCPs act as substitutes for mental health providers, PCCM policies have the potential to reduce referrals for specialist treatment and diagnosis rates of less common mental health conditions. Finally, BHCO policies are predicted to reduce mental health diagnoses within primary care and specialist visits. Impacts on drug treatment depend on whether specialists act as complements or substitutes for psychotropic medication and are ambiguous across all three arrangements.

2.1 Medicaid in Massachusetts, New York, and North Carolina

This study uses data from three states – Massachusetts, New York, and North Carolina – with Medicaid plans encompassing the range of managed care possibilities. New York beneficiaries may receive services on a FFS basis, through a HMO, or as part of a PCCM plan. Patients in North Carolina either have FFS coverage or belong to a PCCM plan. Massachusetts is the only state that carves out behavioral health services for a portion of its Medicaid population.[5] Massachusetts Medicaid beneficiaries may also enroll in a comprehensive HMO that assumes full risk for mental health related costs.

The three states have similar Medicaid eligibility requirements (Robinson *et al*., 2005). First, children within families that receive cash assistance through state TANF programs are eligible for Medicaid coverage. Children who are considered sufficiently close to the federal poverty line and foster children may also receive coverage. Specifically, Massachusetts children with family incomes below 150 percent of the federal poverty line (FPL) are eligible for Medicaid. In both New York and North Carolina, younger children (ages 1-6 in New York and ages 1-5 in North Carolina) with a family income below 133 percent FPL and older children with income below 100 percent the FPL are Medicaid eligible. The three states maintain separate SCHIP programs which cover Medicaid-ineligible children in families with income below 200

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[5] All Massachusetts children enrolled in a plan with a BHCO receive physical health services on a FFS basis through a PCCM plan. This paper is concerned with the impact of MMC policies with respect to mental health conditions. However, if there are important interactions between physical health and mental policies, the estimated impact of a BHCO policy could be interpreted as the combined effect of BHCO and PCCM policies.

percent FPL.

Finally, all three states limit annual receipt of mental health services (Robinson *et al*., 2005). Massachusetts is the least restrictive, limiting services on a weekly basis (e.g., 4 hours of diagnostic services per week, 1 hour of individual therapy per week), while New York was the most restrictive, limiting enrollees to 20 outpatient visits and one assessment per calendar year. North Carolina limits patients to 26 outpatient visits per year (inclusive of psychotherapy and assessment visits). In New York and North Carolina, inpatient care is authorized by the state Medicaid agency; in Massachusetts, patients are screened by an Emergency Services Program prior to inpatient psychiatric admission.

3. Empirical Framework

Families' decisions to enroll in a particular Medicaid plan are likely not random (Glied *et al*., 1997). If, for instance, less healthy families select into FFS arrangements, increased diagnosis rates within the FFS system may simply represent an increased incidence of mental health disorders, rather than a higher quality of care. To address the endogenous selection of patients into MMC plans, I use variation in the penetration of MMC policies at the eligibility group-county-year level as an instrument for individual plan choice. Similar to Duggan (2004) and Duggan and Hayford (2011), my identifying variation is driven by differences in the timing of states' roll-out of mandatory MMC. While I do not observe specific MMC mandates, I take advantage of differences in the targeting of mandatory MMC across eligibility groups. I focus on the three major eligibility categories used in the study states – children receiving Temporary Assistance for Needy Families (TANF) cash assistance, children in foster care, and children sufficiently close to the federal poverty line. The key identifying assumption for this approach is that no changes at the county-eligibility group level occurred concurrently with the roll-out of MMC.

Figures 1 illustrates an example of the variation in the penetration of HMO coverage in New York over time, while Figure 2 displays variation across eligibility groups in New York in a given year. For a given eligibility group-county-year cell, the penetration of a specific Medicaid policy is measured by the percentage of children enrolled in that policy, weighted by each patient's months of Medicaid eligibility during the year. Table II further illustrates the variation in MMC penetration that occurs both across eligibility groups within a given year and across

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years within a given eligibility group. Each cell in Table II represents the average penetration of a given MMC plan at the county-eligibility group level in a given year. For instance, on average, the percentage of children eligible for Medicaid due to receipt of cash assistance that were enrolled in an HMO in a given month and county increased from 27 percent to 44 percent. For foster care children, average HMO penetration in a given county increased from 3 to 28 percent over this same period.

I estimate the following specification using two stage least squares (2SLS):

$$(1) \qquad y_{ijcet} = \lambda \mathbf{X_i} + \mathbf{\eta^p} \mathbf{Plan}_i^p + \delta_e + \delta_c + \delta_y + \delta_{s \times y} + e_{ijcet}$$

I control for a variety of observable patient characteristics and time invariant eligibility group and county-level factors via fixed effects. The vector of patient characteristics, $\mathbf{X_i}$, includes indicators for race (nonwhite), sex, SCHIP coverage, medical comorbidities, a linear term in age, and Medicaid eligibility category fixed effects.[6] The terms indexed by *e, c, y,* and *sXy* represent eligibility group, county, year, and state by year fixed effects. $\mathbf{Plan}_i^p$ is a vector of indicators of specific MMC policies, with FFS coverage serving as the omitted category. Penetration of HMO, BHCO, and PCCM policies at the county-year-eligibility group level serve as instruments for MMC policies.

