

Employer-Sponsored Behavioral Health Program Impacts on Care Utilization and Cost

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The rising cost of providing health insurance to employees in the United States has led to heightened focus and interest among employers in identifying services that show evidence of demonstrable value.¹ At the same time, there has been increasing awareness of the potential impact of highly prevalent behavioral health (BH) conditions, such as depression and anxiety, on all-cause health care utilization, as well as the total cost of care incurred by patients with such conditions.²⁻⁴ The implication is that effective management of depression and anxiety disorders has the potential to directly influence worker productivity in terms of absenteeism, presenteeism, and retention, as well as the direct cost of care for employees. Moreover, the COVID-19 pandemic has increasingly brought attention to the BH impacts of the pandemic on the workforce, especially among health care workers.^{5,6}

Traditionally, BH services have been provided outside of typical medical health insurance, offered as a separate package carved out of the medical plan and managed by a third-party vendor. Moreover, the patient out-of-pocket costs associated with BH services are often substantial,⁷ and access to BH treatment has remained inadequate largely due to the stigma attached,⁸ as well as the overall shortage of BH providers.^{9,10} Such barriers appear to have led to underutilization of BH services and underrecognition of their value on a population health level.^{11,12}

This study seeks to assess the potential economic impact of a unique value-based insurance design from the perspective of a large self-insured academic employer in western New York. Specifically, this study evaluates an employer-sponsored BH program, Behavioral Health Partners (BHP), by examining all-cause health care utilization and total cost of care among a cohort of employees with targeted BH conditions (depression and anxiety disorders) treated by BHP relative to a contemporaneous comparison group of employees of the same employer with similar conditions not treated by BHP. The goal is to show how provisions of employer-sponsored BH benefits such as BHP can potentially affect all-cause health care utilization and cost of care from the payer's perspective.

ABSTRACT

OBJECTIVES: To examine the impact of an employer-sponsored behavioral health (BH) program on all-cause health care utilization and cost.

STUDY DESIGN: Retrospective analysis of health insurance claims data obtained from a large employer in western New York covering a 25-month period between 2016 and 2018. Those employees treated by the employer-sponsored BH program were compared against a contemporaneous comparison group of employees of the same employer who had eligible BH diagnoses for the program but were treated elsewhere.

METHODS: A difference-in-differences method was used to estimate the program's impact on all-cause care utilization (physician office visits and acute care utilization) and total cost of care, including prescription drug costs.

RESULTS: Program participation was associated with a reduction of approximately 28% in total cost of care including prescription drug costs ($P = .043$) over an 18-month period following the initial program encounter, as well as 27% reductions in primary care provider (PCP) visits ($P = .001$) and non-BH specialist visits ($P = .005$). No significant impacts were observed for acute care utilization and BH specialist visit rates.

CONCLUSIONS: The results suggest that the employer-sponsored BH program implementation may have shifted treatments of certain BH conditions away from PCPs and non-BH specialists who may not have the proper training or resources to manage such conditions. Therefore, these results are consistent with the expectation that improved access to BH care is likely to improve efficiency in the health care system via provision of more appropriate care for those who need it.

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BACKGROUND

Detailed background information of BHP has been described in a previously published study.¹³ Since 2014, University of Rochester (UR) has implemented BHP as a part of its employee wellness program. UR is a large academic institution located in Rochester, New York, and is the largest employer in the region with more than 26,000 employees. UR also includes a medical center (University of Rochester Medical Center [URMC]) that, among other services, offers a comprehensive array of BH services via its Department of Psychiatry. BHP takes advantage of the existing resources within UR to offer “in-house” BH services to UR employees and their adult dependents.

BHP augments the traditional employee assistance program¹⁴ by offering diagnostic assessments and evidence-based treatments including psychotherapy, medication management, and consultation for targeted BH conditions, namely depression and anxiety disorders. Other BH conditions considered to be more severe (eg, bipolar disorder, psychosis, primary substance use disorder) fall outside the scope of the BHP program. BHP providers include a full-time multidisciplinary team consisting of mental health therapists, psychologists, social workers, a registered nurse, a nurse practitioner, a psychiatrist, and a care manager, all of whom have clinical and academic privileges through the Department of Psychiatry at URMC.

