The Art of Health Promotion

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Meta-Evaluation of Worksite Health Promotion Economic Return Studies: 2005 Update

Larry S. Chapman, MPH

Setting the Stage

Activity and interest in the worksite health promotion and prevention fields continue to heat up. Rising health care costs, increasing awareness of presenteeism losses, and aging populations are all conspiring to increase the demand for health promotion, particularly for working populations. However, questions about the economic return associated with these types of efforts are also a continued reality. All work organizations must justify their resource investment decisions in health promotion and prevention in primarily economic terms. In an earlier edition of *The Art of Health Promotion*, published in 2003, a formal meta-evaluation of economic return studies of worksite health promotion programs was reported.[1] This original report highlighted the meta-evaluation of 42 peer review articles that met the study inclusion criteria.

In this edition, we are updating the original report with 16 additional peer review articles. However, the author of one of the originally reported studies in 2003 requested that it be withdrawn from the analysis, as it was not ultimately published in a peer review journal. Another study was dropped because of its age and weak methodology. Therefore, this updated meta-evaluation includes a total of 56 peer review journal articles. The term "meta-evaluation," as used in this review article, is defined as . . . "the application of a systematic review process to a set of evaluation studies with a similar purpose and focus in order to determine their quality and summarize their findings."[2]

The contents of this edition include excerpts from the book *Proof Positive: An Analysis of the Cost-Effectiveness of Worksite Wellness* (6th ed., revised and expanded in May of 2005).[3] The book applies the formal meta-evaluation review process and methodology developed and refined by Windsor and Orleans and Boyd and Windsor[4,5] to studies of multicomponent worksite health promotion programs, as defined by Heaney.[6] The highlights of the meta-evaluation are reprinted here with permission.

Overview of the Literature Search Process

As observed previously, the research and evaluation literature on health promotion and wellness programs in workplace settings is both complex and voluminous. The

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literature is characterized by more than 500 formal program evaluation studies of varying quality and methodology, a large number of secondary descriptions of program results, a variety of summary articles reviewing multiple studies, and a growing number of well-designed scientific studies of evaluation findings for programs implemented in workplace settings.[7] For the purposes of this review and analysis, the literature was again divided into original and secondary reports of worksite health promotion program evaluation efforts, and the secondary literature was then discarded. In addition, a distinction continued to be made in this analysis between evaluation studies of single program components or intervention (e.g., a smoking cessation program evaluation) vs. multiple or more comprehensive program interventions (e.g., including a program with smoking cessation, physical activity, cardiovascular health, weight management, and stress management interventions, etc.). Another element of the original meta-evaluation approach that was maintained included a search process using the terms "health promotion" and "wellness." The study selection or inclusion criteria used remained the same and are described below.

Study Inclusion Criteria

For the purposes of this updated meta-evaluation, articles reporting program evaluation studies were included that met all of the following criteria.

1. **Multi-Component Programming:** Qualifying articles must report on programs that include any combination of a minimum of three of the following types of programs: smoking prevention and cessation, physical fitness, nutrition, stress management, medical self-care, high blood pressure control, cholesterol reduction, cardiovascular disease prevention, prenatal care, seat belt use, back injury prevention, back pain prevention, weight management, and nutrition education.
2. **Workplace Setting Only:** Qualifying articles must report on evaluation of organized program efforts conducted only in workplace settings for working populations and/or their spouses.
3. **Reasonably Rigorous Study Design:** Qualifying articles must include the use of a comparison or control group; however, participants can be used as their own controls in order to meet this criteria.
4. **Original Research:** Qualifying articles must represent the initial or original publication of research findings and results.
5. **Examination of Economic Variable:** Qualifying articles must evaluate one or more economic parameters associated with working populations or characteristics of organizational life as part of the evaluation design and measurement strategy. This typically includes any one or a combination of the following: health benefit plan costs, health care utilization indicators, sick leave absenteeism, workers' compensation costs, disability management costs, pension effects, or presenteeism effects.
6. **Publication In a Peer-Reviewed Journal:** Qualifying articles must be published in a peer-reviewed journal and follow traditional methods of peer review and scientific inquiry.
7. **Use of Statistical Analysis:** Qualifying articles must include some appropriate form of statistical analysis of observed changes.
8. **Sufficient Sample Size:** Qualifying articles must have large enough samples to allow meaningful analysis.
9. **Replicable Interventions:** Qualifying articles must use replicable interventions that can be conducted in typical worksite settings.
10. **Minimum Length of Intervention Period:** Qualifying articles must include an experimental or intervention period that is a minimum of 12 months in duration.

Literature Search Process

The search process used to identify the relevant literature that is analyzed in this update remained the same as the earlier meta-evaluation and was as follows:

Step 1. Back-Search of References from Primary Articles. This aspect of the literature search involved the review and use of generally well-known evaluation articles for a back-search process for cited or identified references in the area of evaluation of worksite health promotion programs.

Step 2. Computerized Search of the Business Literature Database. This component of the literature search involved a computerized search of the business literature using the University of Washington's computer database entitled *Business Index–1989 to the Present*. This search was conducted in early February 2005 and utilized four search terms—health promotion, cost-effectiveness, worksite, and evaluation—in an expanded string search format.

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As a result, this report includes studies published between August 1982 and January 2005.

Step 3. Computerized Search of Health and Social Sciences Database. This component of the literature search involved the use of selected topic searches in a variety of databases. These databases included Medline, 1966 to present; Nursing & Allied Health, 1982 to present; PsycINFO: Psychology, 1967 to present; Expanded Academic Index, 1989 to present; ERIC, 1982 to present; and Health Plan, 1986 to present.

The key words used in various combinations in the search process included the following: Cost/benefit, Cost-effectiveness, Disability Experience, Economic Analysis, Evaluation, Health Care Cost, Health Promotion, Health and Productivity Management, Presenteeism, Prevention, Program, Sick Leave Absenteeism, Wellness, Workers' Compensation, and Worksite.