In equation (1), the estimated impact of MMC encompasses both the direct and indirect effects of managed care policies on provider behavior. In other words, $\mathbf{\hat{\eta}^p}$ represents the reduced form treatment effect of MMC policies, encompassing both the direct incentives for physicians to reduce service utilization and the indirect effects of differential provider selection into and across MMC policies. Because many providers participate in multiple Medicaid plans, I estimate a second specification with a full set of provider fixed effects to assess the extent to which provider sorting across MMC policies affects my main results.[7]

3.1 Mandatory MMC roll-out in Massachusetts, New York, and North Carolina

My identification strategy hinges on the assumption that the roll-out of mandatory MMC

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[6] Medical comorbidities were chosen based on the indicators used by the National Survey of Children with Special Health Care Needs and include the following conditions: adjustment disorder, allergies, asthma, migraines, developmental delays/mental retardation, and other serious conditions (lupus, kidney diseases, spina bifida, AIDS, cancer, multiple sclerosis, cystic fibrosis, muscular dystrophy, diabetes, heart diseases, blood diseases, cerebral palsy, and neurological disorders).
[7] I thank an anonymous referee for this suggestion.

in the study states is not correlated with other changes occurring within a county and Medicaid eligibility group over time. New York's move to MMC began in 1997 when the state received an 1115 federal waiver to move TANF and poverty-related eligibility groups into managed care. Implementation of MMC occurred at both the county and zip code level (Holahan and Suzuki, 2003). Although the state Medicaid agency envisioned implementing these changes statewide, by June 2001, some counties had both mandatory and voluntary MMC (Holahan and Suzuki, 2003) and by January 2003, only 21 of New York's 62 counties had fully implemented mandatory MMC. The strong economy and declining Medicaid enrollment in the late 1990s reduced the urgency to switch to MMC (Coughlin and Long, 2004).

Massachusetts and North Carolina were more successful at implementing mandatory MMC statewide during the study period. However, both states altered the administration of their MMC programs. For example, North Carolina was in the process of moving HMO enrollees into a PCCM plan in the Charlotte-Mecklenburg area while in Massachusetts, some eligibility groups saw an increase in access to BHCO coverage.[8]

4. Data and Descriptive Results

My data primarily comes from the 2001 and 2003 Medicaid Analytic Extract (MAX) personal summary, other service, and prescription drug files. The personal summary file contains information on patient demographic characteristics (e.g., age, race, sex), county of residence, Medicaid eligibility (months and category of eligibility), and type of Medicaid policy (e.g., FFS, HMO, PCCM, etc).[9] The other service file contains information on provider specialty (e.g., psychologist, psychiatrist) as well as services, which are identified by a diagnostic code (ICD-9). Finally, I incorporate information on mental health professionals per capita, and hospitals with mental health facilities from the Area Resource Files (ARF).

I classify patients as having a mental health diagnosis if they visited a PCP or another physician and diagnosed with a schizophrenic, affective, neurotic, personality, or conduct disorder, emotional disturbance, or hyperkinetic syndrome (ADD/ADHD).[10] The MAX

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[8] See "Overview and History of Managed Care in NC," available at:
http://www.ncdhhs.gov/dma/ca/overviewhistory.htm (accessed August 31, 2012).
[9] Children enrolled in separate SCHIP programs are not included in the MAX data. Additionally, only data from Massachusetts is reliable in determining which children are insured through a SCHIP Medicaid expansion program.
[10] Unfortunately, I cannot distinguish between new and reoccurring mental health diagnoses except within a given calendar year. Recipients are given a different unique identifier in different years of MAX data.

prescription drug file provides a record of all filled drugs prescriptions, enabling me to identify whether a child receives and fills a prescription for psychotropic drugs, either in conjunction with or in the absence of a mental health diagnosis. Finally, I examine non-drug treatment, measured by whether a patient had a follow-up visit after his or her original diagnosis, or visited a psychologist, social worker, or psychiatrist.

4.1 Sample Selection

The analysis sample includes individuals in the MAX personal summary files between the ages of 5 and 17 who were eligible for Medicaid due to welfare receipt, poverty, or foster care. I exclude children who are eligible for Medicaid through SSI or because they are considered medically needy. These populations likely have very severe medical or mental health conditions and during the period I examine, study states generally served these populations on a solely FFS basis.

I focus on patients who visited a unique PCP at least once during the first six months of the year and were covered by under a single MMC policy or on a solely FFS basis. I eliminate patients that switch Medicaid plans and patients that saw more than one PCP in the first six months as it is difficult to determine which provider generated a referral to a mental health care professional or a prescription for psychotropic drugs. Finally, I eliminate patients with a PCP that did not serve other Medicaid children. The final sample includes 706,287 observations comprised of 89,213 children from Massachusetts, 282,888 from New York, and 334,186 from North Carolina.

I distinguish providers using a biller identification number.[11] A provider is designated as a PCP if over half of his or her patient visits were designated with one of the following specialty code: pediatrics, internal medicine, family practice, or nurse practitioner. The MAX files contain an indicator for "place of service", designating whether the patient saw the provider via a private office, emergency room, or another location. I limit the sample to only include records of services received in the following locations – an office, patient's home, outpatient hospital, federally qualified health center, community mental health center, comprehensive outpatient rehabilitation center, state or local public health clinic, rural health clinic. I also retain records of

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[11] This method cannot distinguish between different doctors that work within a larger facility. Unfortunately, the MAX data field for a unique "provider id" is often left blank and is unreliable for identifying individual doctors.

services received where no place of service is available.[12]

4.2 Characteristics of Medicaid children, providers, and counties

The top portion of Table III displays the characteristics of children in my sample. In the private sector, healthier individuals are more likely to select into managed care policies (Glied, 2000), and in general, this pattern holds for the children in my sample. Children covered on a FFS basis are more likely to have asthma (11 percent versus 9 percent overall), adjustment disorders (5 percent versus 3 percent overall), and a diagnosed developmental delay or mental retardation (2 percent versus 1 percent overall). However, children covered by an HMO are the most likely to have a serious medical condition.