BHP also reduces financial barriers. For those enrolled in the preferred provider organization plan option, there is no co-pay, whereas for those enrolled in the high-deductible plans, the co-pay is \$0 after the deductible has been met. No referrals from primary care providers (PCPs) or prior authorizations are necessary, and there is no predetermined limit to the number of treatment encounters covered. Therefore, BHP is consistent with the principles of the Mental Health Parity and Addiction Equity Act, which seeks to reduce barriers to BH care that may be imposed by some private payers.¹⁵⁻¹⁷

DATA

This study was reviewed and approved by UR's Institutional Review Board. The study team obtained from UR its deidentified employee health plan claims data covering a period from October 1, 2016, through October 31, 2018. The claims data contained all-cause health care utilization information related to each employee's medical and pharmacy benefits, including BH-related services.

The raw claims data included patient demographic information, enrollment status, primary and up to 2 secondary diagnosis codes (*International Classification of Diseases, Tenth Revision [ICD-10]*), dates and locations of service, National Provider Identifier (NPI) number, and encounter types, such as outpatient emergency

TAKEAWAY POINTS

- ▶ Depression and anxiety disorders are prevalent among working adults and are associated with work productivity loss and high cost of care.
- ▶ Since 2014, a large employer in western New York has implemented a unique behavioral health program, Behavioral Health Partners (BHP), as a part of its employee wellness program.
- ▶ BHP augments traditional employee assistance programs by offering easily accessible diagnostic and treatment services for depression and anxiety disorders with lower out-of-pocket costs.
- ▶ This study suggests that employer-sponsored behavioral health programs such as BHP may improve employee behavioral health outcomes and reduce cost of care simultaneously.

department (ED) visits, acute inpatient admissions, and office visits to PCPs and specialists, including BH and non-BH specialists. The claims data also contained the “allowed amounts” (ie, the sum of the health plan's reimbursement to providers plus patients' out-of-pocket costs via co-pays, deductibles, coinsurance, etc) representing the cost of care associated with treating patients. The raw data were subsequently aggregated to a per-member per-month (PMPM) basis, in which each row in the resulting data set represented counts of the corresponding encounters and the sum of the allowed amounts for each employee incurred in a given calendar month. A small constant (\$0.01) was added to allow log transformation of \$0 values.

From the claims data, BHP-treated employees were identified by the NPIs of the BHP providers and the locations of the BHP clinic sites. However, because it was not possible to identify directly from the claims data the date of first BHP encounter, a washout period of 6 months was assumed, and the BHP-treated intervention group was thus restricted to those for whom there was no BHP encounter for at least 6 months prior to the first observed BHP encounter. A contemporaneous comparison group of non-BHP treated employees was also identified from the claims data. This comparison group was defined as those UR employees who had depression or anxiety disorders but sought care elsewhere from non-BHP providers. The non-BHP providers thus included medical care providers, such as PCPs who may lack proper training or resources to treat such patients,¹⁸ and other BH providers in the community not affiliated with BHP. The index date for the comparison group was defined as the first calendar month (rather than day, because the data set was aggregated to a PMPM basis) during which 1 or more *ICD-10* codes for depression and anxiety disorders (shown in [Table 1](#)) were observed as a primary diagnosis.

To be consistent with how the BHP-treated intervention group was defined, the washout period requirement of 6 months was also applied to the comparison group—that is, only those who had no encounter with any of the 10 *ICD-10* codes as the primary diagnosis during at least 6 months prior to the index date were included in the sample as the comparison group. This implied that during the 6-month washout period, the patients might have had claims for BH care for those conditions that fell outside the scope of BHP treatment (eg, substance use disorder, bipolar disorder), as well

TABLE 1. Baseline Characteristics (dates of claim covered: 10/1/2016-10/31/2018)