Step 4. Review of Selected Publications for Program Evaluation Findings. This component of the literature search included review of the technical periodicals identified below, which were reviewed manually for the last 3 years of their publication for articles on the evaluation of worksite health promotion programs: *American Journal of Health Promotion*, *American Journal of Preventive Medicine*, *American Journal of Public Health*, *Annals of Public Health*, *Health Affairs*, *Health Values*, *Inquiry*, *Journal of the American Medical Association (JAMA)*, *Journal of Occupational and Environmental Medicine*, *Health Services Research*, *Medical Care*, *Preventive Medicine*, and *Public Health Reports*.

Step 5. Colleague Inquiry. A variety of professional colleagues were approached in early 2005 to determine if any applicable articles may be in publication that were likely to meet the study inclusion criteria. The literature search process described above identified 56 qualifying evaluation studies of the economic impact and return associated with worksite health promotion programs and are formally analyzed in this meta-evaluation. The studies included in this meta-evaluation are identified in Table 1. Studies in bold are the new studies added to the 2003 meta-evaluation cited earlier.

Description of Meta-Evaluation Approach

The purpose of the meta-evaluation of the 56 peer review studies identified in this publication is to provide a useful assessment of the overall validity of the research and evaluation studies that met the study selection criteria. The methodology used to perform this meta-evaluation remained the same as the original and is described below. The approach used is an adaptation of the methodology developed by Windsor and Orleans,[4] and further refined by Boyd and Windsor,[5] as cited earlier. The basic methodology involves a systematic review of research studies using a standardized set of design and methodological criteria to estimate the relative degree and strength of the internal validity and external validity of the studies reviewed. Points are then assigned for each of the seven meta-evaluation criteria used for each study.

The methodological criteria adapted for use in this meta-evaluation included the areas of research design, sample adequacy, quality of baseline delineation, quality of measurements used, appropriateness and replicability of interventions, length of observational period, and recentness of experimental time period. The scoring rules are listed in Table 2.

In the meta-evaluation process for each criterion, a specified number of points are assigned to each study based on the characteristics of the evaluation study. Within this methodological approach, the higher the number of total points from all the methodological criteria, the greater likelihood of internal and external validity, and therefore the greater the significance of the research findings. Once the studies are ranked in terms of the total number of points from application of the seven meta-evaluation criterion, their results are then summarized, with particular attention to the selected economic variables. The points defining Criteria 7 (Experimental Time Period) were updated to reflect the change in the time period of this analysis, which did create some modifications in point totals and the ultimate rankings of individual studies.

Results of Meta-Evaluation

The results of the meta-evaluation are shown in Table 3. The larger number of study subjects, more recent, longer duration, and better-designed studies obviously rank higher, and their results deserve more weight in assessing the quality of the research literature regarding the economic impact and return associated with multicomponent worksite health promotion programs.

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Summary of Individual Study Findings

Table 4 below summarizes the percent change in economic variables reported in each of the 56 studies reviewed in this meta-evaluation. The percent change noted in Table 4 reflects the magnitude of change associated with the groups receiving the most intensive intervention for the longest observational time period cited in the study. This approach was taken to try and simplify the maximum program effect (intensity times length of time) examined in each study included in the meta-evaluation. The measurement methodology used in each study, even around a common economic variable such as sick leave absenteeism, does include differences. The area of health plan cost comparisons reflects the largest variance in measurement methodology. However, the general magnitude of observed change continues to remain one of the

