

Peer-Reviewed Research:

Regional Health Systems Improve Clinical Outcomes & Speed to Care Through Intelligent Behavioral Health Referrals

New study of claims data found a \$28 PMPM reduction in total medical costs despite increased outpatient utilization

Overview

NeuroFlow published compelling results of our work with regional health systems in the American Journal of Managed Care. The study analyzes the claims data of 13,000 patients and compared risk-adjusted populations, patients whose PCPs used NeuroFlow's tech-enabled referral management, and patients whose PCPs did not leverage NeuroFlow. Those who had access to tech-enabled referral management had stronger clinical and financial outcomes:

36%

improvement in days to care from diagnosis to first outpatient behavioral health visit

43%

less likely to have behavioral health-related inpatient admissions

\$28 PMPM

reduction in total medical spend, even with increased outpatient BH utilization

Linking Insured Adults to Behavioral Health Care: A Cost-Saving Solution

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Connecting primary care providers and commercially insured adults to outpatient behavioral health services via a digital platform improved health outcomes and reduced medical costs.

ABSTRACT

Objective: To evaluate the impact of a digital platform that connects primary care providers and commercially insured adults to outpatient behavioral health services on behavioral health utilization and total medical costs.

Study Design: A matched difference-in-differences approach was used to assess the effects of the intervention. Data were obtained from administrative medical claims for commercially insured adults.

Methods: The intervention group consisted of members assigned to 735 practices that adopted the platform, and the comparison group included members from 516 practices that did not. Propensity score matching was employed to balance baseline characteristics, and doubly robust difference-in-differences analysis was applied to estimate the intervention’s effects on outpatient behavioral health visits, emergency department (ED) visits, inpatient admissions, and total medical costs over 18 months.

Results: The intervention group had a 68% higher likelihood of receiving outpatient behavioral health services. They were 35% less likely to have a behavioral health–related ED visit and 43% less likely to be admitted for behavioral health–related inpatient care. Despite increased outpatient utilization, total medical costs were significantly lower in the intervention group (–\$27.63 per member per month at 18 months post intervention).

Conclusions: Connecting commercially insured adults to outpatient behavioral health services via a digital platform improves utilization of behavioral health care while reducing costly emergency and inpatient services. These findings suggest that enhancing access to outpatient behavioral health services can lead to better health outcomes and greater cost efficiency in managed care populations.

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Takeaway Points

Improving access to outpatient behavioral health services through a digital platform can enhance health outcomes and cost efficiency for commercially insured populations in the following ways:

- Increased outpatient visits: The intervention group was 68% more likely to access outpatient behavioral health care.
- Reduced costly care: Behavioral health–related emergency department visits and inpatient admissions decreased by 35% and 43%, respectively.

- Lower total medical costs: The intervention group saved \$27.63 per member per month, shifting care from expensive inpatient services to outpatient care.
- Implications for policy: Enhancing access to behavioral health services can improve health outcomes and reduce costs,
- informing future health care reform and managed care strategies.

Estimates from the National Institute of Mental Health suggest that nearly 1 in 5 adults in the US in 2019 had a mental disorder, a term that includes mental, behavioral health (BH), and neurodevelopmental conditions.¹ Medical spending to treat adults with mental disorders totaled \$106.5 billion in 2019.¹ Analysis of a nationally representative survey conducted during the COVID-19 pandemic estimated rates of anxiety and depression at 30.6% and 24.5%, respectively.² BH conditions are associated with increased morbidity and mortality, reduced quality of life, and lower productivity and employment.^{3,4} Moreover, BH conditions often co-occur with chronic physical conditions, such as diabetes, cardiovascular disease, and chronic pain, and can exacerbate symptoms, complicate management, and lead to poor outcomes.⁵⁻⁷