Variable	Non-BHP	BHP	P
Unique members, n	1166	376	N/A
Member-month observations, n	12,664	4448	N/A
Cost of care (\$ PMPM)			
Total medical, mean (SD)	332 (2494)	624 (10,130)	.193
Total medical + Rx, mean (SD)	427 (2699)	729 (10,179)	.185
Care utilization (per 1000 per month)			
ED visits, mean (SD)	12 (124)	21 (152)	.010
Acute IP admits, mean (SD)	3 (57)	5 (72)	.236
PCP visits, mean (SD)	120 (457)	176 (490)	<.001
BH specialist visits, mean (SD)	86 (565)	49 (313)	.065
Non-BH specialist visits, mean (SD)	281 (979)	433 (1146)	<.001
Demographics			
Female, %	69.2%	77.7%	.004
Age in years, mean (SD)	37.0 (14.1)	38.0 (12.6)	.230
BH complexity			
Count of BH Dx codes: 0 or 1	64.0%	60.8%	.306
Count of BH Dx codes: 2	26.8%	32.1%	.074
Count of BH Dx codes: ≥3	9.2%	7.1%	.252
Has nicotine dependence (F17.2x)	3.6%	4.7%	.395
Has substance use disorder (F10.xx-F16.xx)	6.3%	7.7%	.397
Health plan characteristics			
Subscriber relation: self	53.3%	74.7%	<.001
Subscriber relation: dependent	46.7%	25.3%	<.001
Has HDHP plan	54.4%	47.9%	.046
Charlson-Quan Comorbidity Index score (range, 0-8)			
0	80.1%	71.2%	.002
1	14.1%	21.5%	.003
> 1	5.8%	7.3%	.386
Prevalence of selected BH diagnoses (ICD-10) at index*			
GAD (F41.1)	43.2%	39.4%	.187
AD with mixed anxiety and depressed mood (F43.23)	20.5%	27.7%	.004
MDD, recurrent, moderate (F33.1)	14.8%	15.2%	.847
Dysthymic disorder (F34.1)	7.6%	6.9%	.645
Posttraumatic stress disorder, unspecified (F43.10)	3.5%	4.8%	.264
AD with anxiety (F43.22)	9.6%	6.4%	.055
MDD, recurrent, severe without psychotic features (F33.2)	2.9%	4.8%	.081
MDD, recurrent, mild (F33.0)	4.1%	5.1%	.439
AD with depressed mood (F43.21)	8.0%	5.1%	.058
MDD, recurrent, in partial remission (F33.41)	1.4%	2.1%	.303

AD, adjustment disorder; BH, behavioral health; BHP, Behavioral Health Partners; Dx, diagnosis; ED, emergency department; GAD, generalized anxiety disorder; HDHP, high-deductible health plan; ICD-10, *International Classification of Diseases, Tenth Revision*; IP, inpatient; MDD, major depressive disorder; N/A, not applicable; PCP, primary care provider; PMPM, per member per month; Rx, prescription drug.

*The percentages add up to more than 100% because some patients had more than 1 of the ICD-10 codes as their primary diagnosis during the month of their index dates.

as the claims for any medical care that they received. The washout period thus ensured a clean preintervention period not confounded by any treatment effects similar to that of BHP.

METHODS

A difference-in-differences (DID) approach was used to estimate BHP's impact on the following selected types of all-cause health care utilization: outpatient ED visits, acute inpatient admissions, PCP visits, non-BH specialist visits, and BH provider visits (including visits to BHP clinics), all measured on a PMPM basis. Outpatient ED visits and acute inpatient admissions, however, were combined to construct a single dependent variable to capture all-cause acute care utilization. This was necessary because, individually, ED visits and inpatient admissions were considered to be rare events in this relatively young employee population. To estimate the BHP impact on total cost of care, 2 categories of costs were considered: total PMPM medical cost (ie, allowed amounts associated with services covered under the medical benefit portion of the health plan only) and total PMPM medical plus prescription drug costs.

The DID approach took into account the possibility that there might be baseline differences between the BHP-treated intervention group and the non-BHP comparison group due to nonrandom selection of employees into both groups, and this baseline difference was explicitly subtracted from the postintervention differences between the 2 groups.¹⁹ The DID approach relied on the assumption that although the 2 groups had differences at the baseline that persisted into the postintervention period, the 2 groups had similar trends during the postintervention period.

The DID estimates were obtained via a set of multivariate regression models (ie, a generalized linear model with log link and gamma distribution was used to fit each of the total cost of care variables²⁰), whereas a Poisson model was used to fit each of the utilization variables because they were count data in nature. In all the regression models, the key explanatory variables were a BHP treatment intervention group indicator that equaled 1 if the given employee belonged in the intervention group and 0 otherwise; a postintervention

indicator that equaled 1 if the given month of observation was on or after the index date (this postintervention indicator was then further broken down into three 6-month intervals: 1-6 months, 7-12 months, and 13-18 months post intervention) and 0 otherwise; and a set of interaction terms between the aforementioned 2 indicator variables. The coefficient on the interaction term represented the estimated DID impact of BHP treatment on the dependent variable in each model.

Other covariates in the regression model included age, gender, age-gender interaction, count of BH diagnosis codes (up to 3 ICD-10 codes with F-prefix to capture complexity of BH condition), Charlson-Quan Comorbidity Index scores to capture medical complexity of each patient at each month of the observation period,²¹ presence of nicotine dependence or substance use disorder, relation to the health plan subscriber (self or dependent), an indicator for whether the employee was enrolled in a high-deductible health plan or not, and a set of calendar year indicator variables to capture secular trends. Clustered standard errors were obtained to account for the correlations in the error terms due to repeated observation of the same employees over time.²² See [eAppendix Tables 1 and 2](#) (eAppendix available at [ajmc.com](#)) for the full regression outputs.