Table 1
Studies Meeting Meta-Evaluation Study Inclusion Criteria

1. Aldana, SG, et al. Influence of a mobile worksite health promotion program on health care costs. *Am J Prev Med.* 1993;9: 378–383.
2. Aldana, SG, et al. Financial impact of a comprehensive multisite workplace health promotion program. *Prev Med.* 2005;40:131–137.
3. Baun, WB, et al. A preliminary investigation: effect of a corporate fitness program on absenteeism and health care cost. *J Occup Med.* 1986;28:18–22.
4. Bertera, RL. The effects of workplace health promotion on absenteeism and employment costs in a large industrial population. *Am J Public Health.* 1990;80:1101–1105.
5. Bertera, RL. Behavioral risk factor and illness day changes with workplace health promotion: two-year results. *Am J Health Promo.* 1993;7:365–373.
6. Blair, SN, et al. Health promotion for educators: impact on absenteeism. *Prev Med.* 1986;15:166–175.
7. Bly, JL, et al. Impact of worksite health promotion on health care costs and utilization: evaluation of Johnson & Johnson's Live for Life Program. *JAMA.* 1986;256:3235–3240.
8. Bowne, DW, et al. Reduced disability and health care costs in an industrial fitness program. *J Occup Med.* 1984;26: 809–816.
9. Cady, LD, et al. Program for increasing health and physical fitness of fire fighters. *J Occup Med.* 1985;27:110–114.
10. Chapman, L, et al. Ten-year economic evaluation of an incentive-based worksite health promotion program. *Am J Health Promo.* 2005:in press.
11. Conrad, KM, et al. Effect of worksite health promotion programs on employee absenteeism. *AAOHN J.* 1990;38:573–580.
12. Dalton, BA, Harris, J. A comprehensive approach to corporate health management. *J Occup Med.* 1991;33:338–348.
13. Erfurt JC, et al. The cost-effectiveness of work-site wellness programs for hypertension control, weight loss, and smoking cessation. *J Occup Med.* 1991;33:962–970.
14. Fries JF, et al. Health risk changes with a low-cost individualized health promotion program: effects at up to 30 months. *Am J Health Promo.* 1992;6:364–371.
15. Fries, JF, et al. Two-year results of a randomized controlled trial of a health promotion program in a retiree population: the Bank of America study. *Am J Med.* 1993;94:455–462.
16. Fries, JF, et al. Randomized controlled trial of cost reductions from a health education program: the California Public Employees' Retirement System (PERS) study. *Am J Health Promo.* 1994;8:216–223.
17. Fries, JF, McShane, D. Reducing need and demand for medical services in high risk persons. *West J Med.* 1998;169: 201–207.
18. Gibbs, JO, et al. Work-site health promotion; five year trend in employee health care costs. *Occup Med.* 1985;27:826–830.
19. Goetzel, RZ, et al. Differences between descriptive and multivariate estimates of the impact of Chevron Corporation's Health Quest program on medical expenditures. *J Occup Environ Med.* 1998;40:538–545.
20. Goetzel, RZ, et al. Health care costs of worksite health promotion participants and non-participants. *J Occup Environ Med.* 1998;40:341–346.
21. Golaszewski, T, et al. A benefit-to-cost analysis of a work-site health promotion program. *J Occup Med.* 1992;34:1164–1172.
22. Hall-Barrow, J, Hodges, L, Brown, P. A collaborative model for employee health and nursing education: successful program. *AAOHN J.* 2001;49:429–436.
23. Harvey, MR, et al. The impact of a comprehensive medical benefits cost management program for the city of Birmingham: results at five years. *Am J Health Promo.* 1993;7:296–303.
24. Haynes, G, Dunnagan, T, Smith, V. Do employees participating in voluntary health promotion programs incur lower health care costs? *Health Promo Int.* 1999;14:43–51.
25. Henritze, J, Brammell, HL. Phase II cardiac wellness at the Adolph Coors Company. *Am J Health Promo.* 1989;4: 25–31.
26. Henritze, J, et al. LIFECHECK: a successful, low touch, low tech, in-plant, cardiovascular disease risk identification and modification program. *Am J Health Promo.* 1992;7:129–136.
27. Hodges, LC, Harper, TS, Hall-Barrow, J, Tatom, ?. Reducing overall health care costs for a city municipality: A real life community based learning model. *AAOHN J.* 2004;52:247–257.
28. Jeffery, RW, et al. Effects of work-site health promotion on illness-related absenteeism. *J Occup Med.* 1993;35:1142–1146.
29. Jones, RC, et al. A study of a work site health promotion program and absenteeism. *J Occup Med.* 1990;32:95–99.
30. Knight, KK, et al. An evaluation of Duke University's LIVE FOR LIFE health promotion program on changes in worker absenteeism. *J Occup Med.* 1994;36:533–534.

Table 1
Continued

31. Lechner, L, et al. Effects of an employee fitness program on reduced absenteeism. *J Occup Environ Med.* 1997;39: 827–831.
32. Leigh, J, et al. Randomized controlled study of a retiree health promotion program: the Bank of America study. *Arch Int Med.* 1992;152:1201–1206.
33. Leutzinger, J, Hawes, C, Hunnicutt, D, Richling, D. Predicting the ratio of benefit to cost in a cardiovascular disease prevention program. *Manag Employee Health Benefits.* 1995;?:1–10.
34. Lorig, K, et al. A workplace health education program that reduces outpatient visits. *Med Care.* 1984;23:1044–1054.
35. Lynch, WD, et al. Impact of a facility-based corporate fitness program on the number of absentees from work due to illness. *J Occup Med.* 1990;32:9–12.
36. Maes, S, Verhoeven, C, Kittel, F, Scholten, H. Effects of a Dutch work-site wellness health program: the Brabantia Project. *Am J Public Health.* 1998;88:1037–1041.
37. Maniscalco, P, Lane, R, Welke, M, Mitchell, J, Husting, L. Decreased rate of back injuries through a wellness program for offshore petroleum employees. *J Occup Environ Med.* 1999;41:813–820.
38. Musich, SA, et al. Effectiveness of health promotion programs in moderating medical costs in the USA. *Health Promo Int.* 2000;15:5–15.
39. Ozminkowski, RJ, et al. A return on investment evaluation of the Citibank, N.A., Health Management Program. *Am J Health Promo.* 1999;14:31–43.
40. Ozminkowski, RJ, et al. Long term impact of Johnson & Johnson's Health & Wellness Program on health care utilization and expenditures. *J Occup Environ Med.* 2002;44:21–29.
41. Pelletier, B, Boles, M, Lynch, W. Changes in health risks and work productivity. *J Occup Environ Med.* 2004;46:746–754.
42. Schultz ALC, Barnett, T, et al. Influence of participation in a worksite health promotion program on disability days. *J Occup Environ Med.* 2002;44:776–780.
43. Sciacca, J, et al. The impact of participation in health promotion on medical costs: a reconsideration of the Blue Cross and Blue Shield of Indiana study. *Am J Health Promo.* 1993;7:374–395.
44. Serxner, S, et al. The impact of a worksite health promotion program on short term disability usage. *J Occup Environ Med.* 2001;43:25–29.
45. Serxner, S, Gold, D, Grossmeier, J, Anderson, D. The relationship between health promotion program participation and medical costs: a dose response. *J Occup Environ Med.* 2003;45:1196–1200.
46. Shephard, RJ. Twelve years experience of a fitness program for the salaried employees of a Toronto Life Assurance Company. *Am J Health Promo.* 1992;6:292–301.
47. Shephard, RJ, et al. The influence of an employee fitness and lifestyle modification program upon medical care costs. *Can J Public Health.* 1982;73:259–263.
48. Shi, L. Health promotion, medical care use, and costs in a sample of worksite employees. *Eval Rev.* 1993;17:475–487.
49. Shi, L. Worksite health promotion and changes in medical care use and sick days. *Health Values.* 1993;17:9–17.
50. Shimizu, T, Nagashima, S, Mizoue , et al. A psychosocial-approached health promotion program at a Japanese worksite. *J UOEH.* 2003;25:23–34.

most important characteristics that can be derived from the economic return literature. In addition, the studies that report cost benefit analysis are also a critical part of the meta-evaluation because of their reflection of the net economic return associated with the studies reported in the peer review literature.

