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Estimating the Return on Investment From a Health Risk Management Program Offered to Small Colorado-Based Employers

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Abstract

Objective—To determine whether changes in health risks for workers in small businesses can produce medical and productivity cost savings.

Methods—A 1-year pre- and posttest study tracked changes in 10 modifiable health risks for 2458 workers at 121 Colorado businesses that participated in a comprehensive worksite health promotion program. Risk reductions were entered into a return-on-investment (ROI) simulation model.

Results—Reductions were recorded in 10 risk factors examined, including obesity (−2.0%), poor eating habits (−5.8%), poor physical activity (−6.5%), tobacco use (−1.3%), high alcohol consumption (−1.7%), high stress (−3.5%), depression (−2.3%), high blood pressure (−0.3%), high total cholesterol (−0.9%), and high blood glucose (−0.2%). The ROI model estimated medical and productivity savings of $2.03 for every $1.00 invested.

Conclusions—Pooled data suggest that small businesses can realize a positive ROI from effective risk reduction programs.

Comprehensive workplace health promotion programs offer a potentially powerful strategy to improve the lives of millions of workers and possibly their dependents. Despite increasing numbers of workplace health promotion (also known as wellness) programs, many are ineffective because of underinvestment. Although recent surveys have shown that 63% of all American companies providing health care benefits to employees offer at least one wellness

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program, far fewer offer comprehensive programs.[1,2] In the most recent US survey on this topic, Linnan et al[3] found that just 6.9% of employers reported having comprehensive workplace health promotion programs in place, as defined by *Healthy People 2010*. According to the same survey, fewer than 5% of employers with 50 to 99 employees, compared with 24% of those with more than 750 employees, offer workplace programs that include health education, links to related employee services, supportive physical and social environments for health improvement, integration of health promotion into organizational culture, and employee screenings with adequate treatment and follow-up.[4]

One reason employers cite for not providing health promotion to their workers is that these programs impose an additional cost to the organization without sufficient evidence of cost savings or a positive return on investment (ROI). Recently, several critics have voiced skepticism about ROI claims associated with wellness programs.[5] Among the criticisms cited is the lack of a clear connection between health risk reduction and medical care or productivity-related savings.

Measuring program impacts and the ROI from a workplace wellness program is complicated. To establish that the program produced health improvements and cost savings, one must ask a key question: “What would have happened in the absence of this program—that is, what changes would have occurred in the health risk profile of workers and how much would have been spent on health care services and productivity-related events had the organization not invested in workplace health promotion?” Therefore, to evaluate program impact, a “counterfactual” must be established that posits a “do nothing” scenario in which workers’ health is improved or worsened in accordance with prior patterns, absent a program. Against this “do nothing” or “control” condition, the effects of the workplace health promotion can then be compared.

The challenge for program evaluators is to perform this type of treatment versus control analysis in a “real world” setting. If unfettered by practical considerations, the evaluator would start with a pool of employees, half of whom would be offered the opportunity to join a workplace health promotion program and the other half not. Again, under ideal circumstances (ideal from a program evaluator’s point of view), workers would then be randomly assigned to the program so that individual factors like motivation to improve one’s health, demographic variables (age, gender, income, and education), or prior health and health care utilization patterns would be randomly distributed between treatment populations (those exposed to the program) and controls (those not exposed to the program).

Having succeeded in randomly assigning workers into treatment and control conditions, the evaluator would then record the experience of both groups over time. On the medical front, savings would be achieved if health care utilization patterns diverged for participants compared with nonparticipants in terms of hospital admissions, emergency department visits, doctor visits, preventive screenings, and prescription drug use. As for productivity savings, these would be achieved when there are fewer absences from work or diminished health-related presenteeism losses for participants in the program compared with nonparticipants. Savings formulated from the earlier-mentioned analysis would then be compared with health promotion program expenses to calculate an ROI.

