How Effective is Health Coaching in Reducing Health Services Expenditures?

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Background: Health coaching interventions aim to identify high-risk enrollees and encourage them to play a more proactive role in improving their health, improve their ability to navigate the health care system, and reduce costs.

Objectives: Evaluate the effect of health coaching on inpatient, emergency room, outpatient, and prescription drug expenditures.

Research Design: Quasiexperimental pre-post design. Health coaching participants were identified over the 2-year time period 2009–2010. Propensity scores facilitated matching eligible participants and nonparticipating controls on a one-to-one basis using nearest kernel techniques. Difference in differences logistic and generalized linear models addressed the impact of health coaching on the probability of incurring costs and levels of inpatient, emergency room, outpatient, and prescription drug expenditures, respectively.

Measures: Administrative claims data were used to analyze health services expenditures preparticipation and post health coaching participation time periods.

Results: Of the 6940 health coaching participants, 1161 participated for at least 4 weeks and had a minimum of 6 months of claims data preparticipation and postparticipation. Although the probability of incurring costs and expenditure levels for emergency room services were not affected, the probability of incurring inpatient expenditures and levels of outpatient and total costs for health coaching participants fell significantly from preparticipation to postparticipation relative to controls. Estimated outpatient and total cost savings were $286 and $412 per person per month, respectively.

Conclusions: Health coaching led to significant reductions in outpatient and total expenditures for high-risk plan enrollees. Future studies analyzing both health outcomes and claims data are needed to assess the cost-effectiveness of health coaching in specific populations.

Key Words: behavioral interventions, health behavior, health care costs, health services, utilization

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The first set of results analyzing the health outcomes for a subset of health coaching participants who completed health inventories at baseline and upon completion of the health coaching program have been recently published in the journal "Global Advances in Health and Medicine" as follows: Lawson et al.[17]

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In the face of rising health care costs and an increasingly scrutinized arena for practicing high quality, cost-effective medicine, health coaching is emerging as a means of encouraging patients to play a more active role in improving their health. On the basis of behavior change theories, health coaching is a client-centric process that entails goal setting determined by the patient, encourages self-discovery in addition to content education, and incorporates mechanisms for developing accountability in health behaviors.[1–4] Health coaches tailor their coaching strategies toward improving patients' activation levels, that is, improving patients' confidence and skills and empowering them to become actively engaged in their health care.[5]

Health coaching differs from existing conventional interventions, namely disease management programs that emphasize coordinated and comprehensive care built upon evidence-based clinical guidelines, pathways, and algorithms.[6] Disease management programs focus on the disease itself, and do not specifically focus on the patient's individualized needs or behavior. Although disease management programs have improved clinical processes of care, they have not led to significant or sustainable improvements in health outcomes or reductions in health care costs.[7] Alternatively, the literature validating health coaching as an effective and cost-saving intervention is growing.[8–11] Health coaching interventions are also beginning to show evidence of improving patient health outcomes.[12–16]

Lawson et al[17] report that coaching participants realized significant improvements in health outcomes preparticipation to postparticipation: a 12% reduction in high stress levels, an 18% improvement in healthy eating, a 21% improvement in exercise levels, and a 12%–15% increase in the percent reporting good physical and emotional health. Study participants voluntarily filled out the Patient Activation Measure (PAM) assessing four stages of "activation" as measured by whether patients (1) believe that their role is important; (2) have the confidence and knowledge necessary to take action; (3) are taking action to maintain and improve one's health; and (4) are staying the course even under stress.[18] Of the 570 participants who voluntarily filled out a pre-PAM and post-PAM survey, individuals realized an average 8- to 9-point increase in PAM scores, with 60% reporting a clinically significant improvement of ≥ 5 points. Finally, Lawson and colleagues report a significant increase in the percent of patients achieving the highest of 4 stages associated with the PAM scores, namely that of maintaining healthy behaviors over time.

The purpose of this study was to expand upon the results reported in Lawson and colleagues and evaluate the impact of health coaching on the probability of incurring costs and on levels of expenditures for inpatient, emergency room, outpatient, prescription, and overall (total) health services.

METHODS

Study Sample

The study sample includes high-risk health plan enrollees invited to participate in a telephonic health coaching intervention. Health plan enrollees were identified as high risk based on high cost, multiple comorbidities, and/or high adjusted clinical group (ACG) risk score, and either recruited for health coaching through claims data (85.6%), health assessments (4.4%), physician referral (2.4%), or they self-enrolled (7.6%).

Health Coaching Program

Health coaching participants worked with a dedicated health coach to address issues and goals identified by the member based on their own values and personal vision for health. Health coaches had backgrounds in nursing, psychology, social work, exercise physiology, nutrition education, and health education; and had completed a customized training program in health coaching codeveloped by the health care company and the University of Minnesota. Consistent with the model of integrative health coaching described by Wolever et al[9] and Edelman et al,[10] the health coaching program differed from disease and case management in that health coaches did not necessarily focus on diagnoses, disease complications, or symptom management, but rather took a holistic perspective including not only the physical, but also the mental, emotional, spiritual, and relational aspects of well-being. Members engaged in scheduled coaching sessions, initiated ad hoc coaching sessions as needed, and actively worked on self-selected goals and health behavior changes. Health coaches provided telephonic coaching to members at their convenience; thus, the number and frequency of calls varied. Members participated for approximately 6 months depending on their unique needs, and on average, engaged in 5–6 phone sessions (1 initial assessment, several coaching sessions, and 1 end-of-program evaluation session). The initial assessment served to identify the member's needs and health-related goals, assess the member's readiness to make lifestyle and behavior changes, and identified their level of self-management knowledge, skills, and confidence. Health coaches helped clients frame their health improvement goals using SMART (specific, measurable, attainable, relevant, and time-sensitive) language, create individualized health improvement plans with interventions and milestones, and develop skill-sets that empower members to establish collaborative and effective relationships with their health care providers.[19] Telephonic coaching sessions and personalized educational mailings, proactive coordination and referral to services and resources, and subsequent assessments were tailored to the member's health improvement plan. Members received a workbook that addressed health behavior change, stress management, healthful living tips, and several exercises to support the member in their health improvement journey.

Study Design

This study utilizes a quasiexperimental pre-post design, comparing the experience of the experimental group of health coaching participants to that of a control group of nonparticipants who were otherwise eligible to participate in health coaching. The study expands upon the analyses of health outcomes described in Lawson and colleagues by focusing on a larger population of health plan enrollees for whom secondary administrative claims datasets were available during the preparticipation and post health coaching participation time. Of 114,615 health plan members identified as high risk and eligible for health coaching, 9718 members participated in health coaching over the 2-year time period January 2009 to December 2010 (Fig. 1). Participants with multiple health coaching participation phases were excluded from the study (n = 670). Although health coaching participants could choose a self-directed track and not interact with health coaches (n = 2108), this study focused on the 6940 active participants who met with health coaches at least twice in a minimum 4-week time period. Additional inclusion criteria were that participants were commercially insured and had continuous insurance coverage throughout the study's time period. As the state public program enrollees tended to go on and off coverage, they were excluded from the analyses (n = 2443), as well as other individuals who did not have continuous coverage throughout the year (n = 1293). To characterize the effect of health coaching on participants with health conditions amenable to health coaching and to minimize the effect that outliers had on skewing the distribution of the data, sensitivity analyses were conducted to determine if excluding the top 1% of cost outliers affected the results (n = 121). As the purpose of this study was to analyze the effect of health coaching on health care expenditures, the minimum amount of time with which to observe a stable, albeit, short-run effect was thought to be 6 months. Thus, participants with a minimum of 6 months of administrative claims data before the first health coaching session and 6 months of data after the last health coaching

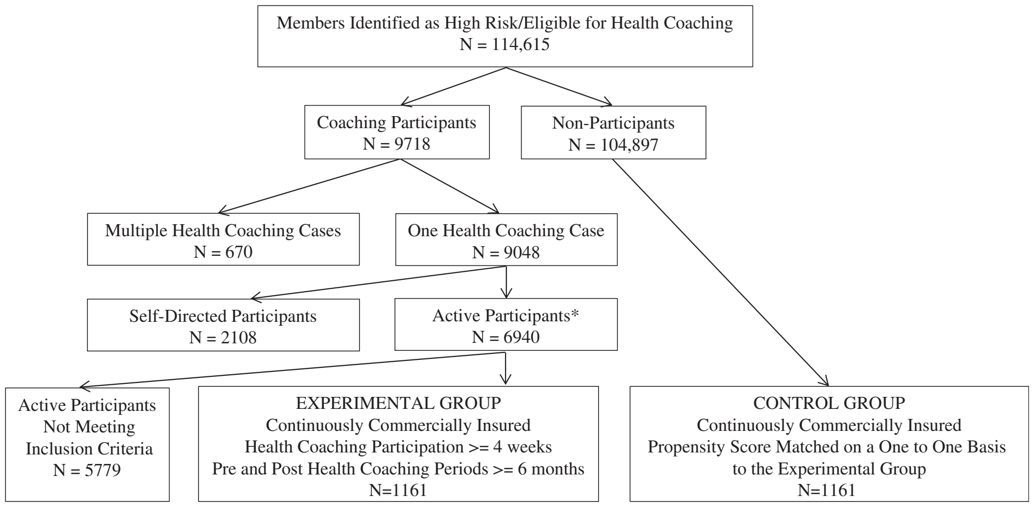

FIGURE 1. Inclusion exclusion criteria and sample sizes. *Active participants had at least 2 health coaching sessions.

session were included. As the health coaching program was first initiated in January 2009 and the last health coaching participant completed the program in December 2010, the claims data cover the time period July 2008 through June 2011. The final sample, excluding the top 1% of cost outliers, consisted of 1161 health coaching participants (Fig. 1).

The experimental group of health coaching participants were matched on a one-to-one basis to a control group of nonparticipating health plan members who were otherwise eligible to participate in health coaching using propensity scores.[20] The likelihood of participating in health coaching was estimated using logistic regression. Independent variables included age, sex, rural/urban residential location, number of comorbidities, ACG risk score, and 20 ACG chronic condition dummy variables (eg, age-related macular degeneration, bipolar disorder, chronic obstructive pulmonary disease, congestive heart failure, depression, diabetes, glaucoma, human immunodeficiency virus, hyperlipidemia, hypertension, hypothyroidism, immune-suppression transplant condition, ischemic heart disease, low back pain, macular, osteoporosis, Parkinson disease, persistent asthma, rheumatoid arthritis, schizophrenia, and seizure disorders), and whether the participant's commercial health plan was in the individual, small, or middle group market. Patients were matched using a Greedy algorithm matching method without replacement available in SAS 9.2.[21–23]

Since health care cost data tend to have a disproportionate mass of observations at 0 (ie, nonusers) and a right-skewed distribution for users, 2-part modeling has been used to address (a) the probability of incurring any cost; and (b) the level of expenditures conditional on having incurred any cost. Although the first of the 2-part model can be estimated using logistic regression, the highly skewed distribution of expenditures in the second part of the 2-part model typically calls for transforming the dependent variable. Generalized linear models (GLM) with a gamma response probability distribution and a log-link function were used to obtain predicted values that maintain the original scale of the data even when the dependent variable is transformed.[24] Distributional assumptions were tested using the link-test, a specification test that regresses the dependent variable on the predicted values and their squares. Two-part models were estimated as difference in differences logistic and GLM where the experimental group's health service expenditures were estimated relative to the control group, thus controlling for sectoral trends.[25,26] For each person in the sample and each of the years represented by the study's time period 2008–2011, the costs associated with the claims data were rolled up in 6-month increments and categorized by type of health service (inpatient, emergency room, outpatient, and prescriptions). A dummy variable indicating the year that each person completed their health coaching program defined the post time period. If the program completion date was within 1 month of the next calendar year, the postperiod was flagged as the next calendar year. The generic model specification is

$$\begin{aligned} y =& \beta_0+\beta_1\,group+\delta_0\,post+\delta_1\,(group\times post)\\ &+\psi_0\,Year+\psi_1\,(year\times group)\\ &+\psi_2\,(year^2\times group)+\epsilon_0\,year+\epsilon_1\,year^2+\mu, \end{aligned} \tag{1}$$

where $year=2008, 2009, 2010, 2011$; y is the outcome of interest; and *post* is a dummy variable for the post-participation time period. The dummy variable *group* captures possible differences between coaching participants and nonparticipating controls before the implementation of the health coaching intervention. The dummy variable *post* captures aggregate factors that could cause changes in the outcome y regardless of participation in health coaching; the *year* variable captures time dependent changes. The interaction terms $year\times group$ and $year^2\times group$ capture potential nonlinear time dependent differences between the experimental and control groups. Finally, the *year* and $year^2$ variables capture potential nonlinear time trends in the dependent variable(s). Matched controls were assigned pseudo-enrollment dates mimicking the experimental group's distribution of the preperiods and postperiods. The coefficient of interest, δ_1, multiplies the interaction term, *group × post*, which is essentially equal to one for health coaching participants in the postperiod. For the 2 time periods, preparticipation and postparticipation, the difference in differences estimate is

$$\delta_1 = (\hat{y}_{B.2} - \hat{y}_{B.1}) - (\hat{y}_{A.2} - \hat{y}_{A.1}) \quad (2)$$

Equation 1 is used to estimate difference in differences models for the following outcomes of interest: (a) the probability of incurring costs in each of the categories inpatient and emergency room services; and (b) expenditure levels for those who incurred inpatient and emergency costs (where a large proportion of patients did not incur costs), and expenditure levels for outpatient and prescription drugs (where most patients incurred costs). Finally, expenditure data were adjusted for inflation and expressed in 2011 dollars using the Consumer Price Index for *Medical Care*.[27]

This study was approved by the University of Minnesota's Institutional Review Board. All differences were considered significant at the 0.05 level. SAS 9.2 was used to create working datasets and Stata/SE 11.2 was used to conduct the statistical analyses.[17,28]

RESULTS

Focusing first on the representativeness of the 9718 members choosing to participate in health coaching (Fig. 1), health coaching participants tended to be older (over the age of 50), were more likely to be female, and more likely to have (multiple) chronic conditions than eligible nonparticipants (see Table, Supplemental Digital Content 1, http://links.lww.com/MLR/A845 which illustrates the differences between eligible health coaching participants and nonparticipants).

Although <6% (6940/114,615) of potential candidates actively participated in health coaching, the analyses of health services expenditures focused on the 1161 participants who met the inclusion criteria. Compared with the 5779 active participants who did not meet the inclusion criteria, the study sample of 1161 participants tended to be older (over the age of 50) and were more likely to live in rural areas (18% vs. 15%) and carry commercial private versus public insurance (92% vs. 60%) (Table 1). Although no significant differences in the percent with a chronic condition and the average number of chronic conditions were found, the study sample was less likely to have bipolar disorder, depression (46% vs. 55%), human immunodeficiency virus, schizophrenia, and seizure disorders (17% vs. 22%), and more likely to have glaucoma, hyperlipidemia (54% vs. 46%), hypertension (55% vs. 50%), and osteoporosis than excluded active participants. Although significant, the percentages differed by 2–3 percentage points unless otherwise noted above.

For health coaching participants in the experimental group, the average number of months members participated in health coaching was 5.35 (range, 4–20.8) (not shown). The average number of months in the prehealth and posthealth coaching time period was 20.69 (range, 6–41.4) and 17.45 (range, 6–34.0), respectively.

Relative to controls, the observed percent of health coaching participants with an inpatient, emergency room, outpatient, or prescription claim significantly decreased from the preparticipation to postparticipation time periods (Table 2). The percent of participants with inpatient costs in the 6 months prior and 6 months postparticipation was 20.3% and 11.5%, respectively. Emergency room visits also decreased from 24.5% to 17.1% preparticipation to postparticipation. The vast majority of participants had an outpatient claim (99.1%) and a prescription-filled (96.9%) preparticipation, yet this dropped to 96.1% and 93.8%, respectively, in the postperiod. Including participants with no prescriptions filled, the average number of prescriptions filled fell from 1.78 preparticipation to 1.63 postparticipation ($P = 0.04$) (not shown). Comparative differences between the preperiods and postperiods for the control group were not significant.

In terms of estimating pre to post differences in expenditure levels for members incurring costs, the average cost of inpatient services per member month significantly increased for both the experimental and control groups (Table 3). Although the average cost of emergency room visits per member month for health coaching participants from the preparticipation to postparticipation periods were similar, the control group experienced a significant increase of \$83–\$151 from the preperiods to postperiods ($P = 0.0004$). For participants with positive outpatient expenditures, the average cost of outpatient visits per member month fell from \$476 to \$354 ($P = 0.006$). The matched control group, in contrast, experienced a significant increase in average outpatient costs per member month from \$426 in the preperiod to \$580 in the postperiod ($P = 0.02$). Finally, for those persons who had prescriptions filled, prescription costs did not significantly change from the preparticipation to postparticipation time period for either the experimental or control groups. Overall, the analyses of total costs (across all categories of health services: inpatient, outpatient, emergent, and prescription drug services) yielded significant decreases from the preparticipation to postparticipation time periods for the experimental group, whereas the control group experienced comparative increases.

As a means of rigorously testing whether the observed differences between the experimental and control groups over the pre and post time periods were significant, the difference in differences logistic model was estimated for service categories whose cost distributions were characterized by a disproportionate share of zero's (ie, no costs), namely inpatient and emergency room services. As the vast majority (over 94%) of health coaching participants incurred outpatient and/or prescription expenses in the preparticipation and postparticipation periods, the 2-part models were not implemented in the analysis of outpatient, prescription and total expenditures (Table 4) (see Table, Supplemental Digital Content 2, http://links.lww.com/MLR/A846 for the full model specifications and results). While the logistic model confirmed that the percent of members with an inpatient claim significantly decreased from the pre to post time periods for the experimental group relative to the controls, no significant change in the percent of members with an emergency room claim was found.

TABLE 1. Demographic and Health Status Characteristics of Health Coaching Participants With At Least 6 Months of Administrative Claims Data Preparticipation and Postparticipation, 2008–2011

	Excluded	Included	P*
Sample size (n)	5779	1161	
Demographics			
Average age (<65 y)	48.0	52.6	<0.01
18–25 y	5.9%	1.0%	<0.01
26–29 y	5.1%	2.1%	<0.01
30–39 y	14.5%	9.7%	<0.01
40–49 y	22.9%	19.3%	<0.01
50–59 y	32.8%	41.1%	<0.01
60–64 y	14.7%	19.9%	<0.01
65 and older	4.1%	7.0%	<0.01
Male (%)	29.3%	31.2%	0.20
Rural (%)	15.0%	18.1%	<0.01
Commercial (private) insurance	59.9%	92.1%	<0.01
Government (public) insurance	38.7%	5.8%	<0.01
Health status: chronic conditions			
Had a chronic condition (%)	94.4%	95.2%	0.28
No. chronic conditions (average)	3.39	3.41	0.79
Age-related macular degeneration	0.6%	1.2%	0.03
Bipolar disorder	5.5%	2.2	<0.01
Congestive heart failure	5.5%	4.4%	0.12
Depression	54.5%	45.9%	<0.01
Diabetes	21.9%	21.6%	0.83
Glaucoma	7.0%	10.1%	<0.01
Human immunodeficiency virus	0.8%	0.0%	<0.01
Hyperlipidemia	45.6%	54.4%	<0.01
Hypertension	49.9%	55.2%	<0.01
Hypothyroidism	15.1%	17.6%	0.03
Immune suppressive trans	0.9%	0.4%	0.13
Ischemic heart disease	7.5%	9.4%	0.03
Osteoporosis	6.5%	9.3%	<0.01
Parkinson disease	3.4%	4.1%	0.28
Asthma	29.5%	26.9%	0.07
Rheumatoid arthritis	5.4%	5.1%	0.64
Schizophrenia	3.6%	2.2%	0.02
Seizure disorder	22.0%	17.2%	<0.01
Chronic obstructive pulmonary disease	4.9%	4.1%	0.28
Low back pain	48.8%	49.5%	0.64

Health coaching participants with a minimum set of administrative claims data 6 months prior and 6 months postparticipation for the time period July 2008 through June 2011 were included in the study samples.

*For continuous variables, a *t* test was used; for categorical variables, a χ^2 test was used.

For members who incurred inpatient or emergency room costs, the difference in differences GLM model did not find that the experimental group of health coaching participants' costs significantly differed from the preperiod to the postperiod relative to their matched controls. The difference in differences GLM model did, however, confirm that outpatient and total costs significantly decreased from the preperiod to the postperiod for health coaching participants relative to their matched controls, yet differences in prescription costs were not significant. The GLM model predicted average monthly outpatient and total cost savings of $286 and $412 per person participating in health coaching relative to the controls, respectively. Finally, as a test of the sensitivity of these findings, the results reported above were robust even when the top 1% of cost outliers were included.

DISCUSSION

This study provides one of the first evaluations of a health plan's investment in health coaching. The cost savings reported here along with the improvements in health outcomes reported in Lawson and colleague's paper point toward the likelihood of the success of health coaching in improving health outcomes while reducing costs. Further research addressing the cost-effectiveness of health coaching is warranted.

As this study was conducted during the program's initial stages of development, it provides important justification for creating stronger patient incentives to participate in health coaching and complete the baseline and follow-up assessments. Consistent with programs aimed at health user engagement over a period of time, incentives for enrollment are critical. Aspects of patient centeredness must be continually evaluated to ensure the perceived value to the participant, increase completion rates, and allow for comprehensive data collection. These findings serve to inform program enhancements and point towards the program's potential to expand its outreach and enrollment efforts, as well as the scope of health coaching services, specifically targeting high-risk subpopulations such as patients with diabetes and cardiovascular disease.

TABLE 2. Percent of Health Coaching Participants Incurring Health Services Expenditures in the Preparticipation and Post Health Coaching Participation Time Periods

Health Services Utilization	Experimental				Matched Controls			
Sample Size (n = 1161)	% With Claim	SE	95% CI Lower	95% CI Upper	% With Claim	SE	95% CI Lower	95% CI Upper
Inpatient								
Preclaim (%)	20.3	0.012	18.0	22.6	19.7	0.012	17.4	22.0
Postclaim (%)	11.5	0.009	9.6	13.3	17.6	0.011	15.4	19.8
Pre vs. post (*P*)	< 0.01				0.18			
Emergency room								
Preclaim (%)	24.5	0.013	22.1	27.0	23.4	0.012	21.0	25.9
Postclaim (%)	17.1	0.012	17.1	21.7	21.5	0.012	19.2	23.9
Pre vs. post (*P*)	< 0.01				0.27			
Outpatient								
Preclaim (%)	99.1	0.003	98.5	99.6	97.0	0.005	96.0	98.0
Postclaim (%)	96.1	0.006	95.0	97.2	95.6	0.006	94.4	96.8
Pre vs. post (*P*)	< 0.01				0.08			
Prescriptions								
Preclaim (%)	96.9	0.005	95.9	97.9	95.9	0.006	94.7	97.0
Postclaim (%)	93.8	0.007	92.4	95.2	94.7	0.007	93.5	96.0
Pre vs. post (*P*)	< 0.01				0.20			

Preclaim = claim was within the 6 months before the first health coaching session, Postclaim = claim was within the 6 months after the last health coaching session, Pre = preparticipation in health coaching; Post = postparticipation in health coaching.
CI indicates confidence interval.

Largely due to the use of secondary datasets that were not being collected for research purposes, this study has some important limitations. First, the generalizability of our results to the larger patient population of healthier plan members may be limited by the fact that health coaching targets the "high cost" less healthy populations. In addition, plan enrollees choosing to participate in health coaching and meeting our inclusion criteria may have had higher baseline patient activation levels than nonparticipants. According to Prochaska's theory of behavioral change, participants may well have been in the "contemplation stage" and "beginning to recognize that their behavior is problematic…"[1] To the extent that Lawson and colleagues report increased patient activation levels postparticipation in health coaching, patient activation likely contributed to cost savings. As patient activation levels were not collected for nonparticipants and

TABLE 3. Average Health Services Expenditures for Health Coaching Participants and Controls Who Incurred Costs in the Preparticipation and Post Health Coaching Participation Time Periods

Type of Health Services	Experimental				Matched Controls			
Sample Size (n = 1161)	Cost/MM	SE	95% CI Lower	95% CI Upper	Cost/MM	SE	95% CI Lower	95% CI Upper
Inpatient								
Preclaim	804.20	54.87	696.10	912.30	976.60	81.50	816.00	1137.20
Postclaim	1187.5	119.9	950.30	1424.6	1290.1	117.60	1058.30	1521.90
Pre vs. post (*P*)	0.004				0.03			
Emergency room								
Preclaim	102.20	8.30	85.90	118.60	82.70	6.84	69.23	96.16
Postclaim	103.40	8.60	86.40	120.40	150.70	17.91	115.4	186.00
Pre vs. post (*P*)	0.92				0.0004			
Outpatient								
Preclaim	475.60	40.82	395.50	555.70	426.40	28.16	371.20	481.70
Postclaim	354.30	15.02	324.80	383.80	580.10	56.90	468.40	691.70
Pre vs. post (*P*)	0.006				0.02			
Prescriptions								
Preclaim	160.30	8.61	143.40	177.20	160.50	8.28	144.40	176.90
Postclaim	154.10	9.67	135.10	173.10	168.50	9.51	149.80	187.10
Pre vs. post (*P*)	0.63				0.53			
Total costs								
Preclaim	793.30	45.08	704.90	881.80	770.10	37.50	696.60	843.70
Postclaim	634.3	28.70	578.00	690.60	961.60	67.74	828.70	1094.50
Pre vs. post (*P*)	0.003				0.01			

Expenditures were adjusted for inflation using the 2011 Consumer Price Index for *Medical Care*.
Preclaim = claim was within the 6 months prior to the first health coaching session, Postclaim = claim was within the 6 months after the last health coaching session, Pre = preparticipation in health coaching; Post = postparticipation in health coaching, MM = member month.
CI indicates confidence interval.

TABLE 4. Difference in Differences Logistic and Generalized Linear Models Estimating Expenditure Levels for Inpatient, Emergency Room, Outpatient, and Prescription Services

Type of Health Services Sample Size (n = 1161)	Coefficient	SE	$P > \|t\|$
Inpatient			
Probability of incurring costs			
Group	−0.049	0.414	0.907
Post	0.231	0.106	0.029
Group × post	−0.344	0.162	0.034
Expenditures|costs > 0			
Group	−1.146	0.591	0.053
Post	0.338	0.150	0.024
Group × post	−0.148	0.234	0.528
Emergency room			
Probability of incurring costs			
Group	0.183	0.370	0.622
Post	0.135	0.098	0.167
Group × post	−0.127	0.146	0.382
Expenditures|costs > 0			
Group	0.278	0.442	0.530
Post	0.412	0.116	0.000
Group × post	−0.318	0.170	0.062
Outpatient			
Expenditures			
Group	0.872	0.473	0.065
Post	0.481	0.132	0.000
Group × post	−0.503	0.196	0.010
Predicted monthly cost savings per health coaching participant			
Control-experimental	$286/mo		
Prescriptions			
Expenditures			
Group	−0.095	0.215	0.658
Post	0.109	0.059	0.063
Group × post	−0.068	0.087	0.433
Total costs: inpatient, emergency room, outpatient, and prescriptions			
Expenditures			
Group	0.211	0.347	0.544
Post	0.444	0.096	0.000
Group × post	−0.426	0.142	0.003
Predicted monthly cost savings per health coaching participant			
Control-experimental	$412/mo		

Group = 0/1 where 1 = experimental group, 0 = control group; Post = 0/1, where 1 = the time period following the participant's last health coaching session. The probabilities of incurring any costs were estimated using logistic regression models; expenditure levels were estimated using generalized linear models (GLM) with a gamma response probability distribution and a log-link function (see Table, Supplemental Digital Content 2, http://links.lww.com/MLR/A846 for the full model specifications and results). Predicted cost savings were estimated as the difference in differences GLM predicted costs for the post minus the pre time periods and the experimental minus the control groups.

were only available for a limited subsample of health coaching participants, the potential bias that more activated participants at baseline contributed toward the positive cost savings reported in this study could not be directly assessed. Collecting baseline patient activation levels for participants and nonparticipants would enable future prospective studies to directly address the correlation between baseline activation levels and subsequent cost savings.

Finally, the identification of matched controls using propensity scores and difference in differences GLM models were used to address the issue of self-selection bias, namely that health plan members signing up for the health coaching program may systematically differ from members who did not participate. The ability to match those in the control group to the experimental group and address the issue of self-selection bias was limited to that of the observed characteristics available in the database. The extent that propensity score matching successfully corrected for possible (unobserved) self-selection bias, including that of patient activation levels, depends on how well the observed and unobserved characteristics are correlated. While theoretically plausible, this relationship cannot be tested and is therefore unknown.

CONCLUSIONS

In summary, health coaching appears to have a positive impact on reducing outpatient and overall health services expenditures. These findings are likely due to the role that health coaching plays in enabling enrollees to proactively improve their health, and navigate and use the health care system more effectively. Future prospective studies incorporating health outcomes, health care expenditures, the costs associated with administering the program, and the persistence of the realized cost savings over time are needed to rigorously assess the cost-effectiveness of health coaching. If program implementation costs are relatively modest and below per member per month cost savings, then health plans would consider health coaching a financially attractive intervention. Understanding the probability of participation for specific disease populations and the successfulness of health coaching in improving health outcomes at reasonable or reduced costs for high-risk subpopulations will also be important.

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