Discussion of Findings

This meta-evaluation illustrates the general lack of standardization in the methodology used in economic analysis of worksite health promotion programs. Different measurement methods, varying categories of economic variables used for measuring economic return, and use of alternative research designs and statistical tests all highlight the lack of methodological consensus within the field for the evaluation of economic impact. However, in spite of the use of these widely varying methods and approaches to the determination of economic impact and return, the results continue to show a surprising amount of congruence. Additional findings and a few observational comments about each are below.

The 56 studies presented here provide a range of meta-evaluation quality scores from 12 to 28. Comment: This continues to demonstrate the wide range of quality

Table 2
Meta-Evaluation Criteria

Points	Meta-Evaluation Criteria Subcomponents
Criterion #1 Research Design (e.g., "Design")	
5	Randomized pretest and posttest, plus matched control group with multiple replications
4	Equivalent control group design, with pretest and posttest with multiple replications
3	Nonequivalent control group design, with pretest and postest with multiple replications
2	Subjects as own controls, with pretest and posttest with multiple replications
1	Subjects as own controls, with pretest and posttest with single replication
1 pt bonus	For control vs. experimental group equivalence
Criterion #2 Sample Size (e.g., "Sample")*	
5	Sample size >50,000
4	Sample size from 25,000 to 49,999
3	Sample size from 10,000 to 24,999
2	Sample size from 1000 to 9999
1	Sample size ≤999
1 pt bonus	For controlling for sample attrition
Criterion #3 Quality of Baseline Delineations (e.g., "Baseline")	
5	Comprehensive baselines for risk factors, biometrics, and organizational indicators
4	Baseline measures for selected risk factors, biometrics, and organizational indicators
3	Comprehensive baselines for risk factors and biometrics
2	Selected multiple baseline measures for risk factors and biometrics
1	Selected baselines for risk factors and/or organizational indicators
1 pt bonus	For each additional year of baseline conducted prior to the intervention
Criterion #4 Quality of Measurements Used (e.g., "Measurements")	
5	Self-report with independent objective verification for all measures, with use of standard measures
4	Self-report with independent objective verification for most measures
3	Self-report or independent objective verification for selected measures
2	Self-report only on risk factors and biometric measures
1	Limited consistency in measurement methodology
1 pt bonus	For completely equal measurement treatment of experimental vs. control groups
Criterion #5 Appropriateness and Replicability of Interventions (e.g., "Interventions")	
5	Current comprehensive state-of-the-art programming, highly replicable, and described in detail
4	Current state-of-the-art programming and highly replicable
3	Current state-of-the-art programming and moderately replicable
2	Traditional programming and highly replicable
1	Traditional programming and moderately replicable
1 pt bonus	For very detailed description of intervention
Criterion #6 Length of Observational Period (e.g., "Length")	
5	Observational period >120 mo
4	Observational period from 49 to 120 mo
3	Observational period from 25 to 48 mo
2	Observational period from 13 to 24 mo
1	Observational period = 12 mo
1 pt bonus	For equal observation period for experimental and control group observations
Criterion #7 Experimental Time Period (e.g., "Recentness")	
5	Last year of intervention conducted after 2001
4	Last year of intervention conducted from 1997 to 2000
3	Last year of intervention conducted from 1993 to 1996
2	Last year of intervention conducted from 1989 to 1992
1	Last year of intervention conducted prior to 1989

* Sample size was not used to independently "weight" the observed effect in each study. This varies from traditional meta-evaluation methods, but follows the approach advocated by Windsor, Orleans, and Boyd.

Table 3

#	Author	Meta-Evaluation Criterion Scores								
		#1	#2	#3	#4	#5	#6	#7	Total	Rank
1	Aldana*	4	2	4	4	4	3	4	25	6
2	*Aldana*	3	2	5	1	3	3	5	24	11
3	Baun	1	1	2	3	2	2	1	12	53
4	Bertera	3	3	4	3	4	3	2	22	20
5	Bertera	4	4	3	3	5	3	1	23	14
6	Blair	4	3	5	4	3	2	1	22	21
7	Bly*	4	3	4	4	5	4	1	25	7
8	Bowne	3	2	4	3	1	4	1	18	35
9	Cady	2	2	4	3	1	4	1	17	40
10	Chapman*	3	2	4	3	4	5	4	25	8
11	Conrad	3	2	2	3	2	4	1	17	41
12	Dalton	2	2	4	3	4	3	1	19	31
13	Erfurt	5	2	2	2	3	3	1	18	36
14	Fries	2	5	2	2	4	3	2	20	29
15	Fries	5	2	4	3	5	2	2	23	15
16	Fries*	5	5	5	4	4	3	2	28	1
17	Fries*	3	5	3	2	5	2	3	25	9
18	Gibbs	2	2	2	3	2	4	1	16	46
19	Goetzel	5	2	0	4	4	3	4	23	16
20	Goetzel	3	2	2	4	4	3	4	23	17
21	Golaszewski	2	4	2	3	4	5	2	22	22
22	*Hll Barrow*	1	2	2	2	2	1	4	14	50
23	Harvey*	4	3	5	4	5	4	2	27	3
24	*Haynes*	2	2	2	3	3	3	2	17	42
25	Henritze	2	1	1	1	3	4	1	13	52
26	Henritze	1	1	1	3	3	1	2	12	54
27	*Hodges*	1	1	1	3	2	3	5	16	47
28	Jeffery	5	3	4	2	2	3	2	21	24
29	Jones	4	2	1	4	4	3	1	19	32
30	Knight	3	2	2	4	4	4	2	21	25
31	Lechner	1	1	4	4	3	1	3	17	43
32	*Leutzinger*	3	2	2	3	4	2	3	19	33
33	Leigh	5	2	5	4	5	1	2	24	12
34	Lorig	2	2	2	3	3	2	1	16	48
35	Lynch	3	2	3	4	2	3	1	18	37
36	*Maes*	2	1	2	3	3	3	3	17	44
37	*Maniscalco*	2	1	2	3	3	3	3	17	45
38	Musich	2	2	2	3	2	4	3	18	38
39	Ozminkowski	4	3	3	3	4	3	4	24	13
40	Ozminkowski*	2	3	5	4	4	4	4	26	4
41	*Pelletier*	1	1	1	3	3	1	5	15	49
42	*Schultz**	3	2	4	4	4	4	4	25	10
43	Sciacca	3	1	3	4	2	4	1	18	39
44	Serxner	3	2	2	3	4	3	4	21	26
45	*Serxner**	4	4	4	4	4	4	4	28	2
46	Shephard	3	1	2	3	1	1	1	12	55
47	Shephard	2	1	2	1	1	5	2	14	51
48	Shi	5	2	1	3	4	2	2	19	34
49	*Shi*	3	2	4	3	4	2	2	20	30
50	*Shimizu**	4	2	4	4	4	4	4	26	5
51	*Stave*	3	2	4	3	4	3	4	23	18
52	*Stein*	3	2	4	3	4	3	3	21	27
53	*Stein*	3	2	4	3	4	3	4	23	19
54	*Trudeau*	4	1	4	4	3	2	4	22	23
55	Wheat	2	2	1	2	2	1	2	12	56
56	Wood	3	1	2	4	4	4	3	21	28