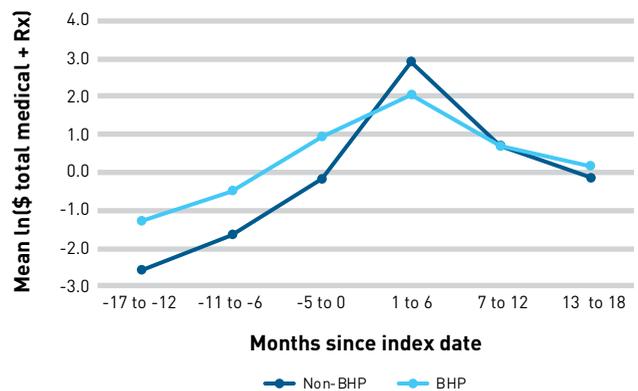
The BHP treatment impact was then illustrated as the estimated difference between the regression-adjusted “observed” and “expected” dependent variable values. The observed values were obtained via the estimated multivariate regression models for each employee in the BHP-treated intervention group; the expected values were obtained by setting the interaction effect between the BHP treatment indicator and the postintervention indicator to 0 and then recalculating the regression-adjusted dependent variable values for the same BHP-treated intervention group, which represented what would be expected among these employees had they not been treated by BHP.

RESULTS

Table 1 summarizes the baseline characteristics of the sample, comparing the BHP-treated intervention group against the non-BHP comparison group. The distribution of patient age ranges from 16 to 77 years. The BHP-treated intervention group appears to have significantly higher rates of ED visits, PCP visits, and non-BH specialist visits at the baseline, which are consistent with the higher total costs of care observed for the group relative to the non-BHP comparison group. Moreover, the BHP-treated intervention group appears to have greater medical complexity, as indicated by the higher proportion of patients who had Charlson-Quan Comorbidity Index values greater than 0.

The prevalence of the selected 10 ICD-10 codes as primary diagnosis and BH complexity measured as counts of BH primary and secondary diagnosis codes are comparable between the 2 groups, with the exception of adjustment disorder with mixed anxiety and depressed mood (F43.23), which is significantly higher among the BHP-treated intervention group. Moreover, the

FIGURE. Patterns of Change in Total Cost of Care (in log scale) Relative to Index Date



BHP, Behavioral Health Partners; Rx, prescription drug.

BHP-treated intervention group was more likely to be female than the comparison group.

The data suggested that the assumptions of the DID approach are reasonable, as illustrated in the [Figure](#), which shows the patterns of change over time in total cost of care (\$ PMPM including medical and prescription drug costs) measured in log scale (to account for the skewness in the data) relative to the index date. During the preintervention period (17 to 0 months prior to the index date), although both groups had increasingly incurred higher costs in months approaching the index date, the non-BHP comparison group consistently incurred lower PMPM total cost of care than the BHP intervention group by roughly the same magnitude. Then, after the index date, the PMPM total cost of care for both groups declined at a similar slope.

More formal tests of the preperiod parallel trends were conducted ([eAppendix Tables 3 and 4](#)). The same regression models used for the main analyses were employed but focused only on the preperiod data. The main coefficient of interest in this case was the interaction effect between the indicator variable for the 6-month period immediately preceding the index date (the omitted reference category was the earlier preperiod, 17 to 6 months preindex) and the BHP indicator variable; a statistically significant coefficient would have indicated a significant divergence in the preperiod trend between the BHP and non-BHP groups. As shown, the coefficients were relatively small in magnitude and not statistically significant, suggesting that there was no significant divergence and thus supporting the parallel trends assumption.

[Tables 2, 3, and 4](#) summarize the estimated BHP impacts on total cost of care and all-cause health care utilization considered in this study. The results indicate that, over the entire 18-month postintervention period (1-18 months), the BHP intervention group was associated with lower total cost of care (with or without the prescription drug costs) and lower rates of PCP and non-BH

TABLE 2. BHP Impact on Total Cost of Care

Period since index date (months)	Total medical (\$ PMPM)				Total medical + Rx (\$ PMPM)			
	Observed	Expected	% difference	P	Observed	Expected	% difference	P
1-6	610	915	-33.3%	.031	783	1145	-31.6%	.019
7-12	495	612	-19.0%	.330	668	805	-17.0%	.356
13-18	397	455	-12.7%	.700	544	616	-11.8%	.682
1-18	538	767	-29.9%	.051	700	967	-27.7%	.043

BHP, Behavioral Health Partners; PMPM, per member per month; Rx, prescription drug.

TABLE 3. BHP Impact on PCP Visits and Acute Care Utilization

Period since index date (months)	PCP visits (per 1000 per month)				Acute care (per 1000 per month)			
	Observed	Expected	% difference	P	Observed	Expected	% difference	P
1-6	246	331	-25.8%	.001	29	40	-28.1%	.206
7-12	153	225	-32.0%	.006	24	23	4.3%	.894
13-18	166	164	0.8%	.966	13	18	-27.2%	.630
1-18	205	282	-27.3%	.001	26	33	-21.8%	.295

BHP, Behavioral Health Partners; PCP, primary care provider.

TABLE 4. BHP Impact on Specialist Visits

Period since index date (months)	BH specialist visits (per 1000 per month)				Non-BH specialist visits (per 1000 per month)			
	Observed	Expected	% difference	P	Observed	Expected	% difference	P
1-6	299	277	7.9%	.796	471	633	-25.7%	.007
7-12	223	165	35.6%	.374	404	529	-23.6%	.091
13-18	148	144	2.6%	.960	306	479	-36.2%	.051
1-18	261	234	11.5%	.718	426	582	-26.7%	.005

BH, behavioral health; BHP, Behavioral Health Partners.

specialist visits. When the BHP impact is broken down by 6-month postintervention intervals, the greatest magnitude of reduction is seen consistently during the first 6 months; subsequently, the impacts then appear to taper off.

DISCUSSION

In the midst of the COVID-19 pandemic, finding innovative approaches to meet the BH needs of workers is likely to be crucial, particularly for the health care workers who have been on the front lines of addressing one of the most significant public health crises in history. Coincidentally, BHP may serve as an example of such innovation. The results of this study provide insight into how such a program might affect the employees with highly prevalent BH conditions that are known to negatively affect employee work performance and productivity.^{23,24}

The apparent lack of significant BHP impact on acute care utilization is not surprising, considering that these are relatively young employees (mean age under 40 years). However, the sharp reductions associated with BHP treatment in utilization of PCPs and non-BH specialists provide an interesting insight about a potential

relationship between BH care utilization and medical care utilization that warrants future studies. The results indicate, as expected, that the utilization of BH providers sharply increased for both the BHP-treated intervention and the comparison groups during the postintervention period, from fewer than 100 visits per 1000 per month for either the non-BH or BH treatment group at the baseline (Table 1) compared with more than 200 during the 1 to 18 months following the index date (Table 4). However, the difference in the increases between the BHP intervention group and the comparison group is not statistically significant, which might be due to a lack of statistical power attributable to the sample size rather than a true zero effect. Nevertheless, the net effects of these patterns are shown by the reduction in total cost of care, which is more clearly demonstrated when medical costs and prescription drug costs were combined together, implying that even with the added cost of prescription drugs, the overall total cost of care savings associated with the BHP program remain significant.

The postperiod trajectories of health care utilization and cost suggest a rapid increase during the early period followed by a gradual decline in subsequent periods—a pattern that is common to both the BHP and non-BHP comparison groups. This is consistent with

the known course of response for depression treatment, which suggests that depression symptoms tend to improve even without treatment in the short term.²⁵ Therefore, any detectable BHP impact is expected to be concentrated on reducing the rapid increase during the early period (ie, lowering the “peak”) rather than on later periods, when depression severity is likely to have improved for both groups.

Limitations

This study is subject to several limitations. First, because this is an observational study relying on certain assumptions about the sample and the DID method used, it is difficult to make causal interpretations. The baseline differences between the BHP-treated intervention group and the comparison group, as shown in Table 1, suggest that the former might have had more severe conditions and thus had higher all-cause care utilization than the latter. This may be because employees with more severe and established BH conditions might have been more willing to seek out the employer-sponsored BHP program than those with less severe and less established conditions who were perhaps hesitant to do the same due to the potential stigma and unfamiliarity with the program. Nevertheless, to the extent that the selection bias, if any, has led to adverse selection of more complex and sicker employees into the BHP-treated intervention group, the results are likely to be underestimates of the true impact. At any rate, future research is needed to better understand the BHP patient selection mechanism.

Second, although the results suggest total cost of care savings associated with BHP from the payer’s perspective, the current data do not provide information on the implementation cost (ie, the cost of implementing and maintain BHP, as well as its opportunity cost) to allow a calculation of the net cost savings or the return on investment associated with BHP. Future studies will augment this current data by obtaining such cost data to estimate the net savings attributable to BHP.

CONCLUSIONS

The implementation of BHP may have shifted treatments of certain BH conditions away from PCPs and non-BH specialists, who often have less training and less resources to manage BH conditions. Therefore, these results suggest that improved access to BH care achieved via provision of employer-sponsored BH programs such as BHP may improve efficiency in the health care system. ■

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eAppendix

eAppendix Table 1: Full Regression Model Results for Cost of Care and Acute Care Utilization

Covariate	Total Medical*		Total Med + Rx*		Acute Care**	
	Coefficient	p	Coefficient	p	Coefficient	p
Pre-Index	(reference)					
Months since Index: 1-6	0.49	<0.001	0.51	<0.001	0.47	0.011
Months since Index: 7-12	0.00	0.987	0.05	0.708	-0.11	0.663
Months since Index: 13 to 18	-0.31	0.174	-0.27	0.190	-0.36	0.413
BHP	0.24	0.130	0.17	0.238	0.32	0.092
BHP x 1-6 Months	-0.40	0.031	-0.38	0.019	-0.33	0.206
BHP x 7-12 Months	-0.21	0.330	-0.19	0.356	0.04	0.894
BHP x 3-18 Months	-0.14	0.700	-0.13	0.682	-0.32	0.630
Age: <=30	(reference)					
Age: 31-35	-0.23	0.321	-0.35	0.232	0.05	0.882
Age: 35-45	-0.35	0.061	-0.43	0.089	-0.08	0.818
Age: >45	0.56	0.004	0.46	0.057	0.52	0.070
Female	0.35	0.039	0.18	0.448	0.65	0.005
Age 31-35 x Female	0.44	0.085	0.52	0.084	-0.13	0.744
Age 35-45 x Female	0.69	0.002	0.71	0.008	0.04	0.916
Age >45 x Female	-0.09	0.724	-0.06	0.832	-0.78	0.019
Count of BH Dx = 0 or 1	(reference)					
Count of BH Dx = 2	0.35	0.003	0.41	0.001	0.33	0.048
Count of BH Dx = 3	0.63	<0.001	0.79	<0.001	0.44	0.060
Has Nicotine Dependence	0.71	<0.001	0.64	<0.001	1.05	<0.001
Has Substance Use Disorder	0.37	0.023	0.28	0.072	0.73	0.006
Subscriber Relation: Self	(reference)					
Subscriber Relation: Dependent	0.07	0.467	-0.08	0.537	0.19	0.172
Has PPO	(reference)					
Has HDHP	-0.38	0.002	-0.38	0.001	-0.25	0.149
Claim Year: 2016	-0.72	0.018	-0.67	0.007	-2.21	<0.001
Claim Year: 2017	(reference)					
Claim Year: 2018	0.24	0.035	0.35	0.002	-0.08	0.673
2016 x HDHP	-0.03	0.928	0.04	0.889	0.88	0.225
2018 x HDHP	0.06	0.627	-0.03	0.789	-0.05	0.813
Claim Month: January - March	(reference)					
Claim Month: April-June	0.01	0.945	0.03	0.614	0.32	0.016
Claim Month: July-September	-0.08	0.371	-0.02	0.814	0.01	0.920
Claim Month: October-December	0.01	0.911	0.06	0.581	0.17	0.347
Comorbidity Index = 0	(reference)					
Comorbidity Index = 1	0.76	<0.001	0.92	<0.001	0.92	<0.001
Comorbidity Index = 2+	1.57	<0.001	1.65	<0.001	1.44	<0.001
Constant	4.88	<0.001	5.22	<0.001	-5.28	<0.001

Note: * Generalized linear model with log link and Gamma distribution; ** Poisson model; BH = behavioral health; BHP = Behavioral Health Partners; Dx = diagnosis; HDHP = high-deductible health plan; PPO = preferred provider organization

eAppendix Table 2: Full Regression Model Results for Physician Office Visits

Covariate	PCP Visits**		BH Specialist**		Non-BH Specialist**	
	Coefficient	p	Coefficient	p	Coefficient	p
Pre-Index	(reference)					
Months since Index: 1-6	0.63	<0.001	1.89	<0.001	0.29	<0.001
Months since Index: 7-12	0.20	0.026	1.39	<0.001	0.05	0.639
Months since Index: 13 to 18	-0.16	0.298	1.34	<0.001	-0.09	0.589
BHP	0.28	<0.001	-0.57	0.065	0.25	0.022
BHP x 1-6 Months	-0.30	0.001	0.08	0.796	-0.30	0.007
BHP x 7-12 Months	-0.39	0.006	0.30	0.374	-0.27	0.091
BHP x 3-18 Months	0.01	0.966	0.03	0.960	-0.45	0.051
Age: <=30	(reference)					
Age: 31-35	0.17	0.340	-0.18	0.636	-0.55	0.036
Age: 35-45	0.18	0.182	0.02	0.947	-0.11	0.667
Age: >45	0.59	<0.001	0.17	0.606	0.69	0.001
Female	0.32	0.002	-0.09	0.762	0.61	0.001
Age 31-35 x Female	-0.26	0.185	0.36	0.378	0.64	0.027
Age 35-45 x Female	0.01	0.944	0.06	0.877	0.32	0.266
Age >45 x Female	-0.38	0.009	0.17	0.640	-0.43	0.067
Count of BH Dx = 0 or 1	(reference)					
Count of BH Dx = 2	0.47	<0.001	0.38	0.006	0.33	<0.001
Count of BH Dx = 3	0.64	<0.001	1.13	<0.001	0.42	0.001
Has Nicotine Dependence	0.47	<0.001	-0.31	0.210	0.64	<0.001
Has Substance Use Disorder	0.09	0.476	-0.31	0.143	0.17	0.270
Subscriber Relation: Self	(reference)					
Subscriber Relation: Dependent	0.11	0.076	-0.18	0.297	0.02	0.784
Has PPO	(reference)					
Has HDHP	-0.19	0.006	0.00	0.992	0.01	0.955
Claim Year: 2016	-0.61	<0.001	0.14	0.505	-0.90	<0.001
Claim Year: 2017	(reference)					
Claim Year: 2018	0.14	0.057	-0.32	0.013	0.24	0.012
2016 x HDHP	0.02	0.912	0.26	0.381	0.00	0.992
2018 x HDHP	-0.19	0.023	0.10	0.531	-0.04	0.720
Claim Month: January - March	(reference)					
Claim Month: April-June	0.06	0.208	-0.04	0.418	0.09	0.039
Claim Month: July-September	0.01	0.773	-0.23	0.002	0.03	0.583
Claim Month: October-December	-0.05	0.314	-0.38	<0.001	0.11	0.089
Comorbidity Index = 0	(reference)					
Comorbidity Index = 1	0.53	<0.001	0.06	0.727	0.55	<0.001
Comorbidity Index = 2+	0.75	<0.001	0.04	0.843	0.86	<0.001
Constant	-2.81	<0.001	-2.51	<0.001	-2.26	<0.001

Note: * Generalized linear model with log link and Gamma distribution; ** Poisson model; BH = behavioral health; BHP = Behavioral Health Partners; Dx = diagnosis; HDHP = high-deductible health plan; PPO = preferred provider organization

eAppendix Table 3: Pre-Period Tests of Parallel Trends for Cost of Care and Acute Care Utilization

Covariate	Total Medical*		Total Medical + Rx**		Acute Care**	
	Coefficient	p	Coefficient	p	Coefficient	p
Pre-period: -17 to -6 months	(reference)					
Pre-period: -5 to 0 months	0.481	0.000	0.442	0.000	0.143	0.551
BHP	0.350	0.099	0.289	0.136	0.055	0.875
BHP x -5 to 0 months	-0.239	0.284	-0.208	0.287	0.486	0.194
Age: <=30	(reference)					
Age: 31-35	-0.543	0.074	-0.786	0.028	0.079	0.871
Age: 35-45	-0.460	0.079	-0.517	0.130	-0.152	0.768
Age: >45	0.659	0.021	0.464	0.165	0.488	0.185
Female	0.365	0.143	0.113	0.716	0.658	0.028
Age 31-35 x Female	0.843	0.016	1.068	0.004	-0.066	0.911
Age 35-45 x Female	0.859	0.008	0.909	0.014	0.342	0.568
Age >45 x Female	-0.132	0.692	0.077	0.826	-0.666	0.127
Count of BH Dx = 0 or 1	(reference)					
Count of BH Dx = 2	0.576	0.000	0.635	0.000	0.206	0.363
Count of BH Dx = 3	0.694	0.001	0.899	0.000	0.174	0.637
Has Nicotine Dependence	0.795	0.000	0.718	0.000	1.186	0.000
Has Substance Use Disorder	0.508	0.035	0.360	0.114	0.915	0.022
Subscriber Relation: Self	(reference)					
Subscriber Relation: Dependent	0.112	0.435	-0.044	0.779	0.384	0.023
Has HDHP	-0.386	0.009	-0.387	0.006	-0.246	0.208
Claim Year: 2016	-0.569	0.086	-0.541	0.049	-2.167	0.001
Claim Year: 2017	(reference)					
Claim Year: 2018	0.515	0.003	0.549	0.001	0.074	0.783
2016 x HDHP	-0.001	0.997	0.060	0.821	0.868	0.239
2018 x HDHP	-0.235	0.271	-0.196	0.330	-0.246	0.462
Claim Month: January - March	(reference)					
Claim Month: April-June	-0.137	0.191	-0.093	0.323	0.346	0.042
Claim Month: July-September	-0.339	0.011	-0.245	0.045	-0.113	0.555
Claim Month: October-December	0.002	0.989	0.036	0.819	0.265	0.282
Comorbidity Index = 0	(reference)					
Comorbidity Index = 1	0.889	0.000	0.988	0.000	0.963	0.000
Comorbidity Index = 2+	1.442	0.000	1.523	0.000	1.150	0.000
Constant	4.526	0.000	4.934	0.000	-5.477	0.000

Note: * Generalized linear model with log link and Gamma distribution; ** Poisson model; BH = behavioral health; BHP = Behavioral Health Partners; Dx = diagnosis; HDHP = high-deductible health plan; PPO = preferred provider organization

eAppendix Table 4: Pre-Period Tests of Parallel Trends for Physician Office Visits

Covariate	PCP Visits*		BH Specialists**		Non-BH Specialists**	
	Coefficient	p	Coefficient	p	Coefficient	p
Pre-period: -17 to -6 months	(reference)					
Pre-period: -5 to 0 months	0.418	0.000	0.065	0.686	0.432	0.000
BHP	0.313	0.010	-0.527	0.161	0.340	0.029
BHP x -5 to 0 months	-0.035	0.788	-0.245	0.388	-0.174	0.212
Age: <=30	(reference)					
Age: 31-35	0.234	0.370	-2.563	0.019	-0.730	0.016
Age: 35-45	0.419	0.032	-1.502	0.154	0.286	0.352
Age: >45	0.795	0.000	-0.229	0.782	0.840	0.000
Female	0.412	0.013	-0.570	0.364	0.742	0.000
Age 31-35 x Female	-0.157	0.590	2.827	0.010	1.010	0.004
Age 35-45 x Female	-0.144	0.519	1.363	0.191	0.123	0.719
Age >45 x Female	-0.534	0.013	0.663	0.455	-0.381	0.161
Count of BH Dx = 0 or 1	(reference)					
Count of BH Dx = 2	0.524	0.000	0.927	0.008	0.277	0.011
Count of BH Dx = 3	0.892	0.000	2.068	0.000	0.342	0.050
Has Nicotine Dependence	0.540	0.000	0.132	0.769	0.566	0.009
Has Substance Use Disorder	0.004	0.982	-0.543	0.206	0.304	0.155
Subscriber Relation: Self	(reference)					
Subscriber Relation: Dependent	0.132	0.118	-0.487	0.348	0.002	0.983
Has HDHP	-0.233	0.008	0.086	0.795	0.041	0.740
Claim Year: 2016	-0.468	0.001	-0.138	0.536	-0.697	0.002
Claim Year: 2017	(reference)					
Claim Year: 2018	0.155	0.149	-0.390	0.260	0.371	0.003
2016 x HDHP	0.095	0.628	0.351	0.095	-0.036	0.902
2018 x HDHP	-0.087	0.513	0.252	0.567	-0.128	0.452
Claim Month: January - March	(reference)					
Claim Month: April-June	-0.046	0.498	-0.060	0.560	0.025	0.678
Claim Month: July-September	-0.138	0.061	-0.121	0.453	-0.177	0.024
Claim Month: October-December	-0.118	0.193	-0.133	0.438	0.075	0.486
Comorbidity Index = 0	(reference)					
Comorbidity Index = 1	0.648	0.000	0.323	0.392	0.629	0.000
Comorbidity Index = 2+	0.708	0.000	-0.404	0.417	0.766	0.000
Constant	-3.215	0.000	-2.498	0.002	-2.720	0.000

Note: * Generalized linear model with log link and Gamma distribution; ** Poisson model; BH = behavioral health; BHP = Behavioral Health Partners; Dx = diagnosis; HDHP = high-deductible health plan; PPO = preferred provider organization