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Pharmaceutical use according to participation in worksite wellness screening and health campaigns

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ABSTRACT

This study evaluated whether participation in worksite wellness screening and health campaigns influences the number and cost (USD) of pharmacy medication claims. Analyses are based on 2531 workers employed all four academic years in a large school district in the western United States, 2010–11 through 2013–14. Mean and ratio comparisons were adjusted by age, sex, year, and baseline health. Approximately 84.2% of employees participated in wellness screening and 60.1% completed one or more health campaigns. Those completing wellness screening were 1.09 (95% CI 1.06–1.13) times more likely to file a claim. Mean total cost remained near $934 (SD = $3695) over the academic years, positively associated with years of wellness screening, suggesting increased awareness of the need for medication through screening. Women were 1.02 (95% CI 1.00–1.05) times more likely than men to participate in wellness screening and had greater total pharmacy cost ($990.6 [SD = $4023.7] vs. $777.9 [SD = $2580.5], p = 0.0104). Women were 1.38 (95% CI 1.32–1.44) times more likely to complete a health campaign. Mean number of pharmacy claims was lower (9.8 vs. 10.6, p = 0.0069) in those completing at least one health campaign, suggesting greater health orientation in women. Those completing at least one health campaign were 0.96 (95% CI 0.92–0.99) times as likely to have a total cost of medication above the median, 0.94 (95% CI 0.88–1.01) as likely to have a total cost of medication above the 75th percentile, and 0.84 (0.75–0.96) times as likely to have a total cost above the 90th percentile.

1. Introduction

Over half of the non-elderly population (about 150 million) in the United States have employer-sponsored insurance coverage (Kaiser Commission on Medicaid and the Uninsured, n.d.). In 2016, the average premium for employer-sponsored health insurance was $6425 for single coverage, increasing from $6251 (3%) in the previous year (2016 Employer Health Benefits Survey, n.d.; 2015 Employer Health Benefits Survey, n.d.). High and increasing insurance costs have motivated many employers to offer health promotion programs to their employees (Allen, 2015; Caloyeras et al., 2014; Liu et al., 2013; Merrill, 2013; LeCheminant and Merrill, 2012; Henke et al., 2011). A large proportion of employers offer biometric screening programs, along with health risk assessments (questionnaires that ask employees about lifestyle, physical and psychological health, and results of in-person examinations) and health campaigns. The 2016 Employer Health Benefits Survey found that among large firms (200 or more employees) in the United States, 53% offered biometric screening (of which 31% included an incentive component), 59% offered health risk assessment (of which 32% had an incentive component), and 83% offered a wellness program (of which 32% had an incentive component) (2016 Employer Health Benefits Survey, n.d.).

Although many studies have identified medical cost savings resulting from employee-based health promotion programs (Merrill and LeCheminant, 2016; Maeng et al., 2013; Merrill et al., 2011a; Patel et al., 2011; Patel et al., 2010; Naydeck et al., 2008; Aldana et al., 2005; Serxner et al., 2003; Serxner et al., 2001; Aldana, 2001), reducing health-care costs is not the only rationale for worksite wellness programs. Specifically, these programs can encourage greater personal responsibility for lifestyle choices, promote better general health, stimulate higher employee productivity, foster a healthcare paradigm that focuses more on prevention than treatment, promote greater employee job satisfaction, retention, and morale, and so on (Chen et al., 2015; Centers for Disease Control and Prevention, n.d.; Michaels and Greene, 2013; Witt et al., 2013; Niessen et al., 2012). Nevertheless, some studies have questioned the effectiveness of worksite health promotion programs (Mattke and Liu, 2015; Frakt and Carroll, 2014; Felter et al., 2013), and have been critical of their ability to produce a beneficial return on investment (Baxter et al., 2014; Rongen et al., 2013; Baicker et al., 2010).