* Top 10 ranked study. Names in italic represent new studies in this 2005 update of the meta-evaluation.

Table 4
Percent Reported Change in Economic Variables and Cost/Benefit Ratio

#	Author	Study Rank	Percent Change in Sick Leave Absenteeism	Percent Change in Health Costs	Percent Change in WC/DM* Costs	Cost/ Benefit Ratio
1	Aldana	6		−16.0†		3.60
2	*Aldana*	11	−20.0	−6.2		15.60
3	Baun	53	−33.4	−47.2		
4	Bertera	20	−12.2			
5	Bertera	14	−14.0			2.05
6	Blair	21	−24.0			
7	Bly	7		−7.4‡		
8	Bowne	35	−20.1	−45.7	−31.7	2.90
9	Cady	40			−25.6	
10	Chapman	8	−49.1	−32.4§		6.52
11	Conrad	41	−16.3			
12	Dalton	31		−18.4	−43.2	7.00
13	Erfurt	36				
14	Fries	29		−30.4		
15	Fries	15	−35.2	−48.8		5.96
16	Fries#	1				
17	Fries	9	−23.3	−26.7		6.00
18	Gibbs	46		−24.2		2.51
19	Goetzel	16		−14.2		
20	Goetzel	17		−32.4		
21	Golaszewski**	22	−19.0			3.40
22	*Hall-Barrow*	50				8.00
23	Harvey	3		−50.1		19.41††
24	*Haynes*‡‡	42		−21.7		
25	Henritze	52				10.10
26	Henritze§§	54	−68.2			
27	*Hodges*	47		−40.6	−59.8	
28	Jeffery	24	−22.0			
29	Jones	32	−31.6‖‖			
30	Knight	25	−33.5			
31	Lechner	43	−52.4			
32	*Leutzinger*	33				3.24
33	Leigh	12	−12.1	−32.0		4.73
34	Lorig	48		−7.2		
35	Lynch	37	−13.8			
36	*Maes*	44	−20.8			
37	*Maniscalco*	45				2.51
38	Musich	38		−19.6		
39	Ozminkowski	13		−41.0		4.64
40	Ozminkowski	4		−9.7		
41	*Pellitier*¶¶	49	−33.3			
42	*Schultz*	10			−36.5	2.30
43	Sciacca	39		−12.0		
44	*Serxner*	26		−16.0		
45	Serxner	2			−20.0	
46	Shephard	55		−34.5		
47	Shephard	51				4.85
48	Shi	34	−21.7	−28.4		3.07***
49	*Shi*	30	−11.0	−8.0†††		
50	*Shimizu*	5	−35.4			

Table 4
Continued

#	Author	Study Rank	Percent Change in Sick Leave Absenteeism	Percent Change in Health Costs	Percent Change in WC/DM* Costs	Cost/ Benefit Ratio
51	*Stave*	18				6.13
52	*Stein*‡‡‡	27				
53	*Stein*	19	−11.7	−29.7	−7.6	
54	*Trudeau*§§§	23				
55	Wheat	56		−31.0		
56	Wood	28	−36.3			3.50
Number of Studies			25	28	7	22
Average‖‖‖			−26.8	−26.1	−32.0	5.81

* WC/DM refer to workers' compensation costs and disability management claims cost. The names in italics represent new studies in this update of the meta-evaluation.

† For consistency, whole integers reported in the literature have been written as a decimal with an "x.0", and for cost/benefit ratios, an additional significant number has been added ("x.y0").

‡ An estimate of 56% for hospital costs, as a portion of overall costs, was made and then applied to the overall observed change to derive the measure of 7.4%.

§ The comparison provided is for external controls.

‖ This number is the average found with two of the three studies. The third study found no significant change.

¶ This article is included because it is one of the first to show a "dose-related" response with increasing intervention intensity and offers one of the few cost-effectiveness analyses in the economic cost/return literature.

This study was included because of its large population (i.e., >100,000 subjects) and its "virtual" style of interventions.

** This study also examined offsetting pension costs, decreased life insurance costs, increased productivity, and program revenue generation.

†† Imputed from data provided in the study.

‡‡ This study showed that wellness program participants had higher health costs during the study period but had several major limitations.