Despite the high prevalence and impact of BH conditions, many individuals face barriers to accessing appropriate and timely BH care, including stigma, lack of awareness, shortage of BH providers, long wait times, high out-of-pocket costs, and poor coordination and integration of BH care with primary care. As a result, many individuals with BH needs remain undiagnosed, untreated, or undertreated, and they may resort to using acute care services, such as emergency department (ED) or inpatient (IP) visits, for BH crises.^{8,9}

Evidence suggests that timely BH management may improve health outcomes and lower long-term costs. For example, in a recent study of individuals with newly diagnosed BH conditions, those who engaged in outpatient (OP) BH treatment incurred significantly lower medical and pharmacy costs over 15 and 27 months than those who did not receive treatment.¹⁰ Reductions in health care expenditures linked to mental health service use are particularly notable among adults with chronic physical conditions¹¹ and when BH care is integrated into community practices.^{12,13}

However, some research data suggest that integrating BH care into the primary care setting may not reduce overall medical costs.¹⁴ Another study reported mixed results of integrated primary and mental care on OP medical, IP hospital, and ED utilization among individuals with serious mental illness.¹⁵

This study estimates the impact of activating members into a digital platform that facilitates BH care on speed to care, BH utilization, and medical costs for those activated between January 2021 and July 2023. We hypothesized that compared with a propensity score–matched comparison group, the intervention group would experience improved speed to care, increased OP BH visits, and reduced BH-related ED visits and hospitalizations, ultimately resulting in lower total medical costs.

METHODS

This study evaluates a technology-enabled intervention that uses a digital platform and care coordination services to improve BH care access, quality, and efficiency. The platform connects primary care providers (PCPs), BH specialists, and patients to facilitate early identification of BH needs, streamlined referrals, enhanced communication, and sustained patient engagement. The platform serves as a central hub, integrating with electronic health records to streamline referrals from PCPs, data exchange, and proactive identification of high-risk populations by health plans. A matching algorithm optimizes patient-provider matching. Provider support services are embedded in the platform, simplifying referrals, improving patient care visibility for PCPs, and delivering prescreened referrals and administrative support for BH providers. The platform also provides data insights on engagement and adherence.

Members can be activated through 2 channels: (1) when health care providers, case managers, or members themselves refer members to the platform or (2) when at-risk members are identified through predictive analytics. Identified members are engaged by care navigators for needs assessment and connection to BH services.

The intervention involves structured support upon activation. Care navigators initiate contact for intake and needs assessment. Navigators leverage algorithmic provider recommendations to manage provider matching and appointment scheduling, confirming provider availability and assisting with scheduling. Navigators also address barriers to access and provide ongoing support, resolving logistical and motivational issues. Postappointment follow-ups confirm attendance and assess progress. If appointments are missed, navigators reengage patients, offering rematching with providers and addressing new barriers. Expanded treatment modalities, including tele-BH, digital cognitive behavioral therapy programs, and peer support groups, broaden access and accommodate diverse patient needs and preferences. Since 2021, Independence Blue Cross (IBX), a health insurer based in Philadelphia, Pennsylvania, has partnered with a BH vendor to implement this intervention within its network. The platform is embedded in 735 primary care practices, serving more than 13,000 members.

We analyzed IBX administrative claims data using a matched difference-in-differences (DID) approach. The intervention group included members attributed to 735 practices that adopted the digital platform and were activated, and the comparison group consisted of members with a BH diagnosis or OP visit from 516 practices that did not adopt the platform. Activation dates determined treatment timing for the intervention group, and the comparison group's index date was aligned with the matched intervention member's activation date.