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Worksite health promotion programs have been characterized of having specific features: a corporate culture of health, supportive company leadership, corporate policy and physical environment promoting program participation, adaptation to employee needs, support, education, and treatment from community health organizations, current technology to facilitate health risk assessments and health education, and health risk reduction and lower healthcare costs (Kaspin et al., 2013). A recently reported study evaluated whether a health promotion program resulted in lower healthcare costs and frequency of claims among employees in a large school district in the western United States (Merrill and LeCheminant, 2016). The health promotion program included health risk assessment (including biometric evaluation), and health campaigns, all of which was designed to reflect the components of a successful worksite health promotion program, as listed above. The results of the study showed that cost of medical claims was lower, but frequency of claims was higher among participants. Other research has shown that the program has improved health behaviors and health risks (LeCheminant et al., 2017; LeCheminant et al., 2015; Merrill and Sloan, 2014).

Several drugs are useful for preventing more serious health conditions, such as antihypertensive medication or statins to prevent cardiovascular disease (Karmali et al., 2016; Fretheim et al., 2012; Taylor et al., 2013), folic acid or multivitamin supplementation to prevent congenital abnormalities (Czeizel, 2005), and aspirin and non-steroidal anti-inflammatory drugs to prevent colorectal cancer (Chan and Giovannucci, 2010). Hence, it may be that worksite health promotion programs that include wellness screening may actually increase the number and total cost of pharmacy medications. On the other hand, worksite health promotion programs aimed at promoting behavior change may lower pharmaceutical costs and number of claims filed. We are not aware of studies assessing how participation in wellness screening and health campaigns simultaneously influences overall number and total cost of pharmacy medications.

The purpose of the current research was to extend the results of a previous study, which focused on medical costs and frequency of claims among participants in wellness screenings and health campaigns (Merrill and LeCheminant, 2016). In the current study, we assess whether pharmaceutical costs and number of claims are influenced by participation in wellness screenings and health campaigns. Previous research has shown that there is greater use of pharmaceuticals in older employees and among women (Stefan, 2015; Beck et al., 2016). Hence, we will also consider the influence of age and sex on participation in wellness screenings, health campaigns, and pharmaceutical use. We hypothesized that participation in wellness screening and health campaigns would differ according to age, sex, and overall health at baseline, and that average pharmaceutical costs and number of claims filed would differ by participation status, after adjusting for age, sex, and baseline health.

2. Methods

This study is based on individuals employed by a school district in the academic years 2010–11 through 2013–14. The school district included 6 high schools, 8 junior high schools, and 31 elementary schools. Each academic year employees were invited to participate in wellness screenings (health risk and biometric evaluation). The screenings consisted of a personal health risk assessment (HRA) and biometric evaluation. Health campaigns were also offered throughout the year, beginning in the winter of 2012. The aim of the wellness screenings and campaigns was to promote healthy behavior change (LeCheminant et al., 2015; Merrill and Sloan, 2014). These data were combined with pharmaceutical data for each academic school year. Study approval was obtained from the institutional review board at Brigham Young University (IRB E1 5259).

2.1. Wellness screening

Participation in wellness screening was voluntary but promoted through incentives. The HRA involved 36 questions and was made available to all employees. It assessed nutrition, physical activity, health status, life-satisfaction, sleep quality, smoking, demographics, productivity, absenteeism, and job satisfaction outcomes. Questions were based on the 2006 Behavioral Risk Factor Surveillance System (BRFSS) survey (Centers for Disease Control and Prevention, 2006), combined with several nutrition questions from another validated instrument (Block et al., 1990).

Biometric screenings included a determination of body mass index, blood pressure, cholesterol, and glucose. These screenings were provided at no cost to the employees. Screenings were available to employees on location or with their personal physician. In each case the health nurse or physician assisted the employee in interpreting their results.

Wellness screening responses were used to generate a behavior specific health score for each participant, along with a letter grade (A–E) for each behavior and biometric category, according to established risk categories. A summary health report card was then produced and reviewed by a nurse or physician with the participant. Wellness program software generated tailored health goals based on their health report card. Participants were then invited to accept and work towards these tailored goals in order to help them maintain good health behaviors and health status or to improve health behaviors and health risks.

2.2. Health campaigns

The health campaigns have been described previously and were provided by WellSteps LLC (Merrill and LeCheminant, 2016). Health campaigns were optional and not tied to incentives. Each campaign lasted roughly 5 weeks, 3–5 per year. A description of the campaigns is provided in Table 1. Campaigns were selected based on the most common health risks experienced among the employees, as identified from their HRA data. In addition, a certain amount of tailoring occurred within the design of each campaign. For example, in the “Move It!” campaign the company helped develop a motivational strategy for encouraging physical activity by having participants choose one or more team members, select a few forms of physical activity, report their activity online, and compete with other teams within the company. The campaign allowed participants to use any form of exercise, such as running, walking, or gardening. Some campaigns allowed users to progress at their own pace and even permitted users to skip sections that they had already completed in a different campaign.

2.3. Wellness screening incentives

Participation in wellness screening consisted of reduced copay and deductibles. In 2011–12, employees who completed the HRA and biometric screening had a $20 lower copay on doctor's office visits and their deductible was $350 instead of $700. In 2012–13, employees who completed the HRA and biometric screening had a $20 lower copay on doctor's office visits, their deductible was $350 instead of $700, and they also received a $40 monthly premium discount. In the academic year 2013–14, the same incentives were applied that were offered in 2012–13. However, to receive the financial incentive required completion of the HRA, biometric screening, and one or more health campaigns, or submit a form that had selected options (i.e., attending a community fitness event, proof of gym membership attendance, meeting with a dietician, completing a course to quit smoking, or any class where the focus was to improve health or relieve stress).

2.4. Statistical techniques

Data was analyzed using the statistical software package PC-SAS

Table 1
Health campaigns.

Campaign	No.	%	Purpose/description
Food Makeover	1048	41.4	To encourage healthier food choices for families. Participants learn which of the foods currently in their homes are healthy and which ones are not by watching a brief video. They take an inventory of the food in their home. They learn shopping secrets that help them know what to buy and how to save money doing it. Participants are asked to choose and prepare one meal from our library of healthy, simple, and tasty recipes.
Move It Coast to Coast	327	12.9	To encourage physical activity via peer support and friendly competition. Groups within a company, race across the country by engaging in physical activity. Once a week, users log time spent in physical activity and minutes translate to miles traveled by your team. This campaign has an interactive map with highlighted landmarks across the country. You can see how your team is doing, how far you have to go to your next landmark, and how close you are to the finish line.
Sugar Buster	780	30.8	To help people know how to avoid hidden sugar and replace it with healthier food options. Users watch a few short videos that help them recognize the many forms of sugar. They learn how to avoid hidden sugar. Uses are invited to replace sugary breakfasts and desserts with healthier options, to apply "sugar busting" substitutions, to prepare a healthy recipe, and to hide or throw out a high-sugar food.
Overcome Overeating	737	29.1	To provide information, strategies, and exercises to avoid overeating. Users view several brief videos about strategies that people have used to overcome overeating. They are given a worksheet to help them identify the foods, cues, and situations that influence their eating. Weekly tasks help them apply what they've learned. At the end of the campaign, they will have learned and applied strategies to overcome overeating.
Posture Perfect	875	34.6	To teach how to avoid injury and to provide back and neck support by developing a healthy daily posture. Users learn how to avoid injury and support their backs and necks. First, they complete an inventory of their workplace stressors. They learn how to properly sit and stand. They end by mastering correct lifting techniques as well as learn some everyday stretches.
Balance It All	483	19.1	To provide weekly tips and new skills to assist in planning around priorities and balancing work and family life. Users watch a short video about priorities then take "the Big Rock" assessment. They learn how to plan around priorities, how to say "No," how to schedule time for themselves, and how to delegate.
Biggest Loser for Life	492	19.4	To provide ideas on weight loss from selected individuals who have successfully lost weight and kept it off. This campaign is not really about weight loss, it is about helping users apply the behavioral secrets of those who have lost weight and kept it off. Each week, users will receive information about a different behavior. They will keep track of simple behaviors each week.
Maintain Don't Gain	598	23.6	To provide educational and motivational messages, recipes, and snack substitutes to help people maintain their weight through the holidays. Users will weigh in and record their weight once each week between mid-November and the first week of January. Each week users are giving tips, ideas, and strategies to help them not gain weight during the holidays.
Fast Food Guide	582	23.0	To select healthy fast foods. During the first week, users will read a few pages in The Stop and Go Fast Food Nutrition Guide and answer some simple questions. During the second week, they take the app to lunch and use it to help you make a healthy food choice. During week three they get the chance to "be the guide." Users get to decide whether certain fast foods are healthy, not healthy or somewhere in between. During the fourth week, users share the book with a friend, family member or co-worker.
Good Fat, Bad Fat	206	8.1	To educate about different aspects of fats in food and ways to replace bad fats with healthier fats. Each week users learn about a different aspect of fats in food. They are given healthy recipes so they can make meals and desserts using healthy fat substitutions. They will be challenged to make a few simple changes in their eating habits and report their progress.
Culprit and the Cure	361	14.3	A book about health risks and prevention methods through lifestyle change. Users read two short chapters in The Culprit and The Cure each week for the first seven weeks. Each week they apply simple lifestyle principles. After reading each short chapter, they answer a few questions. Users share their experiences, successes, ideas, and failures with others in the social sharing application.
Move It	392	15.5	To encourage physical activity by inspiring peer support and friendly competition. Groups within a company, such as sites or departments, can compete against each other. There are four simple steps. Users choose a few forms of physical activity that they like such as jogging or biking. Second, they choose one or more people to be part of their Move It! team. After choosing their team, users plan one or more blocks of 30 min for physical activity into their weekly schedules. Users report their progress online and teams compete with each other.

(version 9.4; SAS Institute, Inc., 2014) and Microsoft® EXCEL 2013. Counts, means, standard deviations, standard errors, and percentages describe the data. Pharmaceutical costs were adjusted using Tom's Medical-Cost Inflation Calculator (v3.11, Copyright 2018) in order to make the yearly costs comparable to 2014 costs. Average dollar ($) pharmaceutical cost and number of claims per eligible employee were derived and presented according to completion of wellness screening and health campaigns. Proportion ratios were adjusting for age, sex, year, and baseline health using the Mantel–Haenszel method. Baseline health was measured using total medical claims expenses in 2009–2010 and, for 264 individuals employed in 2010–11 onward, but not in 2009–10, we used medical claims data from the latter time period. Adjusted mean values were derived using least-squares multiple regression analysis. They were compared and assessed for statistical significance using the *t* and *F* statistics. Comparisons in proportions were assessed using the Chi-square statistic. Because the total cost data were positively skewed, we included an assessment of selected percentiles of total costs according to wellness screening and health campaign participation. Two-sided tests of significance were based on the 0.05 level against a null hypothesis of no association.

3. Results

A description of the employees in this study is presented according to age, sex, and academic year in Table 2. The percentage of female employees did not significantly change ($p = 0.9422$), but remained near 73.2%. Mean age did not significantly differ over the academic years, but remained near 47.2 ($SD = 11.4$, $p = 0.8008$). The percent of employees filing a claim for medication each year was near 65%. Some of the more commonly used medications were antibiotics (21.0%), arthritis (11.0%), cold/flu/allergy (17.8%), blood pressure (16.0%), opioids (16.8%), and statins (11.9%). The percent participating in wellness screening increased over the first three years and then decreased. Among the eligible employees, 2531 were continuously employed during the four academic years, with 73.3% female and mean age 48.4 ($SD = 10.4$). Subsequent analyses are based on these continuously employed individuals.

3.1. Wellness screening

Overall, wellness screening was more common among those continuously enrolled, increasing over the first three years, but then decreasing (i.e., 84.1% in 2010–11, 84.4% in 2011–12, 87.6% in 2012–13, and 80.7 in 2013–14, $p < 0.0001$). Women were 1.02 (95% CI 1.00–1.05) times more likely than men to participate in wellness screening, after adjusting for age, year, and baseline health. The mean age of participants in wellness screening was 2.15 ($SE = 0.28$, $p < 0.0001$) years younger than nonparticipants, after adjusting for sex, year, and baseline health.

Mean number of pharmaceutical claims filed did not significantly change each year ($p = 0.7813$), after adjusting for age, sex, and baseline health. However, in the adjusted model the mean number of claims

Table 2
Eligible employees according to sex, age, and academic year.

		2010–2011	2011–2012	2012–2013	2013–2014
Eligible employees	No.	3023	3110	3219	3286
Women	% (n)	73.6 (2226)	73.3 (2280)	73.0 (2350)	73.1 (2401)
Age	Mean (SD)	47.3 (11.0)	47.2 (11.3)	47.1 (11.5)	47.2 (11.8)
	Range	19–76	18–77	17–77	18–78
Filed a pharmacy claim	%	68.4	65.2	63.2	65.2
Wellness screening	%	72.4	77.0	83.7	78.5

filed was greater for women than men (12.4 [SD = 14.8] vs. 8.7 [SD = 12.6], $p < 0.0001$), and increased with age (5.9 [SD = 9.2] for ages 18–39, 8.6 [SD = 12.4] for ages 40–49, 12.8 [SD = 15.8] for ages 50–59, and 14.9 [SD = 16.0] for ages 60 and older, $p < 0.0001$). Those participating in wellness screening were significantly more likely to file a pharmaceutical claim: 1.09 (95% CI 1.02–1.17) in 2010–11, 1.09 (95% CI 1.02–1.16) in 2011–12, 1.07 (95% CI 1.00–1.14) in 2012–13, and 1.12 (95% CI 1.06–1.19) in 2013–14, after adjusting for age, sex, and baseline health. Overall, those participating in wellness screening were 1.09 (95% CI 1.06–1.13) times more likely to file a pharmaceutical claim, after adjusting for age, sex, year, and baseline health.

The proportion and mean of pharmaceutical claims filed is presented by number of years wellness screenings were completed (Table 3). The proportion filing one or more pharmaceutical claims was significantly different between those who participated in wellness screening 0, 1, or 2 years compared with 3 or 4. The latter group was more likely to file a claim and the mean number of claims was greater.

Mean total cost of medication did not significantly change over the academic years ($p = 0.6315$), but remained about $933.9 (SD = $3695). Approximately 30% of employees did not file a pharmacy claim per academic year. Median, 75th, and 90th percentile total costs of medication were $168.9, $755.3, $1958.8, respectively. Annual total cost was significantly greater for women than men ($990.6 [SD = $4023.7] vs. $777.9 [SD = $2580.5], $p = 0.0104$), after adjusting for age, sex, year, and baseline health. There was also a significant increase in annual total cost with age ($583.4 [SD = $3153.0] for ages 18–39, $721.7 [SD = $2754.5] for ages 40–49, $1035.9 [SD = $4388.2] for ages 50–59, and $1258.8 [SD = $4007.5] for ages 60 and older, $p < 0.0001$), after adjusting for age, sex, year, and baseline health.

Those participating in wellness screening were 1.14 (95% CI 1.08–1.22) times more likely to have a total cost above the median, 1.12 (1.02–1.23) times more likely to have a total cost above the 75th percentile, and 1.01 (0.87–1.18) times more likely to have a total cost above the 90th percentile, after adjusting for age, sex, year, and baseline health. Corresponding adjusted values for 3–4 years of wellness screening compared with 0–2 years of wellness screening were: 1.18 (95% CI 1.12–1.26), 1.18 (1.07–1.30), and 1.05 (95% CI 0.90–1.24), respectively. Total pharmaceutical cost was not significantly associated with number of wellness screenings completed, after adjusting for age, sex, year, and baseline health.

Table 3
Proportion and mean of pharmaceutical claims filed according to number of wellness screenings completed.

Wellness screening						
Years	No.	%	Ratio	95% CI	Mean	Pr > F
0	197	7.8	–		9.7	–
1	95	3.8	1.00	0.92–1.08	8.7	0.2740
2	97	3.8	1.07	0.98–0.1.18	8.6	0.2206
3	331	13.1	1.08	1.01–1.16	11.1	0.0214
4	1811	71.6	1.12	1.07–1.18	10.8	0.0349

Adjusting for age, sex, year, and baseline health.

3.2. Health campaigns

Approximately 60.1% of employees completed one or more health campaigns. Women were 1.38 (95% CI 1.32–1.44) times more likely to complete a health campaign than men, after adjusting for age, sex, year, and baseline health. Overall age was not significantly associated with completing a health campaign in the adjusted model.

Completing one or more health campaigns was not significantly associated with filing a pharmaceutical claim ($p = 0.2729$). However, the mean number of claims for those completing one or more health campaigns was lower (9.8 vs. 10.6, $p = 0.0069$), after adjusting for age, sex, year, wellness screening, and baseline health. The proportion and mean of pharmaceutical claims filed by number of health campaigns completed is presented in Table 4. Those who participated in 10–12 health campaigns were significantly less likely to file a pharmaceutical claim, after adjusting for age sex, years, wellness screening, and baseline health. In addition, the adjusted mean number of pharmaceutical claims filed significantly decreased with increased number of completed health campaigns.

Those completing one or more health campaigns were 0.96 (95% CI 0.92–0.99) times as likely to have a total cost of medication above the median, 0.94 (95% CI 0.88–1.01) as likely to have a total cost of medication above the 75th percentile, and 0.84 (0.75–0.96) times as likely to have a total cost above the 90th percentile, after adjusting for age, sex, year, wellness screening, and baseline health. There was a slight negative association between total pharmaceutical cost and number of health campaigns completed (Spearman Partial Correlation Coefficient [SPCC] −0.021, $p = 0.0369$), after adjusting for age, sex, year, wellness screening, and baseline health.

Those completing wellness screening were asked to rate their overall health, from 1 (low) to 10 (high). In 2010–11, mean self-rated health was 7.9 (SD = 1.4). Those with higher self-rated health status at baseline participated in more wellness screenings (SPCC = 0.085, $p < 0.0001$) and in more health campaigns (SPCC = 0.051, $p = 0.0183$). As self-reported health status increased annual mean number of claims (SPCC = −0.145, $p < 0.0001$) and total cost of claims (SPCC = −0.100, $p < 0.0001$) significantly decreased among screening participants. The SPCC's reported here are adjusted for age and sex.

Based on least-squares multiple regression analysis, mean change in

Table 4
Proportion and mean of pharmaceutical claims filed according to number of health campaigns completed.

Health campaigns						
Years	No.	%	Ratio	95% CI	Mean	Pr > F
0	1010	39.9	–		10.6	–
1–4	892	35.2	0.99	0.97–1.02	10.0	0.0981
5–9	352	13.9	0.99	0.96–1.01	9.7	0.0384
10–12	277	10.9	0.94	0.90–0.98	8.2	< 0.0001

Adjusting for age, sex, year, wellness screening, and baseline health.

the number of claims between 2010–11 and 2013–14 was positively associated with number of years of wellness screening (slope = 0.81, SE = 0.18, $p < 0.0001$), after adjusting for age, sex, and baseline health. Mean change in the total cost of claims was also positively associated with number of years of wellness screening (slope = $109.0, SE = 48.3, $p = 0.0248$), after adjusting for age, sex, and baseline health. Changes in mean number of claims ($p = 0.5496$) and total cost ($p = 0.9436$) were not significantly associated with health campaigns, after adjusting for age, sex, and baseline health.

4. Discussion

This study identified whether the number and cost of pharmacy medication was influenced by participation in wellness screening or health campaigns. The influence of age, sex, and baseline health on participation in wellness screening or health campaigns, as well as use of prescribed medication, was also evaluated.

Wellness screening is designed to improve employee awareness of health risks. Although increased awareness of health risks may involve some nonpharmacological approaches for managing the risks, we found that those participating in wellness screening were significantly more likely to file a pharmacy claim and that the mean number of claims filed was higher. This result was observed even after adjusting for baseline health. The higher level of pharmaceutical claims was associated with 3 or 4 years of wellness screening compared with 0, 1, or 2 years. This may be because wellness screening is identifying a greater need for selected medications. Consequently, wellness screening was also associated with higher total costs of medication, but not above the 90th percentile of costs. This observation is encouraging, assuming that greater use of medication represents better care for employees with health risks and helps in preventing more serious health outcomes in the future.

A valuable benefit of the health campaigns presented in this paper is that they provide opportunities for employees to improve their health, which can improve worker productivity and combat more serious and costly health problems in the future. Previous studies have shown that the selected campaigns presented in this study improve health and lower healthcare expenditures (Merrill and LeCheminant, 2016; LeCheminant et al., 2017; LeCheminant et al., 2015; Merrill and Sloan, 2014). Completion of one or more health campaign was associated with a lower mean number of pharmacy claims. The mean number of claims decreased with an increasing number of health campaigns completed. Total pharmacy costs were lower for these people. These results were adjusted for baseline health. Hence, it is unlikely that this result is because those who complete more health campaigns were initially healthier. In addition, some of the lower use and cost among those who complete more health campaigns may be because these people do a better job maintaining healthy behaviors wherein medication is not needed.

Wellness screening was more common in younger employees and women. Age was not significantly associated with participation in the health campaigns, but women were more likely to participate in the health campaigns. Greater wellness screening in younger employees may be because they are more motivated by the incentives attached to participation. Greater wellness screening and participation in health campaigns among women may be related to their being more health oriented in general, as consistent with previous research (Stefan, 2015; Beck et al., 2016; Merrill et al., 2011b; Merrill and Hull, 2013; Person et al., 2010). Women also filed more pharmacy claims and had higher total pharmacy costs than men. This is consistent with other research (Metge et al., 1999; Bertakis et al., 2000). In a survey of medication use among adults in the United States within the demographic of adults aged 45–64 years, 11% of women and 3% of men took 10 or more medications weekly, and 43% of women and 26% of men took 5 or more medications weekly (Metge et al., 1999). Among adults aged 65+, 12% of both men and women took 10 or more medications weekly, while 57% of women and 44% of men took 5 or more medications weekly (Metge et al., 1999). In another study, researchers found that the number of pharmaceuticals used was 9.7 per year in women compared with 7.9 per year in men, and that women were prescribed antibiotics 1.5 times more than men and were prescribed antidepressants 2 times more than men (Bertakis et al., 2000). Greater healthcare utilization among women may be related to reproductive conditions, more morbidity in women than men, different health perceptions, and a stronger tendency for seeking help with disease prevention (Bertakis et al., 2000).

5. Limitations

Employees were not randomly assigned different levels of participation, hence baseline differences in age, sex, and health status needed to be controlled. Use of a randomized-controlled model would have better balanced out any confounding factors and helped us establish the temporal sequence of events. In addition, trends in per capita spending on prescription drugs vary by geographic region in the US (*Spending on Prescriptions in 2011*). Hence, extrapolation of the results to other areas of the country should be done with caution. Further, we only had self-reported baseline health information on those who completed wellness screening. Hence, we were unable to compare self-reported baseline health information between participants and nonparticipants in wellness screening or health campaigns. However, a surrogate marker for baseline health was used, based on total medical costs prior to the study period. For a small number who were not employed the year prior to the primary years of analysis, we used their 2010–11 total medical cost data to reflect baseline health. Finally, health campaign participation represented several activities. We did not identify the independent contribution of each element of the program to influencing the number and total cost of pharmacy claims. However, the effectiveness of the wellness program may be attributed to its being comprehensive, all-inclusive, and providing health risk appraisal and supportive physical environments.

Strengths of this study involved a large sample size; a multi-site employee population; 4 years of wellness screening, and health campaigns; and the inclusion of pharmaceutical data.

6. Conclusion

Wellness screening improved employee awareness of health risks and the potential need for medication. As a result, participants in screening were more likely to file a pharmacy claim. If newly identified health risks are better managed with medication, more serious future health outcomes may be avoided. The health campaigns further provided employees opportunities to improve their health and reduce risk of more serious health problems in the future.

As the number of health campaigns increased, the number and cost of pharmacy claims decreased, even after adjusting for baseline health. Hence, the campaigns appear to be efficacious in lowering the need for medication. In addition, those completing the health campaigns appear to successfully maintain lower use and cost of medication.

It may be that younger people are more likely motivated by incentives, but a more direct assessment of this issue is needed before firm conclusions can be made. Finally, women are more likely to participate in wellness screening and to complete health campaigns than men, as consistent with other studies. Reasons for this require further study.

Conflict of interest

The authors have no conflict of interest to declare.

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