The remainder of Table III illustrates the substantial overlap in MMC policies within providers and counties. On average, FFS patients have a PCP that sees both other FFS patients (68 percent of the average annual caseload), and a substantial number of HMO and PCCM patients (21 percent and 8 percent respectively). This overlap occurs at the county-level as well. For example, on average, a FFS patient lives in a county where 56 percent of Medicaid recipients also have FFS coverage, 35 percent are covered by an HMO, 2 percent participate in a plan with a BHCO, and 8 percent receive care through a PCCM plan.

5. The Impact of Medicaid Managed Care on Mental Health Outcomes

Table IV displays the first stage estimates of the impact of MMC penetration on the probability a patient is enrolled in a specific MMC policy. I measure MMC penetration by the percentage of patients in a given eligibility group-county-year cell that are enrolled in a specific policy, weighted by number of months each patient is eligible. The percentage of patients enrolled in a FFS plan serves as the omitted category. In other words, my penetration measure represents average monthly participation in a given MMC plan, weighted by the total number of patients in each month.

The point estimates presented in Table IV represent the impact of a moving from a county where 100 percent of the beneficiaries in an eligibility group are covered by FFS to a

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[12] If a single location was designated for half or more of a patient's visits, I assume it is the place of service. The quality of this variable varies substantially across states – over 99 percent of the Massachusetts records contain a valid place of service, while for New York, only 38 percent of records have a valid place of service and in North Carolina only 35 percent of records have a valid place of service. Although I limit my sample to patients that saw a PCP at particular service places, for New York and North Carolina, some records may include patients who were seen in an emergency room or inpatient clinic.

county where 100 percent are covered by the specific MMC policy. For example, focusing on the diagonal elements of the first column within each plan type, a 10 percentage point increase in HMO penetration increases the probability that a child belongs to an HMO plan by 10.4 percentage points, a 10 percentage point increase in BHCO penetration increases the probability of BHCO coverage by 2.5 percentage points, and a 10 percentage point increase in PCCM penetration increases the probability of PCCM coverage by 4 percentage points. The off-diagonal elements are small except in the case of HMO coverage. This is likely due to the fact that HMO coverage was expanded concurrently with other coverage of other MMC plans. The second set of estimates includes a full set of provider fixed effects; results are largely consistent with the main specification. Finally, Table IV displays the F-statistic from a test of the joint significance of the three measures of MMC penetration, which ranges from 12 to 474.

5.1 MMC penetration rates are not correlated with county mental health resources

Although it may be reasonable to assume that families' choice of residence is uncorrelated with the penetration of Medicaid plans within a county, the penetration of Medicaid policies could still be correlated with county characteristics that influence patient outcomes. I evaluate the validity the assumption of instrumental exogeneity by examining correlations between plan penetration rates across all eligibility groups in 2003 and mental health resources at the county level between 2000 and 2002 including child psychologists and child psychiatric facilities per 1000 children, the county psychiatric caseload per 1000 persons, psychologists/social workers per 1000 persons, and the presence of a short term psychiatric hospital and children's psychiatric hospital (Table V). For each of these measures of county mental health resources, the estimated impact of Medicaid policy penetration rates are jointly insignificant.

5.2 The impact of MMC policies on mental health diagnosis rates

Table VI displays OLS and 2SLS estimates of the impact of MMC policies (relative to FFS coverage) on mental health diagnosis rates. I examine the probability of receiving any mental health diagnosis, as well as the probability of being diagnosed both within and outside of primary care. OLS estimates suggest that relative to patients enrolled in a FFS plan, those served by a traditional HMO and PCCM plans experience a decrease in diagnosis rates.

Column (2) presents estimates from 2SLS models, where measures of the penetration of

MMC policies at the county-year-eligibility group level serve as instruments for individual plan choice. The estimated impact of HMO coverage on overall diagnosis rates is consistent across OLS and 2SLS specifications. My estimates suggest that a child with a mental health disorder is twice as likely to receive a diagnosis when covered by a FFS policy relative to receiving services through an HMO. Conversely, 2SLS estimates suggest that, once endogenous selection into MMC policies is accounted for, PPCM coverage is no longer associated with mental health diagnosis rates.

I take advantage of the fact that many providers serve patients enrolled in different MMC plans by estimating 2SLS models that include a full set of provider fixed effects. As shown in column 3 of Table VI, these estimates are largely consistent with those generated by models that do not take into account provider selection into MMC plans and suggest that the direct incentives provided by MMC policies have a larger impact on provider behavior than selection into or out of specific MMC plans.

Next, I estimate the impact of MMC policies on mental health diagnoses within and outside of primary care (Table VI, columns 4 through 9). PCCM policies appear to both decrease mental health diagnosis rates within primary care and increase diagnosis rates by other providers, leaving overall rates of diagnosis unchanged. Children enrolled in a PCCM plan are three times less likely to receive a mental health diagnosis from their PCP (relative to FFS enrollment) but are 130 percent more likely to receive a diagnosis outside of primary care. Again, the inclusion of provider fixed effects does not substantially alter the point estimates suggesting that PCCM policies affect diagnosis rates primary through the direct impacts on providers' behavior.

Conversely, BHCO policies appear to decrease primary care diagnosis rates, although these estimates are imprecise and no longer statistically significant once provider selection into MMC plans is accounted for. Finally, relative to FFS coverage, enrollment in an HMO appears to decrease mental health diagnosis rates both within and outside of primary care, by approximately 42 percent and 16 percent, respectively.

