

**Impact of Mental Health Parity & Addiction Equity Act on Costs & Utilization in  
Alabama's Children's Health Insurance Program**

**Running title/header: Impact of Mental Health Parity in Alabama CHIP**

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#### **Conflict of Interest**

None of the authors have conflicts of interest, financial or otherwise, related to the contents of or area of focus for this manuscript.

### Abstract

**Objective:** The Mental Health Parity and Addiction Equity Act (MHPAEA) of 2008 mandates equivalent insurance coverage for mental-health (MH) and substance-use disorders (SUD) to other medical and surgical services covered by group insurance plans, Medicaid and Children's Health Insurance Programs (CHIP). We explored the impact of MHPAEA on enrollees in ALL Kids, the Alabama CHIP.

**Methods:** We use All Kids claims data for October 2008-December 2014. October 2008 through September 2009 marks the period prior to MHPAEA implementation. We evaluated changes in MH/SUD related utilization and program costs, and changes in racial/ethnic disparities in the use of MH/SUD services for ALL Kids enrollees, using two-part models. This allowed analyses of changes from no use to any use, as well as in intensity of use.

**Results:** No significant effect is found on overall MH service-use. There are statistically significant increases in for inpatient visits and length of stay, and some increase in overall MH costs. These increases may not be clinically important, and are concentrated in 2009-2011. Disparities in utilization between African-American and non-Hispanic white enrollees are somewhat exacerbated, while disparities between other minorities and non-Hispanic whites are reduced.

**Conclusions:** Findings indicate that MHPAEA led to a 14.3% increase in inpatient visits, a 12.5% increase in length of inpatient stay, and a 7.8% increase in MH costs. The increases appear limited to 2009-2011, suggesting existing pent-up 'needs' among enrollees for added MH/SUD services that resulted in a temporary spike in service use and cost immediately after MHPAEA, and which subsequently subsided.

**What's New:**

The literature on the effects of MHPAEA is in its early stages. This is the first study to analyze the impact of MHPAEA on utilization and costs, and racial disparities therein, in a CHIP program, and can provide insights into potential impacts on other stand-alone CHIP programs.

## Impact of Mental Health Parity & Addiction Equity Act on Costs & Utilization in Alabama's Children's Health Insurance Program

### Introduction

The enactment of the Mental Health Parity and Addiction Equity Act (MHPAEA) in 2008 has been described as the culmination of a decades-long effort to improve insurance coverage for mental health and addiction treatment in the U.S. MHPAEA is a federal law that mandates equivalent insurance coverage for mental health (MH) and substance use disorders (SUD) to other medical and surgical services covered by group insurance plans, Medicaid and Children's Health Insurance Programs (CHIP). Specifically, the Children's Health Insurance Program Reauthorization Act of 2009, under Title V ('Improving Access to Benefits') section 502 called for "parity of mental health services in CHIP plans with all covered medical and surgical benefits."<sup>1</sup> The Affordable Care Act (ACA) later extended its provisions to individual health insurance plans offered through the marketplaces.<sup>2</sup>

Historically, health insurance plans have typically provided more limited coverage of mental health services relative to other conditions. Prior to MHPAEA, many states had passed some form of parity legislation. These state policies varied substantially in terms of the eligible population, benefits covered and diagnoses included. For example, some states (e.g., Arizona, Indiana, and South Carolina) required equal annual and lifetime caps for mental health illnesses and physical ailments, while other states (e.g., South Dakota) also required that firms provide the same deductibles, coinsurance, and number of outpatient visits as for physical illnesses. State laws also differed in the conditions covered with some (e.g., Delaware, Colorado, Maine, and Texas) applying only to a subset of severe or "biologically based" disorders,<sup>3</sup> while other states (e.g., Vermont) required that coverage be provided for any mental illness listed in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV).

Alabama, which is the focus of this paper, became a 'mandated offering state' in 2000. Mandated offering states required group plans to offer optional coverage of mental illness, severe mental illness, SUD, or some combination thereof. If the option of coverage is accepted, then it usually comes with an added premium. Alabama required that if the option(s) were selected, the copayments/coinsurance for mental health services had to be the same as those for

physical health services.<sup>4,5</sup> However, there could still be quantitative constraints on mental health services compared to other health services, and as we will describe later, Alabama's CHIP program had several such constraints in place.

The key provision of MHPAEA are that the financial requirements (e.g., deductibles and co-payments, or other forms of cost-sharing) and treatment limitations (e.g., number of outpatient visits or inpatient days of coverage) that apply to MH/SUD services must be no more restrictive than those that apply to medical/surgical services covered by the plan. Additionally, if an insurance plan provides out-of-network medical/surgical benefits, then it must also provide out-of-network MH/SUD benefits. Finally, standards for medical necessity determinations and reasons for any denial of benefits relating to MH/SUD benefits must be disclosed upon request. The provisions became effective for plan years beginning after October 3, 2009.

Insurers have frequently voiced concerns that the provision of intensive, or long-term, care for mental health conditions would drive up health care costs and premiums. Some studies find that MH disorder patients use health services at higher rates compared with otherwise similar individuals.<sup>6</sup> Evidence from the RAND Health Insurance Experiment suggests that the demand for mental health services is more price-elastic than other health services, and may thus increase disproportionately with lower cost-sharing.<sup>7,8</sup> Finally, there is concern about adverse selection, where high cost enrollees with a history of mental health use are more likely to enroll when health plans provide more generous coverage.<sup>9,6</sup>

Studies on state mental health parity laws have found mixed evidence as to whether these laws changed access, utilization, and costs for private group health insurance plans.<sup>10, 11,12,13,14</sup> Relatively few studies have focused on the potential impact of parity laws on child enrollees.<sup>3</sup> We are not aware of any studies that have focused on the impact of MHPAEA on public insurance programs for children.

In this study, we explore the early impact of MHPAEA on enrollees of ALL Kids, the Alabama Children's Health Insurance Program. Of interest is whether there were changes in MH and SUD related utilization and program costs, particularly on inpatient visits and length of stay. We also explore whether the passage of MHPAEA may have changed racial and ethnic disparities in the use of MH/SUD services for ALL Kids enrollees. These results can provide

insights into potential effects on other stand-alone CHIP programs, several of which are in southern states as well.

### **Data & Methods**

Historically, ALL Kids coverage was available to Alabama residents under age 19 with family incomes between 100-200% of the federal poverty line (FPL). Beginning in October 2009, program eligibility was expanded to 300% of the FPL. Enrollees faced annual premiums and copayments that vary across the income groups defined by family income and Native American status. The program is administered by the Alabama Department of Public Health (ADPH), which contracts with Blue Cross and Blue Shield of Alabama (BCBSAL) for claims processing and management. Children enrolled in ALL Kids benefit from full medical, pharmaceutical, and dental coverage from the BCBSAL preferred provider network. Enrollees pay an annual premium and experience cost sharing in the form of copayments for selected services. Children in families with incomes between 100-150% of the FPL (termed the “low-fee group”) face lower levels of cost sharing, while children in families with incomes between 150-200% of the FPL (termed the “fee group”) face higher levels of cost sharing. Children in the 200-300% of the FPL following the expansion in 2009 (termed the “expansion group”) have the same cost sharing as the fee group. The fourth group, comprised primarily of Native American children (“no fee”), is federally exempted from all cost sharing. There are no upfront annual deductibles in the ALL Kids program, and out-of-pocket costs per plan year may not exceed 5% of the family income.<sup>15</sup>

We use claims data from fall of 2008 through 2014 to analyze the potential impact of MHPAEA. The start date is driven by the fact that prior to fall of, 2008, mental health services in the program were provided through a mental health carve-out, and we do not have access to their claims data. Thus, the period from fall of 2008 through summer of 2009 is the period prior to MHPAEA implementation, whereas fall of 2009 and later marks the period when MHPAEA is in effect. During the pre-MHPAEA period, ALL Kids had in place various limits on MH/SUD services, such as a limit of 30 days per member per year for MH inpatient days; a limit of 3 days

per member per year for SUD inpatient days, and 20 outpatient MH visits and 90 outpatient SUD visits per member per year.

We employ pooled enrollee-quarter level data for our empirical analyses. We identify MH/SUD claims and associated costs using ICD-10 codes listed in the Appendix. All costs are adjusted to 2014 dollars using the Consumer Price Index for all items (1982-84=100) from the Bureau of Labor Statistics. MH/SUD services are categorized as being obtained in an outpatient/physician's office setting, an inpatient setting, an ED setting or 'other' setting. Additionally, for inpatient admissions, we also calculate the length of stay. The length of stay is assigned to the quarter when the inpatient admission initially occurred, even if the hospitalization extended to the next quarter.

We use two-part models to estimate the association MHPAEA and our outcomes of interest. Two-part models are appropriate for outcomes (e.g., number of MH/SUD visits) with a large proportion of zeroes for the sample. The first part of the model estimates how covariates of interest are associated with the likelihood of the outcome being non-zero versus zero. The second part of the model estimates how covariates of interest are associated with the level of outcome conditional upon it occurring. Our main covariate of interest is a binary indicator for MHPAEA being in effect (post-MHPAE) versus not (pre-MHPAE). To account for the possibility that the effect of MHPAEA law may be different in the immediate aftermath of passage versus after it has been in place for some years, we also separately categorize the 'post-MHPAEA' period into an 'early period' (2009-2011) and 'later period' (after 2011). We additionally include a continuous 'time' indicator to measure trends in MH/SUD service utilization, and dummy indicators for each quarter to account for seasonal fluctuations in utilization. The models also include a binary indicator for January 2014 onwards, since that marks the period all provisions of ACA went into effect, including the transition of children aged 6-19 with incomes under 133% FPL from CHIP to Medicaid. All models also control for socio-demographic and economic characteristics including age, gender, race-ethnicity (non-Hispanic white, African-American, other), eligibility/FPL category, and urban/rural residency status. Since prior research suggests that poor mental health is associated with chronic health conditions like asthma, we also include whether the enrollee has any chronic health conditions.

Since MHPAEA applied to all CHIP enrollees, we do not have a control group per se for our empirical analyses. However, we employ a falsification test by testing the association between passage of MHPAEA and total cost for non-MH/SUD health services.

To further ensure that any changes associated with MHPAEA were not just an artifact of the 200-300% FPL expansion group joining the pool, we also re-estimated all models after excluding that group altogether from the sample. All results are presented as ‘marginal effects’ (ME) which represent the absolute risk difference between a group and the reference category.

To explore whether passage of MHPAEA changed health disparities, we also estimated models where the binary MHPAEA indicator was interacted with race-ethnicity. Due to the challenges of computing and interpreting marginal effects for interaction terms in non-linear two-part models, we present these results in a linear, quasi-difference-in-difference framework. The statistical software STATA (v. 14) is used for all empirical estimations. This project was approved by the Institutional Review Board of the University of Alabama at Birmingham.

## Results

Figure 1 shows the mean visits in each category per 1,000 enrollee, by quarter, over the entire study period. It is seen that outpatient MH/SUD visits account for the overwhelming majority of overall MH/SUD visits. Moreover, the figure shows a distinct seasonal pattern in MH/SUD visits, though there does not appear to be any clear indication of a trend otherwise. Notably, ED visits for MH/SUD that do not lead to inpatient admissions appear to be very low in number. Based on this information, we focus on presenting results from overall visits, outpatient/ambulatory and inpatient visits, as well as inpatient length of stay and total program costs for MH/SUD.

Table 1 presents descriptive statistics for the periods before and after passage of MHPAEA. In both periods, descriptive statistics are presented for the full sample of enrollees, and for the sub-sample that had a non-zero amount of MH/SUD spending for our study period – that is, they incurred MH/SUD expenditures at least once in this period. From the descriptive statistics we see that there is a slight increase in all categories of MH visits -- with the exception of ED visits, as well as a small increase in average enrollee costs per quarter, from the pre to post-MHPAEA period. Further analyses, not shown in tables, revealed that the 95<sup>th</sup> percentile of



costs increased from \$446.93 in the pre MHPAEA period to \$482.22 in the post-MHPAEA period.

Results for two-part models with and without the expansion group are in Table 2. There is a slight increase in ‘any use’ of MH services following the passage of the MHPAEA act, of approximately 0.2 percentage points (ME: 0.002, t-stat: 4.21), and a similar increase in ‘any use’ of outpatient visits (ME: 0.002, t-stat: 4.23). However, intensity of use shows a negative, albeit insignificant, change. The overall effect on total MH services and outpatient visits is not significant (ME: 0.004, t-stat: 1.22; ME: 0.001, t-stat: 0.36). We observed no change in the likelihood of ‘any’ inpatient visits. However, conditional upon visits, there is an increase in number of visits, and the overall effect on inpatient visits is positive (ME: 0.001, t-stat: 3.65). Correspondingly, there is no change in the likelihood of going from no to any length of stay, which is essentially the same as going from ‘no inpatient visit’ to ‘any visit’. However, conditional upon a non-zero length of stay, there is an increase, and the overall effect on inpatient length of stay is positive (ME: 0.001, t-stat: 2.68). There is also an increase in the likelihood of any MH/SUD program costs, and a positive but insignificant effect on level of costs conditional upon non-zero costs. The overall effect on costs is positive (ME: 1.80, t-stat: 2.63). The increases in MH/SUD inpatient service utilization appears more concentrated in the ‘early’ period of 2009-2011 following the passage of the MHPAEA. For example, both the number of inpatient admissions and the length of stay show a significant increase in the early post-MHPAEA period (ME: 0.001, t-stat 2.62 and ME: 0.0008, t-stat: 2.08), but not in the later post-MHPAEA period (ME: 0.00006, t-stat: 0.10 and ME: 0.0003, t-stat: 0.35). However, the change in the likelihood of using any MH/SUD service remains significant in both early and later periods.

The results remain very similar when the expansion group is excluded, suggesting that this group, which was added to the enrollee pool at the same time as MHPAEA, is not driving the results. Finally, the falsification tests find no evidence of a significant positive association between MHPAEA and non-MH/SUD health costs. In fact, the associations appear negative in many cases.

Results presented in Table 3 indicate that, pre-MHPAEA, African-Americans and ‘other race-ethnicities’ used significantly lower levels of MH/SUD services than non-Hispanic whites.

Post-MHPAEA there is actually a modest widening in the disparities in use of MH/SUD services between African-American and non-Hispanic white enrollees, based on coefficient estimates of ‘Post-MHPAEA\*African-American’ for all visits ( $\beta$ : -0.02, t-stat: -3.53) and outpatient visits ( $\beta$ : -0.01, t-stat: -3.11). The interaction has a negative, although insignificant, coefficient estimate for cost. In contrast, enrollees of other race ethnicities experience a significant increase in inpatient length of stay ( $\beta$ : 0.005, t-stat: 2.08), outpatient visits ( $\beta$ : 0.02, t-stat: 2.87), and total MH costs ( $\beta$ : 6.27, t-stat: 2.61) relative to non-Hispanic whites. In no cases are the baseline disparities completely eliminated, but they are substantially reduced. For example, the disparity in total MH costs shrinks on average by \$6.27, which, based on the average baseline gap of \$15.63, is a 40% decline.

## Discussion

This study adds to the literature on the MHPAEA by being the first study to examine health service utilization, costs, and racial disparities among children in a public health insurance program. We focus on the stand-alone CHIP program in Alabama, and suggest that the results have relevance for the 13 other states with stand-alone CHIP programs<sup>16</sup> and comparable eligibility criteria<sup>17</sup>, including other southern states of Georgia, Mississippi and Texas.

Previous studies of the effects of state mental health parity laws, or parity laws in the Federal Employees Health Benefits (FEHB) program, have shown mixed results. For example, a comparison of seven FEHB plans found an increase in service use in one plan, a decrease in a second plan, and no significant changes in the remainder.<sup>18</sup> Separate analyses focusing on child enrollees in these FEHB plans found evidence of increased use of services in just one plan. Furthermore, there was evidence of declines in out-of-pocket spending on MH/SUD services in three of the FEHB plans, which is consistent with findings of lower out-of-pocket spending and lower probability of financial hardship for families with children with mental health needs in parity states compared to other states.<sup>19</sup>

In ALL Kids the impact of MHPAEA was largely through removal of quantitative constraints on mental health service use, like number of inpatient days and outpatient visits. Our findings are consistent with these changes. Particularly, we see increases both in inpatient admissions and inpatient lengths of stay. Results from our two-part models show an average

increase of 0.001 in the total number of inpatient admissions per quarter. Based on the Pre-MHPAEA mean of 0.007 inpatient admissions per quarter, this represents a 14.3% increase. Along parallel lines, inpatient length of stay also increased by 0.001, which represents an increase of 12.5% based on the Pre-MHPAEA mean inpatient length of stay of 0.008. This is consistent with prior studies that found that inpatient admissions and length of stay increased in the period following passage of MHPAEA. For example, previous work showed that, among beneficiaries covered by employer-sponsored health insurance, mental health inpatient admissions increased from 2.4 per 1000 beneficiaries in 2009 to 2.7 per 1000 beneficiaries in 2011; and the average length of stay increased from 6.1 days to 6.9 days.<sup>21</sup> However, the authors of that report cautioned that the precise role of MHPAEA was unclear.

Overall MH costs for the program also increased on average by 1.80 inflation-adjusted dollars. Based on the pre-MHPAEA mean of \$23.67 per enrollee, this represents an increase of 7.8%. One intriguing finding is an increase in the probability of any MH/SUD visits compared to none, not an increase in the frequency of visits conditional on having any. One explanation might be adverse selection – namely that enrollees in the post-MHPAEA period are more likely to need at least some MH/SUD services compared to their counterparts in the pre MHPAEA period. We are unable to test this rigorously given that there is only one fiscal year in our data before the passage of MHPAEA. Moreover, in our ‘falsification’ analyses where we used non-MH/SUD costs as the outcome, we did not find any positive associations between MHPAEA and these costs, but did see some indication of a negative association. It is possible that non-MH/SUD services, such as visits with a primary care physician or behavioral counseling during well-visits, may be substitutes for MH/SUD visits. Hence greater availability of the latter may plausibly lead to a slight decline in the former. This should be explored in further research.

Another interesting finding is that the effects of MHPAEA on inpatient admissions appear to be more concentrated in the years immediately after its passage and seem to dissipate after 2011. This suggests that there may have been pent-up ‘needs’ among enrollees that required added MH/SUD services in an inpatient setting, resulting in a spike in such service use immediately after the MHPAEA, which subsequently subsided. Taken with the earlier findings, we conjecture that MHPAEA mostly impacted the small number of patients who were affected by the pre-MHPAEA quantitative constraints – and thus likely the sickest and most vulnerable

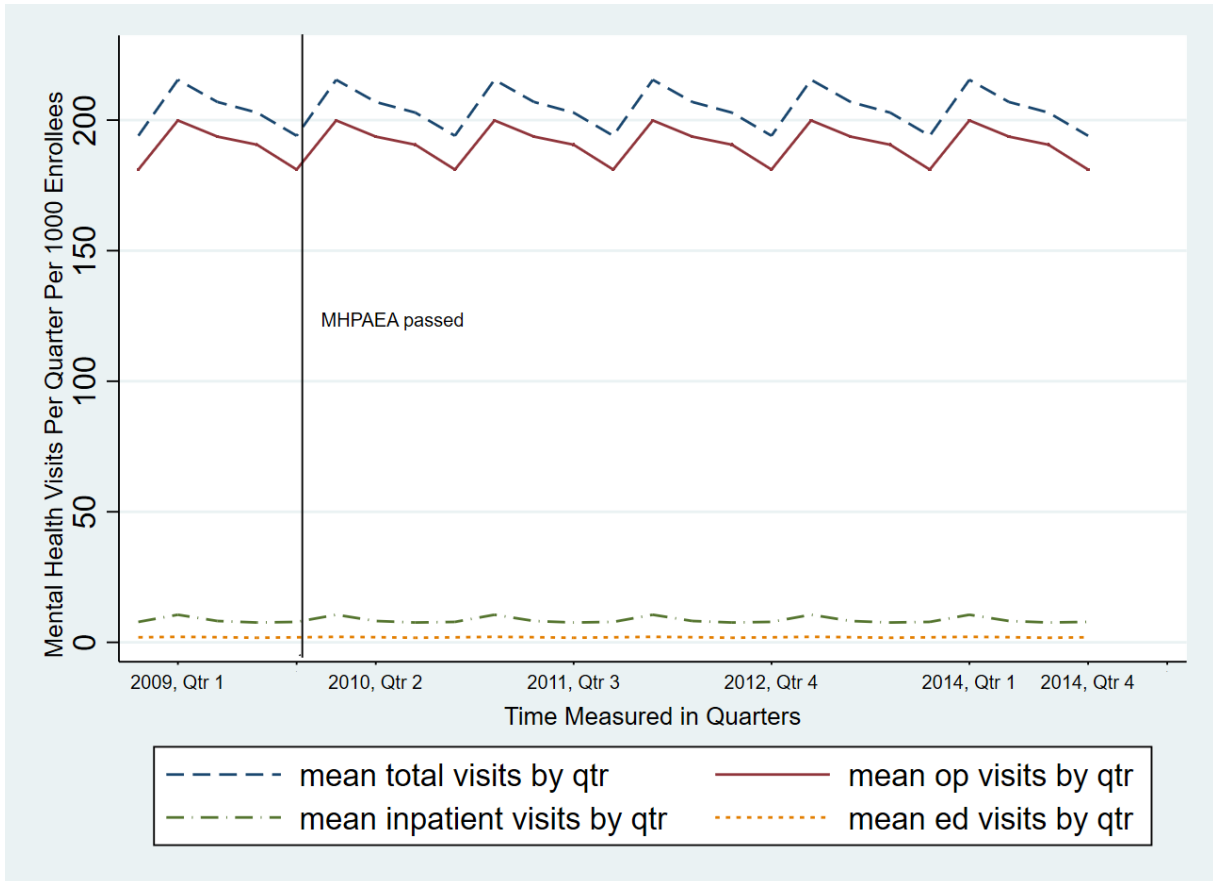
patients benefitted. We further argue that, in context of the overall program, the increases in service use as well as costs were small and not of sufficient clinical importance to merit concern.

With regard to racial disparities in mental health service utilization – we found baseline disparities that may reflect disparities in access. We found a slight exacerbation in disparities between African-Americans and non-Hispanic Whites in the post-MHPAEA period, with total and outpatient visits for African-Americans declining by a small, but statistically significant, amount. In contrast, the disparities between and non-Hispanic whites were reduced for inpatient length of stay and outpatient visits, and in case of MH/SUD spending the gap was reduced by approximately 40% of the baseline amount.

We recognize several limitations of this work. First, MHPAEA applied to all enrollees, thus we did not have a ‘control group’ that allows us to separate the effect of MHPAEA from underlying time trends in utilization, though we did include a falsification test. Another limitation is the relatively short period between the end of the MH/SUD carve-out in ALL Kids and the implementation of MHPAEA, which allows us to examine just 4 quarters of data in the baseline period before the law is passed. This poses a barrier to assessing whether new enrollees in the post-MHPAEA period were more likely to utilize MH/SUD services in the first year of enrollment than new enrollees in the pre- MHPAEA period.

Another challenge arises from the fact we are able to assess observed change in service utilization, but do not know the extent to which there are still barriers to accessing services, particularly the distance that each enrollee has to travel, or the wait times, to see a provider. For example, a prior report based on other states found that plan beneficiaries faced considerable challenges finding psychiatrists who were accepting new patients after the passage of MHPAEA<sup>20</sup>. There may also be heterogeneity in the change in demand for specific MH/SUD health services after MHPAEA. Caution must be exercised in generalizing these findings to all public insurance programs, especially given the variation of results of parity across FEHB plans mentioned previously. Finally, as is always the case with claims data, we can evaluate service use and costs, but cannot evaluate actual improvements in health and quality of life per se, or reductions in financial stress and worries. These dimensions should be explored in future research to get a more complete picture of the impact of the MHPAEA.

**Figure 1:** Mean MH/SUD Visits in Different Categories per 1,000 enrollee, By Quarter



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**Table 1: Summary Statistics, Pooled Enrollee-Quarter, Pre-MHPAEA (Parity=0) and Post-MHPAEA (Parity=1).**

Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	(Pre-MHPAEA, N=304,036)		(Post-MHPAEA, N=1,731,783)		(Pre-MHPAEA, any use, N=57,240)		(Post-MHPAEA, any use, N=363,880)	
Total MH Visits , All	0.178	(1.518)	0.209	(1.588)	0.946	(3.394)	0.995	(3.351)
Total MH Visits, Outpatient	0.167	(1.456)	0.195	(1.485)	0.890	(3.259)	0.928	(3.133)
Total MH Visits, Inpatient	0.007	(0.264)	0.009	(0.346)	0.035	(0.609)	0.042	(0.754)
Inpatient length of stay	0.008	(0.302)	0.009	(0.347)	0.043	(0.696)	0.043	(0.756)
Total MH Visits, ED	0.002	(0.060)	0.002	(0.068)	0.009	(0.138)	0.009	(0.149)
Inflation adjusted MH costs	23.666	(299.445)	26.490	(346.167)	125.706	(680.775)	126.071	(746.828)
Member Age	10.494	(4.780)	10.415	(4.948)	10.463	(4.210)	11.066	(4.582)
Female	0.495		0.496	(0.500)	0.431		0.429	(0.495)
Race								
African-American	0.346		0.307		0.238		0.228	
Other	0.084		0.135		0.059		0.090	
Has Chronic Condition	0.267		0.241		0.397		0.355	
Rural/Urban category								
Urban	0.650		0.667		0.670		0.692	
Federal Poverty Limit (FPL)								
FPL 100-150%	0.617		0.462		0.604		0.452	
FPL 150-200%	0.375		0.348		0.387		0.353	
Exempt	0.008		0.008		0.009		0.009	
Expansion	--		0.182		--		0.185	

Means and standard deviations are presented for continuous variables, and proportions for discrete variables.

Table 2: Estimated Effect of Passage of MHPAE on mental Health Service Use and Costs from Two-Part Models

	Part 1: Logit Results (t-stat)	Marginal Effect	Part 2: GLM Result (t-stat)	Combined Marginal Effect	Part 1: Logit Results (t-stat)	Marginal Effect	Part 2: GLM Result (t-stat)	Combined Marginal Effect
	<b>Full Sample</b>				<b>Without Expansion Group</b>			
Total MH Visits , All								
Post-MHPAEA	0.05 ** (4.21)	0.002	-0.02 (-1.24)	0.004 (1.22)	0.06 ** (5.07)	0.003	-0.02 (-0.99)	0.007 (1.90)
Total MH Visits, Inpatient								
Post-MHPAEA	0.07 (0.82)	0.00003	0.33 ** (5.56)	0.001 ** (3.65)	0.06 (0.72)	0.00003	0.30 ** (4.56)	0.002 ** (3.31)
Inpatient length of stay								
Post-MHPAEA	0.07 (0.82)	0.00003	0.21 ** (3.48)	0.001 ** (2.68)	0.06 (0.72)	0.00003	0.20 ** (3.28)	0.001 ** (2.49)
Outpatient MH Visits								
Post-MHPAEA	0.05 ** (4.23)	0.002	-0.04 (-1.89)	0.001 (0.36)	0.06 ** (5.10)	0.003	-0.03 (-1.89)	0.004 (1.18)
Inflation adjusted MH costs								
Post-MHPAEA	0.05 ** (4.20)	0.002	0.04 (1.31)	1.80 ** (2.63)	0.06 ** (5.06)	0.003	0.05 (1.39)	2.12 ** (3.01)
Non-MH health costs								
Post-MHPAEA	-0.02 (-1.60)	-0.005	-0.016 (-1.30)	-5.66 (-1.33)	0.006 (1.06)	0.001	-0.02 (-1.62)	-6.24 (-1.44)
	<b>Models Separating Effects of Post-MHPAEA into 'Early' and 'Later' periods</b>							
	Part 1: Logit Results (t-stat)	Marginal Effect	Part 2: GLM Result (t-stat)	Combined Marginal Effect	Part 1: Logit Results (t-stat)	Marginal Effect	Part 2: GLM Result (t-stat)	Combined Marginal Effect
	<b>Full Sample</b>				<b>Without Expansion Group</b>			
Total MH Visits , All								
Post-MHPAEA (early period)	0.06 ** (4.43)	0.003	-0.03 (-1.49)	0.004 (1.15)	0.07 ** (4.95)	0.003	-0.02 (-1.19)	0.007 (1.75)
Post-MHPAEA (later)	0.08 **	0.004	-0.05	0.005	0.09 **	0.004	-0.04	0.008

period)	(3.48)		(-1.31)	(0.73)	(3.42)		(-0.99)	(0.02)
<b>Total MH Visits, Inpatient</b>								
Post-MHPAEA (early period)	0.03 (0.28)	0.00001	0.25 ** (3.40)	0.001 ** (2.62)	0.05 (0.47)	0.00002	0.22 ** (2.84)	0.001 ** (2.43)
Post-MHPAEA (later period)	-0.06 (-0.36)	-0.00002	0.08 (0.62)	0.00006 (0.10)	0.01 (0.07)	0.00006	0.04 (0.80)	0.0002 (0.23)
<b>Inpatient length of stay</b>								
Post-MHPAEA (early period)	0.03 (0.28)	0.00001	0.19 ** (2.68)	0.0008 ** (2.08)	0.05 (0.47)	0.00002	0.18 ** (2.50)	0.001 ** (2.07)
Post-MHPAEA (later period)	-0.06 (-0.36)	-0.00002	0.13 (1.08)	0.0003 (0.35)	0.01 (0.07)	0.00006	0.12 (0.93)	0.0006 (0.61)
<b>Outpatient MH Visits</b>								
Post-MHPAEA (early period)	0.05 ** (3.47)	0.002	-0.02 (-0.65)	0.005 (1.36)	0.04 ** (2.59)	0.002	-0.03 (-1.32)	0.001 (0.30)
Post-MHPAEA (later period)	0.05 ** (2.48)	0.002	0.01 (0.24)	0.009 (1.56)	0.03 (1.30)	0.001	-0.02 (-0.44)	0.002 (0.34)
<b>Inflation adjusted MH costs</b>								
Post-MHPAEA (early period)	0.06 ** (4.43)	0.003	0.014 (0.38)	1.42* (1.90)	0.07 ** (4.94)	0.003	0.019 (0.51)	1.72 ** (2.25)
Post-MHPAEA (later period)	0.08 ** (3.48)	0.004	-0.046 (-0.71)	0.61 (0.46)	0.09 ** (3.41)	0.004	-0.038 (-0.55)	0.88 (0.62)
<b>Non-MH health costs</b>								
Post-MHPAEA (early period)	-0.04 ** (-2.15)	-0.009	0.01 (0.80)	-0.65 (-0.13)	-0.04 ** (-2.91)	-0.01	-0.0006 (-0.40)	-0.59 (-0.98)
Post-MHPAEA (later period)	-0.02 (-0.79)	-0.004	0.01 (0.50)	0.23 (0.29)	-0.03 (-1.70)	-0.006	-0.004 (-0.60)	-0.99 (-0.80)

The above results are from two-part models, estimated using pooled quarter-level enrollee data from 2008-2014. Models control for the following variables: A linear time trend, binary indicators for quarter, a binary indicator for 2014 (when all ACA provisions go into effect), enrollee gender, race, FPL category (no fee, low fee, fee, and expansion), and binary indicators for age-category, urban residence and any chronic conditions. Costs are adjusted to 2014 dollars using the Consumer Price Index (1982-84=100). N= 2,035,780 for full model. N= 1,720,815 when the expansion group is excluded. Models are estimated using STATA (v. 14) and the 'tpm' add-on procedure, followed by the 'margins' routine. Marginal effects are computed holding other values at the sample mean. : p<0.05.



**Table 3: Estimated Effect of MHPAE on Racial Disparities in Health Service Use and Costs – Linear Difference-in-Difference.**

	Difference-in-Difference Regressions (t-stat)	Difference-in-Difference Regressions (t-stat)
	Full Sample	Without Expansion Group
Total MH Visits , All		
African-American	-0.11 ** (-17.27)	-0.10 ** (-17.33)
Other	-0.10 ** (-9.67)	-0.10 ** (-9.84)
Post-MHPAEA*African-American	-0.02 ** (-3.53)	-0.03 ** (-4.01)
Post-MHPAEA*Other	0.02 (1.50)	0.008 (0.75)
Total MH Visits, Inpatient		
African-American	-0.006 ** (-4.23)	-0.005 ** (-4.23)
Other	-0.005 ** (-2.04)	-0.004 ** (-2.07)
Post-MHPAEA*African-American	0.0003 (0.20)	0.00002 (0.01)
Post-MHPAEA*Other	0.003 (1.74)	0.002 (1.77)
Inpatient length of stay		
African-American	-0.005 ** (-3.67)	-0.005 ** (-3.73)
Other	-0.006 ** (-2.34)	-0.006 ** (-2.64)
Post-MHPAEA*African-American	0.0002 (0.21)	-0.0003 (-0.21)
Post-MHPAEA*Other	0.005 ** (2.08)	0.004 (1.78)
Outpatient MH Visits		
African-American	-0.11 ** (-26.32)	-0.11 ** (-26.54)
Other	-0.10 **	-0.11 **

	(-17.86)	(-15.84)
Post-MHPAEA*African-American	-0.01 ** (-3.11)	-0.01 ** (-3.01)
Post-MHPAEA*Other	0.02 ** (2.87)	0.02 ** (2.20)
Inflation adjusted MH costs		
African-American	-15.05 ** (-11.34)	-15.03** (-11.21)
Other	-15.63 ** (-6.85)	-15.78 ** (-6.83)
Post-MHPAEA*African-American	-1.92 (-1.33)	-2.49 (-1.68)
Post-MHPAEA*Other	6.27 ** (2.61)	4.96 ** (2.02)

Models control for the following variables: A linear time trend, binary indicators for quarter, a binary indicator for 2014 (when all ACA provisions go into effect), enrollee gender, race, FPL category (no fee, low fee, fee, and expansion), and binary indicators for age-category, urban residence and any chronic conditions. Costs are adjusted to 2014 dollars using the Consumer Price Index (1982-84=100). N= 2,035,780 for full model. N= 1,720,815 when the expansion group is excluded. \*\*: p<0.05.

**Appendix: Codes Used to Identify Mental Health Claims**

## 650 Adjustment disorders

3090 3091 30922 30923 30924 30928 30929 3093 3094 30982 30983 30989 3099

## 651 Anxiety disorders

29384 30000 30001 30002 30009 30010 30020 30021 30022 30023 30029 3003 3005 30089  
3009 3080 3081 3082 3083 3084 3089 30981 3130 3131 31321 31322 3133 31382  
31383

## 652 Attention-deficit, conduct, and disruptive behavior disorders

31200 31201 31202 31203 31210 31211 31212 31213 31220 31221 31222 31223 3124 3128  
31281 31282 31289 3129 31381 31400 31401 3141 3142 3148 3149

## 653 Delirium, dementia, and amnesic and other cognitive disorders

2900 29010 29011 29012 29013 29020 29021 2903 29040 29041 29042 29043 2908 2909  
2930 2931 2940 2941 29410 29411 29420 29421 2948 2949 3100 3102 3108 31081 31089  
3109 3310 3311 33111 33119 3312 33182 797

## 654 Developmental disorders

3070 3079 31500 31501 31502 31509 3151 3152 31531 31532 31534 31535 31539 3154  
3155 3158 3159 317 3180 3181

3182 319 V400 V401

## 655 Disorders usually diagnosed in infancy, childhood, or adolescence

29900 29901 29910 29911 29980 29981 29990 29991 30720 30721 30722 30723 3073 3076  
3077 30921 31323 31389 3139

## 656 Impulse control disorders, NEC

31230 31231 31232 31233 31234 31235 31239

## 657 Mood disorders

29383 29600 29601 29602 29603 29604 29605 29606 29610 29611 29612 29613 29614  
29615 29616 29620 29621 29622 29623 29624 29625 29626 29630 29631 29632 29633 29634  
29635 29636 29640 29641 29642 29643 29644 29645 29646 29650 29651 29652 29653 29654

29655 29656 29660 29661 29662 29663 29664 29665 29666 2967 29680 29681 29682 29689  
29690 29699 3004 311

#### 658 Personality disorders

3010 30110 30111 30112 30113 30120 30121 30122 3013 3014 30150 30151 30159 3016  
3017 30181 30182 30183 30184 30189 3019

#### 659 Schizophrenia and other psychotic disorders

29381 29382 29500 29501 29502 29503 29504 29505 29510 29511 29512 29513 29514  
29515 29520 29521 29522 29523 29524 29525 29530 29531 29532 29533 29534 29535 29540  
29541 29542 29543 29544 29545 29550 29551 29552 29553 29554 29555 29560 29561 29562  
29563 29564 29565 29570 29571 29572 29573 29574 29575 29580 29581 29582 29583 29584  
29585 29590 29591 29592 29593 29594 29595 2970 2971 2972 2973 2978 2979 2980 2981  
2982 2983 2984 2988 2989

#### 660 Alcohol-related disorders

2910 2911 2912 2913 2914 2915 2918 29181 29182 29189 2919 30300 30301 30302 30303  
30390 30391 30392 30393 30500 30501 30502 30503 3575 4255 5353 53530 53531 5710 5711  
5712 5713 76071 9800

#### 661 Substance-related disorders

2920 29211 29212 2922 29281 29282 29283 29284 29285 29289 2929 30400 30401 30402  
30403 30410 30411 30412 30413 30420 30421 30422 30423 30430 30431 30432 30433 30440  
30441 30442 30443 30450 30451 30452 30453 30460 30461 30462 30463 30470 30471 30472  
30473 30480 30481 30482 30483 30490 30491 30492 30493 30520 30521 30522 30523 30530  
30531 30532 30533 30540 30541 30542 30543 30550 30551 30552 30553 30560 30561 30562  
30563 30570 30571 30572 30573 30580 30581 30582 30583 30590 30591 30592 30593 64830  
64831 64832 64833 64834 65550 65551 65553 76072 76073 76075 7795 96500 96501 96502  
96509 V6542

#### 662 Suicide and intentional self-inflicted injury

E9500 E9501 E9502 E9503 E9504 E9505 E9506 E9507 E9508 E9509 E9510 E9511 E9518  
E9520 E9521 E9528 E9529 E9530 E9531 E9538 E9539 E954 E9550 E9551 E9552 E9553  
E9554 E9555 E9556 E9557 E9559 E956 E9570 E9571 E9572 E9579 E9580 E9581 E9582  
E9583 E9584 E9585 E9586 E9587 E9588 E9589 E959 V6284

#### 663 Screening and history of mental health and substance abuse codes

3051 30510 30511 30512 30513 33392 7903 V110 V111 V112 V113 V114 V118 V119  
V154 V1541 V1542 V1549 V1582 V6285 V663 V701 V702 V7101 V7102 V7109 V790 V791  
V792 V793 V798 V799

670 Miscellaneous disorders

29389 2939 30011 30012 30013 30014 30015 30016 30019 3006 3007 30081 30082 3021  
3022 3023 3024 30250 30251 30252 30253 3026 30270 30271 30272 30273 30274 30275  
30276 30279 30281 30282 30283 30284 30285 30289 3029 3060 3061 3062 3063 3064 30650  
30651 30652 30653 30659 3066 3067 3068 3069 3071 30740 30741 30742 30743 30744 30745  
30746 30747 30748 30749 30750 30751 30752 30753 30754 30759 30780 30781 30789 3101  
316 64840 64841 64842 64843 64844 V402 V403 V4031 V4039 V409 V673

Source: <http://www.hcup-us.ahrq.gov/toolssoftware/ccs/AppendixASingleDX.txt>

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