The above-mentioned process describes an idyllic situation, which is rarely achievable in a workplace setting for various practical, legal, and ethical reasons. The challenge is even greater when trying to assess potential benefits for small businesses because of the relatively small number of employees in each company, lack of access to insurance claims data, and variability in the type and content of programs implemented. A reasonable alternative is to demonstrate health improvement for workers exposed to a uniform intervention offered to small businesses and "monetize" the value of those improvements for the pooled participants from those companies. This article describes that approach.

We apply an ROI model to evaluate the economic impact of a Health Risk Management (HRM) program provided by Pinnacol Assurance (Pinnacol) to 121 workplaces in Colorado. In this article, we show how a combined data set from these small employers was leveraged to estimate an ROI from workplace wellness efforts by translating health improvements among workers into monetary terms. This approach enables small or insured employers to remove a major barrier to program evaluation posed by a lack of access to health insurance claims data.

LITERATURE REVIEW

Most research on the impact of workplace health promotion programming on health and cost outcomes has emanated from large corporations with well-established programs.[6,7] Small to midsize workplaces are much less likely to offer workplace health promotion compared with their larger counterparts because of budget limitations and the lack of staff resources for program implementation and maintenance. Small and midsize employers are also less likely to evaluate programs.[8] Compared with their larger counterparts, small businesses that offer health care benefits have experienced higher health care cost increases, highlighting the opportunity for health care cost reduction.[9]

Despite limited resources, small businesses can be successful in improving the health of employees by integrating health promotion programming into the operations and culture of the organization.[10] For example, Lincoln Industries, which employs about 500 workers, won the 2008 C Everett Koop Prize by documenting high participation rates in screening and wellness activities over a 3-year period, leading to significant improvements in body weight, percentage of body fat, flexibility, and systolic and diastolic blood pressure of employees.[11] Lincoln, like other small employers, introduced these programs to increase worker productivity and reduce health care costs and was able to demonstrate positive results in both areas.[12] Another example of a small business recognized for having an exemplary workplace program is Energy Corporation of America, which, with fewer than 500 employees, also won the prestigious C Everett Koop Award in 2008 after documenting significant health improvements among its workers and a medical cost trend that remained flat for 5 years.[13]

Whereas studies of large organizations have shown that well-resourced workplace health promotion programs can achieve significant returns on investment,[14,15] very few studies have been conducted with small businesses. To overcome this void in the literature, researchers are using findings from studies examining the relationships between health risk

and cost to develop simulation models that can be applied to employers of all sizes to estimate the monetary value of workplace health promotion programs. For example, to assist employers in making informed decisions about the financial benefits of health promotion interventions, the Centers for Disease Control and Prevention and researchers from RTI developed a simulation model to calculate the ROI for workplace obesity interventions.[16] Data from national sources (body mass index and absenteeism from the National Health Interview Survey and medical expenditures derived from the Medical Expenditure Panel Survey) were used to estimate annual medical and absenteeism savings associated with different levels of weight loss among workers.

Other methods used to develop ROI models have extrapolated findings from cross-sectional studies that examined the relationship between modifiable risk factors and subsequent health care costs. These models rely on analyses of large health risk and health care cost databases such as the one developed by the Health Enhancement Research Organization study as the foundation for establishing the economic impacts associated with risk reduction.[17–19] A specific application of the ROI model, using the Health Enhancement Research Organization data, was reported in a study that measured the estimated medical and productivity savings from an obesity management program.[20] In that analysis, Baker and colleagues[20] used the model to estimate cost savings and the ROI from a program involving 890 workers from 119 companies of varying sizes (including mostly small and medium employers). The analysis showed that in 1 year, 7 of 10 health risk factors, including overweight and obesity rates, decreased significantly, resulting in a $1.17 to $1.00 estimated ROI. An updated version of this ROI model, based on the analysis of more recent data reflecting the relationships between 10 modifiable health risks and health care costs,[21] was used in the current study to estimate the financial impact of the HRM program.

PURPOSE

In this study, we document changes in health risks for workers enrolled in the Pinnacol HRM program and transform those risk changes into medical and productivity dollar value equivalents by using a simulation model, to determine whether the initiative achieved a positive ROI.

