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Workplace Wellness Programs Can Generate Savings

Katherine Baicker, David Cutler, Zirhui Song

ABSTRACT

With health care expenditures soaring, there is increasing interest in workplace-based disease prevention and health promotion as a means of improving health while lowering costs. We conduct a critical meta-analysis of the literature on costs and savings associated such programs, focusing on studies with particularly rigorous methods and examining effects on health care costs and absenteeism. We find that medical costs fall about \$3.27 for every dollar spent on wellness programs, and absentee day costs fall by about \$2.73 for every dollar spent. This average return on investment suggests that the wider adoption of such programs could prove beneficial for budgets and productivity as well as health outcomes.

With health care expenditures soaring, there is increasing interest among policy-makers, insurers, and employers in methods of improving health while lowering costs. Much discussion has taken place about investment in disease prevention and health promotion as a way of achieving better health outcomes at lower costs. President Obama has highlighted prevention as a central component of health reform, as have major Congressional reform proposals.[1, 2] Workplace-based wellness programs, which could impact prevention, have been showcased in these reform proposals, the popular press, and Congressional hearings.[3, 4]

This enthusiasm for workplace programs stems in part from the fact that more than 60 percent of Americans get their health insurance coverage through an employer-based plan, as well as the recognition that many employees spend the majority of their waking hours in the workplace – making it a natural venue for investments in health. There are several reasons that employers might benefit from investments in employee wellness. First, such programs might lead to reductions in health care costs and thus health insurance premiums. Second, healthier workers might be more productive and miss fewer days of work. These benefits may accrue at least partially to the employer (such as through improved ability to attract workers), even if the primary benefits accrue to the employee. These factors may motivate the increasing interest in such programs among employers – and

especially large employers. In 2006, 19% of companies with 500 or more workers reported offering wellness programs, while a 2008 survey of large manufacturing employers reported that 77% offered some kind of formal health and wellness program.ⁱ[5, 6] Consistent with the evidence presented below, small firms seem slower to offer such programs, and many of the programs offered are still quite limited in scope.[7]

Several well-publicized case studies have suggested a positive return to employer investment in prevention. For every dollar invested in the program, the employer saves more than the dollar spent. The Citibank Health Management Program reported an estimated savings of \$4.50 in medical expenditures per dollar spent on the program.[8] Studies from the California Public Employees' Retirement System, Bank of America, and Johnson & Johnson have similarly estimated significant health care savings from wellness programs.[9-11] Despite this anecdotal evidence of high returns, however, most employers do not engage in wide-scale workplace wellness-promotion practices. The 2004 National Worksite Health Promotion Survey showed that only 7 percent of employers offered comprehensive programs [12] of the type specified in the influential Institute of Medicine report *Healthy People 2010* recommendations.[13] These include health education, worksite screenings linked to appropriate medical

care, and the integration of the program into corporate or organizational structure.

There are some empirical studies that attempt to estimate the return on investment (ROI) of employer wellness programs more systematically, but shortcomings in this literature leave the question unresolved.[14] In particular, most studies lack an adequate comparison or control group, and are thus not able to account for possible unobserved variables that might be responsible for observed differences in costs between wellness program participants and non-participants. This leaves open the possibility of selection bias such as only the most motivated and healthiest people disproportionately enroll in programs when they are voluntary. Low response rates, inexact case-control matching, and potential publication bias (only programs with favorable results are published) also call into question the evidence of high returns. In addition, Nicholson and colleagues show that common methods used by employers to calculate costs and benefits of health-related investments may not reflect the true impact of these programs.[15] These shortcomings mean that even the limited evidence available may not be robust or generalizable.

In this study, we conduct a meta-analysis of the literature on costs and savings associated with employer-based wellness promotion policies. We begin by screening existing studies for

analytical rigor, and then compile standardized estimates of ROI from those studies. We focus on studies for which there is a comparison group of non-participants, and examine effects of wellness program interventions on health care costs and absenteeism. We find a large positive ROI across these rigorous studies, suggesting that the wider adoption of such programs could prove beneficial for budgets as well as health. That they have been implemented so selectively, however, necessitates further research into the likely effects of broader adoption.

METHODS

We conducted a primary literature search from prior peer-reviewed meta-analyses of employee wellness programs, as well as a computerized search of MEDLINE, Lexis-Nexis, and other health and social science databases. Search terms included "employee," "wellness," "workplace," "disease management," and "return on investment." This produced an initial sample of over 100 peer-reviewed studies of employee wellness programs spanning the past three decades. Among these peer-reviewed studies, we restricted our analysis to studies that satisfied the following criteria: (1) they had a well-defined intervention, (2) they had a well-defined treatment and comparison group, even if the comparison group was not strictly randomly assigned, and (3) they represented analysis of a distinct new intervention, rather than

further analysis of an intervention already examined in one of the other studies. We perform additional analysis on the subset of these studies that reported difference-in-difference estimates of the study outcome (differences in health care costs or absenteeism across time between treatment and control groups), or the raw data allowing for this calculation.ⁱⁱ

Applying these criteria narrowed our sample to 32 original publications. These studies are listed in Exhibit 1. Two of these studies reported results of multiple separate interventions; we treated these as separate studies. Several other studies reported the results of multiple interventions, but since participants were allowed to self-select into intervention arms we treated these as a single case each. Thus, the 32 original publications gave us an effective sample of 36 studies. Of these, 22 looked at employee health care costs and 22 looked at employee absenteeism (with 8 examining both). We catalogued the characteristics of the firms that undertook these employee wellness programs and the qualitative dimensions of the programs themselves. We analyzed the health care cost and absenteeism studies separately, but also converted the absenteeism results into dollar cost units using a uniform wage rate to construct comparable ROI estimates.

RESULTS

Sample Characteristics

Over 90 percent of employee wellness programs in our sample were implemented in large (more than 1,000 workers) employers. Twenty-five percent examined wellness programs at employers with more than 10,000 workers. A number of industries were represented: 25 percent of sample employers were in financial services, 22 percent in manufacturing, and 16 percent in school districts, universities, and municipalities. Other industries represented included utilities, telecommunications, energy, pharmaceuticals, and makers of consumer products. Ten studies took place across multiple locations, often the employer headquarters and satellite locations; some were implemented across multiple employers.

Characteristics of Wellness Programs

We can characterize the employee wellness programs in the study sample along two dimensions: the method of delivery and the focus of intervention (Exhibit 2). The method of delivery characterizes how the intervention was carried out. By far the most frequently used method of delivery is the health risk assessment, a survey that gathers baseline self-reported health data from the employee, which is in turn used by the employer to tailor the subsequent intervention. The health risk assessment

is used in 80 percent of the studies in our sample, most commonly serving as the initial intervention or requirement for participation in the wellness program. Participation is almost always voluntary among employees at the treatment site, making selection bias an important concern. Assessments are commonly used in conjunction with a clinical screening of risk factors, including blood pressure, cholesterol, and body mass index. Importantly, the assessment tool provides the employee with information on risk factors that motivate participation. The majority of programs that did not use the assessment method featured an on-site gymnasium or workout facility, which employees were encouraged to use.

The second most common wellness intervention mechanism was the provision of self-help education materials, individual counseling with health care professionals, or on-site group activities led by trained personnel. In our sample, about 40 percent of studies included the use of self help materials, 40 percent offered individual counseling, and 35 percent featured on-site group activities, classes, or seminars. Most programs offered a combination of these interventions.

The use of incentives to motivate participation was seen in 30 percent of programs. Incentives were most commonly bonuses and reimbursements for program participation, but also included the payback of down-payments prior to participation. Such cases

may involve an employer withholding a small portion of employee compensation until program participation occurs. Incentives have become more common in recent interventions.

The most common foci of the programs were obesity and smoking, the two top causes of preventable death in the United States. Over 60 percent of the programs explicitly focused on weight loss and fitness. All but three of the remaining programs focused either on multiple risks or risks specific to the participant. Fifty percent of the programs focused on smoking, often in conjunction with obesity. Eighty percent of programs focused on more than one risk factor, including stress management, back care, nutrition, alcohol consumption, blood pressure, and preventive care in addition to smoking and obesity.

Impact of Programs on Medical Spending

Twenty-two studies reported on the impact of wellness programs on employee health care costs (Exhibit 3). The average sample size of intervention groups exceeded 3,000 employees, and the size of comparison groups averaged about 4,500 employees. While the studies examined programs for three years on average, most wellness programs continued (often indefinitely) beyond the study duration.

We group the studies into three types—those that had a randomized controlled trial or matched control group and pre- and post-intervention data; those that had a non-randomized or unmatched comparison group and pre- and post-intervention data; and those that had post-intervention data only but met our other inclusion criteria (Exhibit 4). We standardize the costs and benefits of each program to annual figures in 2009 dollars, assuming a linear distribution of both costs and benefits over time. We calculate savings as the difference between treatment and comparison groups after the intervention subtracted by the differences between the groups before the intervention (when available). Using reported figures for program costs, we calculate a return on investment (ROI) for each study.ⁱⁱⁱ

Averaging across all programs in which they were reported, the interventions produced \$358 in savings through reduced health costs per employee per year, while costing the employer \$144 per employee per year. The average calculated ROI across the 15 studies that reported program costs was 3.37.^{iv} An additional 7 studies reported savings but not costs, making a direct calculation of ROI for these studies impossible. If we were to assume that they had the same average cost of \$144 as the studies that did report costs, that would imply a slightly lower average ROI of 3.27 (although given that these studies reported somewhat lower savings, we have no reason to assume

that their costs are the same). Only two studies reported that employer wellness programs did not save money.

Studies with random assignment to treatment and control groups or with carefully matched comparison groups are perhaps the most persuasive. In a typical randomized study, employees were randomly assigned to the program and control group, or in several cases to different intensities of the wellness program. In matched comparison studies, the comparison group is typically composed of age- and sex-matched nonparticipants from the same employer identified through a retrospective review of participation. Nine of the studies in Exhibit 3 had such designs. While this matching is an effort to limit the bias introduced by voluntary self-selection of potentially healthier employees into wellness program participation, self-selection remains an important limitation in these studies. The average program savings reported in these studies was \$394 per employee per year, and the average program cost was \$159 per employee per year. The average calculated ROI for this group was 3.36. Six studies used comparison groups that were neither randomized nor matched, yielding \$319 saved per employee per year and \$132 spent per employee per year (average ROI of 2.38). Seven studies did not report baseline data, thus allowing only for calculation of post-intervention cost differences (averaging \$162 per employee per year).^v Studies no. 4, 10, and 15 reported

lower health care costs overall than the other studies, but they are among the earliest studies in the group - all published in the 1980s when average spending (even accounting for inflation) was substantially lower.

Impact of Programs on Absenteeism

The 22 studies that examined employee absenteeism had, on average, smaller treatment groups and slightly larger comparison groups, though the size is generally similar (Exhibit 3). These studies were carried out for only two years on average, compared to three for health care cost studies. We monetized absentee days using the average hourly wage rate in 2009 of \$20.49 [16].^{vi}

The average program savings across the studies was a more modest \$294 per employee per year while program costs were \$132 per employee per year (Exhibit 5). Twelve of these 22 studies reported program costs. The average calculated ROI for these 12 studies was 3.27.^{vii} As above, we could assume that the programs that did not report costs had similar average costs to those who did, which would imply a lower average ROI of 2.73. All but one of the studies showed some reduction in absentee days.

As with the studies on medical costs, the average savings was relatively similar in the subset of studies with rigorous control groups. Among the nine studies with random control groups or matched comparison groups, the average number of

absentee days saved was 1.7 per employee per year, estimated to cost \$274 per employee per year. The next 11 studies had average program savings of 1.9 absentee days or roughly \$309 per employee per year. Taken together, they represent slightly more modest program savings than the health care cost studies suggest.

DISCUSSION

Our review of the evidence suggests that large employers adopting wellness programs see substantial positive returns, even within the first few years after adoption. Medical costs fall about \$3.27 for every dollar spent on wellness programs, and absentee day costs fall by about \$2.73 for every dollar spent. While these benefits surely accrue in part to the employee, they also likely accrue in part to the employer - either in the form of lower replacement costs for absent workers or an advantage in attracting workers to the firm. We discuss only two dimensions of potential benefits (reduced health care costs and reduced absenteeism), but there are likely many other benefits as well, including improved health, reduced turn-over, and lower costs for public programs such as disability insurance and Medicare.

Our results show more modest ROI than prior meta analyses by Chapman (2005), which had more lenient inclusion criteria and

reported an average gross ROI of 5.81 across 22 studies,[17] and by Aldana (2001), which reported gross ROI of 3.48 to 5.82 across 7 studies.[18] We believe that our more systematic treatment of intervention and comparison groups pre- and post-intervention and calculation of equivalent costs and benefits has resulted in more comparable and reliable figures.

There are clearly limitations in the generalizability of these findings. First, the firms implementing these programs are likely those with the highest expected returns. Second, it is difficult to gauge the extent of publication bias, with programs seeing high ROI most likely to be written about and studies with significant findings of positive returns most likely to be published. Third, almost all of the studies were implemented in large employers, who are more likely to have the resources and economies of scale necessary both to implement and to achieve broad savings through employee wellness programs. Whether smaller employers can achieve positive ROI through wellness programs is an important policy question.^{viii} These factors may help explain why such programs have not (yet) been adopted more widely, although they are clearly gaining rapidly in prominence.

Our analysis does not account for the time profile of cost incurred and benefits accrued within programs, and the studies included extend through only a limited time window. This is

important because wellness program costs are likely to be frontloaded, while health benefits are likely to accumulate gradually. Therefore, to the extent that program costs decrease over time and benefits increase over time, we may be understating the true ROI.

Our analysis cannot address the important question of which attributes of wellness programs are most important, and how such programs should be optimally designed. Well-designed field experiments that compare the effectiveness of program components such as patient education and professional counseling across different industries and populations are needed to answer it. Indeed, the answer may not be the same everywhere. A manual laborer in a manufacturing plant is likely to have different underlying health risks, and may respond to employee wellness programs differently, than an office-based clerical worker in a financial institution. Corporate culture, the structure of program incentives, and the diffusion of program participation or health behaviors through employee social networks are all likely to affect ROI.

Further study is also needed to elucidate the time path of ROI, in particular the relative cost-effectiveness of a program's first years compared to its later years. Only a few of the studies in our sample provided data on costs and savings for each year of the program, making it difficult to describe the

average time path of ROI. The assumption of a linear trend in savings from the beginning to end of program evaluation may not reflect the reality of behavior change within organizations.

Still, some patterns are emerging. A growing literature suggests that building incentives into wellness programs helps to raise participation among employees.[19, 20] In the 2004 National Worksite Health Promotion Survey, 26 percent of worksites used incentives to increase employee participation.[12] Recent studies by Kevin Volpp and colleagues use both lotteries and deposits to show that financial incentives are effective at motivating weight loss and smoking cessation.[20, 21] These and similar approaches, borrowing from psychology and behavioral economics, may provide creative solutions to employers aiming not only to increase participation, but ultimately to modify behaviors resistant to change.[22]

These intriguing findings suggest that adding provisions that promote wellness initiatives might be a promising component of comprehensive health reform. Such measures might include direct subsidies (such as the tax credits for small employers that have been proposed in some legislation by Senator Harkin and others) or an easing of regulatory barriers, including an exploration of the legal implications of HIPAA nondiscrimination rules and the Americans with Disabilities Act for program

design.[23] The current reform debate has incorporated active discussion of wellness promotion (including witnesses' testimony on the success of particular employers' programs) and the hope that such programs will be a key component in slowing health care cost growth, but it is difficult to evaluate how realistic these hopes are.

Health insurance in the U.S. is likely to continue to be employment-based. Our critical review of the existing evidence suggests that employer-based wellness initiatives may not only improve health, but may result in substantial savings over even short-run horizons. Encouraging (or even subsidizing) such programs also seem to have broad political appeal, perhaps in part because they operate with less direct government oversight and fewer government dollars and in part because they hold the promise of slowing health care cost growth without the specter of rationing care. Understanding the factors that make them most successful and the barriers to their wider adoption could help smooth the path for future investments in this very promising avenue for improving health and productivity.

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ⁱ There is no broadly accepted definition of a "wellness program," making comparisons of figures across studies difficult. Disease management, such as the disease management pilots incorporated the Medicare program and recently (unfavorably) reviewed by CBO, is generally viewed as distinct.

ⁱⁱ While in the case of random assignment "before" data would not be necessary for the construction of causal estimates (since difference between the treatment and control groups after the intervention would reflect the effects of the intervention), in practice all of the studies with randomized assignment reported both before and after data. In the case of non-randomly assigned comparison groups, the "before" data is necessary to net out any pre-existing differences between the groups in estimating the effect of the intervention.

ⁱⁱⁱ An alternative metric to ROI would be net present value. In this context we prefer ROI because it allows us to compare normalized results across studies (as internally calculated ratios, rather than dollar figures) and allows us to compare our results to those of other studies (the majority of which calculate ROI). There is unfortunately a paucity of information about the time path of investments and returns.

^{iv} 14 studies reported their own ROI, which did not always exactly match ours as they were not always calculated over the

same time period. The average of the 14 reported ROIs yields an almost identical 3.36.

^v As noted above, in non-experimental settings baseline comparisons are a useful way to gauge pre-existing differences in non-randomly assigned treatment and comparison groups.

^{vi} The share of these costs borne by the firm in the form of increased replacement worker costs depends on how many sick days workers are entitled to and whether workers are able to convert unused sick days to other days of leave or pay.

^{vii} In this case the average ROI of 4.71 reported by these 12 studies is substantially higher than that we calculated directly using reported costs and benefits.

^{viii} Some insights can be gained from the magnitude of the ROI seen in large firms, however: for the firms studied here with on average roughly 50,000 employees, the benefits in lower medical costs are about 3:1. Even in the extreme case where *all* of the cost of wellness programs are fixed costs, those costs could be spread over only one third the number of employees and still be cost-neutral.

Please place exhibit list here.

EXHIBIT 1 (table) - online exhibit

Headline: Studies considered

SOURCE: Literature review/authors' analysis

EXHIBIT 2 (table)

Headline: Summary of Program Characteristics

Source: Authors' calculations based on studies described in
Table 1

EXHIBIT 3 (table)

Headline: Summary of employee wellness studies

Source: Authors' calculations based on studies described in
Table 1.

EXHIBIT 4 (table)

Headline: Studies of employee health care costs

Source: Authors' calculations based on studies described in
Table 1.

EXHIBIT 5 (table)

Headline: Studies of employee absenteeism

Source: Authors' calculations based on studies described in
Table 1.