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The relationship of Medicaid expansion to psychiatric comorbidity care within substance use disorder treatment programs

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A B S T R A C T

Background: Co-occurring mental health disorders are common among substance use disorder (SUD) patients. Medicaid expansion aimed to reduce barriers to SUD and mental health care and thereby improve treatment outcomes.

Methods: We estimated change in the proportion of United States SUD treatment sites offering treatment for psychiatric comorbidities following Medicaid expansion as part of implementation of the Affordable Care Act (ACA) in 2014. Using panel data from the 2013–2014, n = 660, and 2016–2017, n = 638, waves of the National Drug Abuse Treatment System Survey (NDATSS), we estimated change in the proportion of sites offering antidepressant medication, other psychiatric medication, behavioral treatment, or any combination thereof for treatment of mental health comorbidities (i.e., beyond services focused on SUD). We modeled the impact of Medicaid expansion as an interaction between year and date of Medicaid expansion. We constructed a mixed-effects linear regression model for each outcome, with the interaction variable as the main exposure, site as a random effect, and site's average duration of treatment, proportion of clients with psychiatric comorbidities, average caseload per treatment prescribing-clinician on staff, type of facility and geographic region as covariates, to estimate a difference-in-differences (D-I-D) equation.

Results: The adjusted D-I-D analysis indicated that the proportion of SUD treatment sites offering antidepressants for psychiatric treatment increased 10% (95% CI 1%, 18%) in the Medicaid expansion sites compared to non-expansion sites. The D-I-D for other psychiatric medications was also 10% (95% 1%, 19%). No significant changes were observed in behavioral treatment or the combination measure. The strongest association between Medicaid expansion and offering medication for mental health comorbidities was the 34% increase observed for residential treatment settings (95% CI 10%, 59%).

Conclusion: Availability of psychiatric medication treatment in SUD treatment settings increased following Medicaid expansion, particularly in residential SUD facilities. This policy change has facilitated integrated treatment for the substantial share of SUD treatment patients with mental health comorbidities, with the greatest benefit for patients receiving SUD treatment in residential programs.

1. Introduction

1.1. Co-occurring mental health disorders among patients with substance use disorders

In general population surveys in the United States, an estimated 30%–70% of individuals with a substance use disorder (SUD) diagnosis also have a co-occurring mental health diagnosis (i.e., dual diagnosis) (Brady & Sinha, 2005; Forman-Hoffman, Batts, Hedden, Spagnola, & Bose, 2018; Kessler, Berglund, Demler, Jin, & Walters, 2005). In one of the most recent publications to examine this topic, half of respondents in the 2008–2012 Mental Health Surveillance Study who met diagnostic criteria for a SUD in the past year also met diagnostic criteria for another psychiatric disorder in the past year (Forman-Hoffman et al., 2018). Treating the SUD and psychiatric condition at the same time appears to improve outcomes (Drake, Mueser, Brunette, & McHugo, 2004; Horsfall, Cleary, Hunt, & Walter, 2009; Vitali et al., 2018). The evidence on whether integrated treatment – that is, providing treatment within the same facility – improves outcomes is mixed but promising (Drake et al., 2004; Horsfall et al., 2009; Kikkert, Goudriaana, De Waal, Peen, & Dekker, 2018). In a recent randomized controlled trial of patients with comorbid SUD and severe mental illness, those treated by teams of providers who were trained in Integrated Dual Disorder Treatment – an approach wherein the team members treat psychiatric and SUD symptoms at the same time – had fewer substance use days than patients treated by teams providing psychiatric care alone (Kikkert

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et al., 2018).

1.2. Recent changes to United States healthcare policy

In 2008, the Mental Health Parity and Addiction Equity Act (MHPAEA) required large employer insurance plans (50 employees or more) that offered mental health or SUD benefits to offer these with no more restrictions than were present for the rest of medical/surgical benefits. The 2010 Affordable Care Act (ACA), which was implemented on January 1, 2014, contained several provisions that expanded access to mental health treatment and SUD treatment in the United States (Beronio, Po, Skopec, & Glied, 2013). The ACA extended the parity requirements to the small employer and individual health insurance markets (Humphreys & Frank, 2014). The ACA also defined mental health and SUD treatment as an essential health care benefit that had to be covered in state health insurance exchanges and in the expanded Medicaid population, and extended Medicaid coverage to several million people with SUD (Abraham et al., 2017). Most of the increase in number of people insured following ACA implementation came from uninsured patients signed up for Medicaid. The proportion of patients of SUD treatment settings covered by Medicaid increased following implementation of the ACA (Andrews et al., 2019). We hypothesize that Medicaid expansion would lead to more individuals with co-occurring SUD and mental health disorders to receive more care that integrates SUD and mental health treatment.

1.3. Study objectives

Using data from two consecutive waves of the National Drug Abuse Treatment Services Study (NDATSS), we examined the effect of the implementation of Medicaid expansion as the Affordable Care Act on provision of mental health services (including medication and behavioral treatment) in SUD treatment settings. We hypothesized that in states that expanded Medicaid in 2014 or 2015, the proportion of SUD treatment settings with integrated or associated (contract) mental health care would be greater in 2016–2017 compared to 2013–2014. In addition to these policy changes, we expected that some facility-level factors would influence whether a given site offered psychiatric treatment.

Broadly, we hypothesized that main drivers of providing integrated treatment would be capacity to provide psychiatric treatment (captured by presence of prescribing clinician on staff, caseload per provider, length of treatment), need in the patient population (approximated by proportion of clients with psychiatric comorbidities), and site characteristics (region, organizational mission, site-specific random effects). Though the question of integrated substance use and mental health care might be considered in a number of settings, we anchored our analysis in SUD treatment settings because of their potential as a first contact for medical care, particularly patients with psychiatric comorbidity, which is a strong predictor of low social capital in SUD patients (Stoffelmayr, Benishek, Humphreys, Lee, & Mavis, 1989). We compared the influence of Medicaid expansion by type of SUD treatment facility – outpatient, inpatient, or residential – to investigate whether the policy change had heterogeneous effects for different settings where SUD treatment is provided.

2. Methods

2.1. Survey overview

The National Drug Abuse Treatment System Survey (NDATSS) is a nationally representative longitudinal study of SUD treatment programs in the United States. NDATSS employs a split-panel design, conducting internet-based surveys with directors and supervisors of treatment sites included in previous waves, and selecting a representative sample of new sites each wave. This analysis uses director and supervisor data from the 2013–2014 survey (n = 660), for which interviews were conducted from November 2013 through May 2014 and the 2016–2017 survey (n = 638), for which interviews were conducted from September 2016 through May 2017. Eighty-three percent (n = 548) of those surveyed in the 2013–14 wave were also surveyed in 2016–2017. We did not restrict our analysis to sites that were surveyed twice, but we did perform a sensitivity analysis to investigate whether results would have changed if we had. Sites were sampled from a sampling frame that included all SUD treatment sites in the Substance Abuse and Mental Health Services Administration's Treatment Locator. Responses were weighted to achieve a nationally representative sample and address potential non-response bias. The response rate was 86% in the 2013–2014 wave and 87% in the 2016–2017 wave (Andrews et al., 2019). Detailed methods for the survey are available in previous publications (Andrews et al., 2018; D'Aunno, Friedmann, Chen, & Wilson, 2015; Grogan et al., 2016). The hypothesis and analysis plan were registered on Open Science Forum (DOI: 10.17605/OSF.IO/HY9GX).

2.2. Dependent variables

This analysis used binary responses to the supervisor questionnaire to assess delivery of six types of mental health services. Provision of antidepressants was measured by the question “In the most recent complete fiscal year, did your program provide antidepressant medication for cooccurring mental disorders?” Provision of benzodiazepines was measured by the question “In the most recent complete fiscal year, did your program provide benzodiazepines for cooccurring mental disorders?” Provision of other psychiatric medications was measured with the question, “In the most recent complete fiscal year, did your program provide psychotropic medication (other than antidepressants) for cooccurring severe mental illness?” Provision of behavioral treatment was measured by the question, “Did any of your unit's substance abuse treatment clients receive behavioral treatment for mental health problems?” For all of these, sites where supervisors answered “Yes” were coded as one and sites where supervisors answered “No” were coded as zero. Two composite measures, any psychiatric medication, and any psychiatric treatment, were coded as one if at least one of the three services was offered and no otherwise.

The proportion of clients with mental health and SUD comorbidities receiving treatment was assessed by follow-up questions about each therapy that were asked only if the supervisor reported the site provided that kind of treatment. For antidepressants and other psychiatric medications, this question was asked as follows: “What percent of clients with both mental health and substance abuse problems received this therapy?” The proportion receiving behavioral therapy was assessed over the whole patient population (“What percent of your unit's substance abuse treatment clients received behavioral treatment for mental health problems?”).

2.3. Independent variable

Difference-in-differences is a method of estimating the impact of a policy change by comparing change in an outcome before and after the policy change in a group that had the change (“treatment group”) to a group that did not have the change (“control group”) (Dimick & Ryan, 2014). To estimate the impact of the most salient part of the Affordable Care Act (Medicaid expansion), we calculated a difference-in-difference from 2014 to 2017, comparing sites in states that expanded Medicaid in 2014 versus states that either expanded Medicaid later or not at all (Kaiser Family Foundation, 2019).

2.4. Covariates

The survey established facilities as outpatient, inpatient, or residential. We investigated need – as approximated by the question “Currently, what percent of your unit's active substance abuse clients

have both mental health and substance abuse problems?" We measured capacity with three variables. The first was having a prescribing clinician on staff (physician or nurse practitioner/physician assistant with prescribing capabilities) based on the rationale that having a staff member who could write prescriptions (as opposed to via contract or not at all) may facilitate integration of pharmacotherapy for co-occurring psychiatric disorders. The second was average length of treatment in months, based on the rationale that sites that primarily offer shorter treatment (e.g., acute detox care) may be less likely to treat comorbidities in-house than to provide referrals. Finally, we included a variable to measure average caseload per staff member based on the rationale that the provider to patient ratio may indicate the capacity to provide more comprehensive care for each patient. We also expected both Medicaid expansion and the types of treatments provided to differ by region (Northeast, Midwest, South, West) as regional differences in substance use disorder treatment, Medicaid spending, and healthcare generally have been documented (Knudsen, 2015; Kronick & Gilmer, 2012; Wennberg & Gittelsohn, 1973).

2.5. Statistical methods

Descriptive statistics – mean, frequencies, interquartile range (IQR) – were calculated with survey weights. We modeled Medicaid expansion as an interaction between time and Medicaid policy (1 for states that implemented Medicaid expansion in 2014 or 2015; 0 for states that implemented Medicaid expansion later or not at all). We compared sites in states that expanded Medicaid to sites in states that did not. We constructed a mixed-effects linear regression model for each outcome, with the interaction variable as the main exposure, to conduct a difference-in-differences analysis. To do this, we specified a mixed effects regression with Medicaid policy, region, and type of facility as fixed effects. We specified site as a random effect to take advantage of the panel design in estimating change in provision of services after accounting for unique characteristics that may separate sites from each other. Time-varying effects included year, proportion of clients with mental health comorbidities, and three variables that measured a facility's capacity to provide psychiatric treatment. A statistical significance level of alpha = 0.05 was used, and 95% confidence intervals were reported. Complete case analysis was used. To validate the approach of a complete case analysis, predictors of missingness were examined through χ^2 tests (categorical variables) and logistic regression (continuous variables). A post hoc analysis stratifying by type of facility (outpatient, inpatient, or residential) was conducted to examine whether the impact of Medicaid expansion was different for different kinds of SUD treatment programs. For the post hoc analysis we modeled only the medication outcomes. Analyses were conducted in SAS 9.4 and Stata 13.1 (Fig. 1).

3. Results

3.1. Descriptive results

In total, data from 1298 treatment sites were included. The 2013–2014 wave included 660 sites, 468 (71%) of which were located in states that would expand Medicaid in 2014 or 2015. The 2016–2017 wave included 638 sites, of which 436 (68%) were located in states that expanded Medicaid in 2014 or 2015. The proportion of clients on Medicaid increased from 2014 to 2017, which a previous study using NDATSS found to be attributable to Medicaid expansion (Andrews et al., 2019). Behavioral treatment was the most common type of psychiatric treatment at SUD treatment facilities, with 78% of sites offering behavioral treatment and about 40% offering antidepressants or other psychiatric medications. Benzodiazepines were less commonly offered, at about 16% of sampled sites (Table 1). At sites that offered antidepressants, on average 48% of patients with mental health comorbidities received antidepressants (IQR = 26–70%). At sites that offered other psychiatric medication, 39% of patients with mental health comorbidities received other psychiatric medications (IQR = 15–60%). At sites offering behavioral treatment, 49% of all clients, regardless of comorbidities, received behavioral therapy (IQR = 25–75%).

3.2. Antidepressants and other psychiatric medications

In 2014, 44% of sites in states that expanded Medicaid offered antidepressants, compared to 45% of sites in states that did not expand Medicaid. In 2017, 48% of sites in states with Medicaid expansion offered antidepressants, compared to 40% of sites in states without Medicaid expansion. This corresponded to a difference-in-differences of 10% (95% CI 1%, 18%) when adjusted for average length of treatment in months, percentage of a site's clients with mental health comorbidities, average caseload, average treatment length, presence of a prescribing clinician on staff, type of facility, and geographic region (Table 2). Northeast geographic region was significantly associated with offering more antidepressants than sites in the Midwest, South, and West.

Results for other psychiatric medications were similar to those for antidepressants. The proportion of sites offering other psychiatric medications increased from 40% to 43% in sites in Medicaid expansion states, while the proportion decreased from 41% to 35% in sites without Medicaid expansion. The adjusted difference-in-differences was 10% (95% CI 1%, 19%). As with antidepressants, geographic region, treatment length, caseload, presence of prescribing clinician, type of facility and proportion of clients with mental health comorbidities were all significantly associated with percentage of clinics offering other psychiatric medication. No significant change in benzodiazepine prescribing was observed.

3.3. Behavioral treatment and composite models

There was not a significant difference-in-differences in offering behavioral treatment (0.4%, 95% CI −9%, 10%) or in the composite "any psychiatric treatment" models. However, the "any psychiatric medication" model did show a difference-in-differences of 11% (95% CI 3, 20). Significant regional differences were also observed for the medication models but not the models that included behavioral treatment. As a sensitivity analysis, we re-ran the six models restricting to only the sites that were sampled in both time periods and found no significant differences compared to the full sample.

3.4. Impact of Medicaid expansion greatest in residential treatment

After finding that inpatient and residential SUD treatment programs were significantly more likely to offer antidepressants and other psychiatric medications compared to outpatient treatment programs, we conducted a post hoc analysis to examine whether the impact of Medicaid expansion differed by type of treatment program. For residential and outpatient programs, we conducted a difference-in-differences analysis, adjusting for the same covariates in the above models. The sample size of inpatient programs with complete data on independent variables and covariates (n = 68) was too small to support the model, so we have omitted them from the post-hoc analysis. For residential SUD treatment programs, Medicaid expansion was associated with a 34% increase (95% CI 10%, 59%) in offering any psychiatric medication (Table 3). Within the outpatient stratum, the 7% estimate for Medicaid expansion was not significant at the 0.05 level, but the resulting confidence interval was most compatible with a positive association (95% CI −0.3%, 16%).

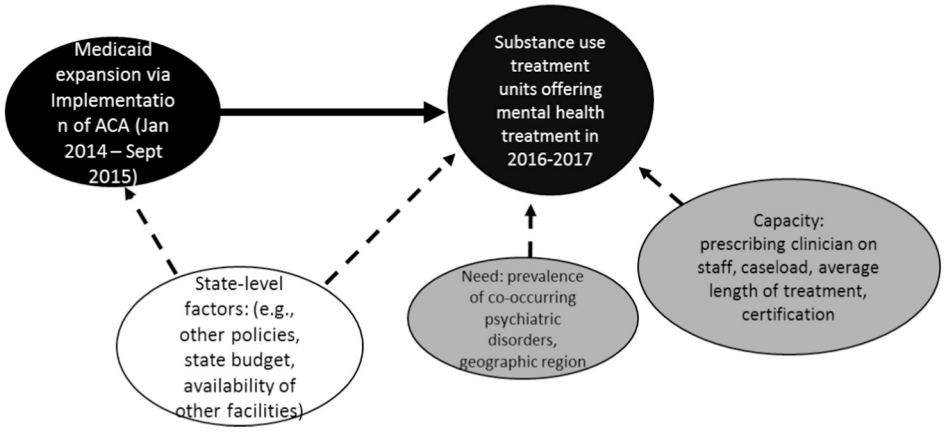

Fig. 1. Directed acyclic graph of hypothesized relationship between Medicaid expansion and treatment for co-occurring psychiatric disorders at substance use disorder treatment units.
Legend: black = main exposure and outcome, grey = time-varying covariates, white = fixed effects, solid line = direct effect (quantity of interest), dashed lines = relationships controlled for in regression model.

Table 1
Characteristics of U.S. substance use disorder treatment facilities in NDATSS, 2013–2014 and 2016–2017, n = 1298.

	2013–2014			2016–2017		
	n (sample)	% (sample)	% (weighted)	n (sample)	% (sample)	% (weighted)
Medicaid expansion in 2014	468	71%	67%	436	68%	65%
Region						
Northeast	188	28%	20%	179	28%	21%
Midwest	156	24%	23%	149	23%	22%
South	170	26%	28%	172	27%	29%
West	146	22%	28%	138	22%	27%
Type of facility						
Outpatient	503	76%	73%	487	76%	74%
Inpatient	43	7%	4%	46	7%	4%
Residential	114	17%	23%	105	16%	21%
Prescribing clinician on staff	276	42%	29%	278	44%	34%
Proportion of clients with comorbid mental health conditions						
< 10%	50	8%	11%	65	10%	10%
10– < 25%	57	9%	11%	35	5%	7%
25– < 50%	69	10%	22%	142	22%	21%
50–75%	178	27%	23%	193	30%	29%
> 75%	206	31%	33%	203	32%	33%
Typical time length of treatment						
< 1 month	78	12%	10%	49	8%	6%
1– < 6 months	276	42%	52%	231	36%	50%
6–12 months	139	21%	28%	140	22%	27%
> 12 months	117	18%	11%	152	24%	16%
Caseload (number of patients per staff person)						
10 or fewer	132	20%	27%	120	19%	23%
11–25	156	24%	32%	142	22%	31%
26–40	149	23%	22%	147	23%	25%
> 40	165	25%	18%	163	26%	21%
Provides antidepressants	284	43%	45%	271	42%	45%
Provides benzodiazepines	113	17%	*19%*	105	16%	20%
Provides other psychiatric medications	256	39%	42%	241	38%	41%
Provides behavioral therapy	493	75%	78%	463	73%	78%
Any psychiatric treatment	525	80%		488	76%	81%
Percent of clients covered by Medicaid						
None	264	40%	58%	232	36%	49%
0 < −10%	80	12%	11%	74	12%	16%
10 < −25%	69	10%	11%	60	9%	11%
25 < −50%	59	9%	11%	55	9%	9%
50 < −75%	42	6%	6%	45	7%	9%
75 < −100%	21	3%	3%	40	6%	7%
Missing	125	19%	15%	132	21%	15%
Total	660	100%	100%	638	100%	100%

Table 2
Results of random effects linear regression models predicting the percent change in proportion of substance use disorder treatment settings offering psychiatric treatment.

	Antidepressants β (95% CI)	Benzodiazepines β (95% CI)	Other psychiatric medication β (95% CI)	Any psychiatric medication β (95% CI)	Behavioral therapy β (95% CI)	Any psychiatric treatment β (95% CI)
Difference in differences (Interaction between year and Medicaid expansion)	9.6 (1.0, 18.2)	4.0 (−4.1, 12.1)	9.9 (1.0, 18.8)	11.1 (2.4, 19.7)	0.4 (−8.9, 9.7)	3.1 (−5.3, 11.4)
Year (2017 vs. 2014)	−5.7 (−12.9, 1.5)	−3.7 (−10.4, 3.1)	−6.5 (−13.9, 1.0)	−6.0 (−13.3, 1.2)	0.8 (−7.0, 8.6)	−1.9 (−8.9, 5.1)
Medicaid expansion	−2.6 (−13.1, 7.9)	−3.3 (−11.7, 5.2)	−4.4 (−14.8, 6.0)	−1.6 (−12.2, 8.9)	3.0 (−6.2, 12.2)	0.4 (−8.1, 8.9)
Treatment length (months)	−0.2 (−0.4, 0.02)	0.02 (−0.1, 0.2)	−0.2 (−0.4, −0.04)	−0.2 (−0.4, 0.01)	0.1 (−0.1, 0.3)	0.04 (−0.1, 0.2)
At least one prescribing clinician on staff	9.2 (3.4, 14.9)	5.6 (0.7, 10.5)	11.2 (5.4, 17.0)	9.6 (3.9, 15.4)	4.2 (−1.2, 9.6)	5.1 (0.1, 10.0)
Proportion of clients with mental health comorbidities	0.2 (0.1, 0.3)	0.2 (0.1, 0.3)	0.3 (0.2, 0.4)	0.2 (0.1, 0.3)	0.3 (0.2, 0.4)	
Type of facility (ref = outpatient)						
Inpatient	46.5 (31.4, 61.6)	16.5 (4.6, 28.3)	42.9 (28.1, 57.8)	44.2 (29.1, 59.3)	6.4 (−6.5, 19.2)	15.8 (3.9, 27.8)
Residential	19.9 (9.1, 30.7)	2.2 (−6.2, 10.7)	13.1 (2.5, 23.7)	18.2 (7.4, 29.0)	14.5 (5.3, 23.6)	12.6 (4.1, 21.1)
Caseload (ref = 10 or fewer)						
11–25	7.3 (−2.0, 16.5)	1.5 (−6.2, 9.3)	5.8 (−3.5, 15.1)	6.3 (−3.0, 15.6)	5.9 (−2.6, 14.5)	6.6 (−1.3, 14.5)
26–40	3.0 (−7.9, 14.0)	1.8 (−7.2, 10.9)	1.1 (−9.8, 12.0)	1.7 (−9.2, 12.6)	8.7 (−1.2, 18.6)	7.6 (−1.6, 16.7)
> 40	5.4 (−5.7, 16.6)	3.2 (−6.1, 12.3)	2.9 (−8.2, 14.0)	3.9 (−7.2, 15.1)	−0.5 (−10.6, 9.6)	1.1 (−8.2, 10.5)
Region (ref = Northeast)						
Midwest	−11.6 (−21.0, −2.2)	4.2 (−3.1, 11.4)	−9.3 (−18.5, −0.1)	−11.7 (−21.1, −2.3)	−3.2 (−11.0, 4.6)	−3.3 (−10.6, 4.0)
South	−12.9 (−24.6, −1.2)	−1.4 (−10.4, 7.7)	−12.3 (−23.7, −0.9)	−10.7 (−22.4, 1.0)	−6.1 (−15.8, 3.5)	−7.2 (−16.3, 1.8)
West	−16.7 (−26.2, −7.2)	5.8 (−1.5, 13.1)	−13.8 (−23.1, −4.5)	−17.0 (−26.5, −7.5)	−7.8 (−15.6, 0.2)	−9.8 (−17.2, −2.5)
Effective sample size	1092	1083	1087	1093	1089	1093

4. Discussion

4.1. Increased provision of psychiatric medication for mental health comorbidities

Medicaid expansion was associated with a statistically significant increase in sites providing antidepressants and some other psychiatric medications. This finding suggests that the expansion of SUD treatment access that occurred through the ACA's Medicaid expansion (Abraham et al., 2017) also extends to the care of co-occurring mental health disorders among patients in the formal addiction treatment system. Notably, the increase in prescription medications being offered in settings with expanded Medicaid points to an impact of expanded mandatory coverage areas. The increase was most evident in residential SUD treatment.

4.2. No increase in behavioral therapy

Before and after Medicaid expansion, the proportion of treatment settings offering behavioral counseling was substantially higher than the proportion offering psychiatric medication. Residential and inpatient treatment settings were more likely than outpatient facilities to prescribe medications for mental health comorbidities, and the association between Medicaid expansion and prescribing these medications was strongest in residential treatment settings. The high proportion of sites offering behavioral treatment, along with variation in what the term “behavioral treatment” encompasses may contribute to why a significant difference was not observed for this outcome nor for psychiatric treatment overall. It is unsurprising that most facilities offer something they would classify as behavioral treatment – e.g., cognitive behavioral therapy, peer counseling, and case management, support groups, or other types of talk therapy – regardless of whether it was specifically intended to address psychiatric comorbidities. Without more detailed information about the kind of behavioral treatment, we cannot generalize about the frequency, form, or staff who provide it; whereas the medications suggest at minimum a physician or nurse practitioner is involved in treatment to prescribe the medications. Furthermore, among sites that offered behavioral treatment, on average they provided behavioral treatment to half of their clients, suggesting that this may not be an exact measure of treatment specifically for people with psychiatric comorbidities.

4.3. Differences by facility characteristics

Need was consistently associated with providing psychiatric treatment at the SUD treatment facilities: proportion of patients with mental health comorbidities was positively associated with providing each of the psychiatric therapies. In terms of capacity, having a staff member with prescribing capabilities was strongly associated with providing any of the medications, which is logical as having a prescribing clinician on staff facilitates pharmacotherapy with fewer barriers than may exist when only contractors can prescribe. After accounting for need, capacity, and Medicaid expansion, SUD treatment facilities in the Midwest and West were significantly less likely than those in the Northeast to offer psychiatric medications. This regional difference highlights a priority for nationwide studies to examine geographic variations in implementation of Medicaid expansion and other health policy enacted on the state level.

On the one hand, the results are encouraging regarding the positive association of Medicaid expansion and increased services for some of the most vulnerable patients in the health care system: individuals with both mental health and substance use disorders. Although we do not have outcome data on patients, provision of a broader range of evidence-based services is generally considered an important process-focused index of quality of care (Humphreys & McLellan, 2011). To the extent that the effects here were attributable to the ACA's Medicaid

Table 3
Adjusted association between Medicaid expansion and providing psychiatric medication for patients with co-occurring mental health and substance use disorders, stratified by type of facility.

	Antidepressants β (95% CI)	Benzodiazepines β (95% CI)	Other psychiatric medications β (95% CI)	Any psychiatric medications β (95% CI)
Residential (n = 196)				
Difference in differences (Interaction between year and Medicaid expansion)	34.2 (9.9, 58.6)	7.6 (−15.5, 30.8)	34.2 (10.4, 58.0)	34.2 (9.9, 58.6)
Year (2017 vs. 2014)	−23.0 (−43.2, −2.7)	−7.3 (−26.5, 12.0)	−21.8 (−41.6, −2.0)	−23.0 (−43.2, −2.7)
Medicaid expansion	−31.2 (−57.9, −4.6)	−17.2 (−38.1, 3.7)	−34.7 (−61.4, −7.9)	−31.2 (−57.9, −4.6)
Treatment length (months)	0.1 (−2.6, 2.9)	1.4 (−0.8, 3.6)	0.1 (−2.7, 2.9)	0.1 (−2.6, 2.9)
Proportion of clients with mental health comorbidities	−0.04 (−0.3, 0.2)	0.1 (−0.2, 0.3)	0.2 (−0.1, 0.5)	−0.04 (−0.3, 0.2)
At least one prescribing clinician on staff	23.3 (7.0, 39.7)	12.7 (−1.1, 26.4)	23.0 (6.7, 39.3)	23.3 (7.0, 39.7)
Caseload (ref = 10 or fewer)				
11–25	−3.1 (−19.7, 13.3)	−10.9 (−24.2, 2.4)	−4.2 (−20.7, 12.2)	−3.1 (−19.7, 13.4)
26–40	−26.9 (−73.4, 19.6)	−19.2 (−59.4, 21.0)	−29.3 (−75.2, 16.6)	−26.9 (−73.4, 19.6)
> 40	49.3 (−14.6, 113.7)	22.2 (−32.6, 77.1)	57.0 (−6.1, 120.2)	49.3 (−14.6, 113.3)
Region (ref = Northeast)				
Midwest	−13.1 (−36.9, 10.6)	9.4 (−8.0, 26.9)	−10.8 (−34.8, 13.2)	−13.1 (−36.9, 10.6)
South	−20.5 (−51.7, 10.8)	−3.9 (−27.1, 19.2)	−22.0 (−53.5, 9.6)	−20.5 (−51.7, 10.8)
West	−18.3 (−40.0, 3.4)	9.9 (−5.9, 25.7)	−16.7 (−38.7, 5.2)	−18.3 (−40.0, 3.4)
Outpatient (n = 829)				
Difference in differences (Interaction between year and Medicaid expansion)	6.8 (−0.3, 16.4)	2.3 (−6.5, 11.1)	5.9 (−4.0, 15.8)	8.8 (−0.7, 18.2)
Year (2017 vs. 2014)	−3.7 (−11.6, 4.2)	−2.4 (−9.8, 4.9)	−5.1 (−13.4, 3.2)	−4.2 (−12.1, 3.8)
Medicaid expansion	2.6 (−9.5, 14.6)	2.4 (−6.9, 11.7)	2.0 (−9.8, 13.9)	3.7 (−8.4, 15.7)
Treatment length (months)	−0.2 (−0.3, 0.04)	0.02 (−0.1, 0.2)	−0.2 (−0.4, −0.03)	−0.2 (−0.4, 0.04)
Proportion of clients with mental health comorbidities	0.2 (0.1, 0.3)	0.2 (0.1, 0.3)	0.3 (0.2, 0.4)	0.2 (0.1, 0.4)
At least one prescribing clinician on staff	6.6 (0.2, 13.1)	2.3 (−3.1, 7.7)	8.6 (2.1, 15.2)	7.0 (0.9, 13.8)
Caseload (ref = 10 or fewer)				
11–25	14.5 (1.0, 28.1)	7.3 (−3.8, 18.3)	12.8 (−0.8, 26.4)	12.1 (−1.5, 25.7)
26–40	10.1 (−3.8, 24.0)	6.7 (−4.5, 17.9)	8.1 (−5.8, 22.0)	7.4 (−6.5, 21.4)
> 40	11.8 (−2.1, 25.7)	8.3 (−2.9, 19.5)	9.1 (−4.8, 23.0)	9.0 (−5.0, 22.9)
Region (ref = Northeast)				
Midwest	−12.0 (−23.0, −1.1)	3.1 (−5.0, 11.2)	−9.0 (−19.6, 1.6)	−12.3 (−23.2, −1.4)
South	−12.8 (−26.2, 0.7)	2.6 (−7.5, 12.6)	−9.7 (−22.8, 3.4)	−10.2 (−23.6, 3.3)
West	−17.5 (−28.7, −6.3)	5.0 (−3.3, 13.3)	−13.7 (−24.6, −2.9)	−18.1 (−29.2, −6.9)

expansion, it would have filled one of its goals which was to bring healthcare to high need, low income populations who would otherwise have been untreated. On the other hand, the fact that the greatest increase occurred in residential SUD treatment settings is concerning given that these facilities make up only about 20–25% of SUD treatment facilities and 90% of patients who receive SUD treatment do so through outpatient facilities (Substance Abuse and Mental Health Services Administration, 2017).

4.4. Limitations

This manuscript has several limitations. First, because only two time points were available, we were not able to perform a test for parallel trends (Andrews et al., 2019). Second, we were not able to determine the proportion of dual diagnosis patients who received mental health treatment. Because the questions about proportion receiving antidepressants and other medication did not capture overlap, it was only possible to estimates the bounds of the proportion of patients with SUD and psychiatric comorbidities who received medication therapy. Therefore, the proportion of people with psychiatric comorbidities who received psychiatric medication may be as low as 48% (if all patients who receive other medications also receive antidepressants) or as high as 87% of patients (if all patients receive only one of the medications). Similarly, because the question about proportion of patients receiving behavioral treatment did not distinguish between those with and without psychiatric comorbidities, it was not possible to determine what share of patients with psychiatric comorbidities received behavioral therapy. Differing interpretations of "severe mental illness" in the question about providing other psychiatric medications could lead respondents to underreport use of other psychiatric medications. If a supervisor interpreted the term "severe mental illness" to refer solely to a population not served at the facility, then they might answer "no" to the question about other psychiatric medication even if the facility does prescribe other psychiatric medication for "non-severe" mental illness.

Third, the data collection time frame in the first wave included several months immediately after the implementation of Medicaid expansion, so some degree of misclassifying post-expansion as pre-expansion is possible. We assessed the potential magnitude of this and found it to be very low.

Fourth, an ideal study of provision of psychiatric treatment, particularly medication, would include clinical or prescription records to verify information reported in the survey. Because this was not available, answers to questions about treatment may be subject to social desirability bias in reporting. If supervisors were motivated to overreport more treatment modalities or number of patients treated, this would lead the estimates to be biased away from the null. This could lead to biased estimates of the difference-in-differences if over- or underreporting were associated with Medicaid expansion status or time period. It is not clear whether or why this would differ by Medicaid expansion status or time period, so it does not seem likely that this was a major concern. Using NDATSS instead of obtaining medical records made it possible to analyze the impact of Medicaid expansion on SUD treatment settings across the United States, while obtaining medical records would likely have limited the scope and size of the study. Fifth, due to the observational nature of the NDATSS study design, we cannot tell if Medicaid expansion caused the changes observed.

Despite these limitations, this analysis provides important information about the association between ACA's Medicaid expansion and therapies for mental health disorders in patients treated for SUD. The increase in SUD treatment programs offering psychiatric medication in

states that expanded Medicaid demonstrates one way increasing access to health insurance can promote integrated health services.

4.5. Future directions

This study adds to the growing literature on the effects of Medicaid expansion on SUD treatment. Future studies with a primary, hypothesis-driven objective to examine differences by type of treatment settings are warranted, particularly with a larger sample of inpatient SUD facilities, to determine if the results for residential treatment settings we observed in a post-hoc analysis represent a true difference. Understanding the impact of Medicaid expansion on increasing access to and quality of care can inform public health and policy initiatives to improve health care for people with SUD and comorbidities.

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