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## The association between enrollment in Maryland’s behavioral health homes and outpatient mental health service utilization

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### Abstract

**Objective:** This study examined the association between enrollment in Maryland’s behavioral health home (BHH) program and outpatient mental health service utilization among people with serious mental illness.

**Methods:** The study sample, drawn from Maryland Medicaid administrative claims data from 2012 through 2017, included individuals aged 21–64 with a serious mental illness. A marginal structural modeling approach with inverse probability of treatment weighting was used to examine the association between BHH enrollment and outpatient mental health utilization, measured as the number of visits per three-month period.

**Results:** BHH enrollment was associated with 0.8 additional outpatient mental health visits per three-month period, or approximately 3 additional visits annually.

**Conclusions:** A specialty mental health system-based health home model with a primary goal of improving access to somatic healthcare, was associated with increased outpatient mental health service utilization.

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The estimated 11.4 million adults with serious mental illness in the U.S.<sup>1</sup> have 10–20 year shorter life expectancy than the general population.<sup>2</sup> Much of this premature mortality is attributable to physical health conditions such as cardiovascular disease and cancer.<sup>2</sup>

Despite high need for both mental health and general medical services among people with serious mental illness, evidence shows that this group often has worse care access and quality compared to people without serious mental illness.<sup>3</sup> In 2018, 36% of adults with serious mental illness did not receive mental health services in the previous year.<sup>1</sup>

The fragmented U.S. specialty mental health and general medical systems are a barrier to achieving “whole person” health care and improving health outcomes among people with serious mental illness. Integrated care models have the potential to address this barrier. Models with primary care practices delivering and/or coordinating some mental health services can improve both mental and physical health care and patient outcomes.<sup>4</sup> In the past decade, models where specialty mental health settings provide and/or coordinate some general medical services have proliferated. This latter model may be particularly beneficial for people with serious mental illness who receive a high volume of services in specialty mental health settings.<sup>5</sup>

Maryland, 16 other states, and Washington D.C. use the Affordable Care Act Medicaid Health Home waiver to implement behavioral health homes (BHH) for people with serious mental illness.<sup>6</sup> Maryland uses their waiver to implement BHHs in psychiatric rehabilitation programs (PRPs). The goals of PRPs are to develop independent living skills and promote community integration. They provide services including case management and assistance with public benefits and liaise with external somatic and mental health providers.<sup>7</sup> Since eligibility criteria for PRPs require significant functional impairment resulting from a serious mental illness,<sup>7</sup> the BHH model allows Maryland to reach a high-need subset of this population.

The limited but growing body of research on specialty mental health based BHH programs has primarily assessed program effects on receipt of primary care services. Findings indicate associations between BHHs and improved quality of general medical and cardiometabolic care,<sup>8</sup> reductions in all-cause emergency department visits,<sup>9</sup> and improvement in physical health quality of life.<sup>10</sup> This study examines whether Maryland’s Medicaid BHH program influenced receipt of specialty mental health services.

## Methods

Maryland Medicaid administrative claims data for 2012 through 2017 were used. Inclusion was limited to participants with serious mental illness aged 21 to 64 with >5 uniquely dated claims for psychiatric rehabilitation services to capture engagement with the PRP. BHH participants were identified as anyone enrolled in a BHH at any time after the program began on October 1, 2013. All participants within a PRP with a BHH were eligible to enroll, and PRP providers reported attempting to enroll all PRP participants but noted staffing shortages sometimes impeded comprehensive enrollment.<sup>11</sup> Comparison individuals were those receiving PRP services not enrolled in a BHH. Baseline characteristics were calculated using claims from the year prior to the start of the BHH program.

All measures were constructed at the person-three-month level. We measured effect of BHH enrollment on outpatient mental health visits using the number of visits in a three-month period as the outcome. Outpatient mental health visits were identified using CPT, HCPCS and ICD-9 and –10 procedure codes consistent with prior literature<sup>12</sup> augmented with codes from Maryland’s behavioral health carve-out fee schedule. BHH exposure was measured as dichotomous enrollment (0/1) that switched from 0 to 1 in the quarter an individual first enrolled in a BHH. The intention of the BHH model is to enroll and retain individuals.

Therefore, we assumed that once enrolled, an individual remained enrolled for the duration of the study period.

PRPs adopted the BHH model throughout the intervention period (October 1, 2013 through September 30, 2014). Of the 54 BHHs operating during the study period, seventy percent (N=38) started enrollment in the first year of the intervention period. In the second year, eleven percent (N=6) began enrollment, and nineteen percent (N=10) began enrollment in the last fifteen months of the study period.

Given the rolling nature of BHH adoption, we included both time-invariant and pre-enrollment time-varying covariates consistent with prior research<sup>9</sup> Time-invariant covariates included: age, sex, race/ethnicity, psychiatric diagnosis, and size of the psychiatric rehabilitation program. Time-varying covariates included: eligibility for Medicaid, comorbid substance use disorder diagnosis, Charlson comorbidity index,<sup>13</sup> the number of PRP services, cumulative number of prior inpatient days, number of emergency department visits, and mental health visits, Medicaid managed care organization, and region of residence. Previous qualitative analysis informed our choice of confounders and our commitment to addressing time-varying confounding.<sup>11</sup>

Common causal inference methods (e.g., difference-in-difference) can introduce bias into estimates of intervention effects when there is time-varying confounding. To address this risk of bias, we used a marginal structural modeling approach with inverse probability of treatment (IPT) weighting.<sup>14</sup> Unlike traditional IPT weighted difference-in-difference, this approach estimates weights for each person-time point in the study period, then fits weighted pooled regression models to estimate effects.

Inverse probability of enrolling in a BHH was estimated at each 3-month period before enrollment based on baseline characteristics and time-varying confounders, after enrollment the IPT is 1. An individual's IPT weight for a given 3-month period was the product of the IPT in the current period and the IPT for all prior periods. By calculating a weight that is the product of IPTs, the weights adjust for individuals' history of time-varying and time invariant confounders up until that time point. To address censoring due to Medicaid disenrollment over the study period, we calculated censoring weights using the same procedures to predict censoring instead of enrollment. Final weights for a person-3-month period were the product of the IPT and censoring weights. This modeling approach provides estimates of the population average effect rather than the effect conditional on confounders, which are instead adjusted for via weighting. In this study, we estimated the effect of BHH enrollment on outpatient mental health utilization in a 3-month period using weights to generate estimates as if the entire population was enrolled vs. not enrolled. Further information on weight calculations can be found in the online supplement.

To estimate the effect of BHH enrollment on the number of expected outpatient mental health visits in a given 3-month period, we used weighted negative binomial regression models (Appendix A). All analyses were conducted in Stata Version 15. This research was considered exempt by the [BLINDED FOR REVIEW] Institutional Review Board.

## Results

The final sample included 151,408 person-3-month observations from 12,232 unique individuals. Throughout the study, 14% of individuals were censored due to Medicaid disenrollment, with the majority censored later in the study period for a loss of 5% of potential observations. Of the 12,232 individuals, 3,319 were enrolled in a BHH with approximately 68% enrolling in the first year of the intervention period, 19% in the second year, and 13% in the last 15 months of the study. 8,913 individuals were never enrolled in a BHH.

Differences in baseline characteristics between BHH enrollees and non-enrollees indicated the need for weighting. Compared to the non-enrolled group, BHH enrollees were, on average, older with more comorbidities. Additionally, the enrollee group contained a larger proportion of men, white individuals, and individuals with schizophrenia (Appendix Table 1). Weighting improved covariate balance with the average absolute standardized mean difference of baseline covariate values between the BHH enrolled group and non-enrollees near or below 20% - a cut-point used to indicate good covariate balance (Appendix Figure 1).<sup>14</sup>

BHH enrollment was associated with 0.8 additional mental health visits per three-month period, with a predicted count of 5.05 visits among non-enrollees vs. 5.85 visits among enrollees over the three-month period,  $p < 0.01$  (Table 1). This three-month difference translates to 9.3 additional visits for enrollees over the study period (65.87 visits for non-enrollees vs. 75.17 visits for enrollees,  $p < 0.01$ ).

## Discussion

Our findings are consistent with the results of studies suggesting that BHH programs, while primarily focused on improving primary care for people with serious mental illness, may also have auxiliary benefits on mental health care utilization and outcomes.<sup>8,10,15</sup> In their randomized trial of the impact of a BHH at a community mental health center on quality and treatment outcomes for people with comorbid serious mental illness and cardiometabolic risk factors, Druss et al. found a modestly greater improvement on the Short Form 36 mental component summary in the BHH group vs. control group.<sup>8</sup> Obsorn et al.'s cluster-randomized trial of the cost effectiveness of an intervention to reduce cholesterol and cardiovascular risk for people with serious mental illness in England found a reduction of inpatient psychiatric admissions leading to lower costs in the intervention group.<sup>15</sup> Kilbourne et al.'s evaluation of care to improve medical and psychiatric outcomes for people with bipolar disorder at a Veterans' Affairs hospital did not find significant differences in psychiatric outcomes, but noted that small sample size may account for the lack of significance in a positive change in mental health quality of life for those in the intervention group.<sup>10</sup>

Previous evaluations of Maryland's health home waiver suggest that the state's BHHs are associated with reduced somatic emergency department use and increases in cancer screening but no changes to quality of cardiovascular care among people with serious

mental illness.<sup>9,16,17</sup> Maryland's BHH program is implemented in psychiatric rehabilitation programs (PRPs). The nature of PRPs may make them especially well-suited to the BHH model. In Maryland, PRPs have a history of coordinating mental health treatment needs predating implementation of BHHs. Therefore, care managers responsible for tracking physical health care and needs in this setting are also likely to be able to identify additional psychiatric needs and facilitate access to services.

Although primary care-based health homes are typically geared toward increasing access to mental health care, and those implemented in specialty mental health settings often prioritize increasing access to primary care, evidence suggests that both models have the potential to increase access to both types of care. This may be due to both models employing similar strategies. For example, care management, shared decision making, and other components of the Chronic Care Model (CCM)<sup>18</sup> are used in both primary care- and specialty mental health-based health home models to proactively address patients' needs and connect them with appropriate treatment and support.

Our findings should be considered with regard to several limitations. We were not able to determine the clinical appropriateness of the additional outpatient mental health visits, or whether they lead to improved clinical outcomes. Future research should explore whether this utilization increase differs among subgroups. Our marginal structural modeling analytic approach assumes that there were no unobserved confounders. Maryland's Medicaid BHH model was implemented in the subgroup of people with serious mental illness who qualify for psychiatric rehabilitation services, which may limit generalizability.

## Conclusions

The present study of Maryland's specialty mental health-based BHH program builds on a growing body of integrated care literature suggesting that both primary care-based and specialty mental health care-based models can help to overcome system fragmentation and facilitate "whole person" healthcare.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Disclosures and Acknowledgements:

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**Highlights:**

A behavioral health home model with the goal of improving somatic health outcomes for people with serious mental illness was also associated with increased utilization of mental health services. Health homes situated in both specialty mental health and primary care settings have the potential to increase access to somatic and psychiatric care.

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**Table 1.**

Average Change in Number of Outpatient Mental Health Visits Attributable to Health Home Enrollment

	<b>3-month period</b>		<b>3-year period</b>	
	<i>Predicted count</i>	<i>95% confidence interval</i>	<i>Predicted count</i>	<i>95% confidence interval</i>
<b>Non-health home enrollees</b>	5.05	4.96, 5.14	65.86	64.49, 67.25
<b>Health home enrollees</b>	5.85	5.64, 6.07	75.17	72.03, 78.32
<b>Difference attributable to health home enrollment</b>	0.80 <sup>*</sup>	72.03, 78.32	9.31 <sup>*</sup>	5.83, 12.79

Asterisk (\*) indicates p-value&lt;0.01.

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