For propensity score matching, we compiled data of intervention group members for the 12 months preceding activation. For each member in the comparison group, we compiled data for the 12 months preceding each of the 31 months during which intervention group members were activated, creating up to 31 twelve-month segments for each potential control unit. We matched on all covariates listed in **Table 1**,¹⁶ except for total medical costs. We matched intervention group members to comparison group members based on the comparison members' historic 12-month data as of the intervention group member's activation month. We performed this process sequentially by month, without replacement, for all months in which members were activated. For example, members activated in January 2021 were matched to eligible comparison group members based on their characteristics in the 12 months preceding January 2021. Successfully matched controls were then excluded from the pool of eligible members, and the process was repeated for February. We also exact matched on members' participation in value-based programs administered by IBX to account for the impact of other programs aimed at reducing ED visits and IP hospitalizations. We used a caliper of 0.2 times the SD of the logit of the propensity score to select the nearest neighbor for each intervention group member. Covariate balance was assessed using standardized differences, with a threshold of 0.1.

Between January 2021 and July 2023, 11,301 eligible members were activated into the intervention. We identified 38,982 eligible comparison group members during the same period. Intervention and comparison group members were excluded from the study sample if they (1) had more than \$12,500 per member per month (PMPM) in medical costs in the 6-month preactivation period; (2) had a diagnosis of end-stage kidney disease, dementia, HIV, hepatitis C, or multiple sclerosis; (3) had claims for transplant, infertility treatments, or hospice; or (4) had fewer than 6 months of health plan enrollment in the preintervention and postintervention periods. The final eligible sample included 7518 intervention group members and 23,546 comparison group members. The final matched sample consisted of 6487 members in each of the intervention and comparison groups.

Outcomes

The primary outcomes of interest were the number of OP BH visits, BH-related ED visits, BH-related IP hospitalizations, and total medical costs. All outcomes were measured at 6, 12, and 18 months post activation or index date. BH-related visits were identified using diagnosis codes from the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition).¹⁷ Total medical cost was calculated as the sum of paid amounts for all medical claims, excluding pharmacy claims, because not all members in the intervention and comparison population had pharmacy coverage through the insurer. Costs are presented in PMPM terms. We also measured the number of days between the date of first BH diagnosis and first OP BH visit as a measure of speed to care.

Statistical Analysis

We used a doubly robust DID analysis to estimate the impact of the intervention on the outcomes, adjusting for all covariates used in the propensity score matching.¹⁸ The DID approach compares changes in the outcomes between the activated and comparison groups from the preintervention to the postintervention period, controlling for baseline differences and time-invariant confounders. The doubly robust method combines propensity score matching and regression adjustment to reduce bias and increase efficiency. We used generalized linear models with a log link and a γ distribution for cost outcomes and negative binomial models for the visit outcomes. Estimated coefficients and 95% CIs are reported for each outcome and follow-up period.

Sensitivity Analysis

We also conducted 3 sensitivity analyses. First, not all members had 18 months of eligibility post activation or index date, so the sample size varies by length of follow-up. We conducted analyses using a stable panel of members having at least 18 months of follow-up. Second, although we matched on enrollment in the insurer’s care management (CM) program during the preintervention period, the magnitude of outcome estimates could be driven by high-acuity and high-cost members who are more likely to enroll in CM programs. Therefore, we conducted analyses removing members who were enrolled in a CM program in the preintervention period. Third, to ensure our results were robust to matching order, we conducted the match in reverse chronological order, starting with the last observed activation date in the study period, July 2023, selecting matches without replacement monthly through the first observed activation date, January 2021.

RESULTS

Study Population Characteristics

Table 1¹⁶ shows the baseline characteristics of the study population after propensity score matching. The intervention and comparison groups were well balanced on most covariates, with standardized differences less than 0.1. Although we did not match on total medical costs, preintervention period costs did not differ between the intervention group and the comparison group after matching.

Health Care Utilization

Figure panels A through C show month-over-month coefficient estimates comparing the intervention and comparison groups on utilization outcomes. In each case, there were no significant differences in preintervention period trends.