§§ Program also examined cardiac rehabilitation savings and savings from treadmill testing.

‖‖ Reductions were found in hourly employees only.

¶¶ This study also documented a 29.8% reduction in presenteeism losses during the study period.

Applying more rigorous statistical methods found that participants did not have a statistically significant lower per capita cost, but the rate of cost growth for participants was 12% lower than for nonparticipants.

*** This cost/benefit ratio was the highest of three different program intervention models.

††† The 8.0% reported reduction was in doctor visit rate. There was also a reported reduction of 1.0% in hospitalizations, but this reduction was not significant.

‡‡‡ This study provides an initial look at the relationship between an index of health risk (HQ) and per capita medical plan costs, sick leave, and STD days, but does not lend itself to percentage calculation. Data from this article was used to calculate selected percentages for the following article.

§§§ This study found that health promotion program participants experienced higher behavioral health service costs than nonparticipants, indicating that they were more likely to seek help for mental health issues after the program. No meaningful percentages could be extracted from the article.

‖‖‖ Averages values reported are simple mathematical means of the average reported effect size of each study. They do not reflect the sample size of each study.

and rigor reflected in the current peer review literature that examines the economic return associated with multicomponent worksite health promotion programs.

The median year of publication for all 56 studies was 1994. Comment: Exactly half of the 56 studies have been published since 1994, or within the past 11 years. The more recent studies continue to have larger average effects and higher cost benefit yields than the earlier literature.

The number of the combined subjects in all 56 studies was 483,232. Comment: This is a large number of study subjects and controls and represents a very diverse range of industries and types of organizations, including governmental and public sector agencies. Given that the average duration of the 56 studies was 3.66 years, it means that the number of person years of observation was close to 1.8 million. This represents a significant amount of experimentation and observation by any standard.

The use of health care utilization or cost analyses for the examination of a program's economic effect occurred in 28 studies, or 50.0% of all studies. Comment: Persistent health care cost escalation will likely continue to make this economic variable the most significant for employers. As a consequence, it is likely to continue to be the most frequently examined economic variable in future program studies.

The 56 studies were conducted in virtually all sizes of organizations. Comment: The distribution of studies by organization size are presented in Table 5.

The use of sick leave absenteeism was measured in 25 studies, or 44.6% of all studies. Comment: This indicates that sick leave effects are the second most prevalent economic variable used to examine the economic return associated with worksite health promotion programs. This may decrease as more employers combine sick days and vacation time into combined leave approaches. However, the growing use of a health and productivity management approach may work in the opposite direction, leading to continued efforts to examine sick leave effects of worksite health management efforts.

Table 5

Size of Study Population	Number of Studies	Percent of Studies
1–200	5	8.9
201–500	5	8.9
501–1000	8	14.2
1001–5000	23	41.0
5001–10,000	8	14.2
10,001+	7	12.8
Total	56	100.0

The use of a single economic measure, such as sick leave or health costs, was used in 39 studies, or 69.6% of all studies. Comment: More than two thirds of the studies examined a single economic variable, so total economic impact and return is likely to be understated. The idea is for each study to examine the following: health plan cost, sick leave cost, workers' compensation cost, and disability management and presenteeism cost effects. This approach to economic return would provide a more realistic assessment of the economic return associated with the program under review.

Only seven studies examined workers' compensation and/or disability management costs. Comment: The limited number of studies that examine these two economic variables continues to indicate that few health promotion programs have included injury prevention or a concern for costs associated with injuries.

Of the 10 highest scoring studies in the meta-evaluation, only one was published before 1990, and the combined subjects for the 10 best studies included 271,490 subjects, or 56.1% of all the subjects involved in all 56 studies. Comment: The more recent and larger studies receive the most weight in the meta-evaluation methodology and do reflect the most important research efforts.

The more recent studies also tend to use the newer prevention technologies, including the following: use of the Transtheoretical Model, Internet-provided health information, tailoring, benefits-linked financial incentives, telephonic high-risk intervention coaching, self-directed change, and annual required morbidity-based health risk appraisals (HRAs) used for individual targeting of interventions. Comment: These newer prevention technologies are also associated with higher levels of economic impact and return. Their use in the studies that have been published in the last 10 years have resulted in slightly more than double the average cost/benefit ratio reported in studies of traditional program models; in other words, instead of the typical 1:3.0 cost/benefit ratio, they report a ratio of 1:6.3.

Conclusion

This meta-evaluation update provides a systematic look at the quality of the economic return evaluation literature for multicomponent worksite health promotion programs. The summary evidence is very strong for average reductions in sick leave, health plan costs, and workers' compensation and disability costs of slightly more than 25%. This continues to have profound implications for American as well as global employers in developed nations and should eventually lead to the institutionalization of appropriately designed and executed worksite health promotion programming for all working populations. Based on these results, worksite health promotion represents one of the most significant strategies for enhancing the productivity of American workers at a time when their average age is increasing faster than that of many of its global competitors.[8] This is particularly true within the context of a Health and Productivity Management (HPM) approach, in which health plan cost, sick leave cost, workers' compensation costs, disability management costs, and presenteeism costs are a primary objective.[9]

Within this 2005 update of the 2003 meta-evaluation, the earlier general findings have been confirmed with the findings and results of the 16 additional studies. It is clear that a growing body of scientific literature documents the importance of worksite health promotion initiatives for working populations. Additionally, the HPM perspective is becoming increasingly critical for American business and for our global trading partners. Abstracts of the newly included articles can be found in the Selected Abstracts section that follows.

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Other Useful Resources

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Pelletier K. A review and analysis of the health and cost-effective outcome studies of comprehensive health promotion and disease prevention programs at the worksite: 1991–1993 update, (II). *Am J Health Promot.* 1993;8:50–62.

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Selected Abstracts

Financial impact of a comprehensive multisite workplace health promotion program.

