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RESEARCH REPORT

HEALTHY BEHAVIORS CLAIMS-BASED OUTCOMES REPORT #3 AND HEALTHY BEHAVIORS MODELING REPORT #2

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in cohort 1, while a member enrolled February 2012 through January 2013 would be in cohort 2, and so on. If a member was enrolled for additional 12 month periods beyond their initial 12 months (e.g., a total of 24, 36, or 48 months' worth of enrollment), the counter would start over and they would be included in those cohorts as well. For example, a member enrolled March 2012 through February 2014 would be in cohort 3 from March 2012 to February 2013, and cohort 15 from March 2013 to February 2014, and so on. Essentially, the cohort corresponds to the study month in which the member's 12-month continuous enrollment begins, and they enter a new cohort for each successive 12-month period. However, we did not keep partial years of data. For example, if a member was enrolled for 18 months, we kept only their initial 12 months, and dropped the other 6. After assigning members to cohorts, we collapsed the data to provide one observation per person per cohort. This method ensures that we retain as many Medicaid members in our sample as possible, while also ensuring that all members in our sample are exposed to a full year of the program to which they are assigned, providing them equal opportunity to engage in HBI program activities, and corresponding to the period of time they have to complete activities before being charged a premium (excluding the additional 30-day grace period).

IDENTIFICATION OF HEALTHY BEHAVIORS

Because we sought to ensure that we used the most generous measure of healthy behavior completion possible, we used both Medicaid claims data and DHS data to identify receipt of a wellness exam and HRA completion. If a member was identified as completing an activity in either of these datasets, we counted that activity. Medicaid claims data allow us to identify wellness exams, but not HRAs. However, the DHS data identify many additional cases of reported wellness exams that are not reflected in the claims data. We primarily relied on the DHS data to identify HRA completion. Though the HRA was available for all Medicaid members, completion was not incentivized or encouraged for the comparison groups leading to extremely low rates (<0.00001%).

UNIVARIATE AND BIVARIATE ANALYSES

Using all years of available data (2012 – 2015) we calculated utilization rates for a number of healthcare outcomes among the Wellness Plan and Marketplace Choice plan members and the IowaCare and Medicaid State Plan comparison groups. We then compared utilization rates within the groups based on members' completion of either one or both of the healthy behaviors (i.e., HRA and/or wellness exam). The specific outcomes we looked at were constructed as either (1) the proportion of members in each plan category who at any time during the year received: an ambulatory care visit, a hemoglobin A1c test (diabetics only), an LDL cholesterol test (diabetics only), and/or experienced a return visit to the ED within 30 days; (2) the number of non-emergent ED visits and hospital discharges per 1,000 member-months in each plan category; and (3) the average annual number of readmissions per 1,000 members in each plan category. Non-emergent and emergent ED visits were determined using the NYU ED algorithm which assigns probabilities of an ED visit being non-emergent, emergent but primary care treatable, emergent not primary care treatable but preventable, and emergent using ICD-9 codes. We assigned individuals as having had a non-emergent ED visit if the first two categories (non-emergent and emergent but primary care treatable) had a combined probability equal to or greater than 0.5. Remaining ED visits were classified as emergent. T-tests were used to compare the means between members within a program who completed versus did not complete healthy behaviors. All differences were statistically significant at $p<0.001$ unless otherwise noted in the results.

RESULTS OF BIVARIATE ANALYSES

The following results are organized by the questions and hypotheses as outlined in the original evaluation proposal.

Question 3: Is engaging in behavior incentives associated with improved access to care and health outcomes?

HYPOTHESIS 3.1

The program will improve WP/MPC members' access to health care.

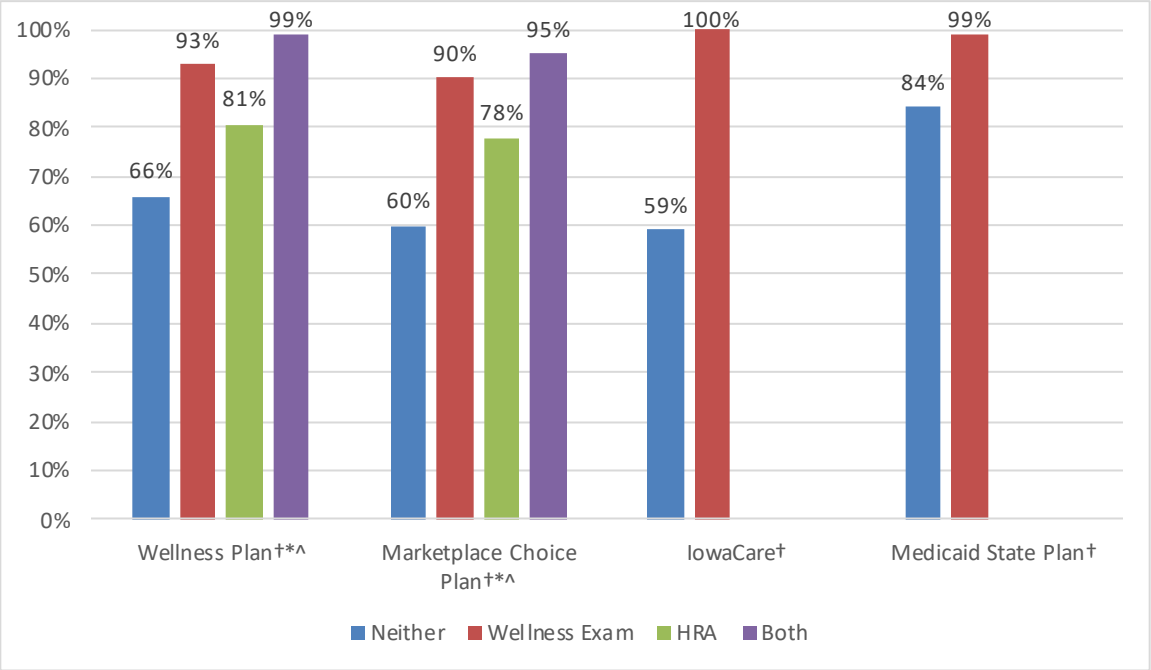
Measure 15: Adults access to primary care

15A : Percent of members who had an ambulatory care visit

Protocol-NCQA HEDIS AAP
Data source-Administrative
Analyses-Means tests between WP/MPC members and three comparison groups before and after implementation

Figure 1 compares Medicaid members within each group, by completion of a wellness exam and/or HRA. We see that the percent of persons having an ambulatory care visit increased significantly when they completed a wellness exam and/or HRA (with values approaching 100%). We suspect that we see these differences because completion of either of these healthy behaviors likely required or resulted from an ambulatory care visit.

Figure 1. Percent of Members Who had an Ambulatory Care Visit, by Group and Healthy Behavior Completion



† Neither vs. wellness exam is significant at p<0.001

* Neither vs. heath risk assessment is significant at p<0.001

^ Neither vs. both (wellness exam and health risk assessment) is significant at p<0.001

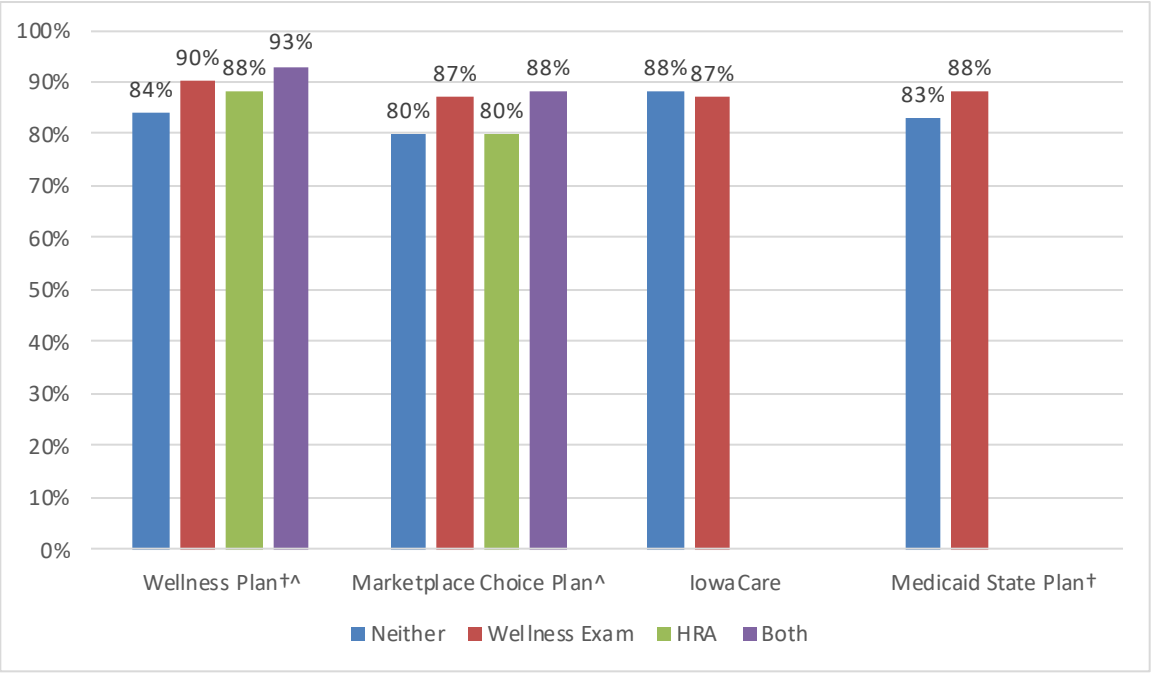
Measure 20: Comprehensive diabetes care: Hemoglobin A1c

20A: Percent of members with type 1 or type 2 diabetes who had Hemoglobin A1c testing

Protocol-NCQA HEDIS CDC; NQF 0057, Adult core measure #19
Data source-Administrative
Analyses-Means testing between WP/MPC members and the three comparison groups before and after implementation

Looking closely at Figure 2, among Wellness Plan and Marketplace Choice Plan members with diabetes, those who completed both healthy behaviors had higher rates of hemoglobin A1c testing in comparison to those who completed neither health benefit (significant at p<0.001). In the Medicaid State Plan, those completing a wellness exam had higher rates of testing. However, it is also important to note that no group had a rate below 80%, which is fairly high. This is important, as even individuals with well-controlled diabetes should have their A1c checked at least annually.

Figure 2. Percent of Members with Diabetes Who had Hemoglobin A1c Testing, by Group and Healthy Behavior Completion



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* Neither vs. heath risk assessment is significant at p<0.001

^ Neither vs. both (wellness exam and health risk assessment) is significant at p<0.001

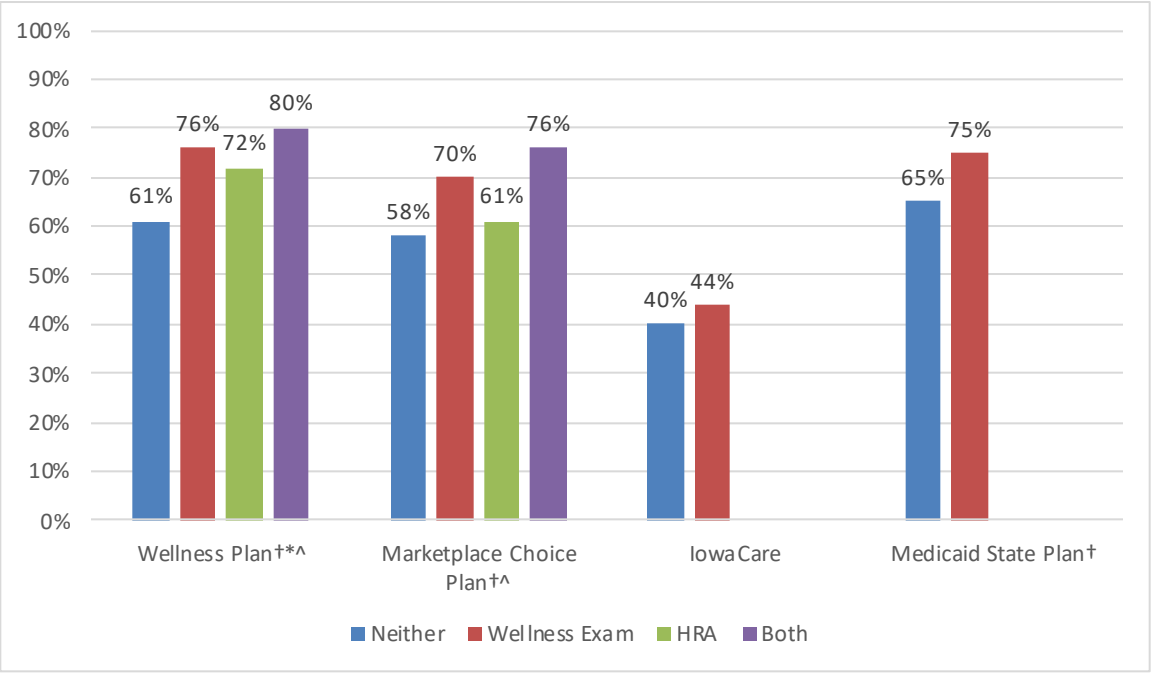
Measure 21: Comprehensive diabetes care: LDL-C screening

21A: Percent of members with type 1 or type 2 diabetes who had LDL-C screening

Protocol-NCQA HEDIS CDC; NQF 0063, Adult core measure #18
Data source-Administrative
Analyses-Means testing between WP/MPC members and the three comparison groups before and after implementation

As we saw in A1c testing, **the group of Marketplace Choice Plan and Wellness Plan members completing both healthy behaviors showed the highest rates of LDL-C Screening** (shown in Figure 3). Rates were comparable among members in the Medicaid State Plan. It is also interesting to note that **screening rates increased with the transition from IowaCare to the Wellness Plan or Marketplace Choice Plan, regardless of healthy behavior completion**, which may merely reflect increased provider network size and improved access to care.

Figure 3. Percent of Members with Diabetes Who had an LDL-C screening, by Group and Healthy Behavior Completion



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* Neither vs. heath risk assessment is significant at p<0.001

^ Neither vs. both (wellness exam and health risk assessment) is significant at p<0.001

HYPOTHESIS 3.2

Health outcomes of WP/MPC members will be positively impacted by completing the healthy behaviors.

Measure 25: Non-emergent ED use

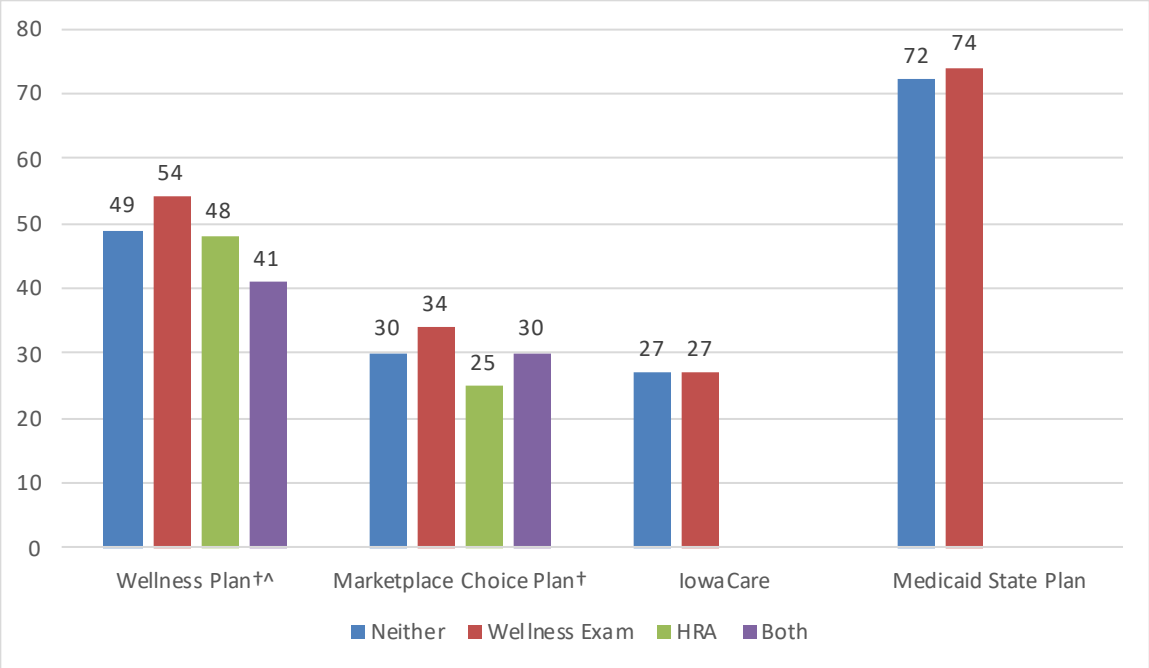
25A: Number of non-emergent ED visits per 1,000 member months

Protocol-Original measure
Data source-Administrative
Analyses-Means testing between MPC members and the 4 comparison groups before and after implementation

When comparing members by completion of one or both healthy behaviors, Figure 4 shows that members who had a wellness exam had higher rates of non-emergent ED visits in all groups except Iowa Care. However, the difference was not statistically significant among Medicaid State Plan members. It is

important to note that non-emergent ED visits represent an inefficient use of the healthcare system. Thus, while perhaps better than not receiving care, a higher rate of non-emergent ED visits could be considered a negative outcome.

Figure 4. Number of Non-Emergent ED Visits per 1000 Member Months, by Group and Healthy Behavior Completion



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* Neither vs. heath risk assessment is significant at p<0.001

^ Neither vs. both (wellness exam and health risk assessment) is significant at p<0.001

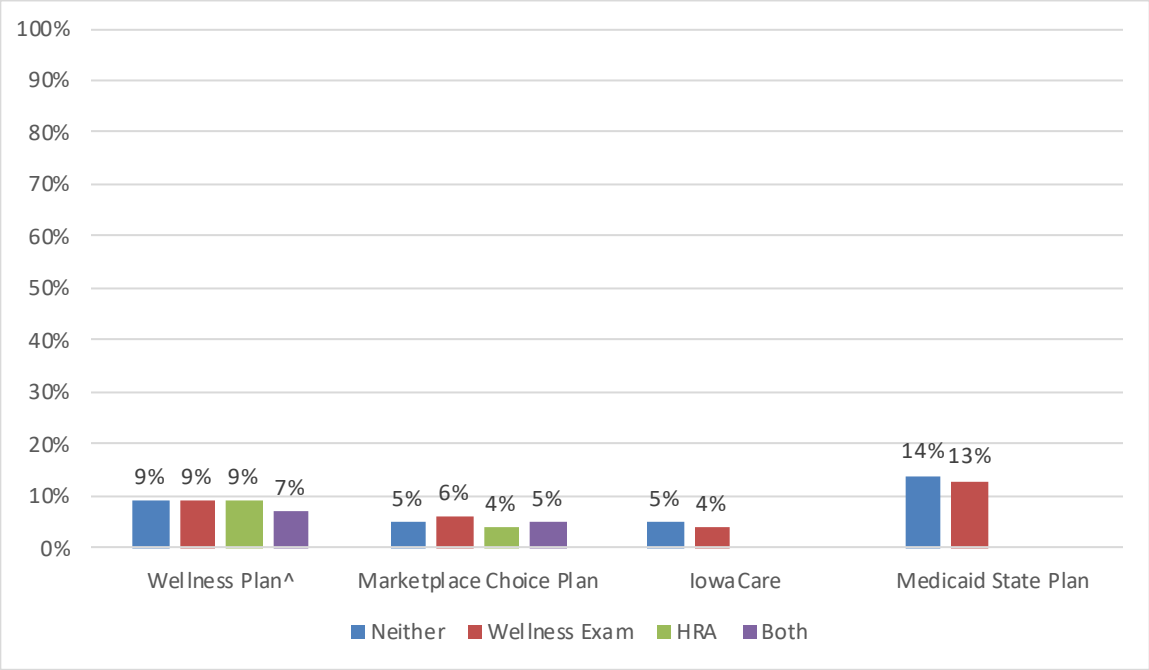
Measure 26: Follow-up ED visits

26A: Percent of members with ED visit within the first 30 days after index ED visit

Protocol-Original measure
Data source-Administrative
Analyses-Means testing between MPC members and the 4 comparison groups before and after implementation

When comparing persons, within each group, by completion of a wellness exam and/or HRA we see in Figure 5, that the only instance of a healthy behavior being associated with a change in the proportion of members having a return ED visit is in the Wellness Plan. Among Wellness Plan members, completing an HRA is associated with higher rates of having a return ED visit. Among MSP members, completing a wellness exam was associated with higher rates of return ED visits. It is important to note that return ED visits represent an inefficient use of the healthcare system. Thus, while perhaps better than not receiving care, a higher rate of return ED visits could be considered as a negative outcome.

Figure 5. Percent of Members with an ED visit within first 30 days after index ED, by Group and Healthy Behavior Completion



† Neither vs. wellness exam is significant at p<0.001

* Neither vs. heath risk assessment is significant at p<0.001

^ Neither vs. both (wellness exam and health risk assessment) is significant at p<0.001

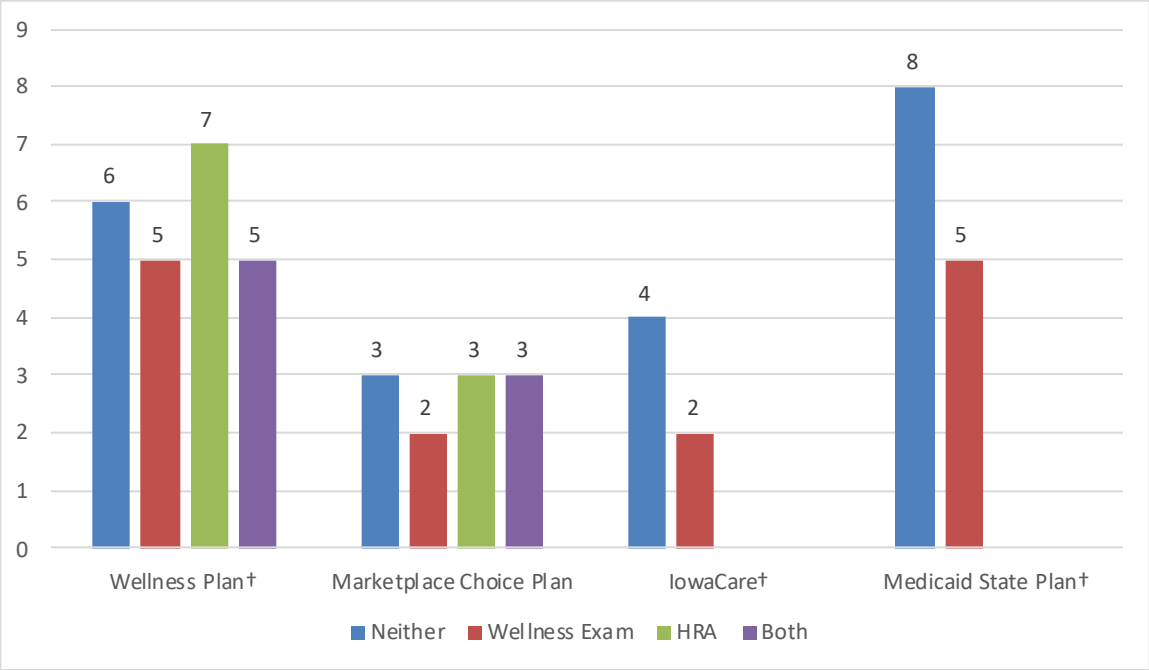
Measure 30: Inpatient utilization-general hospital/acute care

This measure summarizes utilization of acute inpatient care and services in the following categories: total inpatient surgery and medicine using number of discharges per 1000 member months, number of days stay per 1000 member months and average length of stay for all members who were enrolled for at least 1 month during the measurement year

Protocol-NCQA HEDIS IPU
Data source-Administrative
Analyses-Means tests between MPC members and four comparison groups before and after implementation

We created a variable equal to the number of hospital discharges per 1000 person-months of enrollment in either the Wellness Plan, Marketplace Choice Plan, or one of the two comparison plans. Figure 6 shows that when comparing the number of discharges within groups, completion of a wellness exam is associated with lower rates of discharges per 1000 member-months in all groups. However, in the Marketplace Choice Plan, this difference was not statistically significant.

Figure 6. Average Number of Discharges per 1000 Member Months, by Group and Healthy Behavior Completion



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* Neither vs. heath risk assessment is significant at p<0.001

^ Neither vs. both (wellness exam and health risk assessment) is significant at p<0.001

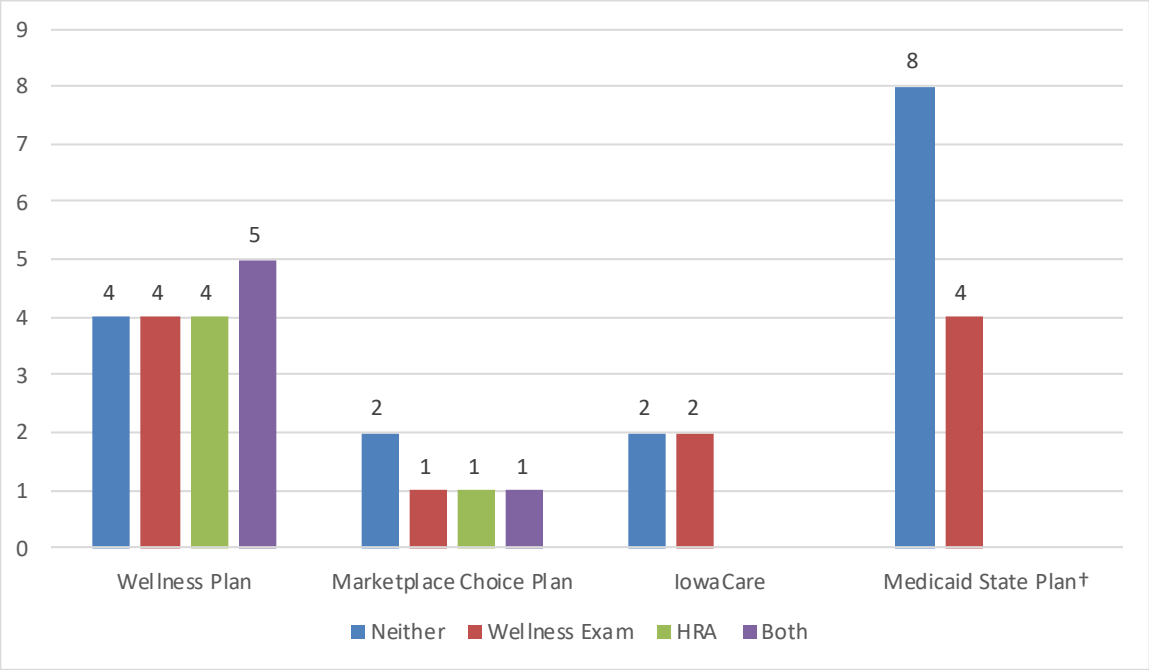
Measure 31: Plan "all cause" hospital readmissions

The number of acute inpatient stays during the measurement year that were followed by an acute readmission for any diagnosis within 30 days and the predicted probability of an acute readmission

Protocol-NCQA HEDIS PCR; NQF 1768; Adult Core Measures #7
Data source-Administrative
Analyses-Means tests between MPC members and four comparison groups before and after implementation

In Figure 7, the only statistically significant difference in the number of hospital readmissions per 1000 members was in the Medicaid State Plan, where completing a wellness exam showed a lower number of readmissions per 1000 members. There were no significant unadjusted relationships between completing healthy behaviors and the rate of hospital readmissions in either the Wellness Plan or Marketplace Choice Plan.

Figure 7. Average Annual Number of Hospital Readmissions per 1000 Members, by Group and Healthy Behavior Completion



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* Neither vs. heath risk assessment is significant at p<0.001

^ Neither vs. both (wellness exam and health risk assessment) is significant at p<0.001

METHODOLOGY FOR DIFFERENCE-IN-DIFFERENCES ANALYSES

DATA SOURCES AND ASSIGNMENT OF MEDICAID PLAN MEMBERS TO PROGRAMS

For our difference-in-differences regression models, we used the same data as described earlier in this report. We also used the same rolling cohort method to assign members to a specific program, and the same method of identifying the completion of healthy behaviors.

STUDY POPULATION AND COMPARISON GROUP

The difference-in-differences approach works by identifying a treatment group (exposed to the intervention of interest) and a control group (not exposed to the intervention of interest), and following them over a period of time both before and after the implementation of the intervention, which in this case is the introduction of the Healthy Behaviors Program. This method adjusts for baseline differences between the treatment and control groups, and then identifies any additional difference among the treatment group once the intervention has been implemented. This additional difference can then be attributed to the intervention itself.

Compared to our bivariate analyses, in which members could be in cohorts that spanned calendar years, the sample for our difference-in-differences analyses was limited to members in cohorts 1, 13, 25, and 37, corresponding to enrollment beginning in January of 2012, 2013, 2014, and 2015, respectively, and continuing through December of each of those years. This was essential to ensure that members did not span calendar years, since the intervention (introduction of the Healthy Behaviors Program) occurred on January 1, 2014. We also required members to be enrolled in all 4 years of the data to generate a stable sample both pre- and post-implementation of the Healthy Behaviors Program.

For these analyses, we used a very conservative method of assigning members to the treatment group, which maximizes our likelihood of identifying a relationship between healthy behavior completion and our outcomes of interest. The **treatment group** consisted of members who were in IowaCare in CY 2012 and CY 2013 and either the Wellness Plan or Marketplace Choice in CY 2014 and CY 2015, and who completed both a wellness exam and an HRA in both 2014 and 2015. The **control group** consisted of members who were in IowaCare in CY 2012 and CY 2013 and either the Wellness Plan or Marketplace Choice in CY 2014 and CY 2015, and who did not complete any healthy behaviors in either 2014 or 2015. Members who completed some healthy behaviors were excluded, as were IowaCare members with incomes above 133% FPL who were ineligible for the Wellness Plan or Marketplace Choice.

MULTIPLE REGRESSION MODELING

We used a difference-in-differences (DID) framework to isolate the effect of the intervention (completion of both HRA and wellness exam) among the treatment group, using the following model:

Where is a dummy variable for observations after the program has taken effect (in 2014), identifies an average individual constant term, andis an indicator variable that captures whether the individual was in the treatment group. As described above, we defined our sample to include individuals who were in our data continually from January 2012 through December 2015. Within each year we required individuals to have been enrolled for 12 months in either IowaCare (2012 and 2013) or the Wellness Plan or Marketplace Choice Plan (2014 and 2015). Our treatment group included individuals in our sample who completed both healthy behaviors in 2014 and 2015. Our control group included individuals in our sample who did not complete any healthy behaviors in 2014 and 2015. We excluded individuals in IowaCare who reported an income above 133% of the federal poverty level, because these individuals would have transitioned to subsidized insurance through the health insurance exchange or another form of insurance, but would not have been eligible for the Wellness Plan or Marketplace Choice Plan. We also excluded individuals who completed some of the healthy behaviors, but failed to complete both activities in both 2014 and 2015.

The coefficient on the interaction term is our primary parameter of interest, as it captures the change in the outcome among the treatment group after the treatment is implemented. In other words, this will demonstrate how outcomes changed for individuals who completed both a wellness exam and an HRA in 2014 and 2015. We also control for a variety of covariates, X, including age, gender, race, rurality of residence (based on rural-urban continuum codes), number of changes in residence within the year, number

of ED visits (this variable is excluded from models where the outcome involves ED visits or readmissions), number of prescription medications, and a count of the number of conditions from a list of 24 commonly tracked chronic conditions for which a member has been diagnosed. For these models, we included individuals who were in our dataset for all four years (2012 – 2015). All analyses were conducted as linear probability models at the person-year level within the DID framework.

RESULTS OF DIFFERENCE-IN-DIFFERENCES ANALYSES

The following results are organized by the questions and hypotheses as outlined in the original evaluation proposal.

***Question 3* Is engaging in behavior incentives associated with improved access to care and health outcomes?**

HYPOTHESIS 3.1

The program will improve WP/MPC members' access to health care.

Measure 15: Adults access to primary care

15B: Whether a member had an ambulatory or preventive care visit

Protocol-NCQA HEDIS AAP adapted as individuals
Data source-Administrative
Analyses-DID for WP/MPC members and three comparison groups before and after implementation

Our difference-in-differences model for ambulatory care visits (shown in Table 3 below) indicated that completing both healthy behaviors in both years (i.e., the effect of being in the treatment group during the post-expansion period) had no effect on the likelihood of having an ambulatory care visit. However, at baseline, the treatment group was nearly 16 percentage points more likely than the control group to have an ambulatory care visit, and both groups were more than 11 percentage points more likely to have an ambulatory care visit in the post-period compared to the pre-period. Other factors in the model were also significant as shown in Table 3.

Table 3. Modeling Ambulatory/Preventive Care Visits as a Function of Healthy Behavior Completion

	Coefficient	95% CI
Post Medicaid Expansion	0.112***	0.093, 0.131
Treatment Group	0.158***	0.132, 0.184
Post Medicaid Expansion*Treatment Group	-0.019	-0.056, 0.017
Age	-0.002***	-0.003, -0.001
Male	-0.062***	-0.078, -0.046
Black	0.042*	0.008, 0.075
Hispanic	0.057*	0.003, 0.111
Other Race	-0.002	-0.047, 0.043
Unknown Race	-0.021*	-0.039, -0.004
Metropolitan	0.035***	0.018, 0.051
Nonmetropolitan Rural	-0.009	-0.048, 0.029
Number of Relocations	-0.002	-0.009, 0.004
Number ER Visits	0.013***	0.008, 0.019
Number of Rx Drugs	0.0002	-0.004, 0.004
Number of 24 Chronic Conditions	0.111***	0.105, 0.116
Constant	0.604***	0.562, 0.646

* p<0.05, ** p<0.01, ***p<0.001

Measure 20: Comprehensive diabetes care: Hemoglobin A1c

20B: Whether a member with type 1 or type 2 diabetes had Hemoglobin A1c testing
Protocol-NCQA HEDIS CDC; NQF 0057, Adult core measure #19 adapted for individuals
Data source-Administrative

Analyses-DID for WP/MPC members and three comparison groups before and after implementation

Table 4 provides the results of our difference-in-differences model for hemoglobin A1c tests (limited to a sample of diabetics). **These results indicate that the effect of completing both healthy behaviors in both years (i.e., the effect of being in the treatment group during the post-expansion period) on the probability of having a hemoglobin A1c test during the year was not statistically significant.** In fact, only the number of prescription drugs was a significant factor, as can be seen in Table 4 below.

Table 4. Modeling Hemoglobin A1c Testing in Diabetic Members as a Function of Healthy Behavior Completion

	Coefficient	95% CI
Post Medicaid Expansion	-0.033	-0.076, 0.010
Treatment Group	0.001	-0.051, 0.052
Post Medicaid Expansion*Treatment Group	0.018	-0.050, 0.085
Age	-0.0001	-0.002, 0.002
Male	-0.012	-0.043, 0.019
Black	0.0005	-0.066, 0.067
Hispanic	0.049	-0.021, 0.118
Other Race	0.052	-0.048, 0.152
Unknown Race	0.026	-0.010, 0.061
Metropolitan	0.029	-0.005, 0.063
Nonmetropolitan Rural	-0.036	-0.116, 0.044
Number of Relocations	0.006	-0.005, 0.017
Number ER Visits	-0.005	-0.015, 0.004
Number of Rx Drugs	0.011***	0.006, 0.016
Number of 24 Chronic Conditions	0.009	-0.003, 0.020
Constant	0.845***	0.745, 0.945

* p<0.05, ** p<0.01, ***p<0.001

Measure 21: Comprehensive diabetes care: LDL-C screening

21B: Whether a member with type 1 or type 2 diabetes had LDL-C screening

Protocol-NCQA HEDIS CDC; NQF 0063, Adult core measure #18 adapted for individuals
Data source-Administrative
Analyses-DID for WP/MPC members and three comparison groups before and after implementation

Our difference-in-differences model for LDL tests (limited to a sample of diabetics) indicated that there was no statistically significant effect of completing both healthy behaviors in both years (i.e., the effect of being in the treatment group during the post-expansion period) on the probability of having an LDL test during the year. Both groups experienced a nearly 19 percentage point increase in the likelihood of having an LDL test from the pre-period to the post-period. As seen in Table 5, other factors in the model were also significant in predicting rates of LDL-C screenings.

Table 5. Modeling LDL-C screenings in Diabetic Members as a Function of Healthy Behavior Completion

	Coefficient	95% CI
Post Medicaid Expansion	0.185***	0.116, 0.255
Treatment Group	0.001	-0.082, 0.084
Post Medicaid Expansion*Treatment Group	-0.061	-0.170, 0.048
Age	0.0002	-0.003, 0.003
Male	-0.036	-0.086, 0.015
Black	0.071	-0.037, 0.179
Hispanic	-0.051	-0.164, 0.062
Other Race	0.063	-0.099, 0.224
Unknown Race	0.030	-0.027, 0.088
Metropolitan	0.121***	0.066, 0.176
Nonmetropolitan Rural	-0.012	-0.142, 0.118
Number of Relocations	0.010	-0.008, 0.028
Number ER Visits	-0.004	-0.020, 0.011
Number of Rx Drugs	0.027***	0.018, 0.035
Number of 24 Chronic Conditions	0.040***	0.022, 0.058
Constant	0.257**	0.099, 0.414

* p<0.05, ** p<0.01, ***p<0.001

HYPOTHESIS 3.2

Health outcomes of WP/MPC members will be positively impacted by completing the healthy behaviors.

Measure 25: Non-emergent ED use

25B: Whether member had a non-emergent ED visit

Protocol-Original measure
Data source-Administrative
Analyses-DID using MPC and the 4 comparison groups before and after implementation

Our difference-in-differences model for non-emergent ED visits indicated that the effect of completing both healthy behaviors in both years (i.e., the effect of being in the treatment group during the post-expansion period) was a statistically significant 11.1 percentage point decrease in the probability of having a non-emergent ED visit during the year. From the pre-period to the post-period, both groups experienced an approximately 9 percentage point increase in the likelihood of a non-emergent ED visit. Several other factors in the model were also significant, as seen in Table 6.

Table 6. Modeling Non-emergent ED Use as a Function of Healthy Behavior Completion

	Coefficient	95% CI
Post Medicaid Expansion	0.094***	0.073, 0.116
Treatment Group	0.014	-0.015, 0.043
Post Medicaid Expansion*Treatment Group	-0.111***	-0.152, -0.070
Age	-0.005***	-0.006, -0.004
Male	-0.053***	-0.071, -0.035
Black	0.068***	0.030, 0.105
Hispanic	0.038	-0.022, 0.098
Other Race	-0.051	-0.101, 0.0001
Unknown Race	-0.020*	-0.040, -0.001
Metropolitan	0.040***	0.021, 0.059
Nonmetropolitan Rural	-0.026	-0.069, 0.018
Number of Relocations	0.009**	0.002, 0.016
Number of Rx Drugs	0.012***	0.008, 0.017
Number of 24 Chronic Conditions	0.043***	0.037, 0.049
Constant	0.356***	0.310, 0.403

* p<0.05, ** p<0.01, ***p<0.001

Measure 26: Follow-up ED visits

26B: Whether member had an ED visit within the first 30 days after index ED visit

Protocol-Original measure
Data source-Administrative
Analyses-DID using MPC and the 4 comparison groups before and after implementation

Our difference-in-differences model for return ED visits indicated no change in the probability of having a return ED visit within 30 days at some point during the year as a function of completing both healthy behaviors in both years (i.e., the effect of being in the treatment group during the post-expansion period). Other factors in the model were significant. Table 7 below shows the covariates that are significant in predicting likelihood of a 30-day return ED visit

Table 7. Modeling ED Visits 30 Days After Index ED Visit as a Function of Healthy Behavior Completion

	Coefficient	95% CI
Post Medicaid Expansion	0.019**	0.007, 0.031
Treatment Group	-0.008	-0.025, 0.008
Post Medicaid Expansion*Treatment Group	-0.020	-0.043, 0.003
Age	-0.002***	-0.003, -0.002
Male	-0.009	-0.019, 0.001
Black	0.016	-0.005, 0.037
Hispanic	0.021	-0.013, 0.054
Other Race	-0.031*	-0.059, -0.002
Unknown Race	-0.020***	-0.031, -0.009
Metropolitan	0.015**	0.005, 0.026
Nonmetropolitan Rural	0.008	-0.016, 0.032
Number of Relocations	0.007**	0.003, 0.010
Number of Rx Drugs	0.005***	0.003, 0.008
Number of 24 Chronic Conditions	0.020***	0.017, 0.024
Constant	0.124***	0.098, 0.150

* p<0.05, ** p<0.01, ***p<0.001

Measure 30: Inpatient utilization-general hospital/acute care

This measure summarizes utilization of acute inpatient care and services in the following categories: total inpatient surgery and medicine using number of discharges per 1000 member months, number of days stay per 1000 member months and average length of stay for all members who were enrolled for at least 1 month during the measurement year

Protocol-NCQA HEDIS IPU
Data source-Administrative
Analyses-Means tests between MPC members and four comparison groups before and after implementation

We created a variable equal to the number of hospital discharges per 1000 person-months of enrollment in either the Wellness Plan, Marketplace Choice Plan, or one of the two comparison plans.

Our difference-in-differences model indicated that there was no relationship between completing both healthy behaviors in both years (i.e., the effect of being in the treatment group during the post-expansion period) and the number of discharges per 1000 member months. While those in the treatment group had fewer discharges compared to the control group at baseline, there were not any significant secular time trend differences between the pre-period and post-period. Only two other factors in the model—gender and chronic conditions—were significant, as can be seen below in Table 8.

Table 8. Modeling Number of Discharges per 1000 Member Months as a Function of Healthy Behavior Completion

	Coefficient	95% CI
Post Medicaid Expansion	1.059	-0.273, 2.392
Treatment Group	-2.364*	-4.163, -0.565
Post Medicaid Expansion*Treatment Group	-0.765	-3.293, 1.763
Age	-0.050	-0.105, 0.005
Male	1.631**	0.540, 2.722
Black	-0.683	-3.004, 1.638
Hispanic	-2.820	-6.518, 0.878
Other Race	-1.836	-4.594, 1.282
Unknown Race	-0.372	-1.593, 0.848
Metropolitan	-0.931	-2.093, 0.231
Nonmetropolitan Rural	-0.157	-2.837, 2.524
Number of Relocations	0.081	-0.335, 0.497
Number of Rx Drugs	-0.044	-0.313, 0.224
Number of 24 Chronic Conditions	4.470***	4.087, 4.853
Constant	1.141	-1.735, 4.017

* p<0.05, ** p<0.01, ***p<0.001

Measure 31: Ian "all cause" hospital readmissions

The number of acute inpatient stays during the measurement year that were followed by an acute readmission for any diagnosis within 30 days and the predicted probability of an acute readmission

Protocol-NCQA HEDIS PCR; NQF 1768; Adult Core Measures #7
Data source-Administrative
Analyses-Means tests between MPC members and four comparison groups before and after implementation

Our difference-in-differences model indicated that there was no relationship between completing both healthy behaviors in both years (i.e., the effect of being in the treatment group during the post-expansion period) and the number of annual hospital readmissions per 1000 members. Neither was there any baseline difference between the treatment and control groups, nor any significant trend between the pre-period and post-period. Only two factors—gender and chronic conditions—were significant in this difference-in-differences model, shown below in Table 9.

Table 9. Modeling Number of Hospital Readmissions per 1000 Members as a Function of Healthy Behavior Completion

	Coefficient	95% CI
Post Medicaid Expansion	0.818	-2.454, 4.091
Treatment Group	-1.543	-5.963, 2.876
Post Medicaid Expansion*Treatment Group	1.123	-5.086, 7.333
Age	-0.121	-0.257, 0.014
Male	4.135**	1.455, 6.816
Black	-3.829	-9.531, 1.872
Hispanic	-6.806	-15.890, 2.278
Other Race	-2.961	-10.620, 4.699
Unknown Race	-1.897	-4.895, 1.101
Metropolitan	-2.418	-5.272, 0.437
Nonmetropolitan Rural	-0.092	-6.676, 6.493
Number of Relocations	-0.561	-1.583, 0.462
Number of Rx Drugs	0.106	-0.555, 0.766
Number of 24 Chronic Conditions	4.219***	3.278, 5.160
Constant	3.612	-3.453, 10.677

* p<0.05, ** p<0.01, ***p<0.001

LIMITATIONS AND DEVIATIONS FROM PROPOSED METHODS

The quantitative analyses are limited in three ways. First, the definition of our sample and the treatment variable, while necessary to cleanly model the relationship between the Healthy Behaviors Program and our outcomes of interest using a quasi-experimental method, results in dropping a number of member-year observations. In turn, this raises the possibility that our results are not generalizable to other Wellness Plan and Marketplace Choice Plan members, to say nothing of Medicaid members writ large. Second, we cannot adequately control for the temporal relationship between completing healthy behaviors and subsequent healthcare utilization. That is, we do not know whether the outcomes occurred before or after the completion of the healthy behavior(s). We did conduct a sensitivity analysis with a lagged dependent variable, but this did not significantly alter the results. Our regression models are limited by the fact that there may be unobserved factors that differ between individuals, for which we are unable to adequately adjust our models. This may bias our results. However, the direction and magnitude of any such bias cannot be well predicted, and we do not formally test the assumption that trends are equal between the treatment and control group in the pre-period here. As with all evaluations, there will be limitations to the interpretation of these results and possible biases if comparison groups are not similar to the treatment groups. Finally, administrative data are collected for billing and tracking purposes and may not always accurately reflect the service provided.

A number of outcomes that we originally proposed are not reported here for two primary reasons. First, the member survey has not been fielded at this time. Consequently, measures 16, 17, 18, 19, 22, 24, and 32 from the original proposal could not be calculated. If and when the member survey is conducted, those measures would subsequently be calculated. For brevity's sake, they are omitted from the results section entirely here. Second, the Medicaid claims data provided for this analysis did not include certain information. Consequently, measure 23 was not calculated as we had only an indicator of having had an outpatient visit, rather than a count of outpatient visits. Thus, this result is not reported in the current results, although a measure of those members having any outpatient visit is reported as measures 15A and 15B. Outcomes for measures 27, 28A, 28B, 29A, and 29B require diagnosis-specific hospitalization data and are not included here. Furthermore, based on feedback from Mathematica that the regression discontinuity design (RDD) models were best conducted around the 100% of poverty threshold to compare Wellness Plan and Marketplace Choice members, we did not estimate any RDD models here, because we did not have a continuous variable that we could identify as assigning someone to treatment, which in this case is considered the completion of both healthy behaviors.

CONCLUSIONS

The HBI program is designed to encourage enrollees to take an active part in maintaining their health and to promote accountability among enrollees. In the current report, we continue to look at the health outcomes associated with the implementation of the HBI program.

Overall, we see from our bivariate analyses that completion of healthy behaviors, the wellness exam and HRA, appears to increase the proportion of individuals with an ambulatory care visit and, in some cases, a non-emergent ED visit. It is not clear that this is a desired result. First, the relationship with ambulatory care visits is likely endogenous, because most individuals are likely to complete an HRA during an ambulatory care visit, and it is not possible to receive a wellness exam without having an ambulatory care visit. Second, the increase in non-emergent ED visits is likely undesirable. If these individuals are going to the ED when they previously would have gone without an ambulatory care visit, then this is beneficial. However, non-emergent use of the ED is typically considered inefficient, and it would be preferable for these individuals to receive ambulatory care for non-emergent conditions in other more appropriate (e.g., office-based) settings. At the same time, among diabetics, completion of healthy behaviors mostly appears to increase the proportion of individuals receiving hemoglobin A1c tests and LDL-C tests. This is clearly a positive outcome. Other positive outcomes appear to be based around hospital-based care. For example, bivariate analyses show that completion of both healthy behaviors is associated with a decrease in the proportion of Wellness Plan members with a return ED visit within 30-days. Similarly, completion of a wellness exam is associated with a decrease in hospital discharges among Wellness Plan members, although HRA completion has the opposite effect. Marketplace Choice members did not experience a significant change in hospital discharges, but those who completed a wellness exam did experience an increase in return ED visits. Finally, completion of healthy behaviors was not significantly associated with 30-day readmissions for Wellness Plan or Marketplace Choice Plan members. Some of these outcomes are undesirable. However, it is important to note that none of these results control for potentially confounding variables.

For that reason, the most empirically robust results come from our difference-in-differences models. These models allow us to limit our sample to individuals who were enrolled in IowaCare for 24 months in 2012 and 2013 before transitioning to the Wellness Plan or Marketplace Choice Plan for 24 months in 2014 and 2015, and compare the treatment group (i.e., those who completed both healthy behavior activities in both 2014 and 2015) with a control group that completed none of the healthy behavior activities. Thus, we are able to isolate the contribution of completing healthy behaviors separately from other aspects of implementing IHAWP, which might include access to a wider range of providers and other factors.

Based on these results, we find that completing both healthy behaviors in both years has almost no effect on the health outcomes we examined here. Compared to those who completed no healthy behaviors, those completing both healthy behaviors saw no changes in the likelihood of having an ambulatory care visit, or the number of hospital discharges, readmissions, or 30-day return ED visits. Nor was healthy behavior completion associated with any change in the likelihood of a diabetic member receiving an A1c test or LDL test. In fact, the only significant difference we observed was that completing the healthy behaviors was associated with a decreased likelihood of having a non-emergent ED visit. There are two reasons that non-emergent ED visits may be reduced. First, since there is no concomitant increase in ambulatory care visit rates, we might assume that providers used the existing ambulatory care visits more effectively, avoiding chronic or acute care problems that might prompt a non-emergent ED visit. Second, in the absence of increased ambulatory care visits rates, we might also be concerned that the reduction in the non-emergent ED visit rate may be the result of reduced access to care. Though either might occur, there were no changes in state Medicaid policy or in the expressed policies of the Qualified Health Plans that would interfere with ED access.

Using two years of data post-implementation of the Medicaid expansion and Healthy Behaviors Program, we do not observe any association between the completion of healthy behaviors and improved process measures of quality among diabetics, nor is there any evidence that completion of healthy behaviors reduces hospitalizations, or improves access to care.

Given the limitations we discuss in the previous section, we urge caution in interpreting these findings. While our difference-in-difference models allow us to adjust for unobserved differences between the treatment and control groups, the method does have limitations in its ability to account for unobserved

variation within the groups, and we were also forced to exclude a significant number of person-year observations to conduct these analyses, raising questions of generalizability. Finally, although we explored the possibility of a one-year lag between activity completion and outcomes and found no notable differences compared to the models we present here, it remains a possibility that the lag length is longer than one year, and we are unable to observe it this early in the program.