OP BH visits. Figure panel A shows a sharp increase in visits for the intervention group relative to the comparison group in the first month of the intervention period and persisting throughout the 18-month follow-up period but attenuating over time. The effect estimates in **Table 2** panel A show the effects across 3 follow-up periods. At the 6-month follow-up period, the intervention group averaged 356 more OP BH visits per 1000 member-months (95% CI, 265-448), and these members were 68% more

likely to visit a professional for BH-related issues. Significantly higher rates of OP BH visits persisted over the 12- and 18-month follow-up periods, although the differences grew smaller over time. In our preferred specification, members incurred a mean cost of \$38 PMPM related to OP BH care.

BH-related ED visits. Figure panel B shows a decrease in ED visits for the intervention group relative to the comparison group post intervention. On a month-over-month basis, the trend toward fewer ED visits began in month 2 of the postintervention period. The estimates in Table 2 panel A show that overall reductions in ED visits were statistically significant within the first 6 months, with 5.9 fewer BH-related ED visits per 1000 in the first 6 months (95% CI, −10.7 to −1.1), and intervention group members were 35% less likely to visit the ED for BH-related issues. The effect increased with a longer follow-up period to 7.1 and 8.3 fewer BH-related ED visits at 12 and 18 months post intervention, respectively.

BH-related IP admissions. Figure panel C shows a pattern of decreased IP admissions for the intervention group relative to the comparison group post intervention that mirrors the patterns shown in panel B. Reductions in BH-related IP admissions stabilized by month 7 and persisted over 18 months. The estimates in Table 2 panel A show a significant reduction of 4.6 visits per 1000 member-months (95% CI, −8.6 to −0.7) within the first 6 months. The intervention group was 43% less likely to have a BH-related IP admission within the first 6 months, and the relative reduction in BH-related IP admissions increased over the 12- and 18-month follow-up periods.

Medical Costs

Like the patterns seen in Figure panels B and C, Figure panel D shows no differences in medical cost trends between the intervention and comparison groups during the preintervention period. Medical costs began to decrease in the intervention group relative to the comparison group shortly after activation, and the reduction persisted over the 18-month postintervention period. Table 2 panel A shows that medical costs trended lower but did not reach statistical significance in the first 6 months, but by month 12, costs were significantly lower for the intervention group and the reduction persisted through month 18.

Days to Care

We examined the number of days to care for a subset of the study sample who received a BH diagnosis and had at least 1 subsequent OP BH visit to assess the impact of the intervention on time to first OP BH visit. Analyses comparing 1683 intervention group members and 1927 comparison group members meeting those criteria showed that the number of days between BH diagnosis and first OP BH visit was significantly lower for the intervention group (mean [SD], 34.2 [76.8]) vs the comparison group (53.6 [112.3]; $t=-5.98$; $P<.001$), a 36% improvement in the number of days to care (Table 3).

Sensitivity Analysis

Members who were activated earlier in the study period had more months of postactivation data. As such, the sample size decreases as the number of follow-up months analyzed increases. Analyses using a stable panel of 3931 members with 18 months of follow-up data show patterns that are similar in direction and magnitude to those observed in the full sample (Table 2 panel B).

Members who were activated through the CM channel had higher DxCG Intelligence risk scores (5.4 vs 1.9; $P<.001$) and higher PMPM medical costs (\$826 vs \$359; $P<.001$) in the preintervention period than members activated through other channels. Members participating in CM programs typically engage with care managers during or shortly after an acute event such as an IP hospitalization. Often, costs surge around the time of CM engagement and fall substantially in the following months when the acute event has subsided. Although we matched on participation in the insurer's CM program in the main analyses, we conducted additional analyses excluding those members to assess whether the observed impact of the intervention was driven solely by high-acuity, high-cost members in the

preintervention period. These analyses showed significant reductions in health care utilization and medical costs among the intervention group that are similar in magnitude to both the full sample and the stable panel sample (Table 2 panel C).

In the primary analyses, we identified matches in chronological order, finding matches for those activated in January, followed by those activated in February, and so on. As a third robustness check, we conducted the matching process in reverse chronological order beginning with the last observed activation date in the study period, July 2023, moving backward in time by month to the first observed activation date, January 2021. This approach yielded 46% new matches relative to the initial chronological match. Nonetheless, **Table 4**¹⁶ shows that the balance between the intervention and comparison groups was similar across both matching methods. Table 2 panel D shows that the estimated effects of activation were again of similar magnitude and direction to the effects found in the main analysis.

DISCUSSION

Our study findings demonstrate that an intervention integrating a digital platform into primary care workflows, streamlining referrals, and connecting patients with appropriate BH care providers was associated with a significant increase in the number of members using OP BH care services and significant reductions in the number of days to receive care. The increase in OP BH services was visible immediately after activation and was sustained over 18 months. Connecting more members to OP BH care was followed by corresponding reductions in BH-related ED visits and IP admissions that were sustained over an 18-month period. The substitution of lower-cost OP services for more expensive ED and IP services was associated with significant and sustained reductions in total medical costs. Our findings align with other research data highlighting that sustained engagement and timely access to OP BH services drive significant cost reductions and improved outcomes for high-cost, high-need populations, reinforcing the value of proactive care navigation and early intervention.¹⁹ These findings suggest that improved access to OP BH services may prevent the escalation of mental health issues to the point of requiring urgent or intensive interventions. They are particularly noteworthy given the well-documented challenges of accessing timely mental health care in the US^{1,2} and contribute to the growing body of evidence supporting the cost-effectiveness of early intervention and comprehensive OP mental health services.^{10–13}

Our findings have several important implications for health policy and practice. First, they underscore the potential for targeted interventions to simultaneously improve health outcomes and reduce costs, a key goal in the era of value-based care. Second, the observed cost savings, inclusive of all BH care expenses, highlight the importance of integrating BH services into broader health care delivery systems, potentially informing the design of future care models. Third, the demonstrated cost savings suggest that facilitating access to OP BH services is a viable long-term strategy for improving health outcomes and reducing total medical costs.

Limitations

Because this was an observational study, it cannot establish definitive causality between interventions and outcomes. Although propensity score matching helps control for confounding variables, unmeasured factors may still influence results. Additionally, selection bias is also a concern because participating practices were larger than nonparticipating practices (75% vs 45%, respectively, were multiprovider practices) and served populations with more mental-physical comorbidities (52% of patients had both depression and diabetes vs 37% in nonparticipating practices).

Moreover, our study population consisted solely of commercially insured individuals, which may restrict the generalizability of our findings to uninsured groups, Medicaid recipients, or different geographic or socioeconomic contexts. The effectiveness of the intervention may vary in these populations due to differences in access, health literacy, and provider availability. Despite these limitations, the consistency of our results strengthens the validity of our findings.

CONCLUSIONS

Our study provides compelling evidence that connecting members to BH care may limit the escalation of BH needs requiring more intensive and costly intervention. As the health care system continues to grapple with rising costs and the growing burden of mental health disorders, interventions that improve access to OP BH services represent a promising strategy for enhancing both the quality and efficiency of care and lowering overall medical costs.