Among children receiving Medicaid in the study states, the percentage enrolled in an HMO plan increased by 6 percentage points (from 28 to 34 percent) between 2001 and 2003. Assuming that additional HMO enrollees would have otherwise been covered by FFS Medicaid, my point estimates suggest that this expansion decreased aggregate mental health diagnosis rates by 0.2 percentage points, or by close to 2 percent. Over this same period, PCCM coverage

increased by 22 percentage points (from 20 to 43 percent). My point estimates suggest that although this expansion had no impact on overall mental health diagnosis rates, an additional 2 percent of Medicaid children receiving a mental health diagnosis were shifted from primary care to the care of another physician.

5.3 The impact of MMC policies on drug and non-drug treatment of diagnosed disorders

Next, I examine whether MMC policies affect the treatment of diagnosed mental health conditions. Table VII presents 2SLS estimates of equation (1); results are robust to including provider fixed effects. Relative to FFS Medicaid, HMO coverage reduces the probability of a follow-up visit after receiving a mental health diagnosis by approximately 8 percent and increases the probability of drug treatment by 9 percent. Other MMC policies do not appear to affect continuity of care or drug treatment. PCCM policies lead to a substantial increase in the probability of a referral to a psychiatrist. Combined with the results presented in Table VI, this suggests that PCCM policies increase the likelihood that a child with a mental health disorder visits a mental health specialist.

5.4 Other Responses to Medicaid Policies: Quality of Care and Specific Diagnoses

Physicians may also respond to limited reimbursement for mental health-related visits by reclassifying mental health diagnoses as other covered conditions. Although in this case, patients will still receive mental health care, misclassification may be detrimental to their future mental health outcomes. While I cannot identify mental health-related office visits that have been classified with an alternative diagnosis code, I test whether Medicaid policies lead providers to prescribe drugs in the absence of a mental health diagnosis. As shown in Panel A of Table VIII, I find little evidence that Medicaid policies induce physicians to engage in this particular type of gaming behavior. In fact, HMO coverage appears to decrease the incidence of drug treatment in the absence of a diagnosis.

Some mental health disorders are more difficult, time consuming, or expensive to treat than others. For example, ADHD may be relatively easy to diagnose and treat in a primary care setting while for schizophrenic or neurological disorders, visits and treatments are likely to be ongoing and require specialist consultations and treatment. Policies that shift the risk of health care costs to providers may provide incentives for PCPs to focus on less expensive disorders.

Additionally, policies that encourage treatment of mental health conditions in primary care may reduce diagnosis rates of less common disorders.

The second panel of Table VIII tests whether the relationship between Medicaid policies and diagnosis rates varies across specific disorders. I separate mental health diagnoses into two groups – those relating to ADD/ADHD and more serious conditions (including diagnoses of emotional disturbance and schizophrenic, affective, neurotic, personality, and conduct disorders). I estimate the two equations simultaneously, using seemingly unrelated regression (SUR); p-values from a Wald test of the equality of cross-equation effects of a particular Medicaid plan are displayed in brackets below each coefficient. I examine both primary care diagnoses and overall diagnosis rates. Patients belonging to an HMO experience a reduction in both ADHD and other diagnoses, both within primary care and overall. PCCM policies lead to a significant increase in the probability that a child is diagnosed with a more serious mental health condition outside of primary care, with no overall impacts on ADHD diagnosis rates.

6. Conclusion

A large body of research suggests that a significant portion of children suffer from undiagnosed and untreated mental health conditions. Primary care is seen as a potential avenue for addressing this problem. This paper fills a gap in the literature on the effects of specific Medicaid managed care policies and evaluates the impacts of these plans on primary care diagnosis and treatment of mental health conditions. Using plausibly exogenous variation in the penetration of MMC policies, I show that PCCM policies lead to a shift in diagnosis and treatment rates from within primary care to specialist providers such as psychiatrists, where serious mental health conditions are more likely to be identified. Conversely, children served by a traditional HMO experience a reduction in diagnosis rates. Physicians do not appear to respond to restrictions on primary care reimbursement of mental health diagnosis by treating children without diagnosing them. I find no evidence that managed care policies increase the probability of mental health treatment in the absence of a diagnosis; individuals served by HMOs experience a reduction in drug treatment without a diagnosis. Finally, I show that these findings are robust to accounting for unobservable differences in provider quality across Medicaid policies.

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Figure 1: Variation in HMO Penetration in New York over Time: Cash Assistance Recipients

A. 2001

■	(.75,1]
▨	(.5,.75]
▨	(.25,.5]
▨	(0,.25]
□	[0]

B. 2003

■	(.75,1]
▨	(.5,.75]
▨	(.25,.5]
▨	(0,.25]
□	[0]
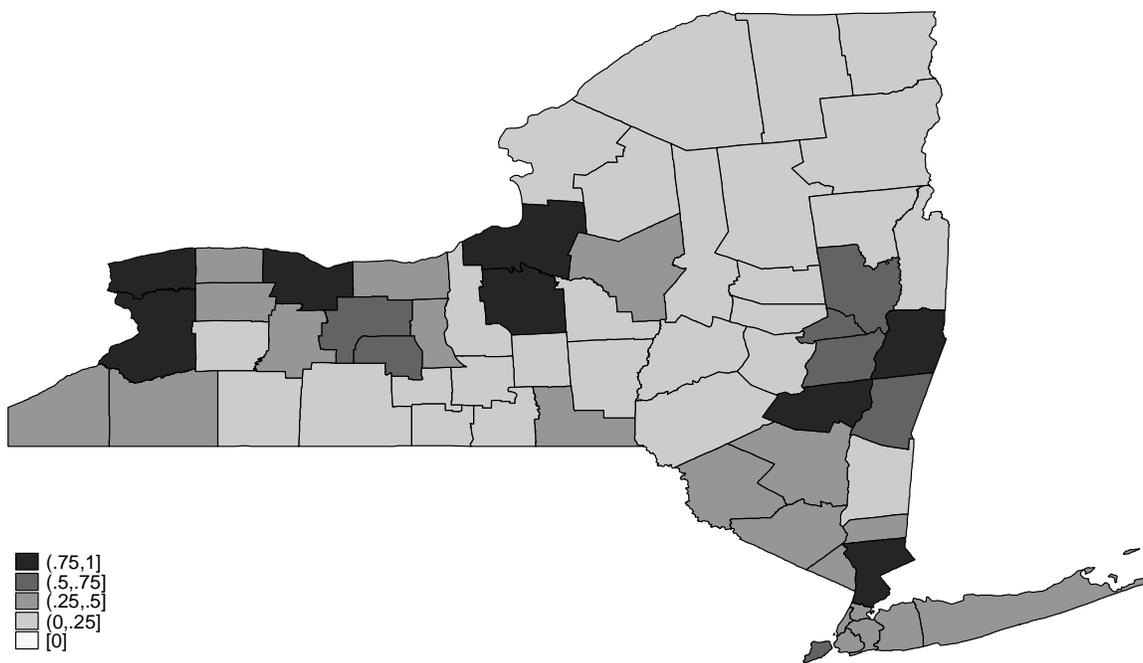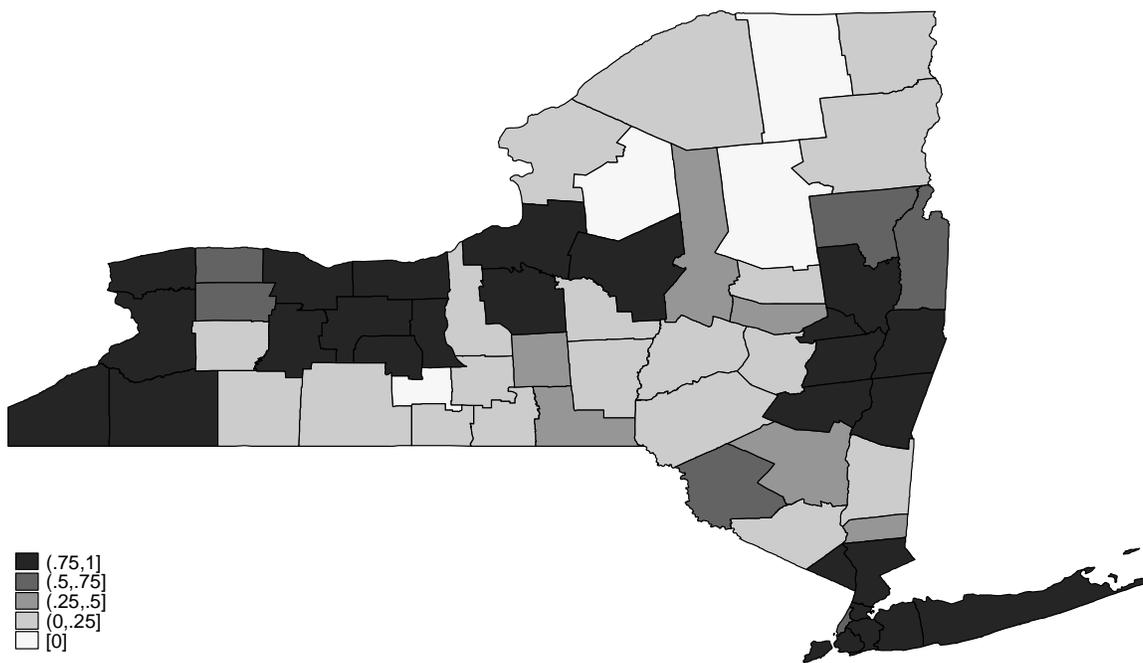
Figure 2: Variation in HMO Penetration in New York across Eligibility Groups: 2003

A. Cash Assistance

(.75,1]
(.5,.75]
(.25,.5]
(0,.25]
[0]

B. Foster Children

(.75,1]
(.5,.75]
(.25,.5]
(0,.25]
[0]

C. Child Poverty

(.75,1]
(.5,.75]
(.25,.5]
(0,.25]
[0]
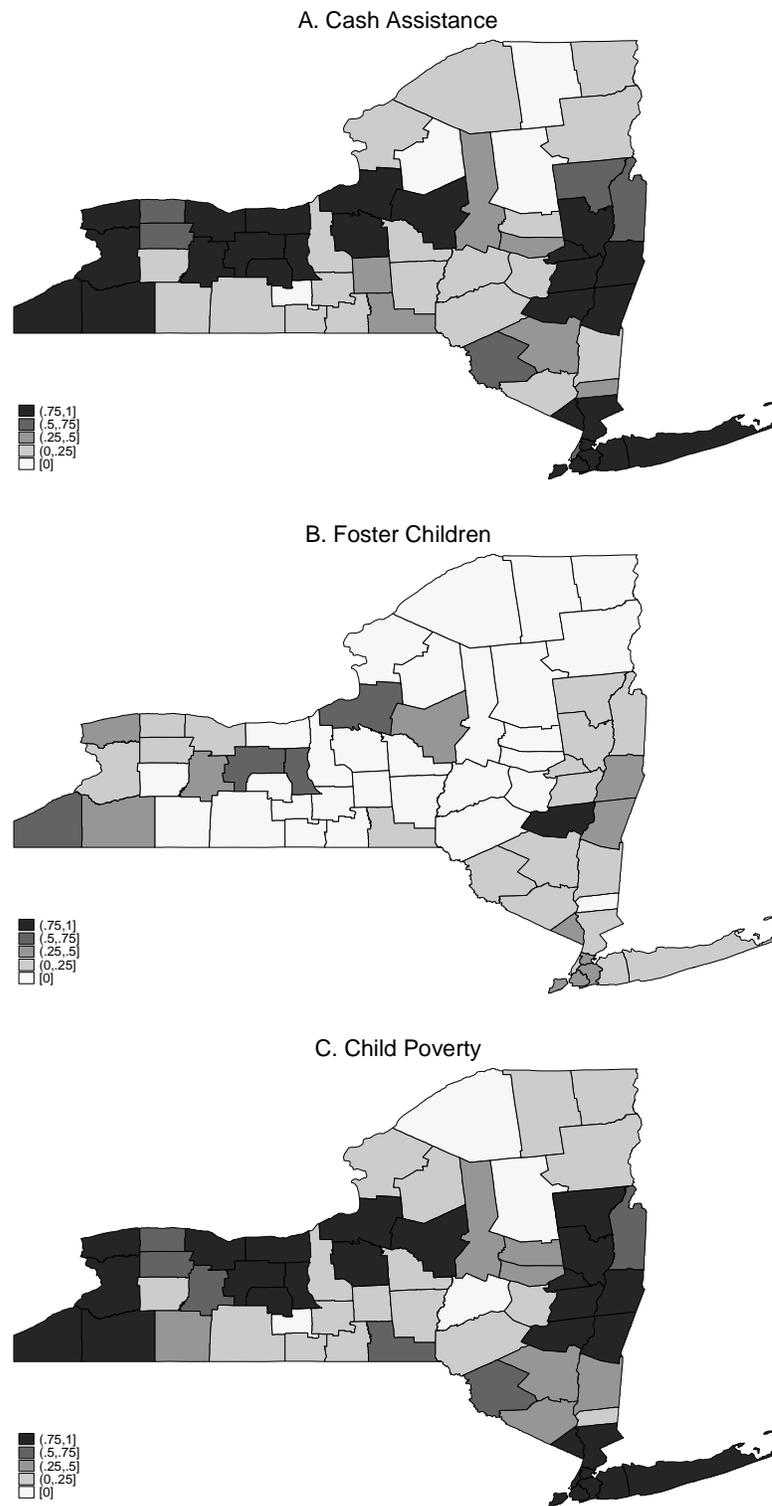
Table I: Medicaid Managed Care Arrangements and Predictions for Mental Health Diagnosis and Treatment Rates

	Behavioral Health Carve Out	HMO	Primary Care Case Management
A. Key Details			
1. What party bears the risk of mental health costs?	Behavioral health managed care organization (BHMCO).	Managed care organization (MCO).	Depends: PCPs may bear some risk, but generally the state Medicaid agency.
2. Are PCPs reimbursed for mental health visits?	No.	Yes, conditional on MCO authorization.	Yes.
B. Predictions for physician behavior			
1. PCP mental health diagnosis rate	Reduction: PCPs are not reimbursed for mental health related visits.	Ambiguous: depends on MCO authorization.	Increase: patients spend additional time with PCPs.
2. Nondrug treatment/specialist visits	Reduction: specialist vists are more costly, BHMCO bears risk of these costs.	Reduction: specialist vists are more costly, MCO bears risk of these costs.	Ambiguous: depends on whether PCPs act as a substitute or a complement to specialists.
3. Drug treatment	Ambiguous: depends on whether drugs are complements or substitutes for nondrug treatment.	Ambiguous: depends on whether drugs are complements or substitutes for nondrug treatment.	Ambiguous: depends on whether PCPs act as a substitute or a complement to specialists.

Table II: Variation in County Medicaid Managed Care Penetration by
Eligibility Group and Year

	1. Cash Assistance	2. Child Poverty	3. Foster Care
MMC Plan and Year:			
A. Health maintenance organization			
2001	0.27	0.10	0.03
2003	0.44	0.24	0.28
B. Behavioral health carve-out			
2001	0.06	0.16	--
2003	0.03	0.13	--
C. Primary care case management			
2001	0.31	0.56	0.97
2003	0.38	0.52	0.72

Notes: Each cell represents the average county MMC penetration for a given plan type, eligibility category, and year. MMC penetration is measured by the percentage of children enrolled in a given MMC plan (weighted by months of enrollment). See text for additional details.

Table III: Patient, Provider, and County Characteristics by Medicaid Managed Care Policy

	FFS	HMO	BHCO	PCCM	All
Number of patients	112,386	184,514	82,692	326,758	706,287
Patient Characteristics					
Male	0.49	0.49	0.50	0.50	0.50
Nonwhite	0.67	0.69	0.45	0.58	0.61
Age	10.4	10.1	10.5	10.2	10.2
Eligibility Category					
TANF/cash assistance	0.68	0.73	0.29	0.43	0.53
Child poverty	0.22	0.27	0.71	0.57	0.45
Foster child	0.10	0.01	--	<0.01	0.02
SCHIP	0.01	<0.01	0.21	--	0.03
Comorbidities					
Adjustment disorder	0.05	0.02	0.01	0.03	0.03
Allergies	0.09	0.08	0.07	0.10	0.09
Asthma	0.11	0.10	0.09	0.08	0.09
Migraines	0.01	0.01	0.01	0.01	0.01
Developmental delay/mental retardation	0.02	0.01	0.01	0.01	0.01
Other serious condition	0.05	0.06	0.03	0.03	0.04
Provider Characteristics					
Primary care physician is a pediatrician	0.80	0.82	0.85	0.67	0.75
Fraction Medicaid visits covered by:					
FFS	0.68	0.17	0.05	0.03	0.17
HMO	0.21	0.82	0.01	<0.01	0.25
BHCO	0.03	0.01	0.94	--	0.12
PCCM	0.08	<0.01	--	0.97	0.46
County Characteristics					
Fraction Medicaid visits covered by:					
FFS	0.56	0.27	0.11	0.11	0.21
HMO	0.35	0.72	0.19	<0.01	0.27
BHCO	0.02	0.01	0.70	--	0.09
PCCM	0.08	<0.01	--	0.89	0.43

Notes: Sample includes children age 5 - 17 seen by a single primary care physician who had at least six months of Medicaid eligibility during the year. FFS = fee-for-service coverage (no managed care policy), BHCO = behavioral health carve out, PCCM = primary care case management. Other serious conditions include: lupus, kidney diseases, spina bifida, AIDS, cancer, multiple sclerosis, cystic fibrosis, muscular dystrophy, diabetes, heart diseases, blood diseases, cerebral palsy, and neurological disorders.

Table IV: First Stage Regressions of the Impact of County Penetration of Medicaid Managed Care Policies on Individual Enrollment in Medicaid Managed Care

Enrolled in MMC Plan:	HMO		BHCO		PCCM	
MMC penetration:						
HMO	1.044**	0.763**	0.007**	0.008**	-0.013*	-0.008*
	(0.149)	(0.086)	(0.002)	(0.002)	(0.041)	(0.043)
BHCO	0.815**	0.516**	0.254**	0.293**	-0.012*	-0.008+
	(0.029)	(0.036)	(0.002)	(0.003)	(0.005)	(0.004)
PCCM	0.356*	0.227**	0.005*	0.005*	0.396**	0.362**
	(0.149)	(0.086)	(0.002)	(0.002)	(0.041)	(0.043)
F-stat from test of joint significance	466	154	12	12	31	25
Provider fixed effects		X		X		X
Observations	706,287	706,287	706,287	706,287	706,287	706,287

Notes: Significant at + significant at 10%; * significant at 5%; ** significant at 1%. Dependent variable is enrollment in a specific Medicaid Managed Care Policy; BHCO = behavioral health carve out, PCCM = primary care case management. Omitted category is percentage of patient-months covered by FFS within a county-year cell. Regressions also include indicators for race (nonwhite), sex, medical comorbidities (see text for definition), Medicaid eligibility category, SCHIP coverage, a linear term in age, and year, state by year, and county fixed effects. When indicated, regressions also include provider fixed effects. Standard errors clustered at eligibility category-county-year level in parentheses.

Table V: Correlations between County Penetration of Medicaid Managed Care Policies and Mental Health Resources

	Any Psychiatric Hospital	Any Child Outpatient Facility	Mental Health Specialists per Capita			
			Child Psych Hospital	Child Psychiatrists	Psychiatric Caseload	Psychologists & Social Workers
Mean of Dependent Variable:	0.01	0.03	0.11	0.08	0.10	1.86
Percentage of Patient-Months:						
HMO	-0.005	0.131*	0.062	0.014	-0.033	1.039
	(0.019)	(0.064)	(0.079)	(0.041)	(0.034)	(0.946)
BHCO	-0.087	0.272	0.723	-0.257	-0.144	-6.486
	(0.075)	(0.239)	(2.094)	(0.853)	(0.674)	(6.401)
PCCM	-0.032+	-0.008	-0.091	-0.107	-0.019	0.533
	(0.018)	(0.046)	(0.111)	(0.072)	(0.066)	(0.677)
F-test of joint significance (p-value)	0.154	0.174	0.671	0.243	0.776	0.463
Observations	174	174	174	174	174	174

Notes: Significant at + significant at 10%; * significant at 5%; ** significant at 1%. Omitted category is fee for service penetration. All regressions include state fixed effects and control for percentage of population in urban areas; county penetration rates measured in 2003 except in regression with psychologists/social workers per capita as dependent variable. Presence of psychiatric hospitals and child mental health outpatient facilities measured in 2002; child psych hospitals per 1000 children measured in 2002; child psychiatrists per 1000 children measured in 2001; psychiatric caseload per 1000 individuals measured in 2001; psychologists and social workers per 1000 individuals measured in 2000. Robust standard errors in parentheses.

Table VI: The Impact of Medicaid Managed Care Policies on the Diagnosis of Mental Health Disorders

	Any Diagnosis			PCP Diagnosis			Other Provider Diagnosis		
	(1) OLS	(2) 2SLS	(3) 2SLS	(4) OLS	(5) 2SLS	(6) 2SLS	(7) OLS	(8) 2SLS	(9) 2SLS
	Average for FFS patients = 0.11			*Average for FFS patients = 0.04*			*Average for FFS patients = 0.09*		
Medicaid Plan:									
HMO	-0.016**	-0.023**	-0.027*	0.001	-0.017*	-0.027**	-0.017**	-0.014+	-0.011
	(0.004)	(0.009)	(0.011)	(0.001)	(0.008)	(0.008)	(0.003)	(0.007)	(0.010)
BHCO	0.006	-0.104	-0.088	0.027**	-0.094+	-0.072	-0.018**	-0.046	-0.037
	(0.004)	(0.130)	(0.083)	(0.003)	(0.056)	(0.066)	(0.003)	(0.126)	(0.050)
PCCM	-0.033**	0.023	0.043	-0.023**	-0.136*	-0.093+	-0.016**	0.117**	0.099*
	(0.005)	(0.042)	(0.057)	(0.004)	(0.056)	(0.049)	(0.004)	(0.034)	(0.049)
Test of equality (p-value):									
All	<0.001	0.460	0.363	<0.001	0.043	0.324	0.911	<0.001	0.074
HMO = BHCO	<0.001	0.538	0.467	<0.001	0.171	0.505	0.714	0.801	0.611
HMO = PCCM	0.008	0.277	0.222	<0.001	0.035	0.178	0.917	<0.001	0.027
BHCO = PCCM	<0.001	0.359	0.196	<0.001	0.602	0.793	0.738	0.212	0.054
Provider fixed effects			X			X			X
Observations	706,287	706,287	706,287	706,287	706,287	706,287	706,287	706,287	706,287

Notes: Significant at + significant at 10%; * significant at 5%; ** significant at 1%. Omitted category is fee for service Medicaid coverage. BHCO = behavioral health carve out, PCCM = primary care case management. Regressions also include indicators for race (nonwhite), sex, medical comorbidities (see text for definition), Medicaid eligibility category, SCHIP coverage, a linear term in age, and year, state by year, and county fixed effects. When indicated, regressions also include provider fixed effects. Standard errors clustered at eligibility category-county-year level in parentheses. In 2SLS regressions, penetration of HMO, BHCO, and PCCM policies at the eligibility category-county-year level serve as the omitted instruments.

Table VII: Medicaid Managed Care Policies and the Treatment of Diagnosed Mental Health Disorders: 2SLS Estimates

| | A. Within Primary Care | | | B. Overall | |
	1. Follow-up	2. Psychologist/ Social Worker	3. Psychiatrist	4. Follow-up	5. Prescription
Average for FFS patients	*0.56*	*0.04*	*0.03*	*0.76*	*0.65*
Medicaid plan:					
HMO	-0.001	-0.008	0.009	-0.063**	0.056*
	(0.052)	(0.017)	(0.020)	(0.020)	(0.028)
BHCO	-0.775	0.900	0.103	-0.492	0.793
	(1.778)	(0.618)	(0.228)	(0.706)	(0.610)
PCCM	0.078	0.047	0.157+	0.093	-0.301
	(0.280)	(0.104)	(0.091)	(0.207)	(0.218)
Test of equality (p-value):					
All	0.891	0.242	0.236	0.658	0.149
HMO = BHCO	0.665	0.144	0.688	0.546	0.232
HMO = PCCM	0.779	0.597	0.098	0.464	0.107
BHCO = PCCM	0.646	0.191	0.828	0.440	0.101
Observations	33,299	33,299	33,299	69,556	69,556

Notes: Significant at + significant at 10%; * significant at 5%; ** significant at 1%. BHCO = behavioral health carve out, PCCM = primary care case management. Omitted category is fee for service Medicaid coverage. Regressions also include indicators for race (nonwhite), sex, medical comorbidities (see text for definition), Medicaid eligibility category, SCHIP coverage, a linear term in age, and year, state by year, and county fixed effects. Standard errors clustered at eligibility category-county-year level in parentheses. Penetration of HMO, BHCO, and PCCM policies at the eligibility category-county-year level serve as the omitted instruments.

Table VIII: The Impact of Medicaid Managed Care Policies on Quality of Care and Specific Diagnoses

	A. Drug Treatment without Diagnosis	B. Specific Diagnoses			
		1. PCP		2. Any Provider	
		ADHD	Other	ADHD	Other
Average for FFS patients	*0.02*	*0.03*	*0.01*	*0.06*	*0.07*
Medicaid plan:					
HMO	-0.008+	-0.013*	-0.007+	-0.017**	-0.015*
	(0.004)	(0.007)	(0.003)	(0.006)	(0.007)
		[0.252]		[0.719]	
BHCO	0.039	-0.102+	0.010	-0.116	-0.023
	(0.063)	(0.057)	(0.020)	(0.085)	(0.078)
		[0.054]		[0.081]	
PCCM	-0.036	-0.110*	-0.040*	-0.020	0.068*
	(0.031)	(0.045)	(0.020)	(0.042)	(0.033)
		[0.075]		[0.078]	
Test of equality (p-value)					
All	0.499	0.032	0.181	0.514	0.041
HMO = BHCO	0.465	0.120	0.402	0.250	0.919
HMO = PCCM	0.354	0.034	0.100	0.947	0.012
BHCO = PCCM	0.289	0.913	0.078	0.316	0.285
Observations	638,294	708,095	708,095	708,095	708,095

Notes: Significant at + significant at 10%; * significant at 5%; ** significant at 1%. HCO = behavioral health carve out, PCCM = primary care case management. Omitted category is fee for service Medicaid coverage. Regressions also include indicators for race (nonwhite), sex, medical comorbidities (see text for definition), Medicaid eligibility category, SCHIP coverage, a linear term in age, and year, state by year, and county fixed effects. Standard errors clustered at eligibility category-county-year level in parentheses. Penetration of HMO, BHCO, and PCCM policies at the eligibility category-county-year level serve as the omitted instruments. P-value from Wald test of cross equation equality of plan type effects in brackets.