Aldana SG, Merrill RM, Price K, Hardy A, Hager R.

INTRODUCTION: The purpose of this study is to determine if the Washoe County School District Wellness Program impacted employee health care costs and rates of absenteeism over a 2-year period. METHODS: Outcome variables included health care costs and absenteeism during 2001–2002. Data were collected on 6246 employees over a 6-year period from 1997–2002. Baseline health claims costs and absenteeism from 1997–2000, age, gender, job classification, and years worked at the school district were treated as covariates. Logistic regression was used to compare 2-year costs and absenteeism rates between non-participants and employees who participated for 1 and 2 years. RESULTS: No significant differences in health care costs were found between those who participated in any of the wellness programs and those who did not participate. There was a significant negative association between participation and absenteeism; program participants averaged three fewer missed workdays than those who did not participate in any wellness programs. The decrease in absenteeism translated into a cost savings of 15.60 US dollars for every dollar spent on the program. CONCLUSIONS: After controlling for several confounding variables, wellness program participation was associated with large reductions in employee absenteeism.

Prev Med. 2005;40:131–7.

A collaborative model for employee health and nursing education. Successful program.

Hall-Barrow J, Hodges LC, Brown P.

Combining the talents and skills of CON faculty and students with those of the CAVHS health professionals has demonstrated the synergy that can be obtained through collaboration. The health care needs of CAVHS employees continue to provide a fertile ground for the education, service, and research missions of the CON. The Program outcomes and employee satisfaction ratings, combined with the positive educational outcomes in the CON, have led to strengthened relationships between nursing education and the veterans health care system. The results of this partnership are illustrated by the recent signing of an additional 3-year contract for the CAVHS.

AAOHN J. 2001;49:429–36.

Do employees participating in voluntary health promotion programs incur lower health care costs?

Haynes G, Dunnagan T, Smith V.

During the past two decades there has been a rapid increase in the number of wellness activities within public and private companies. A rationale for implementing worksite wellness programs has been the assumption that wellness programming can contain health-related costs. This investigation examined the relationship between health insurance costs and employee wellness program participation using a sample of 1,757 university employees over a three-year period. Based upon empirical models and analytic techniques that are appropriate for these investigations, the authors suggest that voluntary wellness programs may face a serious adverse selection problem in that relatively unhealthy individuals may self-select into wellness programming. Specifically, the authors show that employees who participate in worksite wellness programming incur higher rather than lower claims costs.

Health Promot Int. 1999;14:43–51.

Reducing overall health care costs for a city municipality: a real life community based learning model.

Hodges LC, Harper TS, Hall-Barrow J, Tatom ID.

City municipalities implementing health and wellness programs patterned after North Little Rock, Arkansas, can significantly reduce the cost of health care for employees, as well as reduce costs associated with workers' compensation claims and lost time caused by injury. In addition to primary care services, effective programs include health risk assessments through pre-placement physicals, employee physicals, drug screening, employee health and wellness promotion programs, and immunization and registry. In implementing the program, a team from the University of Arkansas for Medical Sciences College of Nurs-

ing worked with city officials to establish a steering committee, safety initiatives through first responders, systems for monitoring immunizations, criteria for pre-placement physicals, and an employee health and wellness program. While the benefits for the city are well documented, the contract also created opportunities for education, research, and services in a real life community-based learning laboratory for students in the College of Nursing. In addition, it provided opportunities for faculty to participate in faculty practice and meet the College's service missions. The College's model program holds promise for use by other major health care centers across the region and nation.

AAOHN J. 2004;52:247–53.

Predicting the ratio of benefit to cost in a cardiovascular disease prevention program.

Leutzinger J, Hawes C, Hunnicutt D, Richling D.

Worksite health promotion programs are often required to justify their existence. But the time needed to produce results from most chronic disease-prevention programs makes justifying the cost arduous—if not impossible. A program at Union Pacific Railroad identified individuals considered at-risk for cardiovascular disease. UPRR then worked with the individuals to reduce their risk. The forecasted ratio of benefit to cost after five years was calculated at $3.24.

Manag Employee Health Benefits. 1995:1–10.

Effects of a Dutch work-site wellness-health program: the Brabantia Project.

Maes S, Verhoeven C, Kittel F, Scholten H.

OBJECTIVES: This study examined a project designed to improve the health and wellness of employees of Brabantia, a Dutch manufacturer of household goods, by means of lifestyle changes and changes in working conditions. METHODS: The workers at one Brabantia site constituted the experimental group, and the workers from two other sites formed the control group. Biomedical variables, lifestyles, general stress reactions, and quality of work were measured identically in both groups at baseline and 1, 2, and 3 years later. During this period, there was continuous registration of absenteeism. RESULTS: The interventions brought about favorable short-term changes in terms of health risks, and there were stable effects on working conditions (especially decision latitude) and absenteeism. CONCLUSIONS: A combination of interventions directed at both lifestyles and the work environment can produce extensive and stable effects on health-related variables, wellness, and absenteeism.

Am J Public Health. 1998;88:1037–41.

Decreased rate of back injuries through a wellness program for offshore petroleum employees.

Maniscalco P, Lane R, Welke M, Mitchell JH, Husting L.

High rates of injury, particularly those for back injuries, at an offshore petroleum unit were addressed through an intensive wellness program initiated in 1991. The number of all types of injuries, including back injuries, decreased between 1991 and 1995. The number of back injuries decreased from nine in 1987 to four in 1992 and was zero in 1993. Although there are inadequate data to provide power for a significant result, other criteria suggest a causal relationship. The results are consistent with the few published studies that suggest a decrease in the number of injuries in association with exercise and perhaps with modification of psychosocial risk factors. Calculations suggest a cost savings of over $800,000 and a return on investment of $2.51, as well as avoidance of pain and injury.

J Occup Environ Med. 1999;41:813–20.