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REFERENCES

1. Soni A. Healthcare expenditures for treatment of mental disorders: estimates for adults ages 18 and older, U.S. civilian noninstitutionalized population, 2019. Agency for Healthcare Research and Quality Medical Expenditure Panel Survey statistical brief 539. February 2022. Accessed May 23, 2024. https://meps.ahrq.gov/data_files/publications/st539/stat539.shtml
2. Collier Villaume S, Chen S, Adam EK. Age disparities in prevalence of anxiety and depression among US adults during the COVID-19 pandemic. *JAMA Netw Open*. 2023;6(11):e2345073. doi:10.1001/jamanetworkopen.2023.45073
3. Walker ER, McGee RE, Druss BG. Mortality in mental disorders and global disease burden implications: a systematic review and meta-analysis. *JAMA Psychiatry*. 2015;72(4):334-341. doi:10.1001/jamapsychiatry.2014.2502
4. Prince M, Patel V, Saxena S, et al. No health without mental health. *Lancet*. 2007;370(9590):859-877. doi:10.1016/S0140-6736(07)61238-0
5. Druss BG, Walker ER. Mental disorders and medical comorbidity. *Synth Proj Res Synth Rep*. 2011; (21):1-26.
6. Chapman DP, Perry GS, Strine TW. The vital link between chronic disease and depressive disorders. *Prev Chronic Dis*. 2005;2(1):A14.
7. Avila C, Holloway AC, Hahn MK, et al. An overview of links between obesity and mental health. *Curr Obes Rep*. 2015;4(3):303-310. doi:10.1007/s13679-015-0164-9
8. Heslin KC, Weiss AJ. Hospital readmissions involving psychiatric disorders, 2012. Healthcare Cost and Utilization Project statistical brief 189. May 2015. Accessed May 26, 2024. <https://hcup-us.ahrq.gov/reports/statbriefs/sb189-Hospital-Readmissions-Psychiatric-Disorders-2012.jsp>
9. Zima BT, Rodean J, Hall M, Bardach NS, Coker TR, Berry JG. Psychiatric disorders and trends in resource use in pediatric hospitals. *Pediatrics*. 2016;138(5):e20160909. doi:10.1542/peds.2016-0909

10. Bellon J, Quinlan C, Taylor B, Nemecek D, Borden E, Needs P. Association of outpatient behavioral health treatment with medical and pharmacy costs in the first 27 months following a new behavioral health diagnosis in the US. *JAMA Netw Open*. 2022;5(12):e2244644. doi:10.1001/jamanetworkopen.2022.44644
11. Bui LN, Yoon J, Hynes DM. A reduction in health care expenditures linked to mental health service use among adults with chronic physical conditions. *Psychiatr Serv*. 2021;72(7):766-775. doi:10.1176/appi.ps.202000161
12. Highland J, Nikolajski C, Kogan J, Ji Y, Kukla M, Schuster J. Impact of behavioral health homes on cost and utilization outcomes. *Psychiatr Serv*. 2020;71(8):796-802. doi:10.1176/appi.ps.201900141
13. Davenport S, Matthews K, Melek S, Norris D, Weaver A. Potential economic impact of integrated medical-behavioral healthcare: updated projections for 2017. Milliman. February 12, 2018. Accessed May 28, 2024. <https://www.milliman.com/en/insight/potential-economic-impact-of-integrated-medical-behavioral-healthcare-updated-projections>
14. Wolk CB, Wilkinson E, Livesey C, et al. Impact of the collaborative care model on medical spending. *Am J Manag Care*. 2023;29(10):499-502. doi:10.37765/ajmc.2023.89438
15. Krupski A, West II, Scharf DM, et al. Integrating primary care into community mental health centers: impact on utilization and costs of health care. *Psychiatr Serv*. 2016;67(11):1233-1239. doi:10.1176/appi.ps.201500424
16. Coffey R, Houchens R, Chu BC, et al. A Severity-Of-Illness Classification for Mental and Substance-Use Disorders for Use With Hospital Administrative Data. Healthcare Cost and Utilization Project; 2011. Accessed September 24, 2024. <https://www.hcup-us.ahrq.gov/reports/SOI.jsp>
17. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. American Psychiatric Association; 2013.
18. Sant'Anna PHC, Zhao J. Doubly robust difference-in-differences estimators. *J Econom*. 2020;219(1):101-122. doi:10.1016/j.jeconom.2020.06.003
19. Placzek HED, Darby B, Kaplan RM, Glassman J, Garcia-Huynh M, Barse P. An evaluation of a care coaching and provider referral intervention for behavioral health needs. *Am J Manag Care*. 2022;28(12):644-652. doi:10.37765/ajmc.2022.89274