SETTING

Pinnacol Assurance, headquartered in Denver, was established in 1915 to provide workers' compensation coverage for about 55,000 Colorado companies—primarily small businesses with fewer than 50 employees. Pinnacol launched the HRM initiative to determine whether decreasing health risks, like obesity and smoking, would reduce the incidence and cost of workers' compensation claims and, at the same time, improve the health and productivity of workers.

INTERVENTION

Pinnacol's HRM workplace wellness program, which began in May 2010, offered policyholders an attractive and cost-free benefit to improve employees' health and well-being. Pinnacol contracted with Trotter Wellness, a nationwide vendor of employee wellness

programs, to facilitate HRM program management. Pinnacol contracted with the Integrated Benefits Institute, a nonprofit employee health and benefits research organization, for productivity assessment and data management. The HRM program was made available to all Pinnacol's policyholders who, once enrolled, were asked to actively promote the program and support a culture of health.

As part of the comprehensive HRM program, employees were offered various wellness services, including an annual health risk assessment (HRA) with an accompanying individual wellness report. Employees also received unlimited access to phone-based health coaching and an array of online, interactive wellness tools, including wellness videos, behavior-change programs to help quit smoking or lose weight, a library of health articles, and other resources.

Participating employers received reports of their workforce's health status that identified specific health risks and quantified the cost of lost productivity due to ill health. A representative from the Trotter Wellness account management team then reached out to the employers and scheduled a meeting to review the report and discuss action steps.

Employer Recruitment

Pinnacol policyholders were either recruited into HRM by company agents or they self-enrolled in the program. Several recruitment and marketing methods were used to educate employers and agents about the HRM program, including informational sales presentations and training sessions conducted by Trotter Wellness and Pinnacol throughout Colorado. Recruitment efforts were complemented by monthly agent e-newsletters and a Web-based resource portal.

To enroll in HRM, policyholders submitted a form and privacy agreement to Trotter Wellness. An enrolled employer then received a welcome communication, followed by a 1-hour installation webinar to review the program and setup instructions to the employer and employees. Some employers also received a wellness program orientation presentation on-site or via webinar. This program orientation presentation provided employees with information about the tools and resources available to them.

Health Risk Assessment and Coaching

Employers received an instructional packet to distribute to workers with information on how to complete the HRA and an overview of resources available through the HRM program. All employees were eligible to complete the HRA, which was offered in English and Spanish.

The HRA used was an online questionnaire that collected basic biometric information (height, weight, cholesterol, blood pressure, and blood glucose), as well as wellness and lifestyle questions related to such topics as nutrition, exercise, tobacco, alcohol use, and stress management. Productivity-related questions included in the HRA were based on the work of Kessler.[22] The HRA took approximately 20 to 30 minutes to complete.

After completing the HRA, employees were invited via postcard to participate in Trotter Wellness' health coaching program. Health coaching, in English or Spanish, was designed to

provide one-on-one education, support, and guidance to employees. All coaching sessions were conducted by phone and were approximately 15 minutes long. Employees were required to complete a new HRA each program year to continue to be eligible for health coaching.

Reporting and Data Management

Ongoing data management was conducted by Trotter Wellness. Employers were provided with various aggregated reports, including an annual health risks and productivity report, an annual customized targeted action plan, a biannual aggregated coaching program activity report, and HRA and health coaching participation reports.

Pinnacol contracted with the Center for Worker Health and Environment, Colorado School of Public Health, to coordinate the research efforts and manage and analyze aggregate de-identified data. Blinded employer and member health risk and demographic data were transferred to the Integrated Benefits Institute, which linked the data to Pinnacol files and then transferred the de-identified files to researchers at the Center for Worker Health and Environment biannually. The final de-identified data set was forwarded to Truven Health Analytics. The University of Colorado's institutional review board reviewed this study and considered it "exempt".

METHODS

A pre- and posttest prospective study design was used to assess changes in employee health risk profiles over a 1-year study period. The analysis examined changes in 10 modifiable health risks for workers at 121 organizations participating in the HRM program between May 1, 2010, and December 31, 2012. Differences between baseline (time 1) and follow-up (time 2) values were assessed for selected categorical variables. The McNemar chi-square test was used to test for statistical significance among categorical variables.