Change in health risks and work productivity over time.

Pelletier B, Boles M, Lynch W.

We sought to examine the relationship between changes in health risks and changes in work productivity. Pre- and postanalysis was conducted on 500 subjects who participated in a wellness program at a large national employer. Change in health risks was analyzed using McNemar chi-square tests, and change in mean productivity was analyzed using paired t tests. A repeated measures regression model examined whether a change in productivity was associated with a change in health risks, controlling for age and gender. Individuals who reduced one health risk improved their presenteeism by 9% and reduced absenteeism by 2%, controlling for baseline risk level, age, gender, and interaction of baseline risk and risk change. In conclusion, reductions in health risks are associated with positive changes in work productivity. Self-reported work productivity may have utility in the evaluation of health promotion programs.

J Occup Environ Med. 2004;46:746–54.

Influence of participation in a worksite health-promotion program on disability days.

Schultz AB, Lu C, Barnett TE, Yen LT, McDonald T, Hirschland D, Edington DW.

This study assessed the impact of health-promotion program participation on short-term and long-term disability absence days during a 6-year period in a manufacturing

company. Male, hourly, active employees (n = 4189) were analyzed from 1995 to 2000. Disability absences were compared for program participants and nonparticipants from baseline (1995) through 5 years of the program. The percentage of nonparticipants absent on any given day was greater than that of participants. Moreover, the average number of disability absence days incurred by nonparticipants significantly increased from baseline to program year 5 compared with participants. The total amount saved each year in disability absence days for the 2596 program participants was $623,040, which resulted in a savings-to-cost ratio of 2.3 per year. Participation in worksite health-promotion programs may lead to reduced disability days in a manufacturing worksite population.

J Occup Environ Med. 2002;44:776–80.

The relationship between health promotion program participation and medical costs: a dose response.

Serxner SA, Gold DB, Grossmeier JJ, Anderson DR.

The purpose of this research was to determine whether participation in the health risk assessment (HRA) component of a comprehensive health promotion program has an impact on medical costs, and whether the addition of participation in interventions has an incremental impact. Program participants (n = 13,048) were compared with non-participants (n = 13,363) to determine program impact on paid medical costs. Overall, HRA participants cost an average of $212 less than eligible non-participants. As HRA participation increased, cost savings also increased. Additionally, although participation in either an HRA or activities alone resulted in savings, participation in both yielded even greater benefits. The findings indicate that there is an independent benefit of each of these elements of participation, and that the sum of the elements provides a greater benefit than the impact of either of the individual elements alone.

J Occup Environ Med. 2003;45:1196–200.

Worksite health promotion and changes in medical care use and sick days.

Shi L.

This study examined the relative effectiveness of different levels of health promotion interventions on changes in medical care use and sick days in a California utility company. A nonequivalent multiple comparison group design was used for the two-year (1988–1990) health promotion interventions, comparing (a) high intensity (i.e., high risk targeting), (b) medium intensity (i.e., group support), (c) low intensity (i.e., self-care), or (d) assessment only control. The results indicated that only the high-intensity group exhibited a consistent decline in doctor visits, hospitalization, injury, and illness days for both men and women.

Health Values. 1993;17:9–17.

A psychosocial-approached health promotion program at a Japanese worksite.

Shimizu T, Nagashima S, Mizoue T, Higashi T, Nagata S.

This study examined trends of sickness absence before and after a psychosocial-approached health promotion program (HPP) at a Japanese worksite. The subjects were 1029 male employees working at a manufacturing company from April 1991 to March 1999. The HPP was performed from April 1995 to decrease sickness absence through helping to improve all employees' lifestyles according to a psychosocial approach incorporating six characteristics: 1) concept based on the population strategy, 2) use of a health risk appraisal (HRA), 3) setting easy lifestyle targets, 4) praising the employees' personal lifestyle initiatives, 5) supported (sponsored) by the management, 6) award of subsidiary payments. Sickness absence was considered to be consecutive days calculated by medical certification and company records. Absences due to musculoskeletal diseases and total diseases decreased, when comparing four-year periods before and after the program's introduction. In this report we show that trends of sickness absence changed after the introduction of the psychosocial-approached health promotion program.

J UOEH. 2003;25:23–34.

Quantifiable impact of the contract for health and wellness: health behaviors, health care costs, disability, and workers' compensation.

Stave GM, Muchmore L, Gardner H.

Current literature about the long-term impacts of corporate health and wellness programs has brought to light new evidence about the cost savings associated with health-promotion interventions. A critical element in these initiatives is attracting the participation of employees at risk for high benefits use. This study presents evidence that suggests accomplishing this task has economic savings implications to large employers. A health and wellness intervention program offered at GlaxoSmith-Kline, entitled the Contract for Health and Wellness, is examined. Focusing on a group of 6049 employees, the study examines the impact on health behaviors and on integrated health benefits use of this continuously employed population from 1996 to 2000. Total benefits costs are examined for participants and non-participants, and

the annual savings associated with the isolated impact of the program are, on average, $613 per participant. Reductions in disability costs accounted for the majority of these savings.

J Occup Environ Med. 2003;45:109–17.

Carrots and sticks: impact of an incentive/disincentive employee flexible credit benefit plan on health status and medical costs.

Stein AD, Karel T, Zuidema R.

PURPOSE: Employee wellness programs aim to assist in controlling employer costs by improving the health status and fitness of employees, potentially increasing productivity, decreasing absenteeism, and reducing medical claims. Most such programs offer no disincentive for nonparticipation. We evaluated an incentive/disincentive program initiated by a large teaching hospital in western Michigan. METHODS: The HealthPlus Health Quotient program is an incentive/disincentive approach to health promotion. The employer's contribution to the cafeteria plan benefit package is adjusted based on results of an annual appraisal of serum cholesterol, blood pressure, tobacco use, body fat, physical fