

APPENDIX

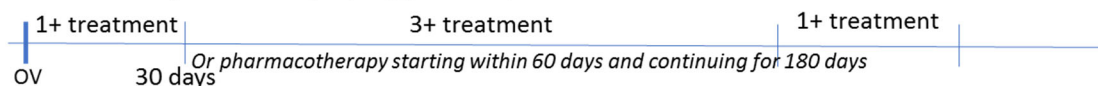
Engagement in Treatment

We developed a definition of *engaged* in treatment to capture individuals who experienced a significant period of treatment following the index event (Figure A1). We stratified the populations with serious mental illness (or substance use disorder) into engaged in treatment and comparison groups. To qualify as engaged in treatment, we required at least five separate days of *outpatient treatment* in the 180 days following the index event, with at least one day of treatment falling in the first 30 days after an outpatient index event or in the first 60 days following an inpatient index event. To define an outpatient encounter, we used the Healthcare Effectiveness Data and Information Set (HEDIS) Adult Core Value Set, specifically the definition found in the Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment, Follow-Up After Hospitalization for Mental Illness, Detoxification, Behavioral Health Outpatient, and Anthem Psychotherapy and Residential Treatment Opioid Use Disorder codes. *Outpatient treatment* was defined as a subset of *outpatient encounters*, which excluded urgent care or medication management (see Appendix Table A18). We required a follow-up visit to occur approximately six months following enrollees' first treatment visit to ensure continuity of care. Operationally, this meant we required at least one day of outpatient treatment to fall between 151 to 210 days following the index event.

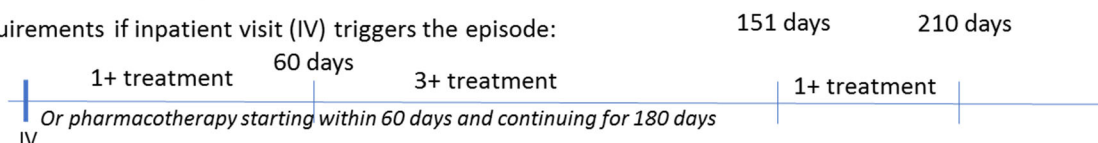
FIGURE A1. Definition of *Engaged* and *Not Engaged* in Treatment

Engaged:

Requirements if outpatient visit (OV) triggers the episode:

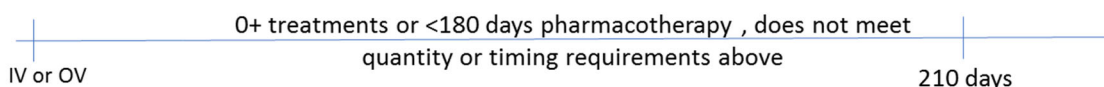


Requirements if inpatient visit (IV) triggers the episode:



Not engaged:

Episode is triggered but does not meet criteria for engaged:



Pharmacotherapy treatment was another way to be engaged in treatment. An initial pharmacotherapy fill must have occurred within the first 60 days following the index event as described above. A seven-day gap between prescription fills was allowed, from the date of the initial fill through the entire 180-day follow-up period. Requiring that treatment occur across a span of time helps ensure that the definition of *engaged* in treatment captures a commitment to treatment that occurs over a significant period and not short-term periodic treatment. An individual who engaged in treatment via either outpatient treatment or pharmacotherapy was included in the treated population, whereas any individual who had a qualifying index event but fell short of both the outpatient treatment and pharmacotherapy requirements was included in the comparison group.

Propensity Score Analysis

The Toolkit for Weighting and Analysis of Nonequivalent Groups (TWANG) R package was used to account and control for potential confounding due to selection bias. The generalized boosted regression model is a data adaptive and nonparametric modeling technique; it automatically selects covariates and interaction terms to reach the optimal iteration that best balances treatment and comparison groups on baseline characteristics. This approach has been used previously in other analyses of substance use disorder treatment interventions (1,2).

The propensity score weights were calculated to balance baseline measures, including demographic characteristics such as age, sex, race/ethnicity (for Medicaid sample only); type of insurance; employee classification (for commercial sample only); year of index event; location (census region for commercial sample and state for Medicaid sample); utilization and health care spending 12 months before the index event; and general medical comorbidities. We used the standard effect size measure to assess the quality of propensity score weights (i.e., the balance achieved between groups on baseline measures), see Appendix Tables A2–A9. For all comparisons, we minimized differences between groups in pretreatment characteristics; no such measures differed by a standardized effect size of more than 0.2, which is a conventional threshold in propensity score analysis (3).

Spending and cost offsets were examined by setting (inpatient, outpatient, and emergency department), by service type (behavioral health treatment, other behavioral health treatment [any claim with a behavioral health diagnosis not included in treatment], and other health treatment), and by each of the three years of follow-up. For each combination of setting and service type, we estimated a propensity score weighted multivariate model to allow for doubly robust estimates (4). Models controlled for the same variables as used in the propensity matching. We then estimated the average treatment effect based on the assumption that the untreated population had an equal chance of being engaged in treatment.

Details about the Internal Classification of Diseases, Ninth and Tenth Revision code list used to identify serious mental illness, substance use disorders, chronic obstructive pulmonary disorder, chronic pain, diabetes, cardiovascular diseases, or hepatitis C, or about how drugs for pharmacotherapy were defined, are available from the authors upon request.

Study Population

We included enrollees who were aged 18 to 64 years during the study period whose insurer contributed medical, prescription drug, and behavioral health services claims to the MarketScan Databases. We excluded enrollees with any capitated claims because we were not certain that claims for all services provided were submitted. We also excluded enrollees who were dually eligible for Medicare and Medicaid because we did not have their Medicare claims. We defined separate study populations for enrollees with commercial insurance and those with Medicaid because differential reimbursement rates by payer may affect whether there is a cost offset. Finally, we required a minimum of four years of continuous enrollment to enable each subject to have a one-year clean period and three years of follow-up. Only three states contributing to the MarketScan Multi-State Medicaid Database met our inclusion criteria and thus were included in the study

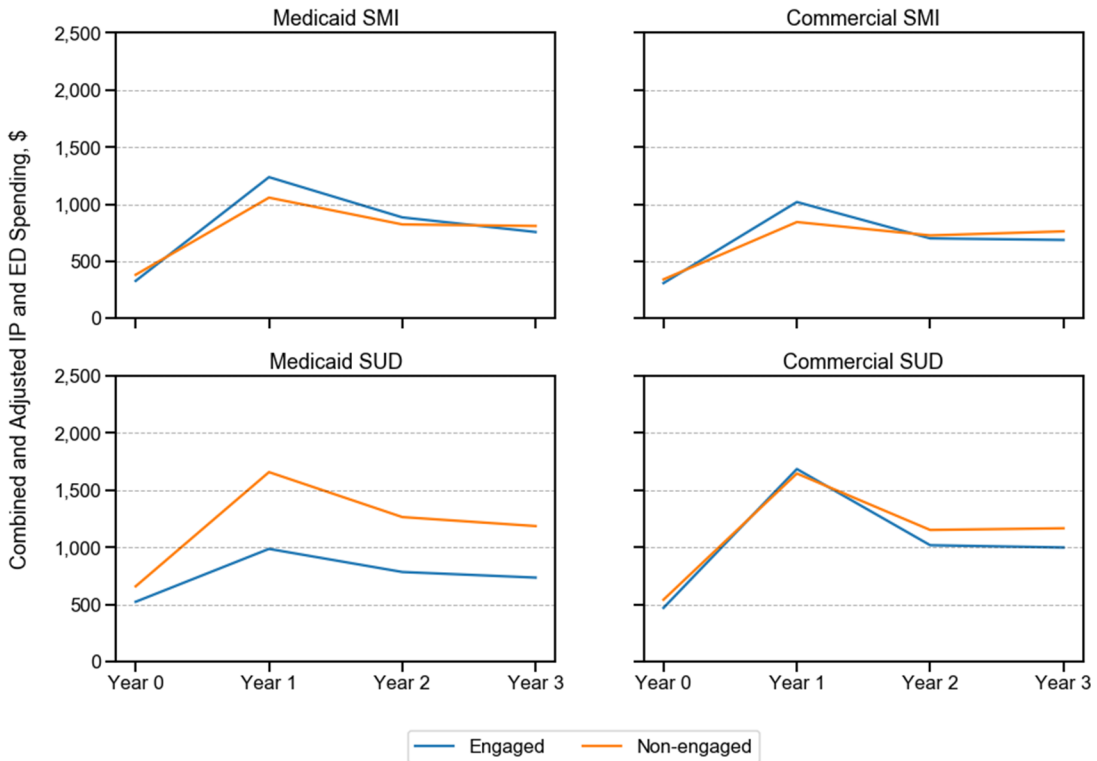
TABLE A1. Attrition table

Step	Serious mental illness		Substance use disorder	
	Medicaid	Commercial	Medicaid	Commercial
Starting population	23,861,190	125,142,161	23,861,190	125,142,161
Has at least 24 months of continuous enrollment	12,907,322	56,752,726	12,907,322	56,752,726
Aged 18–64 years during study	5,860,535	44,816,646	5,860,535	44,816,646
Had drug coverage	4,855,932	37,717,224	4,855,932	37,717,224
Had behavioral health coverage	4,726,304	31,883,837	4,726,304	31,883,837
Was not dually eligible	4,331,918	N/A	4,331,918	N/A
Non-negative claims	4,331,844	31,882,280	4,331,844	31,882,280
No capitated services	1,643,345	31,865,844	1,643,345	31,865,844
Has at least 1 SMI (or SUD) qualifying encounter during CE	130,746	840,019	67,440	343,957
SMI (or SUD) Index Diagnosis Event (with 12-month clean period)	14,281	163,345	11,849	107,408
Have 36 months CE following index Dx and received SMI (or SUD) treatment	1,108	11,030	497	4,331

Abbreviations: CE, continuous enrollment; Dx, diagnosis; N/A, not applicable; SMI, serious mental illness; SUD, substance use disorder.

Source: Authors' analysis of data from the IBM MarketScan Commercial and Multi-State Medicaid Databases.

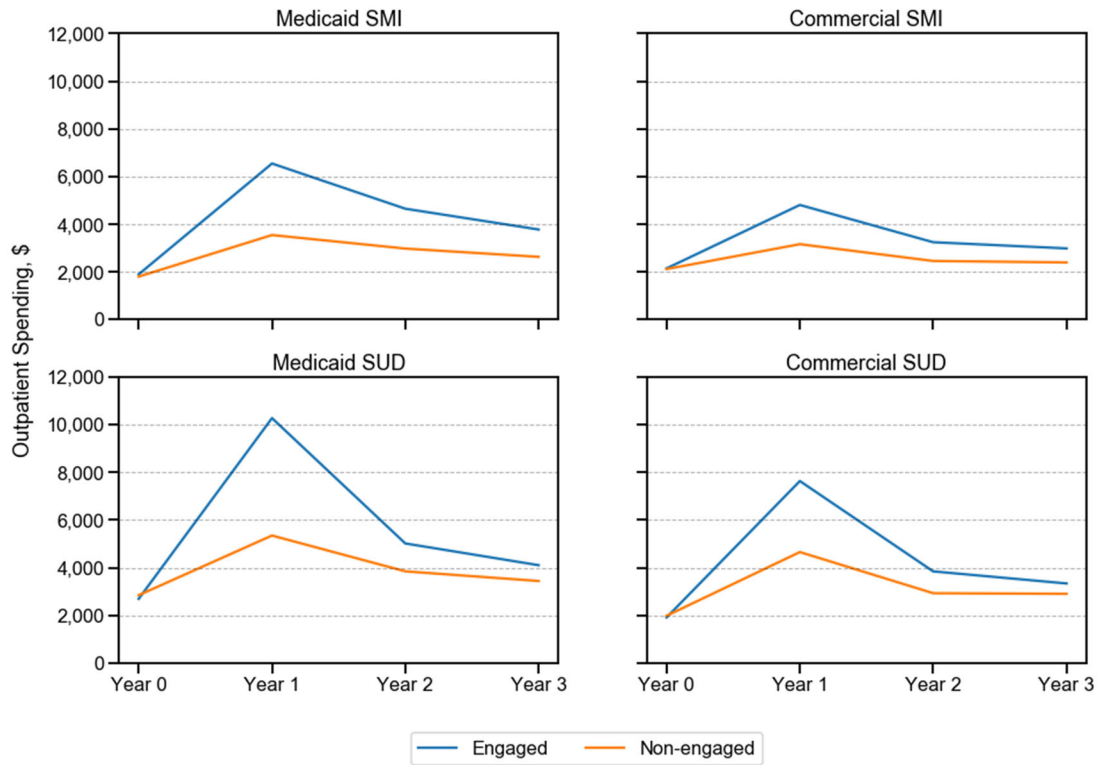
FIGURE A2. Adjusted combined inpatient and emergency department spending by year and engagement type for Medicaid and commercial population^{a,b}



^a IP, inpatient; OP, outpatient; SMI, serious mental illness; SUD, substance use disorder.

^b Source is authors' analysis of data from the IBM MarketScan Databases. All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. Significance testing was not calculated for the setting totals but was for all health care costs.

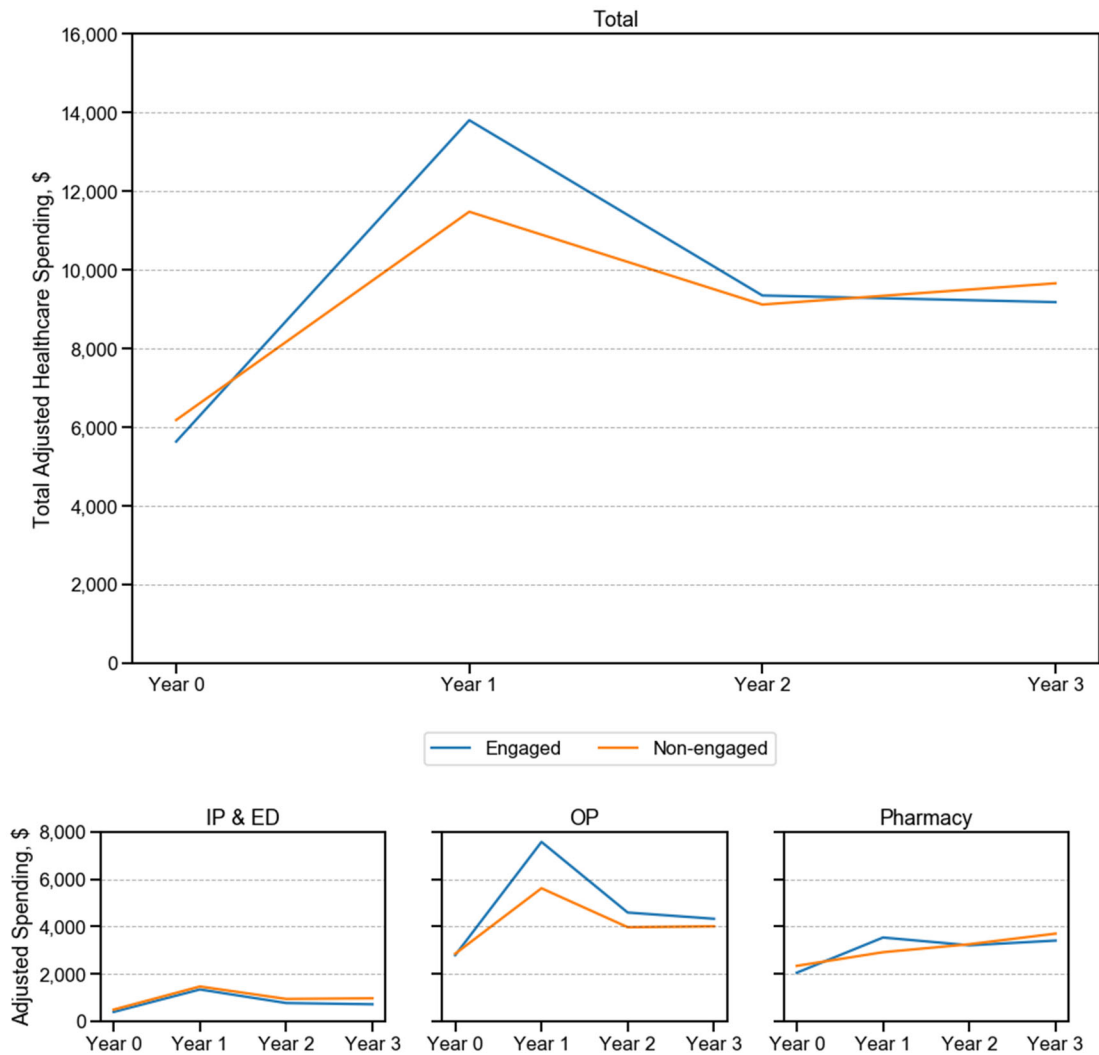
FIGURE A3. Adjusted outpatient spending by year and engagement type for Medicaid and commercial populations^{a,b}



^a SMI, serious mental illness; SUD, substance use disorder.

^b Source is authors' analysis of data from the IBM MarketScan Databases. All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. Significance testing was not calculated for the setting totals but was for all health care costs.

FIGURE A4. All health care costs by year for adults aged 44 -64 with a substance use disorder enrolled in commercial insurance^{a,b}



^a IP, inpatient; OP, outpatient.

^b Source is authors' analysis of data from the IBM MarketScan Databases. All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. Significance testing was not calculated for the setting totals but was for all health care costs. Total health care expenditures is not significantly different for all 3 study years.

TABLE A2. Propensity matching, before and after, Medicaid substance use disorder

Characteristic	Before weighting				After weighting			
	Engaged (n=442), mean	Not engaged (n=1,873), mean	Std. diff., %	P value	Engaged (n=395), mean	Not engaged (n=1,859), mean	Std. diff., %	P value
Age, continuous								
18–64 years	35.4	37.3	–14.0	0.008	36.4	37.0	–4.4	0.425
Sex of patient				0.557				0.474
Female	48.6	47.1	3.1		49.2	47.3	4.0	
Male	51.4	52.9	–3.1		50.8	52.7	–4.0	
Race, %				0.169				0.286
White	60.4	56.8	7.4		60.3	57.4	6.0	
Black	39.6	43.2	–7.4		39.7	42.6	–6.0	
Year of index diagnosis, %				0.368				0.619
2011	48.2	52.7	–9.1		55.3	51.8	7.1	
2012	19.0	16.8	5.6		15.7	17.2	–4.3	
2013	18.3	16.6	4.4		16.0	16.9	–2.5	
2014	14.5	13.8	1.9		13.0	14.0	–3.1	
Co-occurring disorders during 1- year clean period, % with disorder								
Diabetes	5.0	5.9	–4.1	0.465	5.3	5.7	–1.6	0.782
Serious mental illness	19.9	20.9	–2.6	0.635	20.5	20.7	–0.4	0.945
Other medical information during 1-year clean period								
With at least 1 inpatient stay, %	9.7	12.7	–10.1	0.085	9.7	12.4	–9.0	0.140
With at least 1 emergency department visit, %	49.8	57.3	–15.0	0.004	53.6	56.3	–5.4	0.330
Charlson Comorbidity Index	0.61	0.65	–2.7	0.610	0.64	0.64	0.1	0.990
Psychiatric Diagnosis Groups	1.24	1.37	–8.4	0.100	1.32	1.34	–1.5	0.785
All-health spending, \$ 2017	9,566	10,793	–5.5	0.249	9,998	10,596	–2.9	0.545

Abbreviations: Std. diff., standardized difference.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index.

Source: Authors' analysis of data from the IBM MarketScan Multi-State Medicaid Database.

TABLE A3. Propensity matching, before and after, Medicaid serious mental illness

Characteristic	Before weighting				After weighting			
	Engaged (n=923), mean	Not engaged (n=2,074), mean	Std. diff., %	P value	Engaged (n=849), mean	Not engaged (n= 2,035), mean	Std. diff., %	P value
Age, continuous								
18–64 years	33.92	31.28	19.9	<.0001	32.05	31.97	0.6	0.879
Sex of patient, %				0.077				0.346
Female	62.0	58.5	7.1		61.1	59.3	3.9	
Male	38.0	41.5	–7.1		38.9	40.7	–3.9	
Race, %				0.001				0.425
White	56.8	50.4	12.8		53.8	52.2	3.3	
Black	43.2	49.6	–12.8		46.2	47.8	–3.3	
Year of index diagnosis, %				0.024				0.725
2011	43.3	47.9	–9.3		47.4	46.8	1.3	
2012	17.4	18.6	–3.0		16.7	18.4	–4.5	
2013	23.9	20.0	9.3		21.7	20.8	2.3	
2014	15.3	13.5	4.8		14.2	14.0	0.3	
Co-occurring disorders during 1-year clean period, % with disorder								
Diabetes	4.9	3.9	4.7	0.198	3.7	3.9	–0.7	0.851
Substance use disorder	5.6	8.3	–11.5	0.011	6.3	7.6	–5.3	0.250
Other medical information during 1-year clean period								
With at least 1 inpatient stay, %	6.2	8.2	–8.6	0.049	6.5	7.7	–4.9	0.267
With at least 1 emergency department visit, %	45.6	49.9	–8.5	0.032	47.3	48.8	–2.9	0.474
Charlson Comorbidity Index	0.41	0.37	4.2	0.301	0.35	0.37	–2.3	0.535
Psychiatric Diagnosis Groups	0.85	0.92	–6.8	0.080	0.89	0.89	–0.2	0.959
All-health spending, \$ 2017	5,538	6,159	–3.9	0.321	5,581	5,857	–1.8	0.661

Abbreviations: Std. diff., standardized difference.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index.

Source: Authors' analysis of data from the IBM MarketScan Multi-State Medicaid Database.

TABLE A4. Propensity matching, before and after, commercial substance use disorder

Characteristic	Before weighting				After weighting			
	Engaged (n=4,314), mean	Not engaged (n=24,105), mean	Std. diff., %	P value	Engaged (n=4,132), mean	Not engaged (n=24,072), mean	Std. diff., %	P value
Age, continuous								
18–64 years	34.94	34.94	0.0	0.993	34.87	34.94	–0.4	0.807
Sex of patient, %				0.014				0.468
Female	28.5	30.4	–4.1		29.6	30.2	–1.2	
Male	71.5	69.6	4.1		70.4	69.8	1.2	
Plan type, %				<.0001				0.657
CD/HD	17.0	19.4	–6.3		18.5	19.1	–1.4	
HMO/POS/EPO	13.6	14.6	–2.9		14.3	14.5	–0.5	
PPO/comprehensive	69.4	66.0	7.3		67.2	66.5	1.5	
Year of index diagnosis, %				0.002				0.907
2011	26.1	28.7	–5.9		27.9	28.4	–1.0	
2012	28.3	26.8	3.3		27.4	27.1	0.7	
2013	25.2	23.8	3.3		24.3	24.0	0.7	
2014	20.3	20.6	–0.8		20.5	20.6	–0.3	
Co-occurring disorders during 1-year clean period, % with disorder								
Diabetes	2.0	2.4	–2.6	0.148	2.1	2.3	–1.6	0.379
Serious mental illness	5.7	5.8	–0.7	0.678	5.7	5.8	–0.6	0.742
Other medical information during 1-year clean period								
With at least 1 inpatient stay, %	4.9	6.0	–5.1	0.005	5.3	5.9	–2.7	0.142
With at least 1 emergency department visit, %	25.8	28.0	–5.1	0.003	27.1	27.8	–1.4	0.403
Charlson Comorbidity Index	0.21	0.24	–3.9	0.012	0.22	0.23	–2.5	0.130
Psychiatric Diagnosis Groups	0.62	0.61	0.1	0.939	0.61	0.61	–0.7	0.665
All-health spending, \$ 2017	6,067	6,626	–2.7	0.055	5,973	6,530	–3.0	0.037

Abbreviations: CD/HD, consumer-driven/high-deductible; EPO, exclusive provider organization; HMO, health maintenance organization; POS, point of service; PPO, preferred provider organization; Std. diff., standardized difference.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index.

Source: Authors' analysis of data from the IBM MarketScan Commercial Databases.

TABLE A5. Propensity matching, before and after, commercial serious mental illness

Characteristic	Before weighting				After weighting			
	Engaged (n=10,999), mean	Not engaged (n=24,806), mean	Std. diff., %	P value	Engaged (n=10,852), mean	Not engaged (n=24,736), mean	Std. diff., %	P value
Age, continuous								
18–64 years	32.97	32.94	0.2	0.853	32.88	32.95	–0.5	0.647
Sex of patient, %				0.005				0.569
Female	58.3	56.8	3.2		57.5	57.1	0.7	
Male	41.7	43.2	–3.2		42.5	42.9	–0.7	
Plan type, %				0.009				0.635
CD/HD	19.9	18.8	2.9		19.4	19.1	0.9	
HMO/POS/EPO	14.7	15.6	–2.6		15.1	15.4	–0.8	
PPO/comprehensive	65.4	65.6	–0.5		65.5	65.5	–0.1	
Year of index diagnosis, %				0.009				0.904
2011	28.0	27.1	1.9		27.5	27.4	0.2	
2012	26.9	28.5	–3.5		27.7	28.1	–0.8	
2013	25.3	25.4	–0.3		25.4	25.4	0.1	
2014	19.8	19.0	2.1		19.4	19.2	0.6	
Co-occurring disorders during 1-year clean period, % with disorder								
Diabetes	2.8	2.9	–0.4	0.709	2.8	2.8	–0.2	0.857
SUD	2.6	3.4	–4.9	<.0001	3.0	3.2	–1.3	0.297
Other medical information during 1-year clean period								
With at least 1 inpatient stay, %	6.2	7.0	–3.5	0.004	6.3	6.7	–1.7	0.159
With at least 1 emergency department visit, %	30.1	31.7	–3.5	0.003	30.8	31.3	–1.1	0.356
Charlson Comorbidity Index	0.22	0.24	–2.8	0.011	0.22	0.24	–2.0	0.084
Psychiatric Diagnosis Groups	0.84	0.82	1.9	0.101	0.82	0.82	–0.7	0.562
All health spending, \$ 2017	6,285	6,258	0.1	0.907	6,041	6,223	–0.9	0.435

Abbreviations: CD/HD, consumer-driven/high-deductible; EPO, exclusive provider organization; HMO, health maintenance organization; POS, point of service; PPO, preferred provider organization; Std. diff., standardized difference; SUD, substance use disorder.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index.

Source: Authors' analysis of data from the IBM MarketScan Commercial Database.

TABLE A6. Propensity matching, before and after, Medicaid opioid use disorder subpopulation

Characteristic	Before weighting				After weighting			
	Engaged (n=91), mean	Not engaged (n=196), mean	Std. diff., %	P value	Engaged (n= 75), mean	Not engaged (n=190), mean	Std. Diff.	P value
Age, continuous								
18–64 years	37.28	37.95	–5.9	0.635	37.32	37.82	–4.5	0.736
Sex of patient, %				0.589				0.414
Female	72.5	69.4	7.0		75.2	70.4	11.1	
Male	27.5	30.6	–7.0		24.8	29.6	–11.1	
Race, %				0.020				0.336
White	69.2	81.6	–26.9		74.2	79.5	–12.1	
Black	30.8	18.4	26.9		25.8	20.5	12.1	
Year of index diagnosis, %				0.154				0.947
2011	39.6	53.6	–28.7		47.8	51.5	–7.5	
2012	15.4	13.3	5.9		14.5	13.7	2.2	
2013	29.7	20.4	20.3		24.7	22.0	6.3	
2014	15.4	12.8	7.3		12.9	12.7	0.6	
Co-occurring disorders during 1-year clean period, % with disorder								
Diabetes	2.2	6.1	–26.8	0.153	2.1	5.3	–22.9	0.193
Serious mental illness	14.3	15.8	–4.4	0.738	15.9	15.0	2.5	0.851
Other medical information during 1-year clean period								
With at least 1 inpatient stay, %	9.9	14.3	–14.7	0.303	10.0	12.6	–8.7	0.549
With at least 1 emergency department visit, %	50.5	58.2	–15.2	0.229	55.8	55.8	0.1	0.996
Charlson Comorbidity Index	0.341	0.536	–19.7	0.079	0.415	0.495	–8.5	0.510
Psychiatric Diagnosis Groups	1.121	1.403	–18.8	0.127	1.242	1.320	–5.2	0.704
All-health spending, \$ 2017	7,196	11,708	–20.2	0.072	11,045	10,707	1.4	0.929

Abbreviations: Std. diff., standardized difference.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index.

Source: Authors' analysis of data from the IBM MarketScan Multi-State Medicaid Database.

TABLE A7. Propensity matching, before and after, commercial opioid use disorder subpopulation

Characteristic	Before weighting				After weighting			
	Engaged (n=993), mean	Not engaged (n=3,011), mean	Std. diff., %	P value	Engaged (n=967), mean	Not engaged (n=3,001), mean	Std. diff., %	P value
Age, continuous								
18–64 years	32.60	32.67	–0.5	0.881	32.30	32.65	–2.7	0.473
Sex of patient, %				0.005				0.136
Female	31.3	36.2	–10.6		32.8	35.4	–5.6	
Male	68.7	63.8	10.6		67.2	64.6	5.6	
Plan type, %				0.488				0.538
CD/HD	16.8	18.5	–4.4		16.9	18.4	–4.2	
HMO/POS/EPO	15.3	14.7	1.7		15.2	14.7	1.4	
PPO/comprehensive	67.9	66.9	2.2		67.9	66.8	2.3	
Year of index diagnosis, %				0.487				0.699
2011	27.0	27.7	–1.6		28.0	27.5	1.2	
2012	29.5	27.0	5.6		28.8	27.3	3.4	
2013	24.2	25.2	–2.4		23.8	25.2	–3.3	
2014	19.3	20.1	–2.0		19.4	20.1	–1.7	
Co-occurring disorders during 1-year clean period, % with disorder								
Diabetes	1.7	2.6	–6.5	0.127	1.9	2.4	–3.6	0.400
Serious mental illness	6.1	6.6	–1.9	0.605	6.4	6.5	–0.6	0.878
Other medical information during 1-year clean period								
With at least 1 inpatient stay, %	6.7	7.9	–4.6	0.233	7.4	7.5	–0.3	0.928
With at least 1 emergency department visit, %	30.5	33.0	–5.4	0.150	31.5	32.5	–2.2	0.550
Charlson Comorbidity Index	0.18	0.25	–10.3	0.001	0.20	0.24	–6.8	0.059
Psychiatric Diagnosis Groups	0.65	0.68	–3.7	0.309	0.65	0.67	–2.0	0.588
All health spending, \$ 2017	7,464	9,595	–8.4	0.012	8,233	9,143	–3.7	0.336

Abbreviations: CD/HD, consumer-driven/high-deductible; EPO, exclusive provider organization; HMO, health maintenance organization; POS, point of service; PPO, preferred provider organization; Std. diff., standardized difference.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index.

Source: Authors' analysis of data from the IBM MarketScan Commercial Database.

TABLE A8. Propensity matching, before and after, Medicaid subpopulation, adults 44 – 64 years with a substance use disorder

Characteristic	Before weighting				After weighting			
	Engaged (n=144), mean	Not engaged (n=710), mean	Std. diff., %	P value	Engaged (n=124), mean	Not engaged (n= 704), mean	Std. diff., %	P value
Age, continuous								
18–64 years	52.10	52.18	–1.7	0.857	51.86	52.15	–6.6	0.475
Sex of patient, %				0.134				0.701
Female	41.7	35.1	13.4		37.3	35.6	3.6	
Male	58.3	64.9	–13.4		62.7	64.4	–3.6	
Race, %				0.361				0.720
White	46.5	50.7	–8.4		48.9	50.6	–3.5	
Black	53.5	49.3	8.4		51.1	49.4	3.5	
Year of index diagnosis, %				0.931				0.678
2011	47.2	45.4	3.7		50.4	45.3	10.3	
2012	17.4	18.5	–2.9		14.6	18.3	–10.4	
2013	17.4	19.2	–4.7		18.2	19.1	–2.4	
2014	18.1	17.0	2.6		16.7	17.2	–1.4	
Co-occurring disorders during 1-year clean period, % with disorder								
Diabetes	10.4	11.8	–4.6	0.629	11.6	11.6	0.2	0.986
Substance use disorder	19.4	23.2	–9.6	0.321	20.0	23.1	–7.8	0.443
Other medical information during 1-year clean period								
With at least 1 inpatient stay, %	11.1	14.5	–10.8	0.284	12.0	14.0	–6.4	0.548
With at least 1 emergency department visit, %	54.2	56.9	–5.5	0.547	55.1	56.4	–2.6	0.789
Charlson Comorbidity Index	1.097	1.151	–3.0	0.760	1.049	1.140	–5.1	0.580
Psychiatric Diagnosis Groups	1.299	1.375	–5.0	0.567	1.352	1.364	–0.8	0.930
All health spending, \$ 2017	\$10,560	\$13,510	–10.8	0.084	\$11,765	\$13,209	–6.0	0.448

Abbreviations: Std. diff., standardized difference.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index.

Source: Authors' analysis of data from the IBM MarketScan Multi-State Medicaid Database.

TABLE A9. Propensity matching, before and after, commercial subpopulation, adults 44 – 64 years with a substance use disorder

Characteristic	Before weighting				After weighting			
	Engaged (n=1,336), mean	Not engaged (n=8,007), mean	Std. diff., %	P value	Engaged (n=1,304.6), mean	Not engaged (n=8,001.3), mean	Std. diff., %	P value
Age, continuous								
18–64 years	52.67	52.96	–6.1	0.038	52.87	52.92	–1.0	0.731
Sex of patient, %				.098				0.408
Female	32.4	34.7	–5.0		33.4	34.6	–2.5	
Male	67.6	65.3	5.0		66.6	65.4	2.5	
Plan type, %				0.403				0.478
CD/HD	15.5	16.9	–3.8		15.6	16.8	–3.4	
HMO/POS/EPO	15.3	14.5	2.1		15.3	14.5	2.1	
PPO/comprehensive	69.2	68.6	1.3		69.1	68.7	1.0	
Year of index diagnosis, %				.574				0.757
2011	27.9	29.7	–4.0		28.5	29.6	–2.5	
2012	26.4	25.8	1.3		26.0	25.9	0.4	
2013	24.9	23.7	2.6		25.0	23.8	2.7	
2014	20.8	20.7	0.3		20.5	20.7	–0.5	
Co-occurring disorders during 1-year clean period, % with disorder								
Diabetes	4.9	5.4	–2.6	0.394	5.1	5.4	–1.3	0.668
SUD (for the SMI population), SMI (for the SUD population)	4.9	5.3	–1.9	0.525	4.9	5.2	–1.4	0.647
Other medical information during 1-year clean period								
With at least 1 inpatient stay, %	6.1	8.4	–9.7	0.004	6.7	8.1	–5.8	0.089
With at least 1 emergency department visit, %	23.1	27.4	–10.0	0.001	25.1	26.9	–4.1	0.193
Charlson Comorbidity Index	0.41	0.48	–6.2	0.024	0.42	0.47	–4.5	0.117
Psychiatric Diagnosis Groups	0.56	0.58	–2.2	0.442	0.56	0.57	–1.5	0.608
All health spending, \$ 2017	\$9,574	\$10,356	–3.0	0.306	\$9,416	\$10,255	–3.4	0.217

Abbreviations: CD/HD, consumer-driven/high-deductible; EPO, exclusive provider organization; HMO, health maintenance organization; POS, point of service; PPO, preferred provider organization; SMI, serious mental illness; Std. diff., standardized difference; SUD, substance use disorder.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index.

Source: Authors' analysis of data from the IBM MarketScan Commercial Database.