Study Sample

Baseline (time 1: May 1, 2010, to December 31, 2011) and follow-up (time 2: January 1, 2012, to December 31, 2012) HRA data were examined for a cohort population of workers aged 18 to 64 years, completing the Trotter Wellness HRA in each period of time, with a minimum of 300 days between assessments. In year 1, 19,013 employees were eligible for HRM. Of them, 5362 workers completed an HRA at baseline and 2458 were followed as a cohort group for this study, having contributed data at both times 1 and 2.

For the 121 participating employers in the study, a range of industries were represented, including educational institutions (12.4%), financial services (12.4%), special trade contractors (10.7%), social services (9.9%), business services (8.3%), public administration (8.3%), wholesale trade (5.8%), health care services (5.8%), and other (26.4%). Organizations were mostly small, ranging in size from 1 to 2407 employees, with an average of 152 workers.

Measures

The HRA was used to assess the health risk profile of participants. The 10 health risk factors used in our analysis were dichotomized into high versus lower risk. The definition of *high risk* for each risk factor was as follows: (1) physical inactivity: fewer than 3 days of moderate to vigorous physical activity lasting at least 30 minutes; (2) nutrition: consuming fewer than 5 fruits and vegetables a day; (3) obesity: having a body mass index equal to or greater than 30 kg/m^2; (4) smoking: current smoker; (5) total cholesterol: 240 mg/dL or higher; (6) high blood glucose: 126 mg/dL or greater; (7) high blood pressure: systolic blood pressure greater than 140 mm HG or diastolic blood pressure greater than 90 mm HG; (8) high stress: responding positively to questions asking about "feelings of tension, irritability, and anxiety often resulting in difficulty in sleeping"; (9) depression: reporting feeling down, depressed, hopeless, or having little interest or pleasure in doing things for 2 or more weeks in the past month; and (10) high alcohol consumption: for men, consuming 15 or more drinks per week and for women, consuming 8 or more drinks per week.

Descriptive Studies

Data files containing de-identified baseline and follow-up data included person-level demographic and health risk data responses from employees completing the HRA at times 1 and 2. These data were analyzed and compared for changes in health risk profiles of participants during the two periods. Additional information needed for inputs into the ROI model was obtained from Pinnacol, Segue Consulting, and Trotter Wellness. This information included HRM program costs and participation rates in the program.

ROI Analysis

To estimate the economic impact of HRM, we used the Truven Health Analytics ROI model. The model is based on research supporting the notion that health care costs and workplace productivity are influenced by workers' health risk profiles in addition to their demographic characteristics. For example, employees who smoke, are not physically active, and are obese—all of which put them at risk for poor health outcomes—have higher health care costs and are less productive compared with employees with good health profiles (ie, are at lower risk).[17,23–25] By improving the health risk profile of their workers, employers can expect to see medical cost savings and productivity improvements among their workers.[26,27]

The model predicts the financial return from risk reduction programs and calculates a cost–benefit ratio based on the information entered regarding employees' health risks, demographic characteristics, the amount spent on the workplace health promotion program, and the degree of risk reduction realized among program participants. Model predictions are based on established estimates of the relationship between risk and costs.[21] Hereafter, we describe the empirical foundation for the model, inputs used in this application, and the assumptions underlying those inputs.

ROI Model Description

The ROI model predicts cost savings from programs designed to address the following 10 modifiable health risks: high blood glucose, obesity, physical inactivity, poor nutrition/eating habits, tobacco use, high total cholesterol, high blood pressure, high alcohol consumption, high stress, and depression. The model is built primarily on results of the Health Enhancement Research Organization II study[21] and literature examining the relationships between modifiable health risks and productivity impacts.[19,23,25,28–30]

Model Inputs

Various inputs were inserted into the model corresponding to the characteristics of employees in the study sample. Inputs included the number of employees in the cohort (n = 2458), their demographic characteristics (ie, age, gender, job type, and benefit plan design), the US region in which they resided (West), the average participation rate in HRM (37.5%), and the annual program cost per eligible employee ($89.82).

