Financial Analysis

Medical Cost Savings for Web-Based Wellness Program Participants From Employers Engaged in Health Promotion Activities

Laura C. Williams, PhD; Brian T. Day, EdD

Abstract

Purpose. *Assess whether an insurer-provided Web-based wellness program results in cost and utilization improvements.*

Design. *Quasi-experimental, pre-post, treatment-comparison design. Variables of interest were participation rates; medical, professional, and pharmacy expenditures; inpatient admissions; emergency room visits; and preventive service utilization.*

Setting. *Six hundred forty-three employer-based wellness programs in Pennsylvania.*

Subjects. *Forty-seven employers engaged in the Web-based wellness program and 596 employers who were not engaged. The engaged employer group included 10,463 wellness participants; an equal number of matched nonparticipant employees were identified from employers who were not engaged.*

Intervention. *Web-based wellness program features were added to an on-site program in 2004. The program was followed through 2007.*

Measures. *Outcomes were calculated using health insurance enrollment and claims history.*

Analysis. *Participating employees were compared to nonparticipants using generalized linear mixed models to study changes in costs and utilization.*

Results. *During the 2003 baseline year, engaged employers had greater costs, greater chronic disease prevalence, and greater hospitalization. Costs of program participants showed a lower rate of increase in 2004, and then dropped below those of the nonparticipants for the duration of the study. Between 2003 and 2007, the increase in medical expenditures of the participant group was significantly less than that of the nonparticipant group (31% vs. 46%, $p < .01$). In addition, the participant group showed a lower increase in professional service expenditures ($p = .02$) and greater utilization of preventive services ($p < .01$).*

Conclusions. *Web-based insurer-provided wellness programs may decrease health care costs and encourage preventive service utilization. (Am J Health Promot 2011;25[4]:272–280.)*

Key Words: Health Insurance, Wellness Program, Health Promotion, Workplace, Prevention Research, Health Care Costs. Manuscript format: research; Research purpose: intervention testing/program evaluation; Study design: quasi-experimental; Outcome measure: other financial/economic; Setting: workplace; Health focus: medical self care, nutrition, smoking control, stress management, weight control; Strategy: skill building/behavior change; Target population age: adults; Target population circumstances: employees

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INTRODUCTION

In 2010, U.S. health care expenditures are projected to exceed $2.6 trillion, which translates to $8458 per person or 17.7% of the nation's gross domestic product.[1] These expenditures are expected to increase steadily during the next several years, further impacting the nation's economy. Worksite wellness programs are recognized as a promising long-term strategy for curtailing the unsustainable rise in health care costs by improving the long-term health outlook for working adults. Encouraging worksites to offer a comprehensive employee health promotion program to their employees and increasing employee participation are part of the Healthy People initiatives[2,3] developed by the U.S. Department of Health and Human Services.

Many employers have implemented wellness programs to control medical costs by enhancing the lifestyle practices of their employees. When implemented effectively, this approach can result in fewer health risks, a reduction in health care costs and premiums, lower workers' compensation and disability management claims expenses, and increased worker productivity.[4–7]

Employers who struggle with the preliminary development and implementation of wellness programs tailored to their employees sometimes partner with their health insurers to overcome these early challenges. Chapman[8] has observed that health insurers are adopting more aggressive health promotion efforts for their members in response to employer demand. Many employers are adding Web-based components to their exist-

ing health promotion programs. Web-based programs have the advantage of allowing employees to access programs during the day or night. They are also important to small business and decentralized businesses that do not have enough people at one location to make offering on-site programs feasible.[8]

The present study examined employer and employee response to a comprehensive wellness program developed by Highmark, a Pennsylvania insurer based in Pittsburgh. The program had long included on-site features; Web-based features were introduced in 2004. Once introduced, the Web-based programs became the most widely used component of the program. The Highmark wellness program covers many topics, often with on-site and Web-based options, and is capable of meeting the needs of a variety of employee populations. All worksites included in this study were located in central and western Pennsylvania.

There were two primary goals of the present research. First, we compared baseline characteristics of employers who were and were not engaged in our wellness programs between 2004 and 2007. Our hope was to determine if these characteristics might help us understand the types of employers that would adopt programs in the future. Second, we compared participating employees in the engaged companies with matched employees of the non-engaged employers to determine if the wellness program reduced medical costs and increased use of preventive services.

METHODS

Design

The research design was quasi-experimental. Employers with high rates of employees participating in the Web-based program (engaged) were compared to employers with low rates (not engaged) to determine if there were characteristics evident during the year prior to Web-based program initiation that explained why some employers become engaged in wellness program activity whereas others do not. See details in the ''Sample'' section on participation rates for each employer group categorization.

Also, medical care outcomes were compared for employees in engaged and nonengaged organizations, using employee-level matching. The variables of interest were participation rates; medical, professional, and pharmacy expenditures; inpatient admissions; emergency room visits; and preventive service utilization.

Sample

Employer level analysis was undertaken to identify employers who were engaged in the Highmark wellness program during the period in which Web-based features were offered (2004–2007). There were 1299 Pennsylvania employers with 100 or more employees covered by the insurer's medical coverage; 643 of them were covered the entire study time period of 2003–2007. Many (n = 515) of these employers tried aspects of the program after introduction of the Web-based features. Of the 643 employers present during all the study years, 398 were active in the program for at least 3 years between 2004 and 2007. The 47 employers with participation rates of 25% or higher for 2+ years and with an average participation rate of 20% or higher were classified as engaged. Those with lower participation rates were classified as nonengaged. This in effect created an engaged employer sample in which at least 1 out of every 4 employees used the wellness program, which is consistent with other studies in which health assessment tools were introduced to heterogeneous employee samples.[9,10]

Next, employee-level participant and comparison group pools were created for input into the matching process. The 47 engaged employers provided the pool of wellness program participants. Only employees who worked for their employer during the study period and maintained Highmark's health plan coverage across all 5 years were retained (n = 10,682). This requirement ensured that complete claims history was available for these individuals, and it controlled for employee turnover.

The 596 nonengaged employers with little or no wellness program use supplied the pool of wellness program nonparticipants from which the matched comparison group was selected. This approach was used to reduce the possibility that the strong wellness culture in an organization with high participation rates might influence utilization among the comparison pool members who are themselves nonusers of the program. Only employees who worked for their employer during the entire study period and maintained Highmark's health plan coverage across all 5 years were retained. In addition, only employees who never used the program were included in the pool, resulting in 131,054 nonparticipant employees available for selection by the matching process.

Measures

Employee Descriptors. Employee-level variables were extracted from enrollment and claims information retained in the Highmark data warehouse. Measures include baseline demographics (age, gender), medical and pharmacy enrollment history from 2003 through 2007, baseline condition indicators (asthma, coronary artery disease, congestive heart failure, chronic obstructive pulmonary disease, heart disease including hypertension, and diabetes), and baseline utilization (preventive service use, inpatient admissions, and emergency room visits).

Claims history was used to calculate two scores indicating the severity of health issues for a member at baseline: the concurrent risk score and aggregated diagnosis cost group category.[11] Both scores were calculated using DxCG RiskSmart software version 2.1.1 for Commercial Model 18.[12] The concurrent risk score represents the level of health care resource use an individual had based on diagnoses accumulated over the past 12 months. The five aggregated diagnosis cost group categories are similar but provide categorical segments that reflect the health care cost estimates.

Employer-Level Descriptors. Employer-level measures were calculated based on Highmark enrollment data. Standard Industrial Classification (SIC) divisions were collapsed into three groups (service, manufacturing, and all other). Employer size refers to the number of employees in the company. Consumer segment group is related to employer size, and includes two cate-

gories (regional and national). Geographic region describes the location of the employer (western Pennsylvania and central Pennsylvania). Financial rating category describes the kind of insurance plan the employer had (fully insured and self-insured). In a fully insured plan, the employer pays a per-employee premium to an insurance company, and the insurance company assumes the risk of providing health coverage for insured events. In a self-insured plan, instead of purchasing health insurance from an insurance company and paying the insurer a per-employee premium, the employer acts as its own insurer. In the simplest form, the employer uses the money that it would have paid the insurance company and instead directly pays health care claims to providers. Employers with self-insured plans contract with Highmark to administer the plan, but the employer bears the risk associated with offering health benefits.

Outcomes. Medical and pharmacy claims for service dates from 2003 through 2007 were extracted from the Highmark data warehouse for use in the calculation of outcome variables. Health care expenditures are the total allowed charges, which include either insurer or employer group payments along with employee contributions. Total medical expenditure was calculated for each year based on medical costs. Professional service expenditure is a subset of the total medical expenses that includes visits for evaluation and management, durable medical equipment, imaging, certain procedures, and tests. Pharmacy expenditure was calculated for employees carrying pharmacy coverage through Highmark throughout the entire 5-year study period. All expenditure calculations were inflated to 2007 values using the medical care component of the Consumer Price Index.[13]

Inpatient admission count was calculated using inpatient medical claims. Because fewer than 1% of employees had more than one inpatient admission during a calendar year, and there were more than 94% zero values, this variable was converted into a dichotomous inpatient admission variable (0 = none, 1 = one or more). The emergency room visits variable represents a count of emergency room claims during each year. Number of preventive services per year is a count of the total number of preventive physical examinations, screening mammograms, cervical cancer screenings, prostate cancer screenings, colorectal cancer screenings, and other preventive maintenance screenings observed during a calendar year (range 0–6).

Intervention

Since 1991, Highmark has strived to create a comprehensive program for its member employers by offering an array of programs and services. Employers are able to utilize health assessment tools, biometric screenings, lifestyle improvement programs, telephonic tobacco cessation programs, classroom educational programs, awareness campaigns, behavioral change programs, and disease management programs.

In 2004, Highmark began offering an assortment of wellness services through a secure Web site to complement the worksite offerings. Starting in 2004, wellness profiles were administered online. Web-based wellness activities addressing many health topics were introduced. In 2006, a Web-based guide was introduced that used wellness profile results to direct participants toward appropriate preventive services, suggest relevant lifestyle improvement and/or condition management programs, and introduce participants to Web-based health education tools.

Wellness program interventions focused on a variety of topics. For each topic, there were opportunities to participate via Web-based or on-site resources. Clinical assessment and education options included Web-based programs targeting diabetes, depression, back pain management, or general self care; on-site biometric screenings; personalized nutrition coaching; and group classes to prevent and manage heart disease, diabetes, osteoporosis, or depression. Nutrition and weight management options included Web-based programs in nutrition, weight management, or binge eating; group classes teaching healthy eating habits; and a nutrition newsletter campaign. Stress management options included Web-based programs addressing insomnia and relaxation and group-based classes to teach relaxation. Smoking cessation was encouraged through Web-based, individual, and group programs.

Analysis

Employers. Comparisons were conducted between employers engaged in wellness program activity and all other employers with medical insurance enrollment covering the 5 study years. Descriptive statistics were generated for employer size, SIC division, and financial risk type; these were each created at the employer level. Several employee-level variables were also examined to reflect employee characteristics during the baseline year (2003). These variables included age, gender, medical expenses, DxCG concurrent risk score, and binary indicators to reflect the presence or absence of an inpatient admission, emergency room visit, or chronic condition. Comparisons between the two employer groups were based on χ^2 tests when variables were categorical; *t*-tests or Wilcoxon rank sum tests were used to assess between-group differences for continuous variables, depending on distribution shape.

Employee Matching. Participant and nonparticipant employees were matched using a method developed at the Mayo Clinic Division of Biostatistics.[14] Nine employee-level and three employer-level variables were included. All variables were calculated for the baseline year (2003) unless otherwise indicated. Most employee matching variables were selected because of their association with higher health care expenditures over time. These variables included age (matched within 2 years), gender, DxCG aggregated diagnosis cost group category, an indicator for preventive service use, and an indicator for inpatient admission.

Some members did not have access to pharmacy coverage from Highmark. In order to control for this, an indicator for Highmark pharmacy coverage during 2003–2007 was included so that a member with complete pharmacy coverage across the study time frame

would match to another member with the same level of coverage, allowing each participant to be retained along with his or her comparison employee in the statistical model for the pharmacy expenses.

Because an exact match for the overall DxCG diagnosis cost group measure was required, three indicators for chronic condition (asthma, coronary artery disease, congestive heart failure, and/or chronic obstructive pulmonary disease), other heart diseases (including hypertension), and diabetes were matched whenever possible. This was done because certain conditions were relatively rare and might have resulted in many unmatched participants. Further, different combinations of conditions at varying disease stages can result in the same overall diagnosis cost group level. None of the outcomes under study were disease specific.

Employer-level variables were included to control for regional differences in medical expenses and possible differences in health plan design. They included consumer segment group, region, and financial rating category. SIC division was not included as a matching variable because it did not vary significantly in the employer-level analysis comparing engaged employers to nonengaged employers, and it was not expected to be related to the outcomes under study once the other matching variables were taken into account.

Utilization Changes. Changes in medical outcomes for wellness participant employees and matched nonparticipant employees were modeled using generalized linear mixed models (GLMMs). GLMMs were used for all modeling to accommodate the correlation due to repeated measures of each employee and the nesting of employee within employer. GLMMs enable modeling random effects and correlated errors for nonnormal data. Generalized linear models do not require that the outcome variable be normally distributed, making them useful for the study of many kinds of health care outcomes. Furthermore, models exist to handle response variables that are in dichotomous, count, or continuous form.

Models compared the baseline year (2003) to the fourth year of the availability of Web-based wellness offerings (2007). To account for the nonnormal distribution in medical expenses and pharmacy expenses, GLMMs with gamma distribution and log link were used to fit the data. The inpatient admission indicator was analyzed by logistic regression. Emergency room visit count was fit using a negative binomial model, which permits the variance to exceed the mean, given the random effects. Poisson regression was used to evaluate the number of preventive services employees used each year. Each model included a group (participant or nonparticipant) by time (2003 or 2007) interaction and its main effects. All analyses were conducted using SAS version 9.2 (SAS Institute, Inc., Cary, North Carolina), and the GLIMMIX or GENMOD procedures produced the models.

RESULTS

Employer Samples

The 47 engaged wellness employers included 42 regional or Mid-Atlantic employers and 5 national employers (including Highmark). Many (76.6%) of the employers had fewer than 500 employees. Most were within service (59.6%) or manufacturing (21.3%) SIC divisions, but agriculture, finance, retail, transportation, and wholesale were also represented.

All 47 engaged wellness employers used the Web-based components of the program. Five (10.6%) limited their offerings to the wellness profile and Web-based programs, and 42 also offered on-site individual activities, group classes, and/or biometric screenings at some point during the 4-year study period. Most (83.0%) of the 47 wellness employers participated in the wellness program during all 4 years.

Participation Rates. Employee participation rates for the 47 engaged employers are shown in Table 1. Median participation rates increased over time from 11.4% in 2004 to 43.2% in 2007. The level of engagement varied from employer to employer across the 4 years, as indicated by the range of participation rates within each year.

Employee wellness participants were immersed in the program to varying degrees. Nearly a quarter of participants (24.7%) were active in the program for 1 year, 31.0% for 2 years, 22.1% for 3 years, and 22.2% for 4 years. Such variety in program involvement helps to alleviate concerns about self-selection and captures the true response of employees who are offered a voluntary health promotion program. However, it would appear that what we termed engaged employers had difficulty motivating their employees to use wellness program resources on a regular basis during the study period.

A summary of programs used by participants within the engaged group is presented in Table 2. Most wellness participants completed a wellness profile (95.7% per year, on average). Between 2004 and 2007, these individuals took part in Web-based programs (40.1%), individual workplace campaigns (9.5%), on-site group classes (10.8%), and/or on-site biometric screenings (19.9%). The most popular health topics were clinical assessment and education (41.8%), nutrition and weight management (34.8%), and stress management (23.2%). Smoking cessation offerings were also utilized to some extent (4.6%).

Engaged Employers. Engaged employers were compared to 596 nonengaged employers in terms of employer-level variables (employee count, SIC division, and financial risk type) and employee-level variables (age, gender, chronic condition, annual medical expenses, concurrent risk, and indicators for inpatient admission and emergency room visit). All values were calculated for the baseline year (2003). Engaged employers were similar to other employers in size and industry; however, they were more than twice as likely to be fully insured (57.5% vs. 22.8%, $p < .001$).

Other variables were analyzed by comparing the long-term employees of engaged employers to employees from nonengaged employers. Thus, employers with more employees were represented more heavily in the comparisons than smaller employers. Employees of engaged employers were significantly younger (42.9 vs. 44.4, $p <$

Table 1
Participation Rate Trends for Engaged Employers (n = 47)

Yearly Employee Participation Rate	% of Employers			
	2004	2005	2006	2007
0%	34.0	4.3	2.1	8.5
1%–4%	14.9	12.8	0.0	8.5
5%–19%	6.4	6.4	6.4	19.2
20%–39%	29.8	27.7	36.2	12.8
40%–59%	10.6	38.3	34.0	25.5
60%–79%	4.3	8.5	8.5	14.9
80% or higher	0.0	2.1	12.8	10.6
Median participation rate*	11.4	39.5	40.7	43.2

* Median participation percentage among all 47 employers for each year.

.001), but the average difference was less than 2 years. They were less likely to be male (32.8% vs. 59.1%, $p < .001$), and were more costly ($2984 vs. $2937, $p < .001$). In addition, more long-term employees from engaged employers had chronic conditions (12.8% vs. 6.4%, $p < .001$) and inpatient admissions (6.4% vs. 5.6%, $p < .01$). These differences contributed to higher concurrent risk scores for employees from engaged employers (1.82 vs. 1.51, $p < .001$). Results are shown in Table 3.

Long-Term Employee Samples

Matching Variables. The employee wellness participant and nonparticipant groups that resulted from the matching process were restricted to be exactly the same with regard to most matching variables. However, because of the number of matching variables used and the presence of an overall health risk variable, three variables (indicators for presence of a chronic condition, heart disease, and diabetes) were permitted to differ across the two groups where no exact match was found. Chi-square analyses indicate that the participant group had significantly more employees with chronic conditions ($p = .045$), but the incidence of individuals with chronic conditions differed by less than 1% (11.5% for participants, 10.6% for nonparticipants). The groups were statistically similar in their incidences of heart disease and diabetes. The results of the matching process appear in Table 4. Each sample contained 10,463 employees.

Health Care Utilization Changes. Medical expense trends from 2003 through 2007 appear in the Figure. The trend for the nonparticipants is rather linear. Based on other cost-effectiveness research, savings was not expected until 4 years after the introduction of the popular Web-based wellness features.[15,16] In this study, however, savings was immediate. Costs of program participants showed a lower rate of increase in 2004, and then dropped below those of the nonparticipants for the duration of the study. Program participants incurred greater medical expenses at baseline. Change models

Table 2
Activities Selected by Wellness Program Participants

Wellness Activity*	Wellness Participants (Column %)					
	2004 (n = 4956)	2005 (n = 6375)	2006 (n = 7478)	2007 (n = 7037)	Total Over 4 y (n = 10,682)	Average Over 4 y
Wellness profile†	95.7	93.3	97.4	96.3	97.9	95.7
Method of delivery						
Web-based	11.6	19.9	34.4	39.1	40.1	26.3
On-site						
Individual	0.2	0.3	4.0	10.3	9.5	3.7
Group	0.0	0.7	10.3	8.8	10.8	5.0
Biometric screening	0.0	0.0	3.3	27.8	19.9	7.8
Focus of intervention						
Clinical assessment and education	1.6	4.7	17.5	49.0	41.8	18.2
Nutrition and weight management	9.4	17.4	29.4	26.5	34.8	20.7
Stress management	3.6	10.9	16.4	15.8	23.2	11.7
Smoking cessation	1.0	1.9	3.0	2.5	4.6	2.1
Other	0.2	0.1	3.3	3.3	4.2	1.7

* Employers differ in the activities offered to employees. Activity groups are not mutually exclusive.
† Some wellness profiles were in paper form and may not have been entered into the database.

Table 3
Comparison of Engaged Employers to Nonengaged Employers*

Measure	Engaged	Nonengaged	*p* for Difference Between Groups†
Number of employers	47	596	
Number of employees, mean (median)	668.8 (249.2)	852.9 (283.8)	NS
SIC division, No. (%)			NS
Service	28 (59.6)	283 (47.5)	
Manufacturing	10 (21.3)	135 (22.7)	
All other	9 (19.2)	178 (29.9)	
Fully insured health plan, No. (%)	27 (57.5)	136 (22.8)	<0.001
Employee characteristics at baseline			
Employee age, mean (median)	42.9 (44.0)	44.4 (45.0)	<0.001
Male employee, No. (%)	5107 (32.8)	287,696 (59.1)	<0.001
Chronic condition, No. (%)	1995 (12.8)	31,183 (6.4)	<0.001
Medical expenses (2007 US $), mean (median)	2984 (992)	2937 (631)	<0.001
Inpatient admission, No. (%)	993 (6.4)	28,188 (5.6)	<0.01
No. of emergency room visits, mean (median)	0.21 (0.0)	0.21 (0.0)	0.09
Concurrent risk, mean (median)	1.82 (0.97)	1.51 (0.39)	<0.001

* NS indicates not significant; SIC, Standard Industrial Classification.
† Statistical tests include two-sample *t*-test (age), Wilcoxon rank sum test (number of employees, medical expenses, number of emergency room visits, concurrent risk) and χ^2 test (SIC, fully insured plan, male, chronic condition, inpatient admission).

comparing 2003 to 2007 were conducted in order to overcome this initial difference between the two groups.

Table 5 shows the differences in health care expenditures between the participant and nonparticipant groups. Average medical expenditures increased by 31% ($859) per member in the participant group in the post period compared with a 46% ($1191) increase in the nonparticipant group ($p < .01$). Participants' expenses were $332 lower per person by the fourth year that Web-based features were offered with the wellness program, indicating that substantial savings may result once a program is established.

When professional service expenditures were studied, a similar result was observed. Mean professional service expenditures increased by 31% ($355) per member in the participant group and 46% ($562) per member in the nonparticipant group ($p = .02$). This suggests that on average each participant incurred $207 less in health care costs by the fourth year on professional services alone.

The two groups did not differ in the rate at which pharmacy costs increased over time. Most of the wellness programs do not focus directly on changing positive and negative utilization behaviors related to pharmacy expenses.

The logistic regression model comparing the change in likelihood of an inpatient admission from 2003 through 2007 uncovered no significant between-group difference for the two employee groups. The odds of an inpatient admission increased 14% over time for the participant group (odds ratio [OR] = 1.14, 95% confidence interval [CI]: 1.02, 1.29) and 21% for the nonparticipant group (OR = 1.21, 95% CI: 1.08, 1.36). Both groups experienced an increase in the odds of an inpatient admission from baseline to follow-up. Although the ORs for the groups differed by 7%, the difference was not large enough to reach statistical significance.

There was no significant between-group difference in the change in emergency room visit frequency (.03 vs. .02 visit increase). This indicates the wellness program was not able to slow the rate of ER utilization.

Mean preventive services increased in the post period by 16% (.17 services) per member in the participant group compared with a 7% (.07) increase in the nonparticipant group ($p < .01$). Results are shown in Table 5.

DISCUSSION

Results suggest that medical care costs increased at a slower rate for employees participating in the wellness program than they did for the employees in the matched nonparticipant group. The change in medical costs over time was $332 per employee lower for the wellness program participants. Over half of the savings came from professional service expenses ($207). These savings were observed even though wellness participants were more likely to have chronic conditions at baseline (11.5% vs. 10.6%). This research demonstrates that even if participation involves assessments or education via Web-based resources, savings may result after a few years of consistent employer involvement in health promotion.

Those active in the wellness program sought a greater number of preventive services. Taking care of one's health may further impact savings in years to come.

Table 4
Matched Participant and Nonparticipant Employees

	Overall Comparison	
Calendar Year 2003	**Participants (n = 10,463)**	**Nonparticipants (n = 10,463)**
Male gender, No. (%)	2898 (27.7)	2898 (27.7)
Age, mean year	42.3	42.3
Aggregated diagnosis cost group category, No. (%)		
Low	2696 (25.8)	2696 (25.8)
Moderate	4824 (46.1)	4824 (46.1)
Elevated	1794 (17.2)	1794 (17.2)
High	962 (9.2)	962 (9.2)
Extreme	187 (1.8)	187 (1.8)
Chronic condition, No. (%)	1201 (11.5)*	1110 (10.6)
Heart disease, No. (%)	2091 (20.0)†	2043 (19.5)
Diabetes, No. (%)	508 (4.9)‡	452 (4.3)
Preventive service use, No. (%)	4415 (42.2)	4415 (42.2)
Inpatient admission, No. (%)	516 (4.9)	516 (4.9)
Consumer segment group, No. (%)		
Regional	3745 (35.8)	3745 (35.8)
National	6718 (64.2)	6718 (64.2)
Region, No. (%)		
Western Pennsylvania	1482 (14.2)	1482 (14.2)
Central Pennsylvania	8981 (85.8)	8981 (85.8)
Rating category, No. (%)		
Fully insured	8756 (83.7)	8756 (83.7)
Self-insured	1707 (16.3)	1707 (16.3)
Complete pharmacy enrollment (2003–2007), No. (%)	9623 (92.0)	9623 (92.0)

* Compared with nonparticipants, $p = 0.0447$.
† Compared with nonparticipants, $p = 0.4046$.
‡ Compared with nonparticipants, $p = 0.0643$.

This study also provided an opportunity to compare employers who were engaged with the comprehensive wellness program to employers who did not embrace the program. Employers that were engaged in wellness tended to be fully insured. In addition, the employees from engaged employers tended to be slightly younger, were more likely to be female, had more chronic conditions, and used more health care. Thus, engaged employers may have had a greater initial need to decrease health care utilization levels. This initial concern may have caused the engaged employers to educate and encourage employees to participate in health promotion activities.

A 2010 meta-analysis by Baicker et al.[17] examined the savings associated with workplace disease prevention and wellness programs. They found that across 22 cost-effectiveness studies, the average savings on health care costs per employee per year was $358 in 2009 dollars. However, it is unclear how each of the studies in that review included or excluded pharmacy costs. In addition, the meta-analysis was able to include only two studies that were classified as having (1) well-defined treatment and comparison groups and (2) 4 or more years of follow-up.

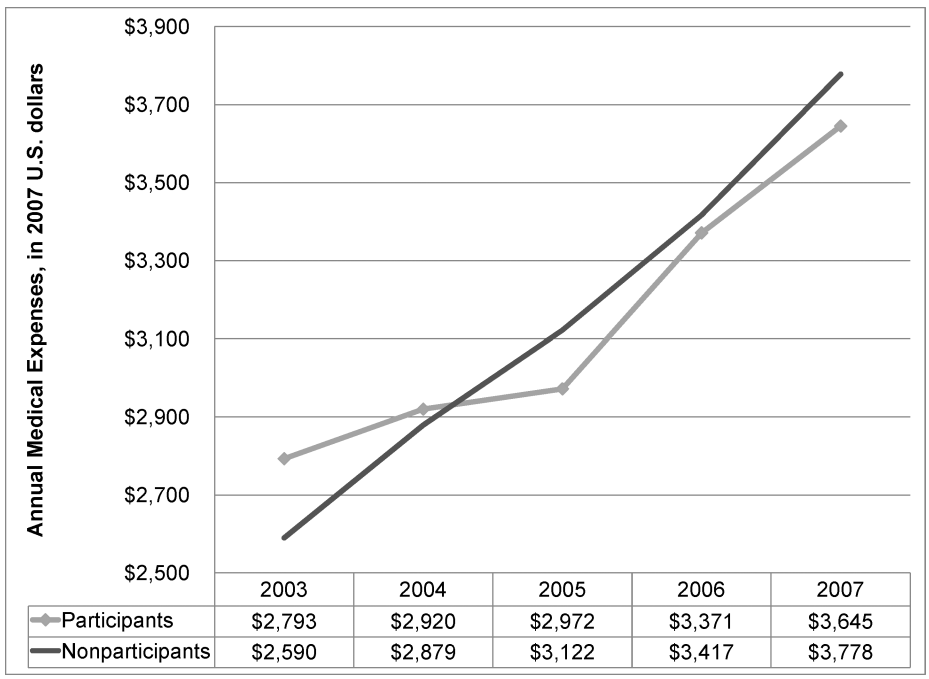
Of those two studies, only one included an overall measure of health care expenses (the other focused on inpatient costs). This study, coincidentally, was also based on Highmark's wellness program. For this research, the wellness participant group was composed solely of Highmark employees.[6] Based on values presented in the article, the simple change in expenses from baseline to the fourth year of wellness programming was $628 in 2007 dollars for Highmark employees. This single-employer study defined health care expenses to include both medical and pharmacy dollars.

Hence, the 4-year medical cost savings from the present Highmark study of companies engaged in Web-based wellness activity of $332 is reasonable in light of the inherent differences between the two studies. First, most employers in the present multiemployer study would not have the strong wellness culture that Highmark does. In addition, because not all employers carved in Highmark's pharmacy benefits, the savings in this multiemployer study was limited to medical costs.

Limitations

No return on investment estimation was possible because of the differences in how the program was implemented at various employers and worksites. However, an insurer can use savings

Figure
Average Annual Medical Expenditures for the Participant and Nonparticipant Employees



estimates provided in this study to estimate potential 4-year return-on-investment values for the long-term employees in an organization when a wellness program of low intensity is to be implemented, assuming that the employer can provide their investment costs (administrative costs, materials, employee time away from work, etc.).

Between 2004 and 2007, the Web-based options were easily the most frequently used wellness services, and many wellness profiles were administered via the secure Web site. Although the study can attest to the popularity of the Web-based services among wellness program participants,

Table 5
Pre and Post Differences in Outcomes Between the Wellness Program Participants and Matched Nonparticipants (n = 10,463 per Group)*

Outcome	Group	Least Squares Mean ± SEM 2003	Least Squares Mean ± SEM 2007	Difference	% Difference Between Pre and Post Periods	*p* for Adjusted Difference Between Groups†	Annual Savings per Participant During Year 4, $
Total medical expenditures	Participant	$2749 ± $94	$3599 ± $123	$859 ($p < 0.001$)	31	<0.01	332
	Nonparticipant	$2593 ± $66	$3798 ± $97	$1191 ($p < 0.001$)	46		
Professional service expenditures	Participant	$1290 ± $48	$1684 ± $62	$355 ($p < 0.001$)	31	0.02	207
	Nonparticipant	$1271 ± $32	$1854 ± $47	$562 ($p < 0.001$)	46		
Pharmacy expenditures‡	Participant	$926 ± $52	$1248 ± $70	$318 ($p < 0.001$)		NS	
	Nonparticipant	$917 ± 31	$1248 ± 43	$317 ($p < 0.001$)			
No. of preventive services	Participant	1.05 ± 0.05	1.22 ± 0.05	0.17 ($p < 0.001$)	16	<0.01	
	Nonparticipant	0.97 ± 0.02	1.04 ± 0.02	0.07 ($p < 0.001$)	7		

* Expenditures were expressed in 2007 U.S. dollars. Change in outcomes was estimated by using generalized linear mixed models. Regressors included time (2003 vs. 2007), group (participant vs. nonparticipant), time × group. NS indicates not significant.
† Testing whether the change in the participant group is statistically different from that in the nonparticipant group.
‡ Only employees with pharmacy coverage from 2003 through 2007 were included (n = 9623 per group).

it cannot compare the impact of the Web-based programs to the impact of the on-site programs that existed at the same time.

The program appeared to attract employers with a greater concentration of females. As described earlier, the program was characterized by high wellness profile and Web-based health promotion program usage. Favorite intervention topics included clinical assessment and education, nutrition and weight management, and stress management. These patterns suggest that program offerings may have interacted with employee characteristics to draw certain kinds of employees more than others. A recent meta-analysis of 60 studies representing 50 corporate wellness programs found the percentage cost reduction for female employees was greater than that of male employees.[18] Understanding how to attract and retain male employees is vital to improving the wellness program's ability to impact employees' health and costs.

SO WHAT? Implications for Health Promotion Practitioners and Researchers

What is already known on this topic?

A growing body of literature shows that workplace health promotion programs reduce medical costs. Few of those studies examine the incremental benefit of adding a Web-based program.

What does this article add?

Adding a Web-based program to an existing workplace health promotion program can produce savings in medical care costs that occur in the first year and continue when the program is maintained.

What are the implications for health promotion practice or research?

Web-based programs may provide a viable option for reducing medical costs. This is important because some employees may prefer the convenient access provided by Web-based programs. Additional research is required to confirm this initial conclusion.

Conclusions

In summary, the insurer-provided wellness program with Web-based options was effective in reducing medical costs for participants and in encouraging employees to seek preventive services. The study demonstrates that the intervention works when it is administered at multiple locations. In addition, the research identified specific employer characteristics that are related to whether employers encourage their employees to engage in Web-based health promotion activities.

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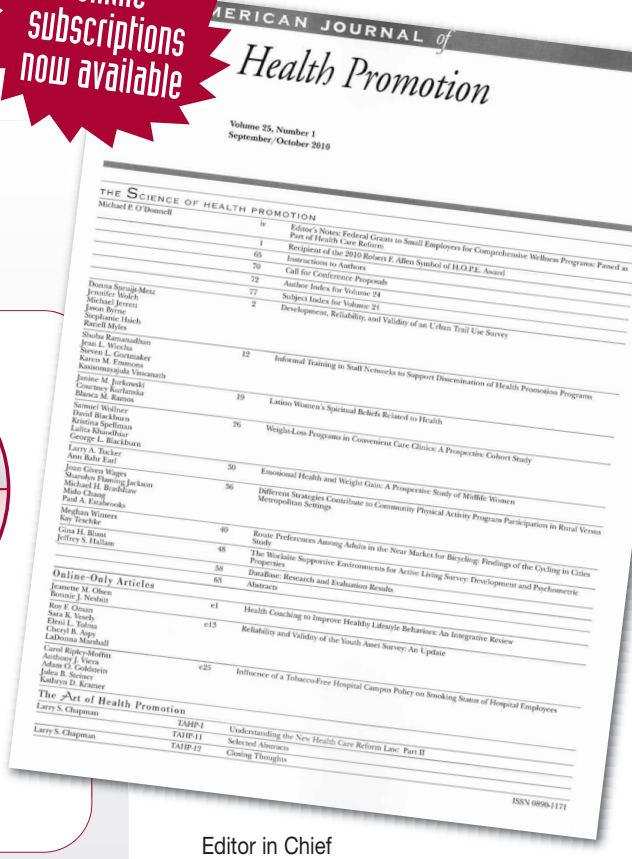

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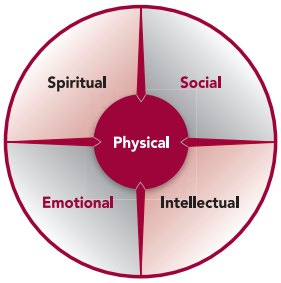
(O'Donnell, *American Journal of Health Promotion,* 2009, 24,1,iv)



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