DOES MEDICAID IMPROVE MENTAL HEALTH? AN EXAMINATION OF TREATMENT USE AND FINANCIAL SECURITY

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Abstract: Mental health outcomes are one of the few dimensions of health in which research has shown promise of an ameliorating effect of health insurance, although the mechanisms behind this effect are unclear. In this paper, we examine whether the increased availability of Medicaid coverage for adults without dependent children and parents in a wave of pre-ACA reforms across the nation improves mental health. We use the natural experiments created by state-level decisions to introduce or expand Medicaid for non-elderly adults without dependent children and parents between 2001-2013 to estimate the effect of enrolling in Medicaid on four different measures of mental health. We combine 13 years of a restricted version of the nationally representative Medical Expenditure Panel Survey with a unique dataset we created that characterizes Medicaid coverage at the state-year level. We use difference-in-differences and instrumental variable methods to identify the effect of Medicaid coverage. Because Medicaid may affect mental health outcomes by reducing the price of mental health treatment and/or increasing financial security, we also examine the influence of Medicaid acquisition on intermediate outcomes that capture mental health service use and financial security.

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1. INTRODUCTION

The purpose of this paper is to estimate the effect of health insurance coverage on mental health and to examine the mechanisms behind this relationship. Understanding whether and how health insurance coverage influences mental health is important for determining the benefits of insurance expansions and for evaluating policy alternatives. If health insurance causes improvements in health, investments in insurance expansions become more cost-effective. Of course, an equity motivation for insurance coverage in low-income populations can remain even in the case that mental health improvements are not specifically present; helping people afford health care treatment may itself be a policy goal. However, depending on *why* health insurance affects mental health, it becomes less obvious that government spending should be specifically targeted towards health insurance rather than other policies.

We examine the relationship between health insurance and mental health within the Medicaid program. Medicaid is a fitting context because it serves a population that has a particularly high rate of mental illness. Additionally, there is increasing, although not uniform, evidence to suggest that mental health outcomes are responsive to the acquisition of Medicaid coverage. The annual prevalence of mental illness in the adult Medicaid population, estimated at 21-33% depending on the beneficiary group, is among the highest rate for any insured population (U.S. SAMHSA, 2014; Adelmann, 2003; Mark et al., 2015). In part, this relatively high prevalence is attributable to the subset of enrollees who gain eligibility because of a psychiatric disability. However, the prevalence of mental illness is elevated in the larger, low-income population from which current or expanded Medicaid programs draw beneficiaries. Specifically, for adults 18 or older, the prevalence of any mental illness in the past year is 26% among those with income below the federal poverty level (FPL) compared to 16% among those with income at or above 200%FPL (U.S. SAMHSA, 2014).

The net effect of insurance coverage on mental health is an empirical question. The traditional view is that health insurance makes it more affordable for individuals to access health care treatment, and that the treatments they access will cause improved health. Increased care use might indeed improve mental health by alleviating symptoms, but could also potentially lead to a decline in mental health as previously undiagnosed illness are discovered. An alternative view is that health insurance positively affects individual financial outcomes, and those changes in financial circumstances might affect health

behaviors by allowing investment in goods and services that may have good or ill effects (for example, alcohol consumption vs. gym membership). Financial circumstances could also directly affect health through reduced stress or improved general well-being (Evans and Garthwaite, 2014).

Despite the high burden of mental illness within the current and potentially eligible Medicaid populations, the evidence of the program's impact on adult mental health outcomes lags behind research on Medicaid coverage, health care access and use. Relatively few studies have investigated the effects of adult Medicaid coverage on mental health, and empirical analyses of the channels through which Medicaid coverage may improve mental health in particular are scarce. Two existing papers examine the effects of early Medicaid expansions on related outcomes. Golberstein and Gonzales (2015) study the effects of changes in Medicaid income eligibility for both parents and childless adults on mental health treatment and out of pocket spending on mental health care. They find no changes in treatment although out-of-pocket spending decreases. The study does not assess health directly or disaggregate results for childless adults from parents. McMorrow et al. (2016) study the effect of the early parental Medicaid expansions on mental health and out of pocket spending in a low-income sample from the National Health Interview Survey, and find some evidence of improvements in mental health and declines in out-of-pocket spending. They did not observe changes in other financial outcomes including worry about the costs of care or unmet need for care due to costs. Neither paper connects changes in Medicaid coverage to treatment to health.

In this paper, we provide a comprehensive look at the effect of Medicaid on adult mental health and an examination of the mechanisms behind it. We examine how the expansion of Medicaid coverage for parents and adults without dependent children in a wave of pre-Affordable Care Act (ACA) reforms across the nation affects mental health. We combine 13 years of a restricted version of the nationally representative Medical Expenditure Panel Survey (MEPS) with a unique dataset we created that characterizes Medicaid coverage at the state-year level. We use difference-in-differences and instrumental variable methods to identify the effect of acquiring Medicaid coverage. The underlying variation in Medicaid programs is due to not only state expansions and contractions of their Medicaid programs from 2001-2013, but also other characteristics of those expansions including the maximum income eligibility threshold. We examine the

robustness of our main specifications to a number of alternative definitions of Medicaid expansion and modeling choices.

While our results should be considered preliminary, we summarize them here. The expansions resulted in an overall increase in health insurance coverage of 1.3 percentage points for childless adults. We find strong evidence that they increased overall health care utilization for childless adults, including outpatient, inpatient, and emergency room utilization. We find weaker evidence that they increased utilization of mental health and substance abuse-specific outpatient and ER services, with a wide range of potential point estimates. We also find strong evidence of increased total expenditures but no evidence of a decrease in out of pocket spending. Despite the increased health care utilization we find no evidence of improved mental health in a variety of measures for childless adults; in fact, one measures suggests a substantial decline. The expansions to parents resulted in an increase in health insurance coverage of 2.3 percentage points. The increase in insurance coverage resulted in increased outpatient utilization, but we find no evidence that it increased emergency room or inpatient use, and no evidence that mental health and substance abuse-specific utilization increased. We also do not find support for the hypothesis that the Medicaid expansions to parents reduced out of pocket spending or increased total expenditures. The expansions also do not appear to have improved mental health in any of our measures; a decline is suggested in one measure.

2. BACKGROUND & RELATED LITERATURE

The literature has separately found that Medicaid may increase the use of mental health care and that it improves measures of financial security. We bring these streams of research together to examine how the two pathways may result in improved mental health for adult Medicaid beneficiaries. In this section, we review the evidence on the effects of expanded Medicaid availability on mental health care use, mental health, and financial security. We then discuss why we might expect mental health care use and financial security may mediate the relationship between Medicaid and mental health.

A. Health insurance and the use mental health care services

A substantial experimental and quasi-experimental literature examines how health insurance availability, and health plan benefits, cost-sharing, and utilization management policies influence mental health care use. We do not comprehensively review it here

instead focusing on the subset of studies that evaluate the effects of expanded Medicaid availability on mental health care use.

A growing body of research evaluates the impact of expanded Medicaid coverage for adults on health care use; however, measures of mental health care use are not routinely included. In a national study, Golberstein and Gonzales (2015) study the effect of increased Medicaid eligibility from 1998-2011 for parents and childless adults using the merged NHIS and MEPS files; they find no evidence of a change in mental health care use service use. The Oregon Health Insurance Experiment team found no evidence of a change in prescription medication use for depression (Baicker et al., 2013). An early Medicaid expansion for childless adults in Wisconsin increased outpatient and emergency department mental health care use among urban beneficiaries (DeLeire et al., 2013); there was no evidence of a change in outpatient mental health care use among rural beneficiaries (Burns et al., 2014). Emerging research on the ACA Medicaid expansions finds evidence of increased mental health-related prescription medication use in Medicaid in expansion states relative to non-expansion states (MacLean, Cook, Carson & Pesko, 2017; Ghosh, Simon & Sommers, 2017).