The model results were primarily driven by changes in the health risk profile of employees from baseline to follow-up—that is, changes in the prevalence of each risk factor from time 1 to time 2. First, we entered baseline information on 10 modifiable health risks of participants as determined from analysis of the time 1 HRA data. We then entered time 2 data reflecting participant health profile after 1 year of participation in HRM. We also entered the anticipated changes in health risks for the cohort group, assuming no program was put in place (the control or “do nothing” condition). The expected annual changes in risks from baseline for individuals *not* exposed to a health promotion program (ie, background changes in population risk) were derived from a literature search.[31–34] These comparison group values reflected general US population health risk trends reported over the past several years by the Centers for Disease Control and Prevention that demonstrate some health risks are reducing (eg, smoking rates) while others are worsening (eg, obesity).

Of note, the ROI model is based on self-reported health risk data, although the data that were used in the development of the model were informed by results from actual laboratory studies.

For other inputs into the model, normative data were used because employer- and employee-specific values were unavailable. For example, the average annual medical payment per employee ($4692) entered into the model was derived from the Truven Health Analytics nationwide MarketScan Database,[35] and the average daily wage of Mountain Region employees was determined to be $222.24, as reported by the Bureau of Labor Statistics from its regional profile.[36] The time horizon used was 1 year because that was the interval between the baseline and follow-up HRA administrations.

RESULTS

The cohort group, consisting of 2458 individuals who completed the HRA at baseline and follow-up, were on average 43 (SD = 11.1) years old at baseline, 34% women, 58% salaried workers, and 14% enrolled in a capitated health plan.

During the 1-year observation period, reductions were recorded in all 10 risk factors examined. Specifically, there were statistically significant decreases in high risk prevalence for obesity (2.0% reduction), poor eating habits (5.8% reduction), poor physical activity (6.5% reduction), tobacco use (1.3% reduction), high alcohol consumption (1.7% reduction), high stress (3.5% reduction), and depression (2.3% reduction). Three additional risk factors showed improvements although they were not statistically significant: high blood pressure (0.3% reduction), high total cholesterol (0.9% reduction), and high blood glucose (0.2% reduction) (see Table 1).

Changes in Health Risks

Table 2 takes the information on the percentage point change in each health risk from time 1 and time 2 reported earlier for the HRM participants—reported as "with program"—and adds the expected percentage point change in the 10 health risks reflecting changes for the US population, aged 18 to 64 years, as reported by the Centers for Disease Control and Prevention—reported as "with no program." As shown, the HRM cohort achieved a net 2.7% point improvement in obesity rates when compared with the comparison group (a 2% point reduction for the treatment group and a 0.7% point increase for the comparison group). In contrast, there was no net difference between the treatment and comparison groups in terms of high blood pressure risk—both treatment and comparison group subjects improved by 0.3% points (see Table 2).

Worker Productivity

Table 3 displays the influence of each of the 10 health risk factors on workers' self-reported productivity in terms of the annual number of unproductive hours reported for individuals having the specified risk factor. The hours shown are extrapolated from peer-reviewed studies that examined these risk factors' influence on worker absenteeism and presenteeism. For example, prior studies have shown that being obese is associated with 9.2 hours of increased absenteeism a year and 13.7 hours of increased presenteeism, compared with normal-weight individuals.[19,23,25,28–30]

ROI Analysis

Table 4 presents the results of the ROI analysis. As shown, total medical costs for these employees over a 1-year period were estimated to total $11.2 million. Cumulative medical and productivity savings projected from a reduction in the 10 health risk factors were $124,867 and $310,040, respectively, while the cost of the HRM risk reduction program was calculated as $214,347. The net present value for medical costs was estimated to be −$89,480 but when combined with productivity savings, the net present value was $220,560. The ROI estimates were $0.58 to $1.00 for medical costs, $1.45 to $1.00 for productivity-related expenditures, and $2.03 to $1.00 when medical and productivity savings were combined.

DISCUSSION

Pinnacol, a workers' compensation provider in Colorado, introduced HRM to its policyholders in 2010 to evaluate whether the program would improve workers' health,

which, in turn, would reduce worker injuries and claims filed for those injuries. A 5-year prospective study is underway to determine whether the HRM influenced workers' compensation claims and costs for companies enrolled in the program. In the meantime, Pinnacol and its policyholders wanted to determine whether 1-year health improvements observed among employees from multiple small employers participating in HRM could be translated to monetary terms specific to medical costs and productivity. Findings are important for employers who have no access to health insurance claims data and therefore are limited in their ability to assess the financial impact of wellness programs.

The ROI model used in this study estimated cost savings and compared these savings to program investment to calculate an expected ROI. The analysis followed a cohort of 2458 employees and compared their health risk profile at baseline and 1 year after program implementation. The person-level analysis found reductions in 10 modifiable health risks, which, in turn, were translated into health and productivity cost savings. The analysis projected a savings of $2.03 for every dollar invested, considering both medical and productivity impacts.

The positive health outcomes and ROI results reported may be attributed to the intensive, but relatively low-cost, interventions provided by Trotter Wellness to the 121 small employers. It is also likely that this subset of employers who "signed up" for the program (158 companies, of which 121 were included in this analysis, of 19,952 companies that hold workers' compensation policies with Pinnacol) may have been the most motivated to introduce health promotion programs and establish a "culture of health" at their workplaces. It may also be the case that this subset of employers offered other complementary health improvement programs and that these additional programs were partly responsible for the large risk reduction results observed.

There are several other points to consider when reviewing these findings. First, as far as we can tell, this is the first large-scale effort by a workers' compensation company, whose primary focus is accident prevention, to influence workers' health more generally. Several studies have shown that health problems such as obesity, excessive alcohol consumption, smoking, depression, and poor control of biometric values[37–39] are correlated with safety incidents at the workplace. Importantly, no longitudinal studies of health promotion program effects on small employers have been published. So, it is in the interest of Pinnacol and its subscriber companies to evaluate whether population health initiatives may afford a significant opportunity to prevent injuries and reduce workers' compensation claims.

Second, this study illustrates the value of pooling data from many small employers into a uniform database so that results of an intervention can be measured across multiple businesses instead of requiring each company to evaluate its own program efficacy. For employers without access to claims data, having small numbers of employees, or lacking resources needed to conduct program evaluations, this serves as a useful alternative method for determining program value and removes a fundamental economic barrier preventing rational investment in wellness programs.

Finally, the ROI model used in this study considered several variables simultaneously, which would be difficult to measure one at a time. For example, inputs into the model included the size of the population under review, its demographic profile, the risk profile of workers, intervention duration, and the cost of the program. To study any of these variables independently would have been expensive and time prohibitive. Pinnacol and Trotter Wellness continue to use the model to further fine tune their wellness offerings to employers by identifying opportunities for program improvement, further risk reduction, and potential cost savings.

LIMITATIONS

There are several limitations worth noting. First, the model relies on a pre- and posttest assessment of changes in the health risk of employees to determine cost savings. Although external national health risk norms were used as a proxy comparison group, there was no true comparison group observed against which the intervention group results could be contrasted. In “real world” studies like these, it is rare to have access to risk data from nonparticipants. The use of external norms helps mitigate this concern. As shown, some risk factors in the general population are worsening over time (eg, obesity) while others are reducing (eg, tobacco use).

A related limitation is that this analysis does not address the problem of selection bias. We did not compare the demographics and risk profile of employees who completed HRAs as part of HRM to employees who chose not to participate and therefore did not contribute health risk data for comparison purposes. Participants and nonparticipants often differ in various ways, including their willingness to examine their health risks and begin a behavior change process. Because this analysis did not have access to nonparticipant data, such an examination and correction for the differences in participants and nonparticipants was not possible.

An associated limitation is that we used external norms for medical and wage data, because organization-specific data for the Pinnacol set of small employers were not obtainable. Also, organization-specific program participation and risk reduction data were not available, and so the data for all employers in the database were pooled for this analysis. Thus, ROI estimates may differ for different organizations depending on their unique participation and risk reduction results.

