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Public Health Insurance Expansions and Mental Health Care Availability

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Abstract

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People living with mental illness face barriers when seeking mental health care, including provider shortages and poor geographic availability. Medicaid expansion under the Affordable Care Act (ACA) may have increased mental health treatment capacity, as previous expansions were associated with mental health sector employment gains. Little research to date has examined the impact of Medicaid expansion under the ACA on mental health care availability. Quasi-experimental studies are needed to estimate the effects of public health insurance expansions on the development of local mental health care systems. This study's objective is to test the hypothesis that Medicaid expansion under the ACA increased the availability of mental health care resources, including mental health sector facilities and employees. Difference-in-difference models with two-way fixed effects were used estimate the impact of Medicaid expansion on county mental health care resources. Each additional year of Medicaid expansion predicts a 1.4% increase in the number of mental health care facilities per 100,000 residents in counties with mental health care after controlling for elected official ideology and factors influencing consumer demand ($p < .01$). Medicaid expansion was not associated with increased likelihood of having at least one mental health care facility in counties with inconsistent mental health care access ($p > .05$). Results indicate that Medicaid expansion improved mental health care availability in areas with established mental health care systems, but areas with developing mental health care systems may not have benefited. Targeted policies are needed to ensure that people throughout the United States can access mental health care.

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Introduction

THE PUBLIC HEALTH PROBLEM

One in five adults in the United States (US) live with mental illness,[2] which is associated with reduced quality of life,[3] lost work days,[3] and lower life expectancy.[4] The burden of mental illness in the US is substantial; mental disorders caused 5.3 million years lived with disability (YLD) among nonelderly adults in 2017.[5] Mental health care can avert the negative effects of mental illness,[6] but many people have unmet mental health needs due to cost and other avoidable barriers.[2] Expanded Medicaid eligibility under the Affordable Care Act (ACA) has addressed cost as an impediment to care by providing low-income adults with health insurance that requires little or no cost sharing for accessing mental health care.[7-9] Coverage gains should increase demand for mental health care, but Medicaid expansion has not increased mental health care utilization.[10] ACA policies reducing out-of-pocket costs improved some aspects of mental health care access,[9] but mental health workforce shortages[11] and poor geographic access[12] may limit the supply of locally available treatment. Research is needed to determine if Medicaid expansion has reduced supply-side barriers to mental health care utilization. This analysis is being performed as a thesis project in the Master of Science in Public Health program in Rollins School of Public Health's Department of Health Policy and Management. The present quasi-experimental study seeks to test whether Medicaid expansion has causal links to the availability of outpatient mental health care facilities and employees at a local level. These outcomes indicate whether expansions of public health insurance increase the community resources needed for mental health service provision. Results on this subject have relevance for policy makers seeking to strengthen the mental health care system's capacity to reduce the burden of mental illness.

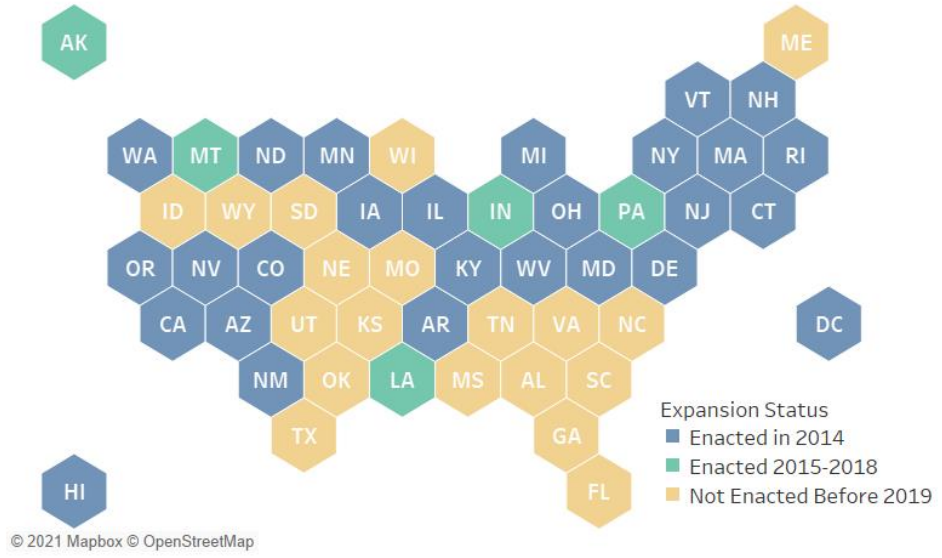
The ACA was projected to improve mental health care coverage for about 62.5 million

people,[8] with Medicaid expansion increasing health insurance coverage for low-income adults. Prior to the ACA nearly 50 million people lacked health insurance, 12 million of whom had a diagnosable mental health or substance use disorder.[8] Health insurance could be denied or underwritten based on health status, making it especially difficult for people with chronic mental health difficulties to obtain coverage.[8] Guaranteed issue and community rating provisions under the ACA made it illegal to deny coverage or increase premiums based on health status, benefiting people living with mental illness. Medicaid expansion also made low-income childless adults below age 65, who disproportionately live with mental illness,[2] eligible for Medicaid coverage. Many states have not adopted this provision of the ACA[13] following a landmark Supreme Court ruling (see Figure 1),[14] leaving millions of uninsured low-income adults without access to public or publicly subsidized health insurance.[15] Though the ACA has supported access to mental health treatment, questions remain about its impact on mental health care.

Medicaid is a safety net program jointly funded by state and federal governments[16] that provides health insurance coverage to people with low income or disability. Medicaid enrollees

Figure 1

Affordable Care Act Medicaid Expansion Status by Year Enacted. [13]



may access health care services with little or no cost sharing,[7] providing in-kind benefits that help alleviate poverty.[17] State-level variation in Medicaid policy has generated a considerable amount of quasi-experimental research on expansions of Medicaid eligibility. Studies have found that Medicaid expansion under the ACA is associated with better access to care, quality of care, and self-reported health status,[18,19] as well as a 9.4% reduction in mortality among near-elderly adults.[20] Converging findings also suggest that Medicaid expansion has improved mental health outcomes for nonelderly adults.[9,21-23] Evidence from the Oregon Health Insurance Experiment demonstrated that Medicaid coverage can improve mental health and mental health care outcomes,[24] though its findings may not generalize to all areas of the US. Interviews on mental health topics were only conducted for people residing near Portland, Oregon,[24] potentially making the findings contingent on residence near an urban center. Studies using nationally representative Behavioral Risk Factor Surveillance System (BRFSS) data show that Medicaid expansion is associated with improved mental health among low-income childless adults,[9,21,22] replicating findings from the Oregon Health Insurance Experiment in a population that was expected to benefit from Medicaid expansion. Other studies show that Medicaid expansion is associated with improved diagnosis of depression[25] and increased mental health care capacity[26] at community health centers. Existing research on Medicaid expansion under the ACA is consistent with findings from the Oregon Health Insurance Experiment, but more work is needed to fully characterize how it has influenced the provision of mental health care.

The outpatient mental health care sector, which generally provides drug and talk therapy services, has recently seen dramatic changes. While Medicaid has long been the largest single payer for mental health care,[27] its funding for depression treatment increased by 145% from 2007 to 2015.[28] Treated depression prevalence, talk therapy utilization, and talk therapy expenditures

also increased during this time period.[28] Increases in demand and funding for services during this time period could augment mental health care systems' treatment capacity. Increases in Medicaid enrollment and expenditures between 1999 and 2009 were associated with mental health employment gains,[29] so similar shifts in the mental health care sector are expected following Medicaid expansion under ACA. Replication of this finding would evince the importance of public health insurance expansions in supporting a robust mental health care system.

Research is needed to test the anticipated relationship between Medicaid expansion under the ACA and increased outpatient mental health resource availability. Many areas have limited mental health care access; a 2017 study found that over 70% of communities have no outpatient mental health facility within 10 miles.[12] Medicaid expansion could improve the geographical availability of mental health care if it makes it financially attractive or viable for new mental health care facilities to open. The Bureau of Health Workforce also estimates that 117 million people are in areas, populations, or facilities with mental health professional (MHP) shortages.[30] Low MHP availability has implications for mental health care access; about 38% of adults who receive mental health care have to wait over a week after seeking care.[31] MHP shortages are expected to deepen by 2030 in the Southeast, West, and Midwest due to workforce participation, retirement, and consumer demand trends,[11] raising concerns about regional mental health service availability. Medicaid expansion could help mitigate workforce shortages if increased revenue is used to hire additional MHPs. Public health insurance expansions may be promising policy interventions for increasing access to mental health treatment if Medicaid expansion is associated with increased outpatient mental health resource availability. Absence of mental health sector growth could indicate that aspects of Medicaid policy, such as low psychiatrist reimbursement,[32] inhibit mental health care access. Increased employment opportunities for MHPs may also have

long-term effects on the MHP workforce that are not immediately detectable. To my knowledge no one has estimated the link between Medicaid expansion under the ACA and supply-side indicators of mental health care availability. This research is important for quantifying the extent to which public health insurance builds the mental health care system's capacity to avert the public health burden of mental illness.

PROPOSED SOLUTION

State-level variation in enaction of Medicaid expansion has allowed researchers to use difference-in-difference (DID) models to estimate the effect of Medicaid expansion on a wide range of health-related outcomes. When correctly applied, this type of model enables researchers to estimate causal relationships between policy interventions and dependent variables. Outpatient mental health facility availability and employment are identified as supply-side factors that quantify a community's mental health treatment capacity. Outpatient mental health care is selected as the most relevant treatment setting, as people with mental illness are nearly eight times more likely to receive outpatient services than inpatient services.[2] The extant literature primarily focuses on Medicaid expansion's association with utilization, but outpatient mental health care availability within geographic areas is important to study. Consumers often seek nearby outpatient mental health services due to time and transportation costs associated with traveling to services located farther away. Counties and county-like equivalents are useful units of analysis for approximating the area in which a population will seek services because they also define a local administrative jurisdiction in which outpatient mental health resources are distributed. Results using this approach allow researchers and policy makers to measure the downstream effects of Medicaid expansion on communities' mental health care systems.

RESEARCH METHODS

The present study addresses gaps in the literature by performing a county-quarter level DID analysis estimating the effect of Medicaid expansion on growth in the outpatient mental health care sector. The time elapsed since implementation of Medicaid expansion is used as the independent variable, representing increased public funding for mental health services over time. Medicaid expansion is operationalized using time units, rather than a binary indicator, to increase sensitivity to delayed effects of the policy on mental health care availability. The ratio of outpatient mental health care facilities per 100,000 county residents is used as an outcome variable to evaluate whether Medicaid expansion motivated providers to establish new mental health care facilities. Another model using these data will estimate the relationship between Medicaid expansion and likelihood of having at least one local mental health care facility. The number of outpatient mental health care sector employees per 100,000 county residents is also used as an indicator of mental health resource availability, modeled after methods used by the Health Resources and Services Administration to define MHP shortage areas.[33] Models are adjusted for factors influencing demand for services, including mental illness prevalence, poverty among nonelderly adults, educational attainment, unemployment, and minority race/ethnicity. The political ideology of state elected officials is included in the model to control for contextual factors that could bias estimates. County and quarter-year fixed effects account for unmeasured, time-invariant factors. The resulting models should provide unbiased estimates of Medicaid expansion's effect on the development of counties' outpatient mental health systems.

OBJECTIVES

This study aims to determine whether Medicaid expansion is associated with indicators of outpatient mental health care capacity. This research will test several hypotheses:

1. The time elapsed since enaction of Medicaid expansion is expected to be positively correlated with (a) the likelihood of having any mental health facility in a county, (b) the number of outpatient mental health sector facilities per 100,000 residents (conditional on having at least one), and (c) the number of outpatient mental health sector employees per 100,000 residents.
2. Medicaid expansion is expected to increase health insurance coverage, which is expected to increase measures of mental health care availability.

SIGNIFICANCE

Policies making mental health care more affordable may only address some aspects of outpatient mental health care access. Mental health workforce shortages[11,33] and limited access to local mental health care facilities[12] raise major questions about the outpatient mental health system's capacity to address the public health burden of mental illness. Additional research is needed to inform policy makers about the potential indirect effects of public health insurance expansions on supply-side factors influencing mental health service provision. Additional policy interventions may be needed if current policies do not increase the availability of outpatient mental health resources. Several barriers to mental health care access were not addressed directly by Medicaid expansion, including MHP workforce shortages,[11,33] low Medicaid reimbursement rates,[32] and poor geographic access to mental health facilities.[12] Confirmation of the primary hypothesis could indicate that policies expanding public health insurance have beneficial downstream effects on the mental health care system, supporting further increases in public health insurance coverage.

The present study is pertinent to various current events, including the COVID-19 pandemic and ongoing discussions about health care legislation. Debates during the 2020

Democratic primary between progressives seeking "universal health care" and moderates supporting a "public option" hinge on discussions about the costs and benefits of government-funded health care. Quantifying the impact of public health insurance on critical public mental health infrastructure and employment will aid policy makers in weighing the relative merits of each proposal. While strong evidence of demand-side responses to public health insurance among low-income adults have been established by the Oregon Health Insurance Experiment,[24] few studies to date have examined supply-side results of the ACA Medicaid expansion. This topic has increased urgency during the COVID-19 pandemic, which caused an unprecedented shock to the world economy and dramatic increases in unemployment.[34] Many people in the US are likely to lose employer-sponsored health insurance, which is the current source of health insurance for 46.6% of the US population.[35] People may enroll in Medicaid coverage during the economic downturn[36] during a time where many people experience greater mental distress due to job loss[37,38] and quarantine.[39] This confluence of factors is likely to cause an increase in demand for Medicaid-insured mental health services. Research on this subject will help both policy makers and leaders in the mental health care sector anticipate changes and respond appropriately.

Literature Review

BACKGROUND

Approximately one in five adults in the US experienced any mental illness (AMI) in the past year,[2] defined by the presence of a diagnosable mental, behavioral, or emotional disorder.[40] The primary diagnostic resource for mental disorders in the US, the Diagnostic and Statistical Manual of Mental Disorders (DSM–5), describes the common elements of mental disorders[41]:

> *A mental disorder is a syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying*

> *mental functioning. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities.*

Mental illness negatively affects quality of life,[3] work days lost,[3] and life expectancy.[4] Difficulties are especially pronounced for adults with serious mental illness (SMI), which substantially impairs major life activities.[40] People affected by SMI may have diagnoses such as bipolar disorder, schizophrenia, and treatment-resistant depression. Adults with SMI are 4.8 times more likely to have lived with disability in the past week and 1.9 times more likely to live in poverty than adults without mental illness.[2] Mental disorders caused 5.3 million years lived with disability (YLD) among non-elderly adults in the US in 2017,[5] highlighting the debilitating nature of these conditions. A 2016 study found that mental disorders are the most costly type of health condition in the US, accounting for $201 billion of annual health care expenditures.[42] The overall economic toll of mental health disorders is staggering; the global cost of mental disorders is expected to reach $6.0 to $16.3 trillion annually in 2030.[43] The scope of mental disorders' potential burden underscores the need for policy measures which ensure that affected populations have access to effective treatment.

The majority of adults experiencing AMI in 2018 did not receive any mental health services in the past year,[2] limiting the potential benefits of mental health care. Mental health treatment is estimated to avert 22% to 48% of the YLD caused by mental health disorders under ideal conditions,[6] but individuals face multiple barriers when seeking mental health care. Supply-side issues such as low Medicaid acceptance rates among office-based psychiatrists,[44,45] mental health workforce shortages[11,33] and poor geographic access to mental health care facilities[12] are well-documented. Adults with AMI also cite concerns about provider availability, necessity of services, and affordability as reasons for not receiving services.[2] Policies reducing financial barriers to mental health care access are important, as over 40% of adults with AMI say they

cannot afford the cost of mental health care treatment.[2] Lack of health insurance, poor mental health benefits, and high out-of-pocket costs make mental health care unaffordable for many people. Low socioeconomic status (SES) is also a determinant[46] and consequence of mental illness,[47] creating a downward cycle of mental illness and poverty. Mental health care can reduce the harmful effects of mental illness on individuals and communities, but its capacity to effect change is contingent on affordability and availability for adults experiencing mental illness.

Medicaid is a crucial public health insurance program for supporting access to and funding for mental health care. State Medicaid programs provide public health insurance with little or no cost sharing for low-income and disabled populations,[7] and the federal government matches between 50% and 76% of the costs.[48] About 22% of adults with AMI have Medicaid coverage,[2] making their mental health care more affordable. Adults with AMI who are covered by Medicaid have 2.66 times greater odds of receiving mental health treatment than uninsured adults with AMI,[49] which is likely due to reduced out-of-pocket spending.[50] Medicaid is also an essential source of funding for the mental health care sector, accounting for about one quarter of all expenditures.[27] Increases in Medicaid coverage rates and spending are associated with increased employment of MHPs and payroll gains at mental health facilities,[29] emphasizing the role that Medicaid plays in the overall industry. Changes in the Medicaid program have an outsized influence on mental health care, as both patients and providers depend on its funding. As Medicaid policy changes over time, it is important to track its impact on the mental health care resources.

HEALTH INSURANCE REFORM AND MENTAL HEALTH CARE COVERAGE

People seeking mental health insurance benefits faced major challenges prior to health insurance reform. Nearly 50 million people did not have health insurance, and about a quarter of

people under age 65 had a coverage break in the past year.[8] An estimated 12 million people living with a diagnosable mental health or substance use disorder did not have health insurance, representing a disproportionate share of the uninsured population.[8] Health status could be used as a basis for denying or underwriting health insurance coverage, making it especially difficult for people with chronic mental health conditions to obtain affordable coverage in the individual market.[8] Nonelderly single adults, who disproportionately experience mental illness,[2] were also ineligible for income-based Medicaid coverage in most states.[8] Health care policy, in addition to financial barriers, prevented many people who experienced mental illness from obtaining mental health care coverage.

The 2008 Mental Health Parity and Addiction Equity Act (MHPAEA) provided long-awaited, yet incomplete, reforms to mental health care policy. New MHPAEA mandates required large group health plans to provide mental health benefits comparable to general medical benefits, but they did not apply to many health insurance policies.[8] Health insurance policies were exempt from parity regulations if they (a) did not provide any mental health care coverage, (b) were offered on the individual or small group market, or (c) were part of a public program such as Medicaid or Medicare.[8] Some states had more generous laws that required mental health benefits for public, small group, or individual plans, but mental health insurance policy generally remained fragmented and state-specific.[8] MHPAEA parity reforms represented progress for people seeking mental health care coverage, but many people still lacked mental health benefits.

The 2010 ACA addressed prevalent issues in the health care sector by (a) protecting health insurance consumers, (b) providing health insurance subsidies, (c) mandating health insurance coverage, and (d) expanding Medicaid eligibility. Its policies built on the MHPAEA, improving access to mental health care coverage for millions of adults experiencing mental

illness.[8] Pre-existing conditions are no longer used to determine health insurance eligibility or premiums, and mental health benefits (at parity with medical benefits) became mandatory in plans that cover essential health benefits (EHBs). Expanded Medicaid coverage also includes EHBs, so newly eligible adults receive mental health care benefits. About 62.5 million people were expected to benefit from these reforms by either obtaining health insurance or increasing mental health benefits due to federal parity protections.[8] These changes under the ACA reduce financial barriers to mental health care access, potentially improving public mental health.

MEDICAID EXPANSION AND MENTAL HEALTH

The ACA expanded Medicaid in 2014 by granting eligibility to nonelderly adults with income up to 138% of the federal poverty level (FPL), including demographic groups that previously had been ineligible. The population which gained Medicaid eligibility is collectively referred to as 'expansion group adults.' This Medicaid policy may increase access to mental health care, but it has not been implemented in many states. Following a US Supreme Court case challenging the constitutionality of the ACA,[14] state governments have been allowed to decide whether to implement Medicaid expansion under the ACA. An initial group of 27 states and Washington, DC, enacted new eligibility rules in 2014 under the ACA. Five additional states enacted Medicaid expansion from 2015 through 2018, leaving 19 states which did not implement Medicaid expansion before 2019 (see Figure 1).[13] Over two million low-income, nonelderly adults in non-expansion states do not presently benefit from ACA health insurance reforms, as they are uninsured and ineligible for public or subsidized private health insurance.[15] This uninsured population disproportionately experiences mental illness,[2] and they have limited means to afford out-of-pocket mental health care costs. Research is needed to quantify the impact of states' Medicaid expansion decisions on this population's mental health and inform

future action.

State divergence in Medicaid policy has spurred research interest in the effects of insurance coverage on health status and health care outcomes. Studies using quasi-experimental difference-in-difference (DID) designs have found that Medicaid expansion is generally associated with improved access to care, quality of care, and self-reported health status, as well as better mental health.[18,19,23] Miller et al. also found that adults aged 55 to 65 who were likely to benefit from Medicaid expansion had a 9.4% reduction in mortality relative to comparison groups,[20] providing the most concrete evidence to date of the policy's health benefits. While these studies focused on general health and medical care provide useful context, their findings and conclusions may not generalize to mental health care.

The Oregon Health Insurance Experiment provides evidence for a causal relationship between a prior expansion of Medicaid coverage and improved depression treatment.[24] Randomly assigned Medicaid eligibility accounted for a steep reduction in undiagnosed depression, untreated depression, and depressive symptoms, as well as an increase in mental-health-related quality of life. The authors also found an increase in the prevalence and utilization of mental health prescriptions. Medicaid coverage did not increase talk therapy utilization, but this part of the study only included participants with a pre-intervention diagnosis of depression. While this research provides strong evidence that Medicaid eligibility improves mental health and increases mental health treatment utilization, interviews were only conducted with people living in the Portland area. People living in other areas of Oregon were excluded from the analysis, raising questions about how well these findings generalize to other states and more rural areas. Geographic access to the mental health care system varies by mean income, rurality, and demographic characteristics,[12] so nationally representative research is needed to clarify how

Medicaid eligibility impacts mental health care access across the United States.

Several studies have used DID models to estimate the effect of Medicaid expansion on mental health and health care affordability using Behavioral Risk Factor Surveillance Survey (BRFSS), which is conducted by the Centers for Disease Control and Prevention. The BRFSS is a nationally representative telephone survey of more than 400,000 adults that collects data on health status, risk factors, and preventative service utilization.[51] One study found that nonelderly childless adults with low income, a population which gained Medicaid eligibility, had fewer poor mental health days and health care cost barriers following Medicaid expansion.[9] A subsequent study's results indicate that the link between Medicaid expansion and improved mental health is limited to childless low-income nonelderly adults with one or more chronic medical conditions.[21] Though most studies focus on childless adults, low-income parents also report less psychological distress.[23] This population did not have increased mental health care utilization, suggesting that improved mental health was not due to increased mental health treatment.[23] These studies clarify which populations primarily benefited from Medicaid expansion and replicate some findings from the Oregon Health Insurance Experiment, but more research is needed to determine the specific implications of Medicaid expansion for mental health care.

Medicaid expansion has been associated with changes in services offered through community health centers (CHCs) and positive health outcomes for their patients. CHCs are safety net facilities that provide primary and preventative services, as well as mental health services in a more limited capacity. One study found that CHC patients who gained Medicaid coverage following Medicaid expansion saw a dramatic increase in the detection of mental health disorders,[25] converging with evidence from the Oregon Health insurance experiment that Medicaid eligibility improves the diagnosis of mental illness.[24] Han, Luo, and Ku also conducted

a DID analysis indicating that Medicaid expansion was associated with widespread changes in service provision at community health centers (CHCs).[26] The authors found that Medicaid expansion was associated with an increase in overall treatment volume as well as mental health treatment volume. Additional analyses found that Medicaid expansion shifted CHC's case mix from uninsured patients to Medicaid-insured patients, potentially improving the centers' financial health. These findings are consistent with the premise that Medicaid expansion has improved mental health care, but research is needed to investigate the subject in more common settings for mental health care.

MENTAL HEALTH CARE IN THE US

Mental health care in the United States typically incorporates a combination of psychotherapy and/or psychotropic medication provided in outpatient, residential, or inpatient treatment settings. Psychotropic medication, the most common type of mental health treatment, was utilized by 36.2% of adults with AMI in 2018.[2] Psychotherapy, also known as talk therapy or counseling, is utilized in outpatient settings by about 26.1% of adults with AMI and inpatient or residential settings by about 3.3% of adults with AMI. Race/ethnicity, age, natal sex, education, employment status, health status, and insurance status are all factors influencing whether adults with AMI utilize mental health services.[49] Effective treatments for mental disorders exist,[52-55] but concerns remain about their population health benefits due to poor distribution of high-quality mental health care.[56] Greater attention to the allocation of mental health care resources is needed to mitigate the burden of mental health disorders.

Mental health services are provided by a heterogeneous mental health workforce. Facilities typically employ a combination of clinical personnel (psychiatrists, psychiatric nurse practitioners, psychiatric physician assistants, psychologists, mental health counselors, school

counselors, clinical social workers, and other therapists),[11] non-clinical service providers (including peer support workers, psychiatric aides and technicians, homeless outreach specialists, case managers, and care coordinators),[57] and administrative staff. Clinical service providers are categorized into medical staff (psychiatrists, psychiatric nurse practitioners, and psychiatric physician assistants) that may prescribe and manage medications, and providers whose duties are typically focused on assessment and therapy (psychologists, counselors, social workers, and other therapists). Many states have workforce shortages across clinical service provider types,[11] raising concerns about the treatment capacity of the mental health care system. Supply-side service provision issues impact mental health care access; about 38% of adults who received mental health care in 2018 had to wait more than a week after seeking services.[31] Research is needed to identify policy interventions which address these difficulties.

The mental health care system is comprised of a diverse set of facilities which serve different functions. Mental health care may be provided in outpatient, residential, or inpatient facilities depending on the severity of a person's mental health difficulties and the level of support needed. Most mental health care facilities provide services in an outpatient or community-based setting, defined by a treatment episode duration of less than 24 hours.[58] Outpatient facilities may be office-based[59] (meaning that a MHP or group of MHPs are primarily responsible for facility operations) or clinic-based[60] (meaning that administrators are responsible for facility operations). Clinic-based facilities are more likely to serve rural and low-income communities, while office-based facilities tend to be located in high-income areas.[12] Areas with higher percentages of Black and Hispanic residents are less likely to have community-based mental health care available.[12] Greater research focus on this topic is needed to develop an evidence base for policy measures that address these disparities in mental health care access.

Hockenberry, Joski, Yarbrough, and Druss conducted a detailed analysis of trends in outpatient depression treatment and spending from 1998 to 2015.[28] The authors found considerable growth in the treated prevalence of depression from 2.36% in 1998 to 3.47% in 2015. The psychotherapy utilization rate among people receiving depression treatment declined from 53.7% to 43.2% between 1998 and 2007, then increased again to 50.4% in 2015. The pharmacotherapy utilization rate among people treated for depression remained high throughout the period analyzed (between 80.8% and 82.4%). Physicians were the most common provider of mental health services, but the proportion of depression patients utilizing their services decreased between 2007 and 2015. The proportion of depression patients utilizing of specialty mental health provider services (psychiatrists and social workers) also increased between 2007 and 2015, suggesting a shift in consumer behavior. While psychotherapy expenditures for depression treatment increased by 90.4% between 2007 and 2015, medication expenditures declined by 16.9% after adjusting for inflation. Depression treatment expenditures by payment source also show dramatic changes between 2007 and 2015; self-payment and private insurance expenditures declined by 31.1% and 13.5% respectively, while Medicaid expenditures grew by 144.9%. This study did not analyze potential causes of recent trends in depression treatment, but mental health care coverage reforms under the MHPAEA and ACA may partially account for changes in depression treatment between 2007 and 2015. Future research efforts should seek to quantify the impact of changes in mental health care policy on patients and providers.

Research on mental health providers' Medicaid acceptance following Medicaid expansion has produced mixed results. Data from the National Ambulatory Medical Care Survey (NAMCS) show that fewer office-based psychiatrists have been accepting new Medicaid patients over time.[44] Studies in the literature indicate that low reimbursement rates,[32] delayed payments,

administrative burden, and a lack of Medicaid enrollees in the local health care market are potential motivating factors.[61,62] Medicaid expansion was not associated with an increase in psychiatrists' Medicaid acceptance rates in one study,[44] perhaps indicating that reimbursement for psychiatrists is insufficient to motivate changes in office operations.[32] A study using the National Mental Health Services Survey (N-MHSS) found, in contrast, that Medicaid expansion was associated with a 1.69 percentage point increase in the probability that a specialty mental health care facility will participate in Medicaid.[63] These findings may be compatible, as the NAMCS and N-MHSS cover different mental health treatment settings (psychiatrist offices versus specialty mental health care centers). While Medicaid coverage may increase consumer demand for services, the effects of Medicaid expansion on service provision could depend on provider type. More research is needed to clarify whether findings on Medicaid acceptance reflect divergent provider responses to Medicaid expansion more broadly.

RESEARCH GAP

While extant research suggests that Medicaid expansion under the ACA may increase mental health care access, no study to date has focused on facility and provider availability. One study on Medicaid expansions between 1999 and 2009 found that Medicaid enrollment and funding is associated with growth in the mental health care sector,[29] but this analysis has not been updated to reflect recent increases in Medicaid funding for mental health care.[28] Questions also remain about the factors that influence whether mental health providers respond to increases in Medicaid coverage. Medicaid participation among specialty mental health care facilities has increased following the ACA's Medicaid expansion,[63] but similar trends are not seen among office-based psychiatrists.[44] Further research on this topic could indicate whether mental health care systems accommodate increased demand for mental health services when public health

insurance eligibility is expanded. New Medicaid enrollees could have limited access to mental health care due to provider shortages[11,33] and poor geographic access[12] if mental health care capacity does not increase. Additional information on the development of local mental health care systems could aid policy makers seeking interventions to reduce the personal, public health, and economic consequences of mental illness in the US.

RATIONALE

Medicaid expansion under the ACA is one of the most significant policies affecting mental health care in the past decade, but an understanding of its impact is still emerging. Quasi-experimental research is needed to estimate its downstream effects on mental health care. DID models are widely used to study the effects of Medicaid expansion,[18,19] as they produce unbiased estimates of treatment effects when assumptions are met.[64] Poor availability of mental health resources is a barrier to mental health care access[11,12,33] that may lessen in response to new public health insurance enrollment and funding.[29] Mental health facilities and providers typically serve local communities, making geographic analysis suitable for this topic. Using these methods to study changes in the mental health care system following Medicaid expansion will provide an empirical basis for future public health insurance policy.

Methodology

The purpose of the present study is to determine the impact of Medicaid expansion under the ACA on the availability of community-based outpatient mental health care resources. Since 2014, states have decided whether to enact this policy and grant Medicaid eligibility to nonelderly adults with income up to 138% of the FPL (referred to as ‘expansion group adults’ hereafter).[13] This source of variation in Medicaid policy has been studied widely using quasi-experimental methods, including difference-in-difference (DID) models.[18,19] Previous research

shows that Medicaid expansions are associated with growth in the mental health care sector,[29] though no research has replicated this finding following recent increases in Medicaid mental health care funding.[28] Some findings suggest that Medicaid expansion has motivated providers to accept Medicaid coverage,[63] but these results do not indicate whether the policy has addressed MHP shortages[11,33] or poor geographic access to outpatient mental health care facilities.[12] The primary objective of the present study is to test the hypothesis that Medicaid expansion has increased the local availability of outpatient mental health facilities and employees.

This study will use DID regression models to estimate causal links between Medicaid expansion and availability of mental health care between 2010 and 2018. County-quarters are the primary level of analysis, representing local access to mental health care over time. Medicaid expansion will be operationalized as the time elapsed between the first quarter of active expansion and the current observation, where quarters are represented as a portion of a year. Because many counties do not have an outpatient MH facility, a two-part model will account for the zero-inflated data. The first part will model Medicaid expansion's the effect on a county's likelihood of having at least one outpatient mental health facility (the extensive margin). The second part will model the number of outpatient mental health facilities per 100,000 residents, conditional on having at least one facility. Another analysis will examine whether Medicaid expansion increased the number of outpatient mental health care employees per 100,000 residents in the largest 10% of counties by population. Analyses will include three outpatient mental health facility types (psychiatrist offices, non-physician MHP offices, and outpatient mental health centers) that are specified by the North American Industry Classification System (NAICS). Out-of-pocket costs are proposed as a mediator, and time-variant factors influencing demand for outpatient mental health services will be controlled to minimize bias. County and

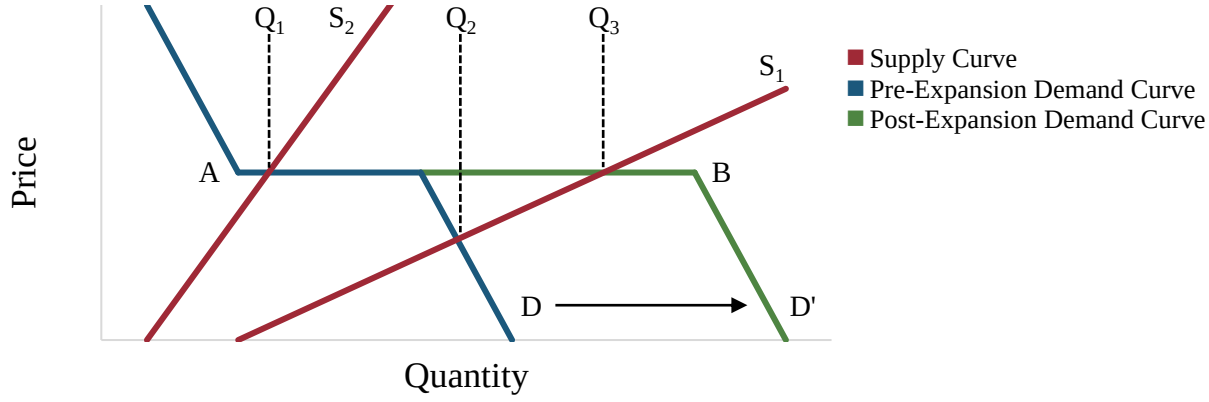
quarter-year fixed effects will control for unmeasured time-invariant factors.

THEORETICAL BASIS

Sloan, Mitchell, and Cromwell's mixed market model for Medicaid services is the theoretical basis for this study (See Figure 2).[61] Reimbursement rates are represented on the y-axis as the price per service, and the quantity of services provided at a given reimbursement rate are represented on the x-axis. Upward sloping supply curves (S_1, S_2) represent increasing marginal costs of production as the quantity of services increases. Downward sloping portions of demand curves (D, D') represent decreasing quantity of services consumed as prices increase. Price is constant along part of the demand curve representing Medicaid services (AB) because Medicaid reimbursement rates are fixed. Other portions of the demand curve slope downward because providers have a degree of price-setting power. Mental health care providers optimize service production at equilibrium points where marginal costs of service provision (S_1, S_2) are equal to marginal revenue per service (D, D'; i.e., insurance reimbursement plus patient cost sharing amounts). In this version of the model, demand at the Medicaid price point increases (from D to D') due to increased Medicaid enrollment. If there are providers with marginal costs

Figure 2

Sloan's Mixed Market Model for Medicaid Services.



Note: Adapted from Baker and Royalty.[1]

of service provision (S_1) lower than the marginal revenue of treating Medicaid patients (the Medicaid reimbursement rate), the quantity of services provided will increase (from Q_2 to Q_3) in response to demand. Additional Medicaid services are not profitable for providers with higher marginal costs (S_2), so the quantity of services provided does not increase (Q_1). Predictions generated by this model are widely applicably to Medicaid policy.

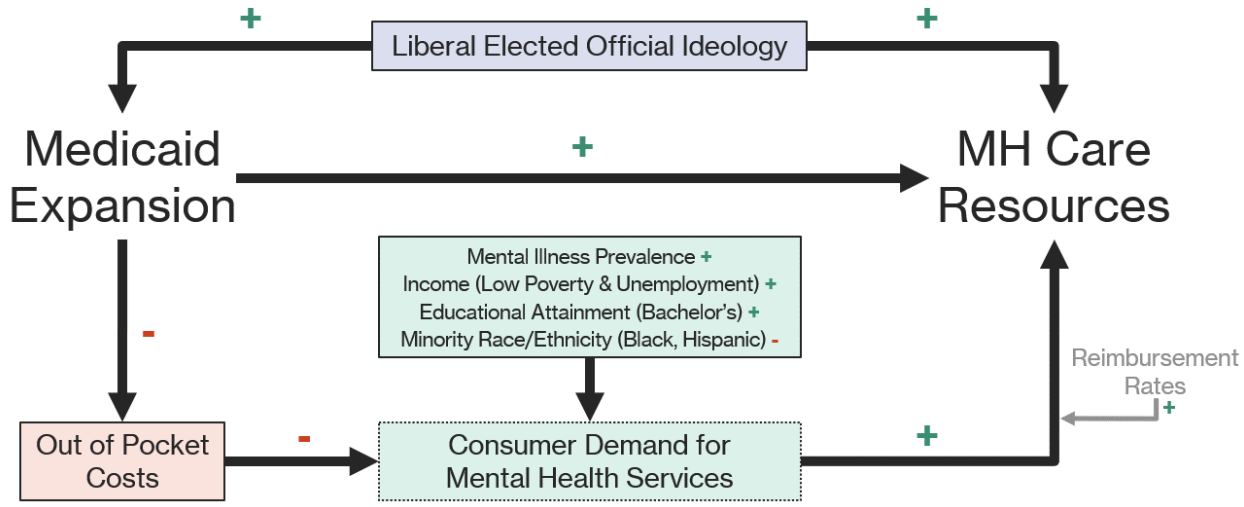
This model predicts mental health service provider responses to Medicaid. Medicaid expansion is expected to increase demand for Medicaid outpatient mental health services (from D to D') due to decreased out of pocket costs faced by the consumer (not shown).[50] In an ideal case (S_1) additional demand for Medicaid services (D') is sufficient incentive for providers to increase supply of mental health care services (from Q_1 to Q_2). Demand for Medicaid services may already exceed supply at that price (S_2), leaving people who gain Medicaid eligibility to compete for scarce services (Q_1). Both cases are plausible in the context of Medicaid expansion. Studies indicate that Medicaid expansions may increase mental health treatment capacity,[26,29] but low Medicaid reimbursement for specialized mental health services could suppress this response.[32] The recent increase in Medicaid funding for depression treatment[28] is likely to favor an increase in supply of mental health services, but this is not a foregone conclusion.

CONCEPTUAL MODEL AND DEFINITIONS

A conceptual model (Figure 3) was devised to predict how constructs would influence the focal relationship between Medicaid expansion and mental health care resources. *Mental health care resources*, the outcome construct for this model, are defined as factors of production (such as labor, capital, land, and technology) that are used to provide mental health care services.[65] Two types of mental health resources, labor and capital, are used in this study as indicators of mental health care resource availability in a local area. Two measures of available mental health

Figure 3

Conceptual Model.



Note: MH = Mental Health. Constructs in gray are unmeasured.

care capital are used: a binary variable indicating whether a county has at least one mental health care facility and the number of mental health care facilities per 100,000 residents. The latter measure will have a log transformation, as exploratory analyses show positive skew. The number of outpatient mental health care employees per 100,000 residents will represent the availability of mental health care labor. Analyses will include three types of outpatient mental health care establishments (psychiatrist offices, non-physician MHP offices, and outpatient mental health centers), which are representative components of the outpatient mental health care system.

Medicaid expansion is defined as a policy intervention under the ACA that, once enacted by states, makes nonelderly adults with income up to 138% of the FPL eligible for Medicaid health insurance coverage.[8] Active Medicaid expansion status is dependent on (a) the Medicaid expansion decision made by state officials and (b) the date it was enacted in a state. Medicaid expansion is operationalized in this study as the time elapsed in years since a state enacted the

policy. Months and quarters are represented as a portion of a year. A state that expanded Medicaid in January 2014, for example, would have a value of 1.25 for this variable in the second quarter of 2015. Counties in states that did not decide to enact Medicaid expansion before 2019 will have a zero value for all time periods in the study. Estimates using this operational definition will be interpreted as an intervention effect per unit of time.

Out-of-pocket costs are health care expenses that are not reimbursed by insurance.[66] Medicaid expansions reduce out-of-pocket mental health care costs[50] by providing health insurance with little or no cost sharing. This factor is proposed as the mechanism through which Medicaid expansion impacts consumer demand for mental health care services. Consumers face a lower marginal cost for accessing mental health services, theoretically increasing the quantity consumed.[67] The proportion of expansion group adults covered by health insurance is used to operationalize this construct. Changes in this variable will represent proximal effects of Medicaid expansion on consumers' out-of-pocket mental health care costs.

Mental Illness is the presence of a diagnosable mental, behavioral, or emotional disorder as defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV).[2] This definition is used by the National Survey of Drug Use and Health (NSDUH), the primary epidemiological survey for mental health in the United States. NSDUH substate mental illness prevalence estimates will be used to control for the component consumer demand for mental health services attributable to mental illness. Substate areas are non-overlapping geographic areas within states defined by county boundaries or census tracts used to produce local mental illness prevalence estimates. Estimates are pooled across 3-year intervals to increase precision.

Income is money that is received regularly by households before taxes, deductions, and payments, excluding one-time payments, noncash benefits, and capital gains.[68] Higher consumer

income may increase demand for health care services because people can afford a larger array of goods and services.[67] Consumers may be more willing to pay for mental health care, increasing the quantity of services demanded at a given price point. Two measures are selected as indicators of consumer income. The proportion of nonelderly adults with income at or below 138% of the FPL controls for both consumer income level and the proportion of the population that is eligible for Medicaid expansion coverage. The unemployment rate adjusts for overall economic conditions in the area. Inclusion of both these measures in the model reduces the likelihood that changes in economic factors over time will bias estimates.

Educational attainment is defined as the highest level of education completed by an individual.[68] College graduates are more likely than people without a high school education to receive mental health care,[49] so the proportion of people aged 25 or older with a Bachelor's degree or higher will be included in the model. Controlling for this variable will adjust for an aspect of consumer demand for mental health services that could bias the focal relationship.

Minority race/ethnicity is a complex construct that requires several definitions. *Race* is a social construct based on a person's physical characteristics, such as skin color.[69] Self-reported race indicates exposure to social and political factors associated with racial identities, rather than differences based on a person's phenotype.[70] *Ethnicity* is defined by shared linguistic, psychological, religious, and cultural traditions.[69] *Minority* refers to racial and ethnic groups other than non-Hispanic White people, who are the largest racial/ethnic group in the US. Hispanic and Non-Hispanic Black people are both less likely than non-Hispanic White people to receive mental health services[49] or have mental health care facilities near their residence.[12] The proportion of people who self-identify as members of these groups will be included in the model to adjust for the differences in consumer demand between racial/ethnic groups.

Reimbursement rates are payment amounts set by health care providers and insurers that fund covered health care expenses.[71] In the context of this model, reimbursement rates are the amount of money paid to mental health service providers by Medicaid for providing mental health care services. The amount paid varies over time by state, provider type, service type, and place of service. Payment rates are important in the mixed market model for Medicaid services,[61] as they determine the price signal that providers face when deciding the quantity of Medicaid services to provide. This construct is unmeasured in the present study, as no research to date has estimated Medicaid reimbursement for mental health services relative to other insurers' reimbursement. A report from the Urban Institute indicates that Medicaid reimbursement for medical care is generally lower than Medicare reimbursement, but their analysis does not include mental health services.[72] Variation over time in Medicaid reimbursement for mental health services, if it is correlated with Medicaid expansion and changes in mental health care resource availability, could be an unmeasured source of bias in the model.

Liberal elected official ideology is defined based on Converse's framework, which states that elected officials' political beliefs, ideas, or attitudes are ideological when a stance on one issue predicts stances on other issues.[73] For example, one may have ideological political beliefs if support for Medicaid expansion predicts beliefs on immigration and environmental policy. Poole and Rosenthal built upon this work by developing a method for quantifying legislators' time-invariant ideological position in "issue space."[74,75] The primary dimension that predicts elected officials' roll-call voting behavior is a liberal-conservative ideological scale. Elected officials with higher scores on this dimension have a more liberal ideology. Berry et al. used this scale to construct the NOMINATE measure of state government ideology,[76] which aggregates elected officials' ideology scores at a state level. Liberal elected official ideology could bias the focal

relationship if favorable stances on Medicaid expansion are linked to policies increasing mental health care resources. Controlling for this construct reduces potential spuriousness in the model.

DATA SOURCES

Measures of mental health care resource availability are calculated using the Quarterly Census of Employment and Wages, which is published by the Bureau of Labor Statistics.[77] This dataset is based on unemployment insurance administrative data, which covers establishments that employ workers. Partnerships and sole proprietorships may not be included if they do not have any employees. Despite this limitation the Bureau of Labor Statistics estimates that these data represent more than 95% of employment in the US. Tabulated variables are available at a county-quarter level of analysis by NAICS code. Three NAICS codes corresponding to psychiatrist offices, non-physician MHP offices, and outpatient mental health care centers will be included as core components of the outpatient mental health care system. Underlying administrative data are collected as part of a mandatory government program, so counties without data on the number of establishments are interpreted as having zero facilities. Employment data is censored for counties with a low number of mental health care facilities, so the employment regression model will use a smaller subset of counties. Raw counts of mental health facilities and employees will be divided by American Community Survey 5-year population estimates to standardize measures for county population size.

Medicaid expansion data are obtained from the Kaiser Family Foundation.[13] Counties in states that enacted Medicaid expansion before 2019 are considered Medicaid expansion counties for the purpose of this study. The time elapsed since Medicaid was expanded is calculated as the difference in years between the date of a given observation and the date that a given state expanded Medicaid. This value is set to zero for all observations prior to Medicaid expansion

and is always zero for non-expansion counties. States that granted Medicaid eligibility to nonelderly adults with income at or below 138% of the FPL prior Medicaid expansion[78] are not differentiated from other Medicaid expansion states, as they were not previously required to cover mental health care benefits.[8] Pre-expansion policy interventions would bias results toward the null hypothesis, resulting in more conservative estimates.

The remaining data sources, in addition to the ones described above, are detailed in Table 1 below. County-level unemployment rates are obtained from the Bureau of Labor Statistics' Local Area Unemployment Statistics program.[79] The United States Census Bureau's Small Area Health Insurance Estimates produce county-level population totals and health insurance coverage rates for different demographic groups, including expansion group adults.[80] Population estimates

Table 1

Data Source Summary.

Source	Program	Construct	Measure
KFF	State Health Facts	Medicaid Expansion	Time Elapsed Since Enacted (Years)
BLS	QCEW	MH Care Resources	Outpatient MH Facilities & Employees per 100,000 county residents
BLS	LAUS	Unemployment	Unemployment in Labor Force (%)
Census Bureau	SAHIE	Out-of-Pocket Costs	Health Insurance in Expansion Group (%)
Census Bureau	SAHIE	Poverty	Income ≤ 138% of the FPL (%)
Census Bureau	ACS	Educational Attainment	Adults (25+) with Bachelor's Degree (%)
Census Bureau	ACS	Race	Black People (%)
Census Bureau	ACS	Ethnicity	Hispanic or Latino People (%)
SAMHSA	NSDUH	MI Prevalence	1-Year Substate MI Prevalence (%)

Note: KFF = Kaiser Family Foundation. MH = Mental Health. ACS = American Community Survey. BLS = Bureau of Labor Statistics. QCEW = Quarterly Census of Employment and Wages. LAUS = Local Area Unemployment Statistics. SAHIE = Small Area Heath Insurance Estimate. FPL = Federal Poverty Level. SAMHSA = Substance Abuse and Mental Health Services Administration. NSDUH = National Survey on Drug Use and Health. MI = Mental Illness.

for other demographic information are obtained from American Community Survey data tables.[81] Mental illness prevalence estimates are based on substate estimates for the National Survey on Drug Use and Health.[82] State prevalence estimates are used when substate region definitions are not consistent with county borders. The NOMINATE State Government Ideology dataset[76] was obtained from Richard Fording's repository.[83]

RESEARCH QUESTION AND HYPOTHESES

The present study's objective is to answer the following research question: has Medicaid expansion increased the availability of outpatient mental health facilities and employees at a local level? Two *a priori* hypotheses will be tested:

1. The number of quarters since Medicaid was expanded is predicted to be positively associated with three measures of available mental health care resources:
    a. The likelihood of a having at least one mental health care facility.
    b. The number of mental health care facilities per 100,000 residents, conditional on having at least one facility.
    c. The number of mental health care employees per 100,000 residents.
2. Medicaid expansion is expected to have an indirect effect on mental health care resources that is mediated by an increase in the proportion of people with health insurance among nonelderly adults with income at or below 138% of the FPL.

ANALYTIC PLAN AND SAMPLE DERIVATION

The generalized regression equation shown below will be used to perform analyses:

$$R_{cst} = \beta_0 + \beta_1 E_{st} + \beta_2 C_{ct} + \beta_3 S_{st} + \theta_c + \tau_t + \varepsilon_{cst}$$

All models will use two-way fixed effects and cluster-robust standard errors using Stata 16.1's panel-data commands (xtlogit and xtreg). Measures of available mental health care

resources (R_{cst}) in the c^{th} county and the s^{th} state in quarter-year t are dependent variables in this equation. Medicaid expansion (E_{cst}) is the independent variable, operationalized as the time elapsed in years since Medicaid expansion was enacted. Vectors of time-variant county-level (C_{ct}) and state-level (S_{st}) factors are included to control for potential sources of bias identified in the conceptual model. Washington, DC, is the only county with missing data, as the elected official ideology scale is not applicable. County fixed effects (θ_c) adjust for unmeasured time-invariant factors, and quarter-year fixed effects (τ_t) control for variation over time across counties. All time periods from 2010 through 2018 are included in analyses. Two-tailed tests will be performed with an α-level of .05.

The first part of the analysis on outpatient mental health care facilities will consist of a two-way fixed effects logistic regression model estimating the effect of Medicaid expansion on the likelihood of having at least one outpatient mental health facility. Counties that had a mental health facility for some, but not all, quarters from 2010 through 2018 will be included (n = 485, 15% of total). Counties with no variation in the dependent variable (n = 2655, 85% of total) cannot be included in the model due to county fixed effects. Average semi-elasticities[84] will be reported ($\bar{\eta}$, calculated with the user-written aextlogit command[85]) instead of β-coefficients. These statistics represent the average proportional change in likelihood of having at least one outpatient mental health care facility per unit change in the covariate. Findings will indicate whether Medicaid expansion improved mental health care facility availability in counties with inconsistent mental health care access.

A two-way fixed effects regression model will estimate the effect of Medicaid expansion on the log-transformed number of outpatient mental health care facilities per 100,000 residents (referred to as the "number of outpatient mental health facilities"), conditional on having at least

one facility. This analysis will include the 1,955 counties (62% of total) that had at least one mental health care facility for each quarter from 2010 through 2018. Coefficients estimated by this model are interpreted as a proportional change in the number of outpatient mental health care facilities per 100,000 residents for each unit change in the applicable covariate. Results from this model will test whether there is a causal link between Medicaid expansion and the availability of outpatient mental health care facilities among counties with reliable access to mental health care.

The analysis on mental health care employment will use two-way fixed effects regression models to estimate the effect of Medicaid expansion on the number of outpatient mental health care employees per 100,000 residents (referred to as the "number of outpatient mental health care employees". Analysis of employment data is only feasible using a state-month unit of analysis due to censoring at lower levels of geography, which are based on the number of facilities and market dominance.[86] Separate models, covering 48 states each, will be fitted for private psychiatrist offices and private non-physician MHP offices (referred to as psychiatrist offices and MHP offices respectively). States will be excluded from a model if any month from 2010 through 2018 is censored. Linear coefficients will be interpreted as the change in the number of outpatient mental health care employees per 100,000 residents for each unit increase in the covariate. Model results will indicate whether Medicaid expansion was associated with employment gains at mental health care facilities.

Results

A descriptive table (Table 2 below) was constructed to inspect differences between Medicaid expansion counties (n = 1,497, 47.7%) and non-expansion counties (n = 1643, 52.3%) at the beginning and end of the study period (from 2010 through 2018). Health insurance

Table 2

Descriptive Statistics on County and Population Characteristics.

	Expansion (n = 1497)		Non-Expansion (n = 1643)	
	2010	2018	2010	2018
Population (total)	188 873 709	197 295 559	114 500 912	124 922 898
County Population (median)	31 500	31 467	22 161	22 432
Counties with ≥ 1 Outpatient Mental Health Facility (%)	76.9	77.3	61.6	64.6
County Mental Health Facilities per 100k Residents (median)	6.6	7.9	4.4	5.3
Nonelderly Adults At or Below 138% FPL (%)	19.5	16.5	22.3	18.6
Expansion Group Adults With Health Insurance (%)	61.9	83.5	52.4	66.8
Mental Illness Prevalence Among Adults (%)	18.3	19.1	17.9	18.3
Unemployment in Labor Force (%)	9.9	4.1	9.2	3.6
Adults (≥ Age 25) With a Bachelor's Degree (%)	29.0	32.7	26.0	29.5
Black or African-American Residents (%)	11.1	11.6	16.8	17.5
Hispanic or Latinx Residents (%)	16.0	17.9	15.3	17.6

coverage among expansion group adults was higher in Medicaid expansion counties in 2010 (61.9% versus 52.4%) at showed a greater increase over eight years (+21.6% versus +14.4%). Coverage gains were gradual from 2010 to 2013, before increasing dramatically from 2014 to 2016 (see Figure A in Appendix). Increases in health insurance coverage during these years were greater in Medicaid expansion counties than non-expansion counties. The proportion of counties with at least one mental health facility was higher among expansion counties than non-expansion counties in 2010 (76.9% versus 61.6%) and increased slightly over the study period in both groups (+0.4% and +3.0% respectively). Medicaid expansion counties had a higher median number of outpatient mental health facilities per 100,000 residents in the first quarter of 2010 (6.6 versus 4.4) and saw a greater increase over the study period (+1.3 versus +0.9). The proportion of nonelderly adults that would qualify for Medicaid expansion based on income was

higher in non-expansion counties and decreased across both groups.

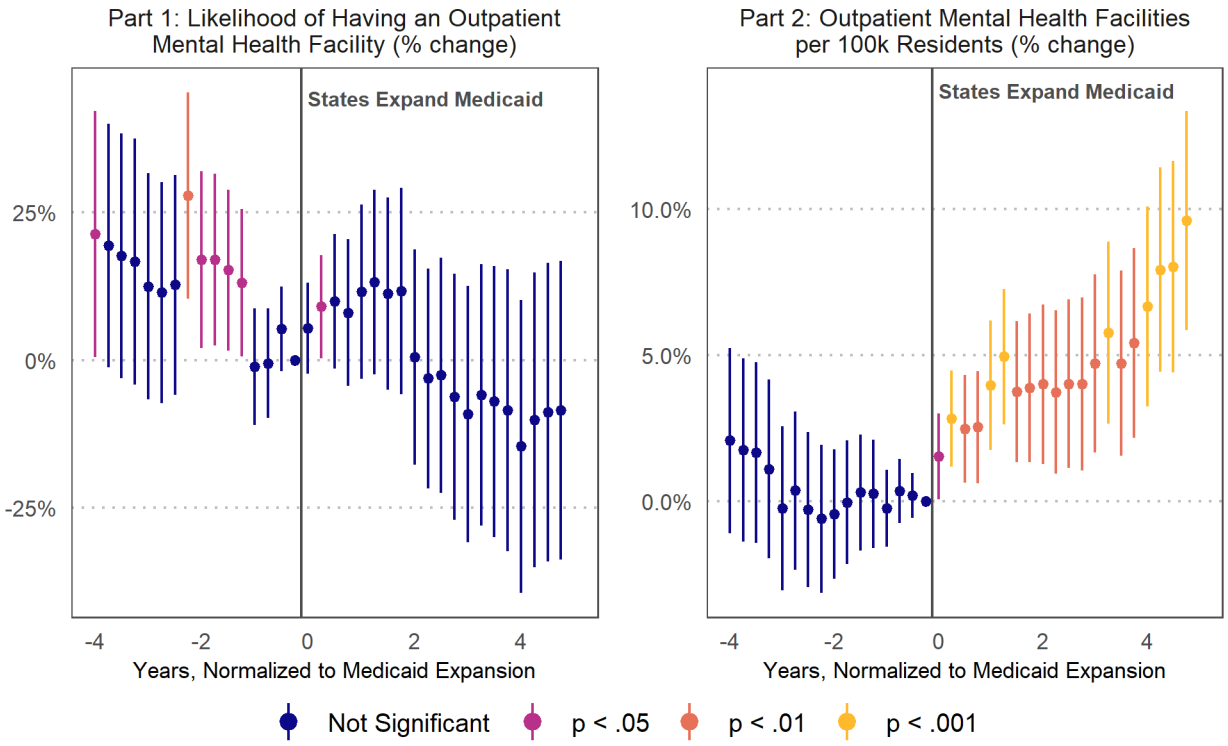
COUNTY-LEVEL OUTPATIENT MENTAL HEALTH FACILITY MODEL

Exploratory analyses indicated that the dependent variable, the number of outpatient mental health facilities per 100,000 county residents, had many zero values and positive skew (see Figure B in Appendix). Applying a log transformation resolved positive skew (see Figure B), and the two-part model accounts for zero inflation. A two-part difference-in-difference analysis was conducted to determine the impact of Medicaid expansion on (a) the likelihood that counties with inconsistent access to mental health facilities (n=485) have at least one mental health facility and (b) the number of mental health facilities per 100,000 residents in counties with at least one mental health facility (n=1,955). Counties without an outpatient mental health care facility from 2010 through 2018 (n=700) had no variation in the outcome variable and could not be analyzed using county fixed effects.

Two-way fixed effect regression models were fitted to test the parallel trends assumption for both parts of the model (see Figure 4 below). Time (in years) was normalized, setting the first quarter of active Medicaid expansion equal to zero. The first quarter of 2014 was set to zero for non-expansion counties, as this was the policy implementation date for most expansion states. This calculated field was included with a binary variable for each quarter-year, and the last pre-expansion quarter was set as the reference point. Medicaid expansion by time interaction effects were plotted as points with their 95% confidence interval shown as a line. Both models were adjusted for adult mental illness prevalence, the proportion of nonelderly adults with income at or below 138% of the FPL, unemployment, Bachelor's degree attainment, the proportion of people identifying as Black or African-American, the proportion of people identifying as Hispanic or Latinx, and elected official ideology.

Figure 4

Two-Way Fixed Effects Models Evaluating the Parallel Trends Assumption for Mental Health Facility Models.



Note: Points show time by Medicaid expansion interaction estimates, and vertical lines show 95% confidence intervals. Interactions show estimates in expansion counties relative to non-expansion counties. Models satisfy the parallel trends assumption if significant interactions are not seen before Medicaid expansion.

The logistic (part one) model's time by Medicaid expansion interaction shows that Medicaid expansion counties had a decreasing likelihood of having a mental health facility over time relative to non-expansion counties. Several pre-expansion quarters had significantly higher likelihood of having a mental health facility relative to the last pre-expansion quarter ($p < .05$). Post-expansion interaction effects are mostly insignificant ($p > .05$), but they seem to continue downward pre-expansion trends. Interaction terms for the first part of the model will be interpreted with caution, as effects seem to predate Medicaid expansion.

The log-transformed linear (part two) model shows no significant pre-expansion

interaction effects ($p > .05$), and post-expansion interaction effects are all significant ($p < .05$). The parallel trends assumption is satisfied for the log-transformed linear model, as the interaction effects seen following Medicaid expansion are not seen before Medicaid expansion. Later quarters show larger increases, providing evidence for a robust difference-in-difference effect.

Table 3 below shows regression results for the two-part model estimating the effect of Medicaid expansion on mental health facility availability. The logistic model indicates that Medicaid expansion was not associated with increased likelihood of having a mental health

Table 3

Two-Way Fixed Effects Models Testing the Effect of Medicaid Expansion on Mental Health Facility Availability.

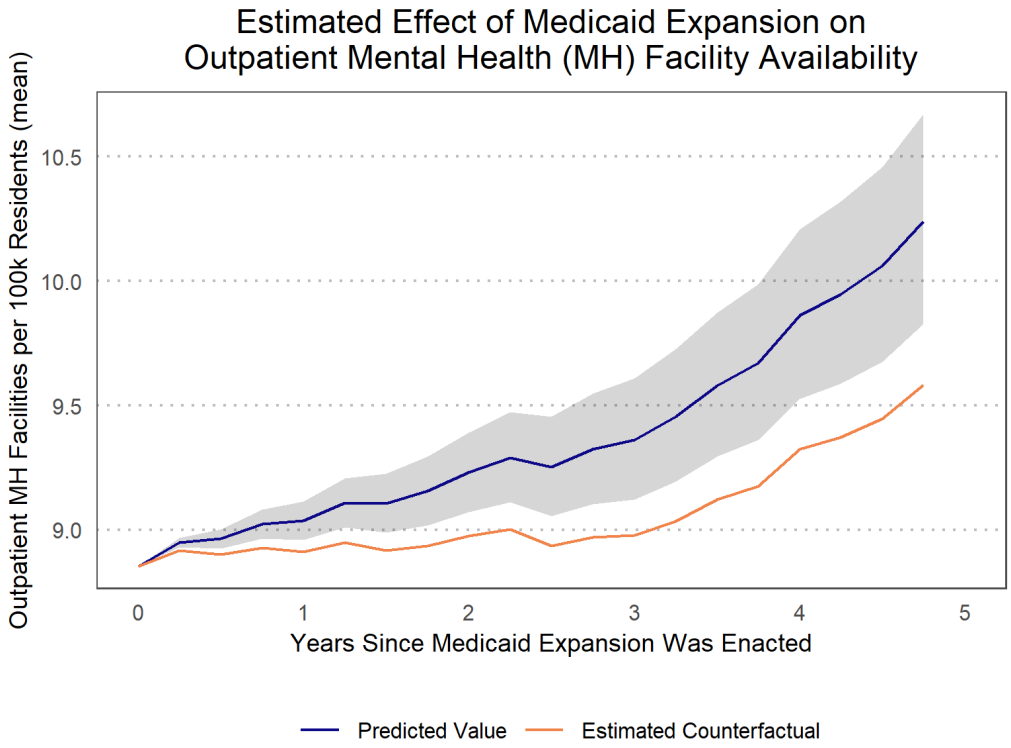
	Part 1: Logistic Model		Part 2: Log-Linear OLS Model	
	Adjusted $\bar{\eta}$	Mediated $\bar{\eta}$	Adjusted β	Mediated β
Time Since Medicaid Was Expanded (years)	-0.0563 [-0.1128,0.0002]	-0.0433 [-0.1029,0.0164]	0.0140** [0.0054,0.0226]	0.0112* [0.0024,0.0200]
Mental Illness Prevalence (%)	-0.0521** [-0.0904,-0.0138]	-0.0493* [-0.0875,-0.0111]	-0.0068* [-0.0130,-0.0006]	-0.0075* [-0.0137,-0.0012]
Nonelderly Adults At or Below 138% FPL (%)	0.0452* [0.0094,0.0809]	0.0463* [0.0102,0.0824]	0.0078* [0.0013,0.0143]	0.0077* [0.0012,0.0142]
Unemployment in Labor Force (%)	0.0150 [-0.0104,0.0404]	0.0144 [-0.0109,0.0397]	0.0023 [-0.0034,0.0081]	0.0027 [-0.0030,0.0084]
Adults (≥ Age 25) With a Bachelor's Degree (%)	0.0123 [-0.0174,0.0420]	0.0127 [-0.0171,0.0425]	0.0076* [0.0014,0.0138]	0.0075* [0.0013,0.0138]
Black or African-American Residents (%)	0.0238 [-0.0403,0.0880]	0.0227 [-0.0411,0.0864]	0.0092 [-0.0017,0.0201]	0.0093 [-0.0015,0.0202]
Hispanic or Latinx Residents (%)	-0.0547 [-0.1151,0.0057]	-0.0573 [-0.1183,0.0037]	0.0080 [-0.0036,0.0196]	0.0081 [-0.0036,0.0197]
Elected Official Ideology (liberal is higher)	0.0003 [-0.0044,0.0050]	0.0003 [-0.0044,0.0050]	0.0010* [0.0002,0.0018]	0.0011** [0.0003,0.0018]
Expansion Group Adults With Health Insurance (%)		-0.0070 [-0.0188,0.0049]		0.0016 [-0.0004,0.0035]
Y-intercept			1.7077*** [1.4266,1.9887]	1.6246*** [1.3254,1.9239]
N	17 460	17 460	70 380	70 380

Note: 95% confidence intervals in brackets. * p<0.05, ** p<0.01, *** p<0.001. OLS = Ordinary Least Squares. η = average semi-elasticity, which is interpreted as the proportional change in likelihood per unit change in the covariate.

facility in a county ($p > .05$). The statistically insignificant coefficient was negative, contrary to the hypothesized relationship. Each additional percentage point of mental illness prevalence was associated with a 5.21% decrease in likelihood of having a mental health facility ($p < .01$). A percentage point increase in the proportion of nonelderly adults with income at or below 138% of the FPL is associated with a 4.52% increase in the likelihood of having a mental health facility ($p < .05$). Adding the proportion of expansion group adults with health insurance to the model decreased the magnitude of the relationship between Medicaid expansion and likelihood of having a mental health care facility.

The second part of the outpatient mental health facilities model supports a causal link between Medicaid expansion and the number of outpatient mental health facilities per 100,000 county residents, conditional on having at least one facility. There was a 1.40% increase in the number of outpatient mental health facilities for each additional year of Medicaid expansion ($p < .01$). This model estimates that Medicaid expansion increased the number of outpatient mental health facilities by 6.83% from 2014 through 2018 in counties that had at least one mental health facility (see Figure 5 below). Each additional percentage point increase in the prevalence of mental illness among adults predicted a 0.68% decrease in the number of mental health facilities ($p < .05$). Percentage point increases in the proportion of nonelderly adults at or below 138% of the FPL were associated with a 0.78% increase in the number of outpatient mental health facilities ($p < .05$). Bachelor's degree attainment and liberal elected official ideology were positively associated with the number of outpatient mental health facilities ($p < .05$). Adding the percentage of expansion group adults with health insurance coverage to the model decreased the strength of the relationship between Medicaid expansion and mental health facility availability, providing preliminary evidence for partial mediation.

Figure 5



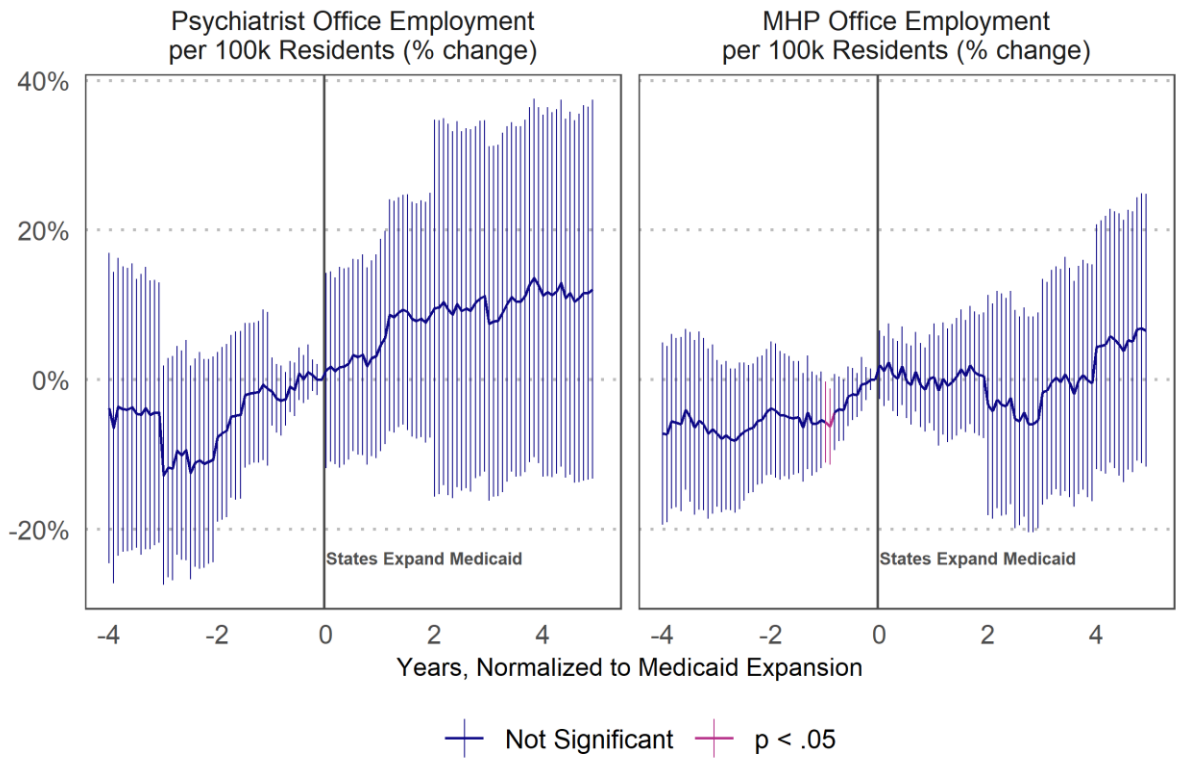
Note: The 95% confidence intervals for the difference-in-difference estimator are shown by the grey ribbon.

STATE-LEVEL OUTPATIENT MENTAL HEALTH EMPLOYMENT MODELS

The relationship between Medicaid expansion and the number of outpatient mental health care employees per 100,000 state residents was modeled using a state unit of analysis. Figure C in the Appendix shows this measure over time by Medicaid expansion status for private psychiatrist offices and private non-physician MHP offices. The median number of mental health employees increased over time across both Medicaid expansion status and facility type. Medicaid expansion states had a higher median number of mental health care employees across both facility types. Raw measures showed positive skew, so a log transformation was applied

Figure 6

Two-Way Fixed Effects Models Evaluating the Parallel Trends Assumption for Mental Health Employment Models.



Note: Points show time by Medicaid expansion interaction estimates, and vertical lines show 95% confidence intervals. Interactions show estimates in expansion counties relative to non-expansion counties. Models satisfy the parallel trends assumption if significant interactions are not seen before Medicaid expansion.

(see Figure D in Appendix).

Figure 6 shows adjusted time by Medicaid expansion status interaction effects to evaluate the parallel trends assumption. Time in years was normalized, setting the first month of active Medicaid expansion to zero. January 2014 was set to zero for non-expansion states. Month-years were included in the model as binary indicators, and the last pre-expansion month was used as the reference time period. Monthly estimates are shown with a horizontal line, and 95% confidence intervals are shown with vertical lines. Models were adjusted for adult mental illness

prevalence, the proportion of nonelderly adults with income at or below 138% of the FPL, unemployment, Bachelor's degree attainment, the proportion of people identifying as Black or African American, the proportion of people identifying as Hispanic or Latinx, and elected official ideology.

Time by Medicaid expansion interaction effects indicate that the number of outpatient mental health employees may have increased in Medicaid expansion states relative to non-expansion states, but wide 95% confidence intervals do not permit definitive conclusions. Insignificant interaction effects ($p > .05$) for psychiatrist office employment seem to predate active Medicaid expansion, indicating that the model may not satisfy the parallel trends assumption. A few significant interaction effects ($p < .05$) in the MHP employment model are seen prior to Medicaid expansion despite wide confidence intervals, suggesting that the parallel trends assumption was not met.

Table 4 below shows the results of the state-level models estimating the effect of Medicaid expansion on outpatient mental health care employment. The effect of Medicaid expansion on psychiatrist office employment was not statistically significant ($p = .14$) but using a state-level unit of analysis (n = 48) provided limited statistical power. The psychiatrist office employment model estimates that each additional year of Medicaid expansion is associated with a sizable 4.56% increase in employment at private psychiatrist offices. Percentage point increases in the number of people identifying as Black or African American were associated with a 25.16% increase in private psychiatrist office employment ($p < .05$).

Adding the proportion of expansion group adults with health insurance coverage to the model did not alter estimates substantially. The estimated effect of Medicaid expansion on private non-physician MHP office employment was relatively modest (+1.30% per year of

Table 4

Two-Way Fixed Effects Models Testing the Effect of Medicaid Expansion on Mental Health Care Employment.

	Private Psychiatrist Offices		Private Non-Physician MHP Offices	
	Adjusted β	Mediated β	Adjusted β	Mediated β
Time Since Medicaid Was Expanded (years)	0.0456 [-0.0150,0.1063]	0.0510 [-0.0033,0.1053]	0.0130 [-0.0217,0.0478]	0.0057 [-0.0294,0.0407]
Mental Illness Prevalence (%)	-0.0017 [-0.0441,0.0408]	0.0006 [-0.0430,0.0441]	0.0140 [-0.0202,0.0482]	0.0108 [-0.0237,0.0454]
Nonelderly Adults At or Below 138% FPL (%)	-0.0720 [-0.1513,0.0073]	-0.0737 [-0.1545,0.0070]	-0.0323 [-0.0928,0.0283]	-0.0298 [-0.0901,0.0306]
Unemployment in Labor Force (%)	0.0057 [-0.0340,0.0455]	0.0038 [-0.0376,0.0451]	-0.0155 [-0.0512,0.0201]	-0.0130 [-0.0495,0.0235]
Adults (≥ Age 25) With a Bachelor's Degree (%)	-0.1237 [-0.3286,0.0812]	-0.1330 [-0.3467,0.0807]	-0.0258 [-0.1477,0.0962]	-0.0123 [-0.1314,0.1067]
Black or African-American Residents (%)	0.2516* [0.0243,0.4788]	0.2345* [0.0094,0.4595]	-0.1831 [-0.3696,0.0035]	-0.1597 [-0.3625,0.0431]
Hispanic or Latinx Residents (%)	-0.0420 [-0.1803,0.0963]	-0.0423 [-0.1817,0.0970]	0.0551 [-0.0519,0.1622]	0.0560 [-0.0537,0.1657]
Elected Official Ideology (liberal is higher)	0.0020 [-0.0030,0.0070]	0.0020 [-0.0029,0.0069]	0.0008 [-0.0033,0.0049]	0.0009 [-0.0031,0.0048]
Expansion Group Adults With Health Insurance (%)		-0.0033 [-0.0166,0.0100]		0.0046 [-0.0050,0.0142]
Y-intercept	4.7945 [-1.4760,11.0651]	5.4575 [-1.7321,12.6472]	5.6246* [1.1998,10.0494]	4.6897 [-0.1939,9.5733]
N	5 184	5 184	5 184	5 184

95% confidence intervals in brackets
* p<0.05, ** p<0.01, *** p<0.001

Medicaid expansion) and non-significant (p = .45). Other covariates were not statistically significant (p > .05). Adding the proportion of expansion group adults with health insurance coverage to the model decreased the magnitude of the Medicaid expansion effect.

Discussion

Difference-in-difference model estimates indicate that Medicaid expansion increased the number of outpatient mental health facilities by 1.40% per year of Medicaid expansion in counties that had mental health care. Other models did not find a statistically significant effect of

Medicaid expansion on mental health care availability, though psychiatrist office employment may have increased substantially in Medicaid expansion states relative to non-expansion states. Health insurance coverage among expansion group adults may be a partial mediator of the relationship between Medicaid expansion and the number of outpatient mental health care facilities, but more robust mediation studies are needed to clarify the potential mechanisms of Medicaid expansion. Results do not support the hypothesis that Medicaid expansion increased the likelihood that a county has outpatient mental health care.

Results are encouraging in the context of recent findings that Medicaid acceptance among psychiatrists is declining[44] and Medicaid reimbursement for psychiatric services is low relative to primary care services.[32] Medicaid expansion prompted an increase in the number of mental health facilities despite these trends, indicating that changes in Medicaid policy incentivize increased participation in the market for outpatient mental health care services. These benefits were not equally distributed; Medicaid expansion did not increase the likelihood of having an outpatient mental health facility in counties with inconsistent access. Mental health workforce scarcity, unfavorable economic conditions, and gradual resource redistribution could account for this finding. A large proportion of counties (22%; n = 700) also had no outpatient mental health care available from 2010 through 2018. Further research should characterize salient determinants of mental health care availability in low-resource areas and identify modifiable factors that could improve access.

The proportion of nonelderly adults with income at or below 138% of the FPL was correlated with better availability of outpatient mental health care facilities. These results were surprising, since this population is under-resourced relative to populations with higher income. This preliminary finding suggests that outpatient mental health care facilities face favorable

economic conditions in areas where more people qualify for Medicaid expansion coverage, despite lower income levels. While more research is needed, these results challenge the perception that low-income areas cannot support robust mental health care systems.

Adult mental illness prevalence was associated with poorer availability of outpatient mental health care facilities. This finding is not surprising, given that low socioeconomic status is both an outcome[46] and determinant of mental illness.[47] Future research should test whether the mental health care system is allocating treatment resources to areas with greater need for mental health care services. Results would indicate whether areas with more mental health difficulties also have poorer access to outpatient mental health facilities.

The present study is the first, to my knowledge, to use nationally representative quasi-experimental methods to study the downstream effects of Medicaid expansion under the ACA on the availability of outpatient mental health care. This research advances policy research by analyzing an intervention that promotes population health by building mental health care capacity. These findings are important in the context of debates over the relative costs and benefits of public health insurance expansions, as they indicate that tax dollars spent on health care services may be reinvested in health care resources. As more people in the US gain Medicaid health insurance coverage, it will be increasingly important to understand the impact of these changes on local health care systems.

LIMITATIONS AND FUTURE RESEARCH

There are a number of limitation of this study, First, the outcome measures used represent the availability of mental health care resources (e.g., facilities, personnel), but these resources do not necessarily have a direct impact the quality of mental health care delivered. One would expect people to benefit from improved mental health resource availability, especially since

scarcity of resources is a common barrier to care, but research to date has not examined whether this factor alone impacts the quality or outcomes of mental health care. Additional studies are needed to establish a link between supply-side measures of mental health care availability and person-centered outcomes. Mixed-method studies would be useful, as they could clarify how insufficient mental health resources influence subjective experiences and clinical outcomes of mental health care. Further research is needed in this area to fully establish the impact of mental health resource shortages on mental health.

This study indicates that Medicaid expansion increased the number of mental health facilities, but many questions remain about these new facilities. They could be new businesses or additional locations of pre-existing mental health care providers. The specific motivation for opening new facilities is also unknown, potentially determining whether these findings generalize to other policy interventions. New facilities may or may not serve marginalized communities, impacting equitable access to mental health care. The results from this study are a potential starting point for future quantitative and qualitative studies that deepen our understanding of how Medicaid expansion impacts access to mental health care.

Medicaid reimbursement rates for mental health services, while theoretically relevant for this research question,[61] were not available for inclusion in regression models. Reimbursement rates are the price signal (i.e., marginal revenue) that mental health care providers face when deciding whether to serve the expansion group, and they are not generally available to researchers. Improved access to state Medicaid programs' pricing information would improve policy decisions, as researchers could determine whether prices set by public health insurance programs are sufficient to ensure adequate health care treatment capacity for those with

Medicaid. Without consolidated access to pricing data, many questions about the impact of public health insurance on health care providers will remain difficult to answer.

This study uses the Quarterly Census of Employment and Wages (QCEW), which is based on state unemployment insurance systems.[77] This dataset is partially limited by its methodology, as it only includes facilities that employ workers. Sole proprietorships and partnerships may not be required to participate in unemployment insurance, so they will not be present in administrative data. This is not a major limitation for the present research question, as administrative burden associated with Medicaid participation[61,62] makes it unlikely that outpatient mental health facilities without employees would have the capacity to process Medicaid payments.

The impact of Medicaid expansion on outpatient mental health employment could not be determined using the public access QCEW, preventing definitive conclusions about changes in the distribution of the mental health care workforce. Employment models were constrained by censoring practices designed to protect participating employers from disclosure.[86] Fewer than 10% of counties had consistently available employment data, necessitating models with a state unit of analysis. State-level models indicate that the number of employees at private psychiatrist offices may have increased, but estimates were too imprecise to generate reliable findings. Models using clustered error estimation and two-way fixed effects have robust internal validity, but they lack statistical power when sample sizes are limited. Research using restricted QCEW data is needed to examine mental health care employment with greater precision.

This study uses geographic units of analysis defined by state and county borders, which have both strengths and limitations. One advantage is that many data sources are available for these jurisdictions, enabling methods that control for many potential sources of bias. Geographic

borders, however, may not represent populations naturalistically or with a high level of detail. County-level population characteristics are sufficient for many purposes, but they are unlikely to detect effects related to smaller under-resourced communities within counties. County borders may also be an artificial boundary in some areas when characterizing the market for outpatient mental health services. Individuals living in a county with poor mental health facility availability may travel to an adjoining county with relative ease. People living in large counties may also be unable or unwilling to travel within the county to areas where mental health facilities are available. Future research using smaller units of analysis, such as census tracts, may yield additional insights on this subject.

While fixed effect models control for many potential sources of bias, they also limit models' analytic scope to time-variant factors. Population characteristics that do not show short-term variation, such as rurality, cannot be used to explain between-group variation. Future research on this topic would benefit from complementary methods that broaden the scope of explanatory analysis. Alternative methods are especially important for this research topic, as they would allow researchers to determine why some areas consistently lack access to outpatient mental health care. Research on this topic and others are only possible using methods that allow consideration of time-invariant variables.

POLICY SIGNIFICANCE

The analysis presented here provides evidence for a causal link between Medicaid expansion and the number of outpatient mental health facilities available. Each additional year of Medicaid expansion is estimated to increase the number of outpatient mental health facilities by 1.4%. Benefits associated with this policy change, however, were limited to a subset of counties in Medicaid expansion states that had consistent access to mental health care (n = 1,052,

representing 59.2% of the 2018 US population). Access to outpatient mental health care could be improved in counties with mental health facilities if more states enacted Medicaid expansion (n = 903, representing 35.4% of the population). A considerable number of counties still have inconsistent (n = 485, representing 3.3% of the population) or no access (n = 700, representing 2.1% of the population) to outpatient mental health facilities. Medicaid expansion did not have a detectable impact on access to mental health facilities in these areas. Additional policy measures may be needed, in addition to expansions of public health insurance, to improve access to mental health care in those areas. Inconsistent implementation of public health insurance expansions, coupled with pre-existing disparities in access to mental health care,[11,12,33] threatens to create and deepen mental health disparities. Increasing health insurance coverage among people with low income is an important first step toward improving mental health outcomes and strengthening the mental health care system.

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Appendix

Figure A

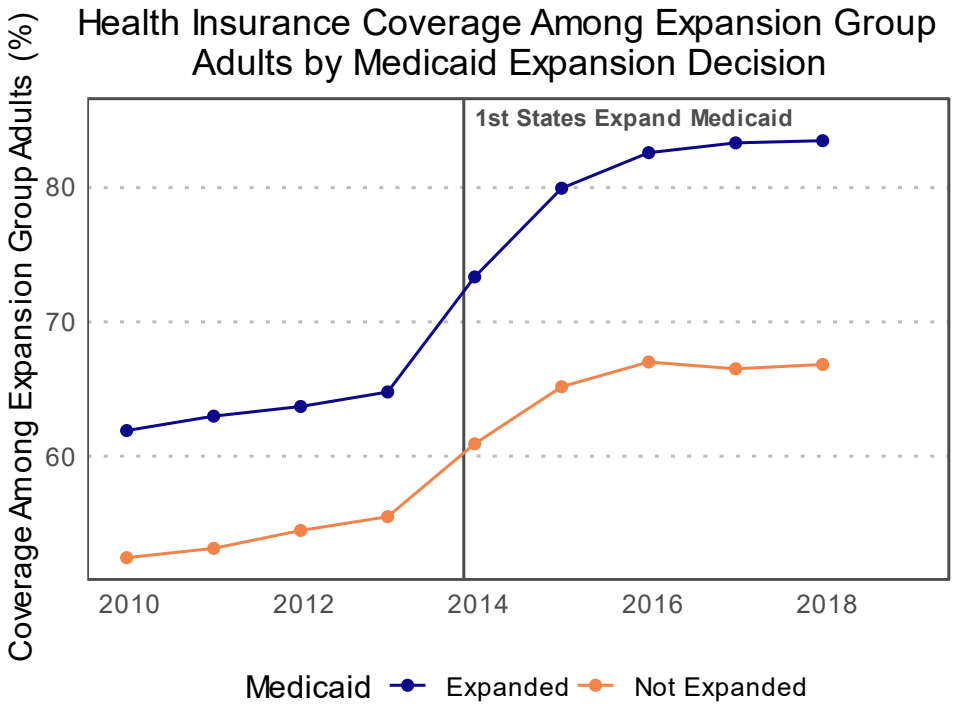

Figure B

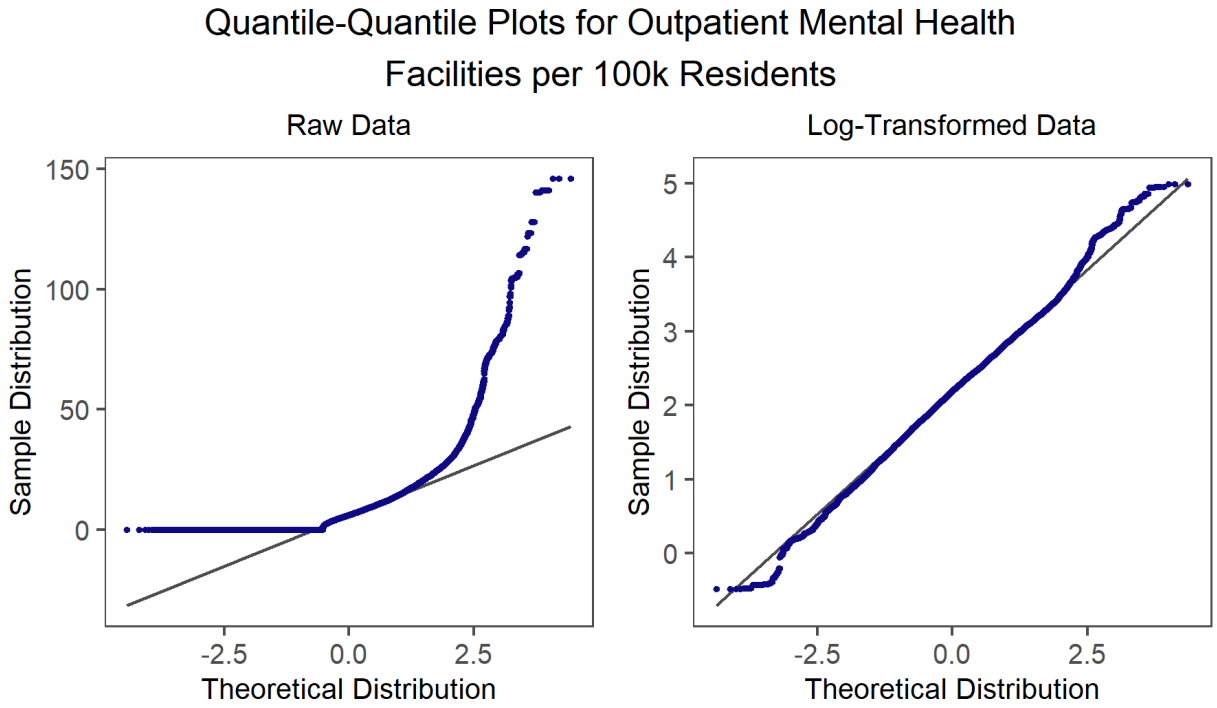

Figure C

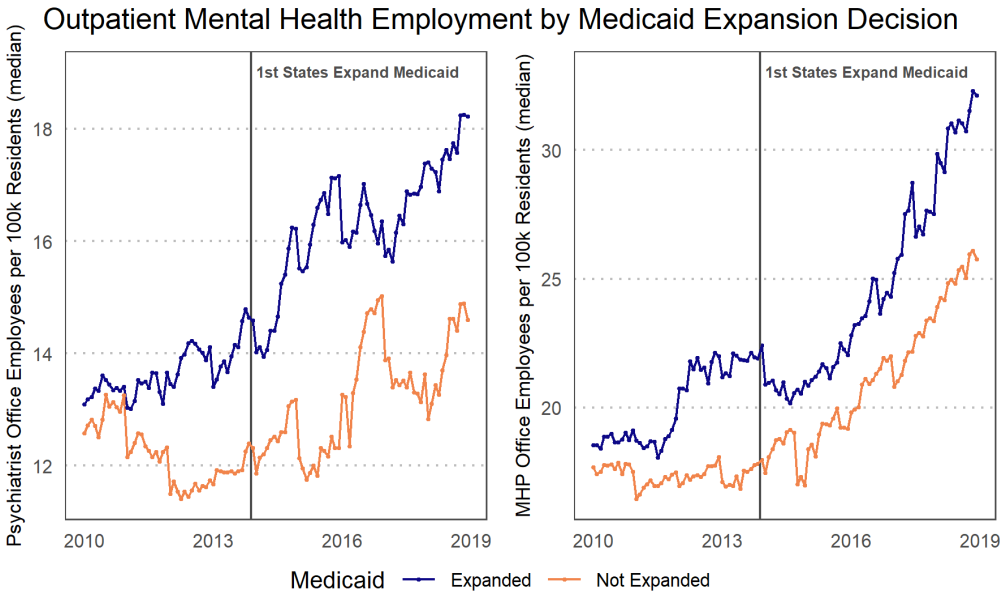

Figure D