B. Health insurance and mental health

Findings from the OHIE suggest that Medicaid coverage positively influences some measures of mental health. In both the first and second year survey findings, Medicaid coverage was associated with a decrease in the likelihood of a positive screen for depression (Finkelstein et al., 2012; Baicker et al, 2013). Several additional mental health outcomes showed improvement in the first year after treatment assignment including overall happiness and the SF-8 mental health component summary score although these did not persist in the second year findings. Empirical findings from quasi-experimental research also supports the possibility that Medicaid coverage may improve mental health outcomes although here too the findings are not uniform. McMorrow et al., (2016) evaluate the effects of Medicaid eligibility expansions to parents from 1997-2009 in a low-income sample from the National Health Interview Survey (NHIS) and find a decreased probability of moderate psychological distress. In a series of studies that evaluate the effects of ACA-related Medicaid expansions on health Miller and Wherry (2016; 2017) use a difference-in-differences design and the NHIS; they find no evidence of a change in reporting depression as a health condition. McMorrow and colleagues (2017) update their prior work with an evaluation of ACA-related expansions' impact on health among low-income adults in expansion and non-expansion states from 2010-2015. In the sample as a whole, they found

a marginally significant decline in the likelihood of reporting serious psychological distress among respondents in expansion states relative to non-expansion states with more pronounced effects when the sample was stratified according to the magnitude of the expansion. Finally, Courtemanche and colleagues (2017) evaluate the impact of ACA-related Medicaid expansions on multiple outcomes including self-reported days that are not spent in good health. Using the Behavioral Risk Factor Surveillance Survey and a triple difference-in-differences design, they find no effect of the expansions on this measure of mental health.

C. Health insurance and financial security

A quasi-experimental and experimental literature examines how health insurance affects financial security. Research consistently finds improved financial outcomes across a variety of measures in response to expanded public health insurance availability. Finkelstein and McKnight (2008) originate this work with a study of how the introduction of Medicare affected out of pocket (OOP) medical expenditures in the elderly, showing a large decrease in the right tail of the distribution. Other work on Medicare, including studies that included additional financial measures, has come to similar conclusions (Engelhardt and Gruber, 2011; Barcellos and Jacobson, 2015). Mazumder and Miller (2016) examine the Massachusetts reform and find improvements in a variety of measures from credit report data.

Within the context of Medicaid, Finkelstein et al., (2012), Baicker et al. (2013), Hu et al. (2016), and Gruber and Yelowitz (1999) study financial outcomes and find improvements in medical debt, financial strain, credit scores, and OOP medical spending, although not all outcomes improve in all studies. Gross and Notowidigdo (2011) examine bankruptcies using the expansions of SCHIP and Medicaid from 1992 to 2004, and find that a 10-percentage point increase in eligibility decreases bankruptcies by 8%. Two additional papers find decreases in out of pocket spending in the context of the early Medicaid expansions. Golberstein and Gonzales (2015) look at mental health-specific out of pocket expenditures and find a decrease of roughly $21 resulting from a gain of Medicaid eligibility (baseline $31). McMorrow and colleagues (2016) find a 5-percentage point decline in the probability that overall out of pocket spending was $500 or more.

D. Potential linking mechanisms

Efficacious treatments exist for the most prevalent mental health disorders among adults, major depression and generalized anxiety disorders (Gelenberg, Freeman, Markowitz, et al., 2010; Katzman, Bleau, Blier, et al., 2014). Thus, it is reasonable to hypothesize that mental health service use may reduce symptoms and improve outcomes. Although there is heterogeneity in treatment response, patients with major depression or anxiety disorders may experience symptom relief and outcome improvement within a relatively short-time frame, for example four to eight weeks (Cipriani, Furukawa, Salanti, et al., 2009; Mathew, Amiel, Coplan, et al., 2005). Patient mental health improvement in clinical research has been demonstrated using a variety of outcomes including diagnostic tools and clinical judgment, as well as measures of health related quality of life and function that are more readily available in national surveys (Wilson, Mannix, Oko-osi, and Revicki, 2014; Kolovos, Kleiboer, Cuijpers, 2016). Thus, to the extent that the acquisition of health insurance promotes treatment use, the potential effects are plausibly observable with some of the health outcome measures included in national health surveys in a relatively short time period.

Improved financial security may influence mental health through several potential mechanisms. Health insurance changes both the risk of large unexpected expenses and the out of pocket price of health care services. Medicaid itself is a transfer program and so may also influence financial well-being more broadly through income effects in which resources previously allocated to health care are newly available for other purposes. An implication of this is that these measures of financial strain may themselves reflect inputs to mental health through a reduction of stress, an ability to purchase goods and services that may affect mental health.[2] A growing literature examines the effects of health insurance expansions on measures of medical-related financial risk including, cost-related treatment non-adherence, medical debt and collections (Finkelstein et al., 2012; Barcellos and Jacobson, 2015; Sommers et al., 2017). Evidence of impact is also captured in subjective measures of financial strain, on credit report scores, debt, delinquency and personal bankruptcy (Gross and Notowidigdo, 2011; Finkelstein et al., 2012; Mazumder and Miller, 2016). The literature generally presumes that financial outcomes are a proxy for the consumption-smoothing benefits of health insurance, although it's unclear to what degree

[2] A further complication, pointed out by Finkelstein, Mahoney, and Notowidigdo (2017), is that the incidence of reductions things like medical debt may not be on the newly insured.

the changes in finances reported result from decreased prices, reduced risk, increased effective income, or some combination.

3. DATA

We combine nationally representative survey data, the Medical Expenditure Panel Survey (MEPS) with a primary data source on state Medicaid programs for adults without dependent children and parents, the Medicaid Waiver Dataset (MWD). The MWD characterizes Medicaid coverage for each state and the District of Columbia from 1996 through 2014. We constructed the MWD through a systematic review of state and federal Medicaid documents, research publications, and onsite data collection at the Centers for Medicare and Medicaid Services. The current study uses MWD data from 2001 – 2013, a time during which there were numerous expansions in childless adult and parental coverage.

A. The Medical Expenditure Panel Survey

The MEPS is a household survey administered by the Agency for Healthcare Research and Quality (AHRQ); it includes five interviews or rounds over two years for each household member (Cohen, Monheit, Beauregard, et al., 1996). The MEPS collects a rich set of variables from each household member including sources of income, public program participation, demographics, health insurance, health care use and physical and mental health outcomes. We use a restricted-access version of the MEPS Household Component data that includes the subject's state of residence to merge the MEPS to the MWD. The MEPS is the study's data source for outcome variables, mediators, and for state, household, and individual covariates. We pool data from 2001-2013. Detailed health care use data are available in the MEPS health care event files. These are annual files that are linkable to Household Component by the subject's unique identifier.

Health insurance enrollment. We measure health insurance as a binary variable indicating any coverage in the year. The AHRQ constructs this variable from responses to the health insurance questions posed at each interview in the year. Specifically, at each round of data collection, a series of prompts takes the household respondent through each person in the family and each type of health insurance to ascertain coverage for each household member since the start of the data collection round. We use this measure rather than Medicaid coverage or public insurance coverage more generally for several reasons.

This set of state expansions had several characteristics that complicated how individuals might report them in a survey. Typically, individuals who gained eligibility through the expansions were enrolled in managed care organization (MCO) such that the enrolled received a benefit card with the name of the MCO rather than Medicaid. Additionally, the expanded Medicaid programs themselves often had specialized state-specific names that could be unrelated to Medicaid (e.g. Wisconsin's BadgerCare program). While the MEPS questionnaire does incorporate local state names for Medicaid programs, it is unclear how individuals would choose to respond. In some ways, the best test is to look at where the increases in insurance show up; the simple insured vs. uninsured measure is where this is in the MEPS. This measure also has the advantage of being the net change in insurance coverage after any potential crowd-out, so that any changes in health care use, health, and spending can be thought of as the result of the change from uninsured to Medicaid coverage.

Outcome measures. The primary outcome for this study is mental health. We measure mental health using four distinct measures. The global measure of self-reported mental health includes five response categories (i.e., excellent, very good, good, fair, poor). It is available in all of the study years and captures a dimension of perceived health that is associated with social role functioning and mental health care use (Fleishman and Zuvekas, 2007; Zuvekas and Fleishman, 2008). We analyze this variable as a binary outcome in which the five response categories are collapsed into "excellent, very good, or good" or "not excellent, very good, or good."

The remaining three outcome measures are derived from instruments included within the MEPS self-administered questionnaire (SAQ), a questionnaire that is administered to all household respondents over the age of 18. These include the Mental Health Component Summary Score from the Short-Form 12 Health Survey (Ware, Kosinski and Keller, 1996); the Kessler index of non-specific psychological distress (K6) (Kessler, Andrews, Colpe, et al., 2002); and the Patient Health Questionnaire (PHQ-2) (Kroenke, Spitzer and Williams). The MCS score is constructed from the individual items on the SF-12 using a proprietary algorithm that weights more heavily those SF-12 questions that assess emotional well-being and social role functioning. It is normalized to a range of 0-100 with a population mean of 50 and a standard deviation of 10. A higher score indicates better mental health. We analyze this outcome as a continuous measure.

The Kessler index is intended to distinguish cases of mental illness from non-cases in a community sample. It is comprised of six questions that assess mental health during

the past 30 days (Kessler, Andrews, Colpe, et al., 2002; Kessler, Barker, Colpe, et al., 2003). The summation of the six items produces the K6 Summary Score with a range of 0 to 24. A score of 13 or higher is a suggested threshold as an indicator of serious psychological distress. Based on the K6 summary score, we created a binary measure that takes on a value of zero if the subject met or exceeded that cutoff value, and a value of one if the individual has a negative screen for serious psychological distress. We constructed our last outcome measure from the PHQ-2 screening instrument for depression. Our dichotomous measure of a negative depression screen equals one if the subject's PHQ-2 summary score is below 3, the recommended threshold for a positive screen.

Mediators. We are interested in two potential paths by which Medicaid enrollment may affect mental health outcomes: mental health care use and financial health. We define mental health care use based on the diagnosis associated with the particular health care visit using the clinical classification system (Coffey, Chu, Barrett et al., 2010). The MEPS includes detailed health care use for each subject including the service month and year, procedure codes, type of provider, and diagnosis codes for all major service categories: outpatient; inpatient; and emergency department care. We constructed category-specific measures of mental health care use in the year including binary and count measures to summarize the probability and quantity of mental health care use for each major service category.

Measuring financial health is more challenging. We use the term financial health to refer to both financial security and financial well-being. Medicaid coverage may improve financial security by protecting the individual against the risk of large and unexpected medical expenditures. As noted above, out-of-pocket (OOP) health care expenditures is a frequent measure of financial risk in studies of Medicaid and health insurance expansions more broadly; a post-expansion decrease in OOP spending is consistent with reduced financial risk (Finkelstein et al., 2012; Busch, Golberstein and Meara, 2014; Sommers, et al., 2017). Our primary measure of financial security is an annual measure of total OOP spending for all types of care. In future iterations of this work, we will include measures of foregone or delayed medical, dental or prescription medications due to cost in the year.

B. Medicaid Waiver Dataset

There is significant variation across states and years regarding the generosity and availability of Medicaid benefits for non-disabled, working-age adults; however, centralized information about this coverage has not been readily available. We undertook a systematic

review of multiple sources including state and federal Medicaid documents, research publications, state news, and onsite data collection at the Centers for Medicare and Medicaid Services to characterize Medicaid coverage for non-elderly, non-disabled parents and childless adults. The resulting, publicly available Medicaid Waiver Dataset (MWD) describes the presence and attributes of childless adult Medicaid coverage for each state and the District of Columbia from 1996 through 2014 (Burns, Dague, and Kasper, 2016). We will publish the analogous dataset for parents and caretakers in 2018. These datasets include a range of measures that allow researchers to define Medicaid coverage and availability in a manner that is most salient to their research question. For example, for each state and year, the measures include each authorizing source of coverage (e.g., Section 1931, Section 1115 waiver, ACA expansion), and the attributes of that coverage such as income eligibility, benefit generosity, enrollment caps, required premiums, and so on.

During this study period, 2001-2013, all states offered some coverage for low-income parents in compliance with Section 1931 of the Social Security Act. This statute requires states to offer Medicaid coverage to those who meet the income, resource, and family composition rules in place on May 18, 1988 under the Aid to Families with Dependent Children program. States have considerable discretion in selecting the maximum income eligibility threshold for Section 1931 coverage. However, for individuals who are eligible for Medicaid through this mechanism, states must provide full Medicaid benefits and may not impose enrollment caps, freezes, or waiting lists. Additionally, states could extend Medicaid coverage to parents who were ineligible for Section 1931 coverage (e.g., due to higher income) through the use of state-funded initiatives or federal waivers. Medicaid coverage for non-disabled, working-age childless adults was unevenly available across the states during the study period consistent with the absence of any federal statute requiring coverage for this population. The income eligibility thresholds ranged widely, and the type of assistance that Medicaid programs offered to childless adults varied from modest subsidies for employer sponsored premiums to coverage for primary care services to full Medicaid benefits. As such identifying what constitutes Medicaid coverage for each of the study populations and determining which program attributes best describe the scale of the programs are non-trivial analytic decisions.

Our approach to defining the availability of Medicaid coverage for parents and childless adults follows from our research question. First, since our hypothesis is that Medicaid may affect mental health through mental health care use and/or financial security,

we defined Medicaid coverage to include only those programs in which these mechanisms are most plausible. These are likely to be programs that provide comprehensive Medicaid benefits. We thus excluded programs that offered only partial benefits or limited financial assistance with private premiums. While the scope of mental health benefits under full Medicaid coverage was not identical across states during the study period, all programs covered mental health care through coverage for physician visits, prescription drugs, emergency department and inpatient care. Second, we define Medicaid availability in each state-year separately for parents and childless adults. For childless adults, we selected the maximum income eligibility threshold as the indicator of the program's potential reach or availability. For parents, the presence of Medicaid coverage beyond federal requirements (i.e., Section 1931) is our indicator of greater availability.

We define our treatment and comparison groups as those states that did and did not implement a change in these measures of Medicaid availability respectively between 2001-2013. During this period, 12 states added and/or dropped non-Section 1931 Medicaid coverage for parents. These states comprise the treatment group for the parent sample. Figure 1 compares the change over time in the mean maximum income eligibility threshold for the parent population in treatment and comparison states. On average, the income eligibility threshold is consistently higher among treatment states relative to comparison states. Relative to a stable trend among comparison states, the mean income eligibility threshold initially increases during the study period with a subsequent decline in the later years.

The group of treatment states for the childless adult population includes the 17 states that changed the maximum income eligibility threshold for this beneficiary group between 2001-2013. These include 12 states that initiated and/or eliminated childless adult coverage and 5 states that consistently offered coverage to this beneficiary population. Figure 2 displays the variation within and across years in the maximum income eligibility threshold for childless adult coverage. In most states and years, the maximum income eligibility threshold was at or below 200% FPL.

C. Analytic Sample

The study sample includes non-institutionalized, civilian adults, ages 19 to 64. Pooling the MEPS data from 2001 – 2013, the primary analytic sample size is 123,104 childless adults and 108,612 parents. The sample size varies across outcome measures because three measures only became available in 2004. The analytic sample includes all

childless adults and parents without regard to income. We do not condition on income to define the primary analytic sample because the annual measure of income may mask relevant income fluctuations in anticipation, or as a consequence, of newly available Medicaid coverage. Table 1 reports the weighted mean and estimated standard error for each of the listed characteristics for civilian, non-institutionalized childless adults (Column I) and parents (Column II) ages 19-64 in the Medical Expenditure Panel Survey. Calendar year 2001 is the baseline year for all but three measures. Calendar year 2004 is the baseline year for the SF-12 measure, and the screening measures for depression and serious psychological distress. Each column represents a group of states defined by the change in Medicaid coverage for the population identified in the column heading, childless adults or parents. Treatment states for childless adults include states that introduced or eliminated Medicaid for this population from 2001-2013. Treatment states for parents include states that implemented a change in the maximum income eligibility threshold for parents that exceeded the 75th percentile of the distribution of such changes from 2001-2013. The reference group for F-test comparisons of means within each study population is the "change" states. While there are some differences in education level and ethnicity for childless adults, the differences are not large. The parent sample shows differences at baseline in health insurance coverage and some outcome measures.

5. METHODS

We use the timing and characteristics of the expansions of Medicaid eligibility that states implemented during the 2001-2013 period to estimate the effect of enrolling in Medicaid on mental health care use, out of pocket health care spending, and mental health outcomes of individuals in the MEPS. The effect of health insurance enrollment on mental health could be represented by:

$$(1)\ Y_{ist} = \alpha_1 + \beta_1 * Enrollment_{st} + \boldsymbol{X}_{ist}\gamma_1 + \boldsymbol{\delta}_{1s} + \boldsymbol{\theta}_{1t} + \varepsilon_{1ist}$$

In this individual level regression equation, *i* represents individuals, *s* represents states, and *t* represents years. *Enrollment* could be either an indicator for whether or not the individual was enrolled in health insurance in a particular year, or the fraction of months during which they were enrolled; *Y* represents the outcome under consideration. Characteristics that vary at the individual-state-year level are represented by $\boldsymbol{X}_{ist}$, $\boldsymbol{\delta}_{1s}$ are state fixed effects, and $\boldsymbol{\theta}_{1t}$ are year fixed effects.

However, equation (1) misses that there is self-selection into insurance enrollment; in particular, those with the highest health care needs and mental health may self-select into enrollment. This type of selection will bias the coefficient of interest, β_1, towards finding that Medicaid enrollment worsens mental health (which is unlikely as individuals are voluntarily enrolling in the program and would likely simply elect to remain uninsured if it were of no or negative value to them). For a more general measure of health insurance, those with higher incomes may be more likely to afford insurance and may also be healthier; this could lead to bias in the other direction (understating the utilization effects of Medicaid). This motivates the need for an exogenous determinant of Medicaid enrollment, for which we exploit state changes in Medicaid policy. As discussed above, between 2001 and 2013 many states used various funding authorizations to increase (and sometimes decrease) the generosity of their programs. The simplest possible way to represent these changes would be to condense them to a binary indicator variable for whether or not the state had an expansion in place. In this form, the effect of Medicaid expansion on enrollment is given by:

$$(2)\ Enroll_{ist} = \alpha_1 + \beta_1 * Expansion_{st} + \boldsymbol{X}_{ist}\gamma_1 + \boldsymbol{\delta}_{1s} + \boldsymbol{\theta}_{1t} + \varepsilon_{1ist}$$

where *Expansion* is an indicator variable for whether or not a state had expanded Medicaid coverage in a given year. Note that this equation represents a standard difference-in-difference analysis of the effect of Medicaid expansion on Medicaid enrollment. Interpreting β_1 as the causal effect of state Medicaid expansions on enrollment requires only the usual difference-in-differences assumption of parallel trends. In this context, we are relying on the exogeneity of state Medicaid expansion decisions to the outcome variable.

The effect of Medicaid expansion on mental health outcomes would similarly be given by:

$$(3)\ Y_{ist} = \alpha_2 + \beta_2 * Expansion_{st} + \boldsymbol{X}_{ist}\gamma_2 + \boldsymbol{\delta}_{2s} + \boldsymbol{\theta}_{2t} + \varepsilon_{2ist}$$

where *Y* represents the mental health outcome under consideration and the other variables are defined as above. The parallel trends assumption is also what is required for interpreting β_2 as the intent-to-treat effect – how expansion affects mental health-- in this "reduced form" representation.

We then obtain an estimate of the effect of Medicaid enrollment on mental health in the ratio β_2/β_1. Importantly, this is equivalent to an instrumental variables analysis where

we first obtain predicted Medicaid enrollment by estimating equation (2) and then instrument enrollment in equation (1) with predicted enrollment. An additional assumption (the exclusion restriction) required for interpreting this coefficient causally is that the only channel through with Medicaid affects these mental health outcomes is through actually enrolling in the program. This rules out, for example, that something about the reform or expansion itself directly affects the mental health outcomes without an individual participating in the program.[3] We refer to this approach as "DDIV" to represent that it is an instrumental variables approach where the instrument is inherently a natural experiment of the difference-in-differences form.[4] Using a continuous treatment measure such as the income threshold is also an extension of this idea.

We present these DDIV estimates below. We can also include additional specifications that extend the DDIV intuition to incorporate other characteristics of the expansions. Currie and Gruber (1996) describe their use of the simulated eligibility instrument as a "convenient parameterization" of a state's eligibility rules; other studies of Medicaid expansions have similarly used the income threshold itself (Hamersma and Kim, 2009) or the simple indicator formulation above. However, the expansions we study here were not uniform (or linear) in generosity, unlike the earlier expansions to parents and children, and reducing their dimensionality to a simple fraction eligible determination through these parameterizations may miss important variation and potentially lead to null bias. We therefore extend the idea of the DDIV to include additional characteristics of the expansions that can each be used as instruments for Medicaid enrollment. These include, for example, income thresholds, the presence of enrollment caps, and other features of the programs discussed above; to our knowledge this is a new way of using variation in state Medicaid programs as identification.[5] For childless adults, these alternative instruments make very little difference in the results, but for parents our analysis is not yet complete.

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[3] While we believe it to be plausible, this is, of course, an assumption. The intended mechanism of eligibility expansions is likely to be increased program enrollment. However, the presence of Medicaid may create "conditional eligibility" and could influence decisions even among those who do not enroll. To the extent that these decisions also influence mental health, they undermine the exclusion restriction. However, many of these expansions were capped or frozen, and therefore conditional eligibility may be less important in this context. .

[4] We did not originate this approach. For example Duggan (2004) and Duflo (2001) apply this idea, among others.

[5] Burns & Dague 2017 control for the presence of enrollment caps and freezes in a DD framework.

In addition to the exclusion restriction, discussed above, Imbens (2014) notes that IV requires four additional assumptions which we make explicit here. First, the stable unit treatment value assumption (SUTVA) requires that treatment of one individual does not affect outcomes of others, explicitly ruling out spillovers. Second, the instrument must be exogenous conditional on covariates in the model to justify the causal interpretation; this is essentially the DD parallel trends assumption. Third, we assume monotonicity, which in this context means that nobody is less likely to enroll in Medicaid because of the instruments; in practice we construct the instruments so that they are increasing in generosity and assume that no one is less likely to enroll in coverage because it becomes more generous. Finally, the instruments must be relevant in that the correlation needs to be strong enough to draw inference; we provide standard tests of this below.

We implement the estimation using Ordinary Least Squares and Two Stage Least Squares regression analyses in Stata 14. Estimated standard errors are clustered at the state level.

6. RESULTS

We treat the childless adult and parent samples separately and discuss results for each in turn. For all childless adult results, we use as the instrument the maximum income threshold, scaled so that 1 is equivalent to 100% FPL. Results from a binary formulation of expansion/non-expansion are almost identical, but the income threshold has a higher f-statistic. We also obtain similar results when including whether an expansion was capped as an additional instrument. For all parent results, we use a binary formulation of whether the state had in place an expansion over and above its required section 1931 coverage. This misses some important aspects of parental expansions including when states used the 1931 mechanism to expand coverage by raising the income eligibility threshold for 1931 coverage; future versions of our analyses will further explore alternative instrument formulations.

For health care utilization, we use a binary formulation of visits by type (outpatient, ER, inpatient). We have examined visit counts and the results are qualitatively similar but are more sensitive to outliers and will likely require a more formal modeling of the skewed distribution. For spending, we consider total out of pocket as well as total overall expenditures. For mental health, we consider an indicator for not depressed, an indicator

for not having serious psychological distress, the SF-12, and an indicator for self-reported mental health very good or good; these measures are discussed in detail in the data section.

We show results for the full MEPS sample as well as for subsamples with incomes below 200% FPL. Because income subsamples potentially suffer from endogeneity and survey measurement of income is unlikely to be representative of what a program would use to calculate actual income eligibility, we think that the below 200% FPL subsample is best regarded as a supporting analysis rather than a main specification.

In interpreting these results, we recognize that the IV identifies the local average treatment effect (LATE), that is, the average effect among those who are induced to enroll in Medicaid when a state makes its program more generous ("compliers"). If treatment effects are heterogenous, then the LATE may not be the same as the average treatment effect for the sample as a whole. The reader should consider whether results for the compliers in this context are generalizable.

A. Childless Adults

Table 2 contains OLS and DDIV estimates of the effect of Medicaid enrollment on health care use. The first row of results is for any potential visit type and the second row of results is only for those classified as mental health and substance abuse. The OLS coefficient on any health insurance for any outpatient visit type (column 1) is .342, meaning that having health insurance is associated with a 34 percentage point increase in the probability of having an outpatient visit in the year. The IV coefficient in column 2 is very similar, at 39 percentage points attributable to health insurance coverage induced by the Medicaid expansions. The first stage estimate is at the bottom of the table, showing that the estimated increase in insurance coverage for the childless adult expansions is 1.3 percentage points for an expansion of 100 percentage points FPL. It has an associated F-statistic of 13.51, high enough to not generally be considered a weak instrument. For emergency room visits, the OLS coefficient suggests that having any health insurance is associated with an increase in the likelihood of having a visit in the past year of 2 percentage points; the IV estimate is a much larger 15 percentage points although not statistically different from zero. For inpatient visits the OLS estimate is 4.7 percentage points, while the IV estimate is a much larger and statistically significant 22.8 percentage points. Our interpretation of these estimates is that there is strong evidence that these Medicaid expansions increased overall health care utilization for childless adults in all three

visit categories; although the ER visits estimate is imprecise, the confidence interval suggests the estimate is likely positive.

For the MHSA visits, the OLS estimates suggest that having insurance increases the probability of having any utilization for outpatient and inpatient mental health or substance abuse treatment. The IV estimates are generally much larger, but they are imprecisely estimated and not statistically significantly different from zero. Our interpretation of these results is that there is evidence that Medicaid increases utilization of outpatient and ER MHSA services (the confidence intervals are strongly positive), but the range of possible point estimates is large.

Table 3 repeats these analyses for the low-income subsample. The estimated first stage is larger at 2 percentage points, but the F-statistic is smaller (likely reflecting the large reduction in sample size). For outpatient visits of any type, the OLS coefficient is similar; the IV coefficient is somewhat smaller and no longer statistically significant, although it is not statistically different from the main sample IV coefficient. For ER visits, we find something slightly different from the main sample. The OLS coefficient suggests that having any health insurance in this subsample increases the probability of having an ER visit in the last year by 9 percentage points, and the IV coefficient suggests an increase of 32 percentage points; both are statistically significant at the 1% level. Inpatient results are similar to the main sample although twice as large and again are statistically significant at the 1% level. For MHSA health care usage, all OLS coefficients are much larger and statistically significant; however, as in the main sample, none of the IV coefficients are statistically different from zero. IV coefficients for outpatient and ER MHSA visits are positively signed, but the coefficient on inpatient use is negatively signed and notably large. With this exception, we consider the results in the low-income sample to be supportive of the main analysis.

The next outcomes that we examine are related to health care spending. Table 4 contains the results of our estimation for the main sample. The OLS coefficient on any health insurance for the out of pocket spending outcome suggests an increase of $54. While it may seem surprising that these are positively correlated, it is consistent with the increased health care utilization that accompanies increased insurance generally. The IV coefficient is also positive and is larger at $222, but has a very large standard error and is not statistically significant. Although some of the expansion programs did require cost-sharing on the part of enrollees, we would not necessarily expect this coefficient to be

positive; the confidence interval includes both large positive and negative effect sizes. The total expenditures outcome includes all health care spending for the individual whether paid for by them or by a third party. The OLS estimate is nearly $2,500 in additional spending associated with health insurance coverage. The IV estimate, identified by changes in Medicaid expansions, is almost 3 times as large at $7,400 and is statistically significant at the 10% level; while not precisely estimated it is certainly supportive of an increase.

In the low-income sample, presented in Table 5, results are similar for total expenditures (although larger) but not for out of pocket spending. In this group, the OLS estimate shows health insurance coverage is associated with a small decrease in out of pocket spending which is not statistically different from zero; the IV estimate is again positive but has a very large standard error. Our interpretation of these results together is that there is strong evidence of increased total expenditures but not much to say about out of pocket spending; certainly there is no evidence of a decrease.

We finally turn to mental health outcomes. The sample sizes for these outcomes differ slightly from the above because the questions assessing depression and serious psychological disorder were not asked prior to 2004, so we lose some sample years. In addition, response rates to the SF-12 questionnaire and to self-reported mental health were not 100%. For this reason we present sample sizes and first stage estimates for each outcome in Table 6, which shows the results for the main sample. OLS estimates consistently show that health insurance coverage is associated with slightly better mental health; a 1.7 percentage point decrease in the likelihood of depression, a 1 percentage point decrease in the likelihood of a serious psychological disorder, a .67 increase in the SF-12 score, which is an increase in mental health. For the probability of reporting very good or good mental health, we see no change associated with having health insurance; the coefficient is positive but has a large standard error and is not statistically significant. However, the IV estimates are all of opposite sign, suggesting decreases in mental health. While the coefficients for not depressed, not serious psychological disorder, and self-reported mental health very good or good are not statistically significant and have large standard errors that don't rule out even large positive effects, the coefficient on the SF-12 measure is very large and significant at the 5% level. This measure is designed to be normally distributed, so such a large effect is particularly unusual. We do not have an explanation for the effect size other than that we think it is somewhat implausible. These

findings are not supportive of the hypothesis that these Medicaid expansions improved mental health.

In the low-income sample, shown in Table 7, the OLS findings are different. Coefficients on all of the mental health measures are negative and statistically significant, suggesting that insurance in this population is associated with decreased mental health. This is supportive of the idea that there is selection into insurance coverage and the less healthy are more likely to be covered. The IV coefficients remain negative, however, and are not statistically significant with the exception again of the SF-12 measure, which is negative, large, and statistically significant at the 5% level. These results are consistent with our conclusion above that there is no evidence of improved mental health from the childless adult expansions; there is some evidence of decreased mental health. The coefficient on the SF-12 is odd and concerning in its size; the source is a weighted set of separate questions which we have access to and plan to explore directly in future iterations of this work.

B. Parents

We now turn to the sample of parents and the different set of expansions of coverage to them. We reiterate the caveat mentioned above that the instrument used in this version of the analyses seems to be somewhat weak. Estimates of the effect of health insurance coverage on health care use identified by the parental expansions for the full sample of parents can be found in Table 8. For outpatient visits of any type, the OLS coefficient suggests an increase of 32 percentage points in the probability of a visit in the last year. The IV estimate suggests that the causal effect is substantially larger, at 88 percentage points. This estimate is statistically significant at the 5% level although it has a relatively large standard error. For ER visits of any type, the OLS coefficient shows a 3 percentage point increase in the likelihood of a visit in the last year associated with having health insurance; the IV coefficient is negative and relatively large, but not statistically different from zero. The OLS coefficient on inpatient utilization is also positive and significant, suggesting an increase of 5 percentage points, but the IV coefficient is very small and not statistically different from zero. Our interpretation of these results is that there is only evidence of increased health care utilization for outpatient visits.

Table 9 also shows the results for visits defined as mental health and substance abuse related. The OLS coefficients suggest that outpatient visits increase by 4 percentage points, no difference in ER visits, and a very small (less than one percentage point) increase

in inpatient visits for mental health and substance abuse associated with insurance coverage in this sample. None of the IV coefficients are statistically different from zero, and only the coefficient on outpatient visits is positive. We interpret these results as unsupportive of the hypothesis that Medicaid coverage increases health care utilization for mental health and substance abuse.

Results for the low-income subsample are shown in Table 10. Outpatient visits of any type are again associated with a 30 percentage point increase in utilization in the OLS specification; the IV coefficient is slightly larger but not statistically different from zero. For ER visits, the OLS coefficient suggests an 8 percentage point increase, and the IV coefficient is positive but not statistically different from zero. For inpatient visits, the OLS coefficient is about 9 percentage points and the IV coefficient is again positive but not statistically different from zero. For MHSA-specific visits, the OLS coefficients are all positive, statistically significant, and larger than for the main sample. The IV coefficients for outpatient and ER visits are also positive and larger than their OLS comparison points, and while the coefficient on inpatient visits is negative it is very small. None are statistically different from zero. We view these results as supportive of the conclusion from the main sample.

Table 11 shows the results on health care spending for the main sample. Unlike the finding for childless adults, the OLS coefficient on out of pocket spending is very small and not statistically significant for parents. The IV coefficient is positive and similar in size to the result for childless adults but has a very large standard error and is not statistically significant. The OLS coefficient for total expenditures is $1,525 and statistically significant at the 5% level, but the IV coefficient is negative and not statistically different from zero. Results for the low-income subsample show a statistically significant $52 decrease in out of pocket spending associated with health insurance coverage in the OLS specification, but a positive and not statistically significant effect in the IV. For total expenditures, the OLS coefficient suggest an increase in spending of $1,885, but the IV estimate is small, negative, and not statistically different from zero. In summary, we do not find support for the hypothesis that the Medicaid expansions to parents reduced out of pocket spending or increased total expenditures.

Results for the mental health outcomes for the main sample are in Table 12. This table can be quickly summarized by saying that we see no statistically significant

differences in any mental health outcomes in either the OLS or IV results. With the exception of the SF-12, the OLS estimates are negative while the IV estimates are positive, which is consistent with selection, but not conclusive. For the low-income subsample, shown in Table 13, we see in the OLS result that all mental health outcomes are significantly negatively associated with having health insurance. The sign flips for the IV estimates for the depression and self-reported mental health outcomes, but none of the estimates are statistically significant. There is no evidence in this analysis that the Medicaid expansions for parents improved mental health.

7. DISCUSSION AND NEXT STEPS

In this paper, we use the numerous expansions of publically subsidized health insurance coverage to parents and non-disabled adults without dependent children to study the effects of health insurance coverage on health care utilization, health care expenditures, and mental health. We combine data from the MEPS with data we collected on the characteristics and timing of these expansions and exploit these natural experiments using difference-in-differences and instrumental variables methods to estimate our empirical models.

Our results should be considered preliminary. We find increases in health insurance coverage from both the childless adult and parental expansions, with a larger increase in insurance coverage from the parental expansions. We find strong evidence that they increased overall health care utilization for childless adults, including outpatient, inpatient, and emergency room utilization, as well as weaker support for increased utilization of mental health and substance abuse-specific outpatient and ER services, with a wide range of potential point estimates. However, we find only increased outpatient utilization for parents, with no evidence of increased mental health and substance-abuse specific use. Similarly, for childless adults we find strong evidence of increased total expenditures but no evidence of a decrease in out of pocket spending, while for parents we find no evidence of any change in either outcome. Despite the increased health care utilization and potential for improved financial well-being, we find no evidence of increased mental health in a variety of measures for childless adults or for parents; in fact, one measures suggests a substantial decrease. Our findings are not supportive of the hypothesis that these Medicaid

expansions improved mental health, nor that they improved measures we might expect to mediate the relationship between insurance and mental health.

Medicaid policy has changed significantly since the pre-2013 era; in particular, expansion programs are much more uniform than they were in the earlier period of state experimentation. Whether these changes to the Medicaid program will remain the status quo is a matter of speculation. We argue that examining the effects of Medicaid in the pre-ACA context is nonetheless an important contribution in understanding how insurance affects mental health. The ACA included many simultaneous changes to the healthcare system that may have had overlapping and general equilibrium effects, complicating researchers' ability to draw inference. The earlier expansions were smaller and were also complex; they were not uniform in eligibility or benefits, but their smaller, more ad-hoc nature supports their plausibility as a set of natural experiments. We attempt to turn these characteristics to our advantage by using them for identification.

This paper is incomplete and as such we note our planned next steps. First, we acknowledge the limitation of OOP spending as a measure of financial risk; it simultaneously reflects the price effects and consumption-smoothing effects of Medicaid coverage. Although the MEPS does not include general measures of financial well-being, we are exploring the use of several measures to gain some insight into the effect of Medicaid enrollment on this potential mediator. Specifically, the MEPS includes a set of measures that assess respondents' risk-preferences with respect to health insurance,[6] and multiple outcomes related to medical debt and financial strain for individuals with selected conditions (e.g., cancer).

Second, future versions of this analysis will include empirical models that more explicitly consider the skewed nature of health care use, expenditure, and health outcome data as well as models with individual fixed effects. Using the panel nature of the MEPS, so that effects are identified from within-person changes over time across states that did and did not expand their programs, is an important advantage of the data. Diagnosis, treatment, and household finances are likely themselves amenable to health insurance enrollment.

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[6] These four measures ascertain attitudes toward health insurance by asking the subject how strongly s/he agrees with the following statements: do not need health insurance; health insurance is not worth the money it costs; more likely to take risks than the average person; can overcome illness without the help from a medically trained person.

This means that analysis of cross-sectional subsamples defined by a particular chronic condition, prior treatment, health status, or income may be problematic, since the composition of the sample is endogenous and changing over time as a result, or in anticipation, of the policy. The use of panel data will eliminate concerns about changes in the composition of the treatment and control groups over time and allow analysis of specific subsamples of interest.

Third, work remains to understand which program attributes or combination of attributes are most predictive of enrollment for parents to obtain a stronger first stage. Fourth, we plan to examine some additional outcomes. Prescription drugs are one of the most important forms of treatment for some types of mental health problems and are not included in this version of the analysis. The measure of mental health in which we found declines in both populations, the SF-12, can be decomposed into its component parts to further explore where the decline is coming from.

Finally, we have numerous planned design checks, placebo analyses, & robustness checks which are not yet implemented. For example, the DDIV relies on the exogeneity of the instrument, which we have not established in this paper for these outcomes. We plan to expand this argument and add Granger causality tests for the outcomes considered here similar to our approach in Burns and Dague (2017). The cross-sectional models will also need to be robust to the addition of person level covariates and state-level macroeconomic variables. The paper is also currently missing some standard checks for the IV estimation.

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Tables & Figures

Figure 1. Average maximum income eligibility threshold for parents in treatment and comparison states, 2001 - 2013

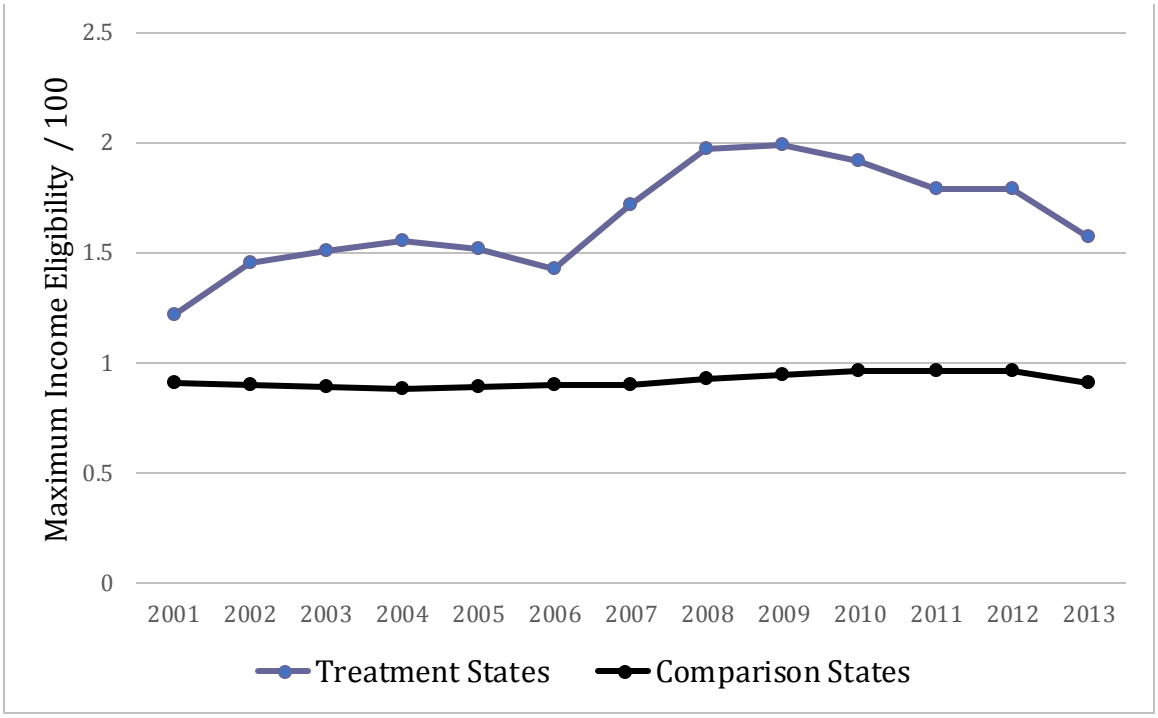

Figure 2. Maximum income eligibility for childless adults among states that offered coverage between 2001-2013

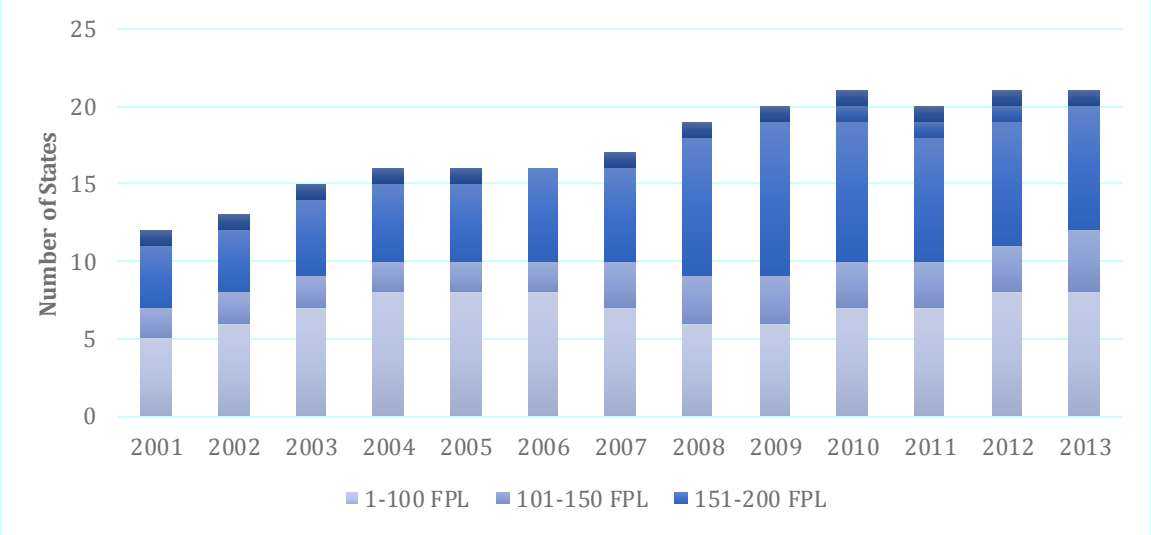

Table 1. Sample characteristics and outcomes at baseline by state's Medicaid coverage change status, 2001-2013

	I. Childless Adults			II. Parents	
	Treatment States	Comparison States		Treatment States	Comparison States
Male	0.53	0.52		0.44	0.44
	0.01	0.01		0.01	0.01
Age	41.8	42		37.6	37.3
	0.31	0.21		0.24	0.16
Hispanic	0.12	0.08**		0.23	0.14**
	0.01	0.004		0.01	0.005
Married	0.45	0.47		0.73	0.73
	0.01	0.01		0.01	0.01
>= High School GED/Diploma	0.89	0.85**		0.82	0.82
	0.01	0.01		0.01	0.006
Any Health Insurance	0.86	0.85		0.86	0.85
	0.01	0.01		0.01	0.005
Any Public Health Insurance	0.11	0.12		0.13	0.1**
	0.01	0.005		0.01	0.005
Any Medicaid Coverage	0.06	0.05		0.12	0.08**
	0.01	0.003		0.01	0.004
Negative screen for depression	0.9	0.9		0.92	0.91
	0.01	0.01		0.01	0.01
Negative screen for serious psychological	0.94	0.94		0.96	0.96
	0.01	0.01		0.01	0.004
SF-12 Mental Component Summary Score	50.72	50.45		50.8	50.17*
	0.22	0.15		0.22	0.16
Excellent, Very Good, Good Mental Health	0.94	0.93		0.95	0.95
	0.005	0.004		0.01	0.004
Any outpatient visit	0.73	0.73		0.66	0.70**
	0.01	0.01		0.01	0.01
Any MHSUD outpatient visit	0.09	0.08		0.06	0.07
	0.01	0.004		0.01	0.004
Any ED visit	0.13	0.14		0.11	0.14**
	0.01	0.005		0.01	0.01
Any MHSUD ED visit	0.003	0.005		0.006	0.006
	0.001	0.001		0.002	0.001
Any Inpatient Admission	0.07	0.07		0.06	0.07
	0.01	0.004		0.01	0.004
Any MHSUD Inpatient Admission	0.004	0.005		0.002	0.003
	0.001	0.001		0.001	0.001
Unweighted Sample, All Years (N)	39,536	83,568		36,333	72,279
States (N)	12	39		12	39

Notes: Table reports weighted mean and standard error for each of the listed characteristics for civilian, non-institutionalized childless adults (Column I) and parents (Column II) ages 19-64 in the Medical Expenditure Panel Survey. Calendar year 2001 is the baseline year for all but three measures. Calendar year 2004 is the baseline year for the SF-12 measure, and the screening measures for depression and serious psychological distress. Each column represents a group of states defined by the change in Medicaid coverage for the population identified in the column heading, childless adults or parents. Treatment states for childless adults include states that introduced or eliminated Medicaid for this population from 2001-2013. Treatment states for parents include states that implemented a change in the maximum income eligibility threshold for parents that exceeded the 75th percential of the distribution of such changes from 2001-2013. The reference group for F-test comparisons of means within each study population is the "change" states. **p-value < 0.01; *p-value <0.05.

Table 2. Estimates of the effect of Medicaid enrollment on health care use, Childless Adults

Dependent Variable	**Any Outpatient**	**Any Outpatient**	**Any ER Visits**	**Any ER Visits**	**Any Inpatient**	**Any Inpatient**
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Any Visit Type					
Any Health Insurance	0.342***	0.394**	0.020***	0.147	0.047***	0.228**
	(0.003)	(0.195)	(0.002)	(0.097)	(0.002)	(0.114)
	MHSA Visits Only					
Any Health Insurance	0.047***	0.161	-0.000	0.040	0.001*	0.007
	(0.002)	(0.188)	(0.000)	(0.041)	(0.0004)	(0.021)
	First Stage:					
	Scaled Maximum Income Threshold			0.0130***		
				(0.00354)		
	F-statistic on omitted instrument			13.51		
State fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 3. Estimates of the effect of Medicaid enrollment on health care use, Childless Adults < 200% FPL

Dependent Variable	**Any Outpatient**	**Any Outpatient**	**Any ER Visits**	**Any ER Visits**	**Any Inpatient**	**Any Inpatient**
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Any Visit Type					
Any Health Insurance	0.356***	0.297	0.0878***	0.318***	0.0947***	0.410**
	(0.00510)	(0.265)	(0.00466)	(0.113)	(0.00351)	(0.164)
	MHSA Visits Only					
Any Health Insurance	0.108***	0.0609	0.00507***	0.0585	0.00597***	-0.0602
	(0.00380)	(0.118)	(0.00119)	(0.0824)	(0.00106)	(0.0479)
	First Stage:					
	Scaled Maximum Income Threshold			0.0196***		
				(0.00700)		
	F-statistic on omitted instrument			7.799		
State fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 4. Estimates of the effect of Medicaid enrollment on health care spending, Childless Adults

Dependent variable	**Any Health Insurance**	**Total Out of Pocket**	**Total Out of Pocket**	**Total Expenditures**	**Total Expenditures**
	First Stage	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)
Any Health Insurance		54.04***	222.1	2458.8***	7400.5*
		(8.219)	(265.5)	(78.48)	(4495.6)
Scaled Maximum Income Threshold	0.0130***				
	(0.00354)				
F-statistic on omitted instrument	13.51				
Individuals (Unweighted N)	123,104	123,104		123,104	
State fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 5. Estimates of the effect of Medicaid enrollment on health care spending, Childless Adults < 200% FPL

Dependent variable	**Any Health Insurance**	**Total Out of Pocket**	**Total Out of Pocket**	**Total Expenditures**	**Total Expenditures**
	First Stage	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)
Any Health Insurance		-16.95	314.2	3538.8***	7793.8**
		(12.62)	(584.6)	(129.5)	(3544.7)
Scaled Maximum Income Threshold	0.0196***				
	(0.00700)				
F-statistic on omitted instrument					
Individuals (Unweighted N)	32,943				
State fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 6. Estimates of the effect of Medicaid enrollment on mental health, Childless Adults

Dependent variable	Not Depressed	Any Health Insurance	Not Depressed	Not SPD	Any Health Insurance	Not SPD	SF-12 Mental	Any Health Insurance	SF-12 Mental	Mental Health VG/G	Any Health Insurance	Mental Health VG/G
	OLS	First Stage	IV	OLS	First Stage	IV	OLS	First Stage	IV	OLS	First Stage	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Any Health Insurance	0.0167***		-0.191	0.00960***		-0.217	0.660***		-8.729**	0.00102		-0.0584
	(0.00263)		(0.351)	(0.00213)		(0.269)	(0.0757)		(3.928)	(0.00206)		(0.235)
Scaled Maximum Income Threshold		0.0120***			0.0125***			0.0129***			0.0130***	
		(0.00332)			(0.00343)			(0.00383)			(0.00353)	
F-statistic on omitted instrument		12.93			13.36			11.38			13.55	
Individuals (Unweighted N)		83,639			83,021			115,109			123,038	
State fixed effects	X	X	X	X	X	X	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 7. Estimates of the effect of Medicaid enrollment on mental health, Childless Adults <200% FPL

Dependent variable	Not Depressed	Any Health Insurance	Not Depressed	Not SPD	Any Health Insurance	Not SPD	SF-12 Mental Component	Any Health Insurance	SF-12 Mental Component	Mental Health VG/G	Any Health Insurance	Mental Health VG/G
	OLS	First Stage	IV	OLS	First Stage	IV	OLS	First Stage	IV	OLS	First Stage	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Any Health Insurance	-0.0622***		-0.0168	-0.0491***		-0.326	-2.156***		-9.127**	-0.0871***		-0.101
	(0.00542)		(0.325)	(0.00466)		(0.284)	(0.140)		(4.357)	(0.00445)		(0.207)
Scaled Maximum Income Threshold		0.0234**			0.0239***			0.0206***			0.0194***	
		(0.00896)			(0.00842)			(0.00761)			(0.00706)	
F-statistic on omitted instrument		6.824			8.093			7.301			7.575	
Individuals (Unweighted N)		23,767			23,437			31,169			32,924	
State fixed effects	X	X	X	X	X	X	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 8. Estimates of the effect of Medicaid enrollment on health care use, Parents

Dependent Variable	**Any Outpatient**	**Any Outpatient**	**Any ER Visits**	**Any ER Visits**	**Any Inpatient**	**Any Inpatient**
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Any Visit Type					
Any Health Insurance	0.318***	0.878**	0.0291***	-0.249	0.0462***	0.00420
	(0.00509)	(0.369)	(0.00523)	(0.305)	(0.00177)	(0.121)
	MHSA Visits Only					
Any Health Insurance	0.0368***	0.0704	0.000437	-0.0273	0.000818***	-0.0119
	(0.00199)	(0.115)	(0.000530)	(0.0387)	(0.000302)	(0.0225)
	First Stage:					
	Has a Program Outside of Section 1931			0.0227**		
				(0.00960)		
	F-statistic on omitted instrument			5.610		
State fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 9. Estimates of the effect of Medicaid enrollment on health care use, Parents < 200% FPL

Dependent Variable	**Any Outpatient**	**Any Outpatient**	**Any ER Visits**	**Any ER Visits**	**Any Inpatient**	**Any Inpatient**
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Any Visit Type					
Any Health Insurance	0.304***	0.410	0.0805***	0.0983	0.0863***	0.0993
	(0.00717)	(0.300)	(0.00456)	(0.309)	(0.00491)	(0.160)
	MHSA Visits Only					
Any Health Insurance	0.0516***	0.123	0.00279***	0.0177	0.00237***	-0.00187
	(0.00472)	(0.113)	(0.000881)	(0.0385)	(0.000689)	(0.0329)
	First Stage:					
	Has a Program Outside of Section 1931			0.0369***		
				(0.00977)		
	F-statistic on omitted instrument			14.28		
State fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 10. Estimates of the effect of Medicaid enrollment on health care spending, Parents

Dependent variable	**Any Health Insurance**	**Total Out of Pocket**	**Total Out of Pocket**	**Total Expenditures**	**Total Expenditures**
	First Stage	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)
Any Health Insurance		-3.288	166.9	1524.6***	-474.9
		(10.51)	(601.2)	(69.35)	(2927.9)
Has a Program Outside of Section 1931	0.0227**				
	(0.00960)				
F-statistic on omitted instrument	5.610				
Individuals (Unweighted N)	108,612				
State fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 11. Estimates of the effect of Medicaid enrollment on health care spending, Parents < 200% FPL

Dependent variable	**Any Health Insurance**	**Total Out of Pocket**	**Total Out of Pocket**	**Total Expenditures**	**Total Expenditures**
	First Stage	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)
Any Health Insurance		-52.01***	280.3	1885.2***	-123.9
		(17.47)	(200.6)	(87.89)	(2002.2)
Has a Program Outside of Section 1931	0.0369***				
	(0.00977)				
F-statistic on omitted instrument	14.28				
Individuals (Unweighted N)	45,290				
State fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 12. Estimates of the effect of Medicaid enrollment on mental health, Parents

Dependent variable	Not Depressed	Any Health Insurance	Not Depressed	Not SPD	Any Health Insurance	Not SPD	SF-12 Mental Component	Any Health Insurance	SF-12 Mental Component	Mental Health VG/G	Any Health Insurance	Mental Health VG/G
	OLS	First Stage	IV	OLS	First Stage	IV	OLS	First Stage	IV	OLS	First Stage	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Any Health Insurance	-0.000142		0.394	-0.00131		0.150	0.176		-5.532	-0.00486		0.202
	(0.00389)		(0.526)	(0.00282)		(0.383)	(0.136)		(10.16)	(0.00346)		(0.246)
Has a Program Outside of Section 1931		0.0127*			0.0135**			0.0232**			0.0227**	
		(0.00639)			(0.00574)			(0.00983)			(0.00969)	
F-statistic on omitted instrument		3.971			5.569			5.566			5.475	
Observations (Unweighted N)		72,490			71,928			101,382			108,563	
State fixed effects	X	X	X	X	X	X	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level

Table 13. Estimates of the effect of Medicaid enrollment on mental health, Parents

Dependent variable	Not Depressed	Any Health Insurance	Not Depressed	Not SPD	Any Health Insurance	Not SPD	SF-12 Mental Component	Any Health Insurance	SF-12 Mental Component	Mental Health VG/G	Any Health Insurance	Mental Health VG/G
	OLS	First Stage	IV	OLS	First Stage	IV	OLS	First Stage	IV	OLS	First Stage	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Any Health Insurance	-0.0528***		0.0112	-0.0378***		-0.182	-1.618***		-17.37	-0.0457***		0.0363
	(0.00519)		(0.417)	(0.00476)		(0.343)	(0.131)		(12.33)	(0.00273)		(0.318)
Has a Program Outside of Section 1931		0.0241**			0.0257**			0.0350***			0.0369***	
		(0.0120)			(0.0121)			(0.0100)			(0.00981)	
F-statistic on omitted instrument		4.038			4.522			12.13			14.19	
Observations (Unweighted N)		31,937			31,559			42,856			45,266	
State fixed effects	X	X	X	X	X	X	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and state cluster-robust standard errors (in parentheses) from Ordinary Least Squares and 2SLS regression analyses. *** indicates statistical significance at 1% level; ** at 5% level; * at 10% level