A third limitation refers to the short time horizon for this study. It is often true that workers participating in a health promotion program take immediate steps to improve their health through behavior change, but there is often a regression toward poorer health habits over time as the novelty of the program wears off.[26] It is therefore preferable to track long-term health changes and risk reduction trends to determine whether cost savings are sustainable beyond a 1- or 2-year period. The prospective research being conducted by our team will examine this question over a 5-year period.

The ROI model is based on the assumption that unhealthy workers are immediately replaced by healthy ones for each risk category. Quite simply, it implies that a given population is replaced with other people who are similar demographically but different in terms of their

health risks. This, undoubtedly, is never the case. People improve their health risks, and as they improve, their costs may change, sometimes slowly and sometimes rapidly. Few longitudinal studies have examined long-term changes in health risks and their effects on costs. We published one such study examining the experience of Johnson & Johnson employees over 4 years that found changes in some risks produced changes in costs.[40] Nevertheless, there are limited data showing the precise mechanism by which changes in risk produce changes in costs and the time horizon by which those changes are evident.

Fourth, the ROI model reported savings from medical and productivity-related expenditures. Some critics of workplace programs note that medical cost savings are direct and tangible, while productivity savings, especially those attributed to presenteeism, are indirect and reliant on self-report, which is subject to bias. Thus, critics of this ROI analysis may place less importance on productivity savings when compared with direct medical savings. In addition, the medical cost savings may not accrue to the small businesses that participated in the HRM, because some of them may not be providing employees with health care insurance coverage.

Fifth, the analysis did not consider the level of exposure to the HRM program. Participation was assumed to be an “on-off” switch—that is, individuals either participated or did not participate in the program. In reality, individuals may receive different levels of program “dose” and may respond differently to the dose delivered. Admittedly, the binary nature of program exposure does not allow for a nuanced analysis of what, in particular, may bring about behavior change and subsequent cost savings. A limitation of the ROI model is that it is “agnostic” about the specific program elements that may influence health behaviors. The model does not differentiate between different program components, which may include coaching programs, Web-based behavior change tools, incentive structures, policy changes, or leadership initiatives. It is certainly the case that each of the earlier-listed interventions is likely to have a different cost attached to it and some interventions may be more cost-effective than others. Nevertheless, an estimate of the specific program elements and their health and cost impacts were not included in the current model design.

Sixth, companies self-selected into the HRM program, and they may have done so because they had forward-thinking leaders, a greater willingness on part of workers to become engaged in health improvement initiatives, a particularly poor health risk profile at baseline, high health care costs, or energetic internal champions who devoted their time and effort to make the program successful. It is unknown how the companies electing to join the initiative differed from those that did not and whether these inherent differences may have produced the positive results reported. Furthermore, employees at these companies self-selected to participate in the program and so the results presented should be interpreted in light of the potential for selection bias.

Seventh, the HRM cost figure used in the analysis may underestimate the actual cost of the program. In this project, Pinnacol paid for Trotter Wellness’ services. The program cost used in the ROI calculation was based on the total amount paid to the wellness vendor plus administrative costs for Pinnacol and its field teams that worked with small businesses. We were not able to discern the indirect cost of participation in HRM for the 121 small

businesses—for example, the time and effort expended by company staff and employee participants, or the direct cost of incentives, if any were offered.

Eighth, while it is likely that the observed improvements in health risks can be attributed to the HRM, it is possible that other unmeasured factors may have contributed to risk reductions. We have no knowledge of other health promotion activities that may have been conducted by the participating companies during the period in which they engaged in the HRM.

Finally, as is true for all data that rely on self-report, individuals responding to the HRA may not have accurately recorded their health risks and health habits. Nevertheless, this problem exists in all survey research that depends on truthful responses to questionnaires. Because answers to the HRA did not result in any penalty to the workers based on achievement or nonachievement of certain health targets, it is likely that the health risks reported were an accurate reflection of true health behaviors, to the extent that workers were aware of their actual health risks.

CONCLUSION

A group of 121 small employers in Colorado pooled the health risk data collected from employees to determine whether a health promotion and disease prevention program could produce meaningful reductions in employee health risks and whether a dollar value could be attached to those reductions. A cohort group composed of 2458 employees from these small employers was followed for 1 year, and changes in their health risk profile were reported. An ROI model translated those health improvements into dollar equivalents, and a positive financial return was estimated when combing direct medical and indirect productivity savings. Importantly, the savings derived by the model are driven entirely by a shift in the health risk profile of workers.

The US health care system is undergoing significant changes as a result of the Affordable Care Act. Employers are experimenting with new care delivery models, some of which are predicated on the assumption that a healthy workforce leads to lower medical spending and higher productivity. The initiative described here offers hope to small businesses that wish to pool their resources and create health company cultures. When workers improve their health, their organizations benefit as well. Medical and productivity savings can then be distributed to employees in the form of higher wages and better working conditions.

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TABLE 1

Changes in Health Risk Factors for the Cohort Group

		Time 1, %		Time 2, %		
Health Risk Factor	***n***	**Mean**	**SD**	**Mean**	**SD**	**% Point Change**
Obesity	2,458	24.04	0.43	22.05	0.41	−1.99**
High blood pressure	2,303	2.30	0.15	1.96	0.14	−0.34
High total cholesterol	1,911	5.70	0.23	4.79	0.21	−0.92
High blood glucose	1,674	1.85	0.13	1.62	0.13	−0.23
Poor nutrition/eating habits	2,458	37.43	0.48	31.61	0.47	−5.82**
Physical inactivity	2,458	36.33	0.48	29.82	0.46	−6.51**
Tobacco use	2,458	8.54	0.28	7.24	0.26	−1.30**
High alcohol consumption	2,458	8.34	0.28	6.59	0.25	−1.75**
High stress	2,458	43.98	0.50	40.44	0.49	−3.54**
Depression	2,458	13.87	0.35	11.60	0.32	−2.28*

*$P \leq 0.01$

**$P \leq 0.001$.

TABLE 2

Annual Percentage Point Changes in Health Risks—Actual Versus Expected

		Annual Change (%Points)	
	Baseline Risk, %	**No Program**	**With Program**
Biometric			
Obesity	24.0	0.7	−2.0
High blood pressure	2.3	−0.3	−0.3
High total cholesterol	5.7	−0.5	−0.9
High blood glucose	1.9	0.3	−0.2
Behavioral			
Poor nutrition/eating habits	37.4	−0.1	−5.8
Physical inactivity	36.3	−0.6	−6.5
Tobacco use	8.5	−0.7	−1.3
High alcohol consumption	8.3	−0.1	−1.7
Psychosocial			
High stress	44.0	0.2	−3.5
Depression	13.9	0.2	−2.3

TABLE 3

Hours of Productivity Loss (Absenteeism and Presenteeism) Associated With 10 Modifiable Risk Factors

	Estimated Productive Hours Lost Annually	
	Absenteeism	**Presenteeism**
Biometric		
Obesity	9.2	13.7
High blood pressure	7.6	11.0
High total cholesterol*		
High blood glucose	26.0	8.9
Behavioral		
Poor nutrition/eating habits	0.8	23.7
Physical inactivity	12.3	27.2
Tobacco use	31.6	25.0
High alcohol consumption	27.8	9.2
Psychosocial		
High stress	19.4	59.7
Depression	73.8	89.5

*There are no estimates from the literature that are statistically significant.

TABLE 4

Results of the ROI Analysis for the Cohort Group

Cumulative Savings, Program Cost, and ROI (All Discounted)	
Cumulative medical cost, no program	$11,205,538
Cumulative medical savings, with program	$124,867
Cumulative productivity savings, with program	$310,040
Cumulative program cost	$214,347
NPV, medical care	−$89,480
NPV, medical + productivity	$220,560
ROI, medical care	$0.58
ROI, workplace productivity	$1.45
ROI, medical care + workplace productivity	$2.03

NPV, net present value; ROI, return on investment.