TABLE A10. Adjusted health care costs for Medicaid enrollees with serious mental illness

Spending per person, \$	Year 0				Year 1				Year 2				Year 3			
	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH
Engaged in treatment																
Total	3,349		8	2,555	13,174		1,411	4,491	10,562		691	4,238	9,487		488	3,780
Inpatient	108			108	1,314		1,113	201	729		528	201	525		344	181
Outpatient	1,902		8	1,894	6,549		3,122	128	3,299		1,495	85	3,074		1,030	74
ED	552			552	1,161			170	991			79	963			69
Pharmacy	786				4,150				4,137				4,189			
Not engaged																
Total	3,339		10	2,565	7,469		870	4,033	6,755		456	3,715	6,593		398	3,530
Inpatient	126			126	939		702	237	542		339	203	498		301	197
Outpatient	1,807		10	1,798	3,550		763	60	2,726		460	44	2,479		329	41
ED	641			641	1,178			108	1,070			72	1,033			56
Pharmacy	764				1,803				2,124				2,336			
Offset																
Total	10		-2	-10	5,704*		541	459	3,807*		235	523	2,894*		90	250
Inpatient	-18			-18	375		411*	-36*	186		188*	-2	27		43*	-16*
Outpatient	95		-2*	97	2,999		2,358*	68*	573*		1,036*	40*	595*		701*	34*
ED	-89			-89*	-17		62*	-79*	-63			7*	-70*		13*	-146*
Pharmacy	22				2,347*				2,012*				1,853*			

Abbreviations: BH, behavioral health; ED, emergency department.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. An * indicates significance at the 0.05 level. For year 0, BH treatment is zero based on the clean period requirement. Year 1–year 3, BH treatment is required to occur in an outpatient setting, thus we did not provide a total. Pharmacy data are provided on a combined basis, not on a per treatment or setting level. Results are from a generalized boosted regression model adjusting for all variables in the matching tables and only included the propensity score matched sample. The offset is calculated as cost for engaged enrollees minus cost for nonengaged enrollees.

Source: Authors' analysis of data from the IBM MarketScan Multi-State Medicaid Database.

TABLE A11. Adjusted health care costs for Medicaid enrollees with substance use disorder

Spending per person, \$	Year 0				Year 1				Year 2				Year 3			
	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH
Engaged in treatment																
Total	6,184		19	3,724	16,855		809	5,776	11,494		396	5,093	10,460		269	4,827
Inpatient	356			356	809		178	630	547		44	503	511		36	475
Outpatient	2,697		19	2,679	10,274	5,660	573	4,041	5,019	1,096	290	3,633	4,107	479	209	3,419
ED	689			689	1,162		58	1,104	1,020		62	958	957		25	933
Pharmacy	2,441				4,610				4,909				4,884			
Not engaged																
Total	7,121		13	4,152	12,350		983	6,348	10,504		370	5,583	10,292		259	5,305
Inpatient	420			420	1,465		595	870	952		187	766	860		136	724
Outpatient	2,850		13	2,836	5,351	1,334	189	3,828	3,850	425	94	3,331	3,444	250	79	3,115
ED	896			896	1,849		199	1,650	1,575		89	1,486	1,510		44	1,466
Pharmacy	2,955				3,685				4,127				4,478			
Offset																
Total	-937		5	-429	4,504		-174	-573	990		26	-489	167		10	-478
Inpatient	-64			-64	-657		-417*	-240*	-405		-143*	-262*	-349		-100*	-249*
Outpatient	-152		5*	-158	4,923	4,326*	384*	213	1,169	671*	197*	301	663	229*	130*	304
ED	-207			-207*	-687		-141*	-546*	-556		-27*	-528*	-553		-19*	-533*
Pharmacy	-514				924*				782*				406			

Abbreviations: BH, behavioral health; ED, emergency department.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. An * indicates significance at the 0.05 level. For year 0, behavioral health treatment is zero based on the clean period requirement. Year 1–year 3, behavioral health treatment is required to occur in an outpatient setting, thus we did not provide a total. Pharmacy data are provided on a combined basis, not on a per treatment or setting level. Results are from a generalized boosted regression model adjusting for all variables in the matching tables and only included the propensity score matched sample. The offset is calculated as cost for engaged enrollees minus cost for nonengaged enrollees.

Source: Authors' analysis of data from the IBM MarketScan Multi-State Medicaid Database.

TABLE A12. Adjusted health care costs for commercial enrollees with serious mental illness

Spending per person, \$	Year 0				Year 1				Year 2				Year 3			
	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH
Engaged in treatment																
Total	3,449		3	2,770	9,312		886	4,213	6,889		315	3,656	6,703		264	3,637
Inpatient	22			22	709		673	35	258		234	23	208		184	23
Outpatient	2,151		3	2,149	4,812	1,753	49	3,009	3,249	682	21	2,546	2,990	466	20	2,503
ED	600			600	1,331		163	1,168	1,146		60	1,086	1,169		59	1,110
Pharmacy	676				2,460				2,237				2,336			
Not engaged																
Total	3,412		2	2,808	5,935		405	3,881	5,258		182	3,566	5,643		169	3,612
Inpatient	24			24	341		312	30	158		133	25	145		122	23
Outpatient	2,123		2	2,121	3,167	570	19	2,578	2,463	171	9	2,282	2,402	148	9	2,245
ED	663			663	1,348		74	1,274	1,298		39	1,258	1,382		38	1,343
Pharmacy	603				1,079				1,340				1,714			
Offset																
Total	36		1	-37	3,377		481	332	1,631		133	90	1,060		94	25
Inpatient	-2			-2*	367		362*	5*	100		101*	-2*	63		63*	0
Outpatient	28		1*	28	1,645	1,183*	30*	432	786	511*	12*	263	588	319*	11*	258
ED	-63			-63*	-17		89*	-106	-152		20*	-172	-213		21*	-234
Pharmacy	73*				1,381*				897*				622*			

Abbreviations: BH, behavioral health; ED, emergency department.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. An * indicates significance at the 0.05 level. For year 0, BH treatment is zero based on the clean period requirement. Year 1–year 3, BH treatment is required to occur in an outpatient setting, thus we did not provide a total. Pharmacy data are provided on a combined basis, not on a per treatment or setting level. Results are from a generalized boosted regression model adjusting for all variables in the matching tables and only included the propensity score matched sample. The offset is calculated as cost for engaged enrollees minus cost for nonengaged enrollees.

Source: Authors' analysis of data from the IBM MarketScan Commercial Database.

TABLE A13. Adjusted health care costs for commercial enrollees with substance use disorder

Spending per person, \$	Year 0				Year 1				Year 2				Year 3			
	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH
Engaged in treatment																
Total	3,964		17	2,838	13,605		2,550	3,888	8,205		1,058	3,522	7,662		879	3,562
Inpatient	381			381	2,393		1,771	622	1,194		678	516	1,119		597	521
Outpatient	1,915		17	1,898	7,635	4,565	553	2,517	3,848	1,303	270	2,275	3,341	896	203	2,242
ED	559			559	975		226	749	841		110	731	877		79	798
Pharmacy	1,109				2,601				2,322				2,326			
Not engaged																
Total	4,288		26	3,042	9,554		1,833	4,116	7,004		861	3,787	7,224		789	3,882
Inpatient	433			433	2,066		1,339	728	1,272		629	643	1,238		570	668
Outpatient	1,986		26	1,960	4,658	1,998	240	2,420	2,933	587	126	2,220	2,907	567	124	2,216
ED	650			650	1,223		255	969	1,030		106	924	1,094		96	998
Pharmacy	1,219				1,607				1,769				1,986			
Offset																
Total	-324		-9	-205	4,051		717	-228	1,204		197	-265	438		89	-321
Inpatient	-52			-52*	327		433*	-106*	-77		50*	-127*	-119		28*	-147*
Outpatient	-70		-9*	-62	2,978	2,568*	313*	98	915	716*	144*	55	434	329*	79*	26
ED	-91			-91*	-248		-29*	-220*	-190		3*	-193*	-217		-17*	-200*
Pharmacy	-110				994*				552*				340*			

Abbreviations: BH, behavioral health; ED, emergency department.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. An * indicates significance at the 0.05 level. For year 0, BH treatment is zero based on the clean period requirement. Year 1–year 3, BH treatment is required to occur in an outpatient setting, thus we did not provide a total. Pharmacy data are provided on a combined basis, not on a per treatment or setting level. Results are from a generalized boosted regression model adjusting for all variables in the matching tables and only included the propensity score matched sample. The offset is calculated as cost for engaged enrollees minus cost for nonengaged enrollees.

Source: Authors' analysis of data from the IBM MarketScan Commercial Database.

TABLE A14. Adjusted total health care costs for Medicaid enrollee, subpopulation with opioid use disorder

Spending per person, \$	Year 0	Year 1	Year 2	Year 3
	All health	All health	All health	All health
Engaged in treatment				
Total	6,472	19,629	15,708	15,953
Not engaged in treatment				
Total	8,187	14,540	12,657	13,205
Offset				
Total	-1,715*	5,088*	3,051*	2,749*

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. An * indicates significance at the 0.05 level. For year 0, behavioral health treatment is zero based on the clean period requirement. Results are from a generalized boosted regression model adjusting for all variables in the matching tables and only included the propensity score matched sample. The offset is calculated as cost for engaged enrollees minus cost for nonengaged enrollees.

Source: Authors' analysis of data from the IBM MarketScan Multi-State Medicaid Database.

TABLE A15. Adjusted health care costs for commercial enrollees, subpopulation with opioid use disorder

Spending per person, \$	Year 0				Year 1				Year 2				Year 3			
	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH
Engaged in treatment																
Total	5,065		22	3,924	18,641		3,587	4,947	13,669		2,253	4,862	11,999		1,867	4,983
Inpatient	1,003			1,003	3,585		2,530	1,054	2,639		1,554	1,086	2,509		1,293	1,216
Outpatient	2,164		22	2,142	9,922	6,080	860	2,982	6,157	2,782	576	2,799	5,206	2,000	452	2,754
ED	779			779	1,107		197	910	1,100		123	977	1,134		122	1,013
Pharmacy	1,119				4,028				3,772				3,149			
Not engaged																
Total	5,797		30	4,280	14,115		3,113	5,654	11,410		2,033	5,494	12,353		1,999	5,756
Inpatient	1,143			1,143	3,826		2,441	1,385	3,056		1,605	1,451	3,155		1,553	1,602
Outpatient	2,338		30	2,308	6,737	3,280	441	3,017	4,707	1,554	313	2,840	4,788	1,583	317	2,888
ED	829			829	1,484		231	1,253	1,319		115	1,204	1,395		129	1,266
Pharmacy	1,487				2,068				2,328				3,015			
Offset																
Total	-732		-8	-356	4,526*		474	-708	2,259*		220	-633	-354		-132	-773
Inpatient	-140			-140	-241		89	-331*	-416		-51	-365*	-646		-260*	-386*
Outpatient	-173		-8	-165	3,185	2,800*	419*	-34	1,450	1,228*	264*	-41	418	416*	135*	-134
ED	-50			-50	-377		-34*	-343*	-219		8*	-227*	-260		-7*	-253*
Pharmacy	-368				1,960*				1,444*				134			

Abbreviations: BH, behavioral health; ED, emergency department.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. An * indicates significance at the 0.05 level. For year 0, BH treatment is zero based on the clean period requirement. Year 1–year 3, BH treatment is required to occur in an outpatient setting, thus we did not provide a total. Pharmacy data are provided on a combined basis, not on a per treatment or setting level. Results are from a generalized boosted regression model adjusting for all variables in the matching tables and only included the propensity score matched sample. The offset is calculated as cost for engaged enrollees minus cost for nonengaged enrollees.

Source: Authors' analysis of data from the IBM MarketScan Commercial Database.

TABLE A16. Adjusted total health care costs for Medicaid enrollees, subpopulation adults 44 – 64 years with a substance use disorder

Spending per person, \$	Year 0	Year 1	Year 2	Year 3
	All Health	All Health	All Health	All Health
Engaged in treatment				
Total	7,294	14,635	11,050	12,164
Not engaged in treatment				
Total	7,416	14,507	14,522	14,075
Offset				
Total	-122	128	-3,473*	-1,911

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. An * indicates significance at the 0.05 level. For year 0, behavioral health treatment is zero based on the clean period requirement. Results are from a generalized boosted regression model adjusting for all variables in the matching tables and only included the propensity score matched sample. The offset is calculated as cost for engaged enrollees minus cost for nonengaged enrollees.

Source: Authors' analysis of data from the IBM MarketScan Multi-State Medicaid Database.

TABLE A17. Adjusted health care costs for commercial enrollees, subpopulation adults 44 – 64 years with a substance use disorder

Spending per person, \$	Year 0				Year 1				Year 2				Year 3			
	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH	All health	BH treatment	Other BH	Non-BH
Engaged in treatment																
Total	5,637		14	3,571	13,808	3,435	1,922	4,911	9,351	866	635	4,638	9,182	559	490	4,723
Inpatient	244			244	1,632		1,239	393	653		346	307	638		295	344
Outpatient	2,793		14	2,779	7,578	3,435	423	3,720	4,594	866	186	3,542	4,331	559	132	3,640
ED	547			547	1,058		260	799	893		103	789	802		63	739
Pharmacy	2,052				3,539				3,212				3,410			
Not engaged																
Total	6,185		22	3,821	11,481	1,532	1,662	5,367	9,120	289	619	4,956	9,661	263	514	5,180
Inpatient	310			310	1,675		1,196	479	826		409	418	792		325	467
Outpatient	2,854		22	2,832	5,620	1,532	200	3,887	3,975	289	89	3,597	4,012	263	82	3,667
ED	679			679	1,267		266	1,001	1,063		122	941	1,152		107	1,045
Pharmacy	2,342				2,919				3,256				3,704			
Offset																
Total	-548		-8	-250	2,327	1,903	260	-456	231	578	16	-318	-479	297	-25	-457
Inpatient	-66			-66	-43		44*	-86*	-174		-63*	-111*	-154		-30*	-124*
Outpatient	-61		-8	-53	1,959	1,903*	223*	-168	620	578*	97*	-56	319	297*	49*	-27
ED	-131			-131	-209		-7*	-202*	-170		-18*	-152*	-350		-44*	-306*
Pharmacy	-290				620*				-45				-294*			

Abbreviations: BH, behavioral health; ED, emergency department.

Note: All spending was adjusted to 2017 levels using the Medical Care Consumer Price Index. An * indicates significance at the 0.05 level. For year 0, BH Treatment is zero based on the clean period requirement. Year 1–year 3, BH treatment is required to occur in an outpatient setting, thus we did not provide a total. Pharmacy data are provided on a combined basis, not on a per treatment or setting level. Results are from a generalized boosted regression model adjusting for all variables in the matching tables and only included the propensity score matched sample. The offset is calculated as cost for engaged enrollees minus cost for nonengaged enrollees.

Source: Authors' analysis of data from the IBM MarketScan Commercial Database.

TABLE A18. Treatments and Encounter definitions, when combined with a serious mental illness or substance use disorder diagnosis

Code system	Code	Code system	Code	Code system	Code	Code system	Code	Code system	Code
Treatment									
CPT	99484	CPT	90865	CPT	99241	CPT	S5101	HCPCS	H2020
CPT	99492	CPT	90867	CPT	99242	CPT	S5110	HCPCS	H2032
CPT	99493	CPT	90868	CPT	99243	CPT	S9123	HCPCS	H2035
CPT	99494	CPT	90869	CPT	99244	CPT	S9127	HCPCS	H2036
CPT	1182F	CPT	90870	CPT	99245	CPT	T1001	HCPCS	S0201
CPT	3090F	CPT	90871	CPT	99251	CPT	T1007	HCPCS	S9475
CPT	3091F	CPT	90875	CPT	99252	CPT	T1011	HCPCS	S9480
CPT	3700F	CPT	90876	CPT	99253	CPT	T1017	HCPCS	T1006
CPT	4060F	CPT	90880	CPT	99254	CPT	T1019	HCPCS	T1012
CPT	4065F	CPT	90882	CPT	99255	CPT	T1021	HCPCS	T1015
CPT	4320F	CPT	90899	CPT	99341	CPT	T1040	HCPCS	T2048
CPT	90785	CPT	90901	CPT	99342	CPT	T2022	ICD10PCS	HZ2ZZZZ
CPT	90791	CPT	90906	CPT	99343	CPT	T2033	ICD9PCS	94.62
CPT	90792	CPT	90908	CPT	99344	HCPCS	G0155	ICD9PCS	94.65
CPT	90801	CPT	90911	CPT	99345	HCPCS	G0176	ICD9PCS	94.68
CPT	90802	CPT	9462	CPT	99347	HCPCS	G0177	Rev Code	0909
CPT	90804	CPT	96100	CPT	99348	HCPCS	G0396	Rev Code	0910
CPT	90805	CPT	96101	CPT	99349	HCPCS	G0397	Rev Code	0918
CPT	90806	CPT	96102	CPT	99350	HCPCS	G0409	Rev Code	1001
CPT	90807	CPT	96103	CPT	99354	HCPCS	G0410	Rev Code	1002
CPT	90808	CPT	96116	CPT	99355	HCPCS	G0411	Rev Code	0116
CPT	90809	CPT	96117	CPT	99383	HCPCS	G0443	Rev Code	0126
CPT	90810	CPT	96118	CPT	99384	HCPCS	G0463	Rev Code	0136
CPT	90811	CPT	96119	CPT	99385	HCPCS	H0001	Rev Code	0146
CPT	90812	CPT	96120	CPT	99386	HCPCS	H0002	Rev Code	0156
CPT	90813	CPT	96125	CPT	99387	HCPCS	H0004	Rev Code	0510
CPT	90814	CPT	96127	CPT	99393	HCPCS	H0005	Rev Code	0513
CPT	90815	CPT	96150	CPT	99394	HCPCS	H0008	Rev Code	0515
CPT	90816	CPT	96151	CPT	99395	HCPCS	H0009	Rev Code	0517
CPT	90817	CPT	96152	CPT	99396	HCPCS	H0010	Rev Code	0519
CPT	90818	CPT	96153	CPT	99397	HCPCS	H0011	Rev Code	0520
CPT	90819	CPT	96154	CPT	99401	HCPCS	H0012	Rev Code	0521
CPT	90821	CPT	96155	CPT	99402	HCPCS	H0013	Rev Code	0522
CPT	90822	CPT	97537	CPT	99403	HCPCS	H0014	Rev Code	0523
CPT	90823	CPT	98960	CPT	99404	HCPCS	H0015	Rev Code	0527
CPT	90824	CPT	98961	CPT	99408	HCPCS	H0016	Rev Code	0528
CPT	90826	CPT	98962	CPT	99409	HCPCS	H0017	Rev Code	0529
CPT	90827	CPT	99078	CPT	99411	HCPCS	H0018	Rev Code	0900
CPT	90828	CPT	99201	CPT	99412	HCPCS	H0019	Rev Code	0901
CPT	90829	CPT	99202	CPT	99509	HCPCS	H0022	Rev Code	0902
CPT	90830	CPT	99203	CPT	99510	HCPCS	H0031	Rev Code	0903
CPT	90832	CPT	99204	CPT	G0116	HCPCS	H0035	Rev Code	0904
CPT	90833	CPT	99205	CPT	G0129	HCPCS	H0036	Rev Code	0905
CPT	90834	CPT	99211	CPT	G0300	HCPCS	H0037	Rev Code	0906

Code system	Code	Code system	Code	Code system	Code	Code system	Code	Code system	Code
CPT	90835	CPT	99212	CPT	G0502	HCPCS	H0038	Rev Code	0907
CPT	90836	CPT	99213	CPT	G0503	HCPCS	H0039	Rev Code	0911
CPT	90837	CPT	99214	CPT	G0504	HCPCS	H0040	Rev Code	0912
CPT	90838	CPT	99215	CPT	G0505	HCPCS	H0046	Rev Code	0913
CPT	90841	CPT	99217	CPT	G0506	HCPCS	H0047	Rev Code	0914
CPT	90842	CPT	99218	CPT	G0507	HCPCS	H0050	Rev Code	0915
CPT	90843	CPT	99219	CPT	g0716	HCPCS	H2000	Rev Code	0916
CPT	90844	CPT	99220	CPT	G8947	HCPCS	H2001	Rev Code	0917
CPT	90845	CPT	99221	CPT	H0006	HCPCS	H2012	Rev Code	0919
CPT	90846	CPT	99222	CPT	H0023	HCPCS	H2013	Rev Code	0944
CPT	90847	CPT	99223	CPT	H0025	HCPCS	H2014	Rev Code	0945
CPT	90849	CPT	99231	CPT	H0026	HCPCS	H2015	Rev Code	0982
CPT	90853	CPT	99232	CPT	H0029	HCPCS	H2016	Rev Code	0983
CPT	90855	CPT	99233	CPT	H0032	HCPCS	H2017		
CPT	90857	CPT	99238	CPT	H2021	HCPCS	H2018		
CPT	90862	CPT	99239	CPT	H2027	HCPCS	H2019		
Encounters									
CPT	90839	CPT	99291	CPT	H0020	HCPCS	H2010	HCPCS	S9485
CPT	90840	CPT	99605	CPT	S9482	HCPCS	H2011	Rev Code	0516
CPT	90863	CPT	99606	HCPCS	H0007	HCPCS	M0064	Rev Code	0526
CPT	99283	CPT	G9369	HCPCS	H0034	HCPCS	S9484		

Abbreviations: CPT, Current Procedural Terminology; HCPCS, Healthcare Common Procedure Coding System.

REFERENCES

1. Hunter SB, Ramchand R, Griffin BA, et al: The effectiveness of community-based delivery of an evidence-based treatment for adolescent substance use. *J Subst Abuse Treat* 2012; 43:211–220.
2. Ramchand R, Griffin BA, Suttorp M, et al: Using a cross-study design to assess the efficacy of Motivational Enhancement Therapy–Cognitive Behavioral Therapy 5 (MET/CBT5) in treating adolescents with cannabis-related disorders. *J Stud Alcohol Drugs* 2011; 72:380–389.
3. Schuler M S, Griffin BA, Ramchand R, et al: Effectiveness of treatment for adolescent substance use: is biological drug testing sufficient? *J Stud Alcohol Drugs* 2014; 75:358–370.
4. Kang JDY, Schafer J L: Demystifying double robustness: a comparison of alternative strategies for estimating a population mean from incomplete data. *Stat Sci* 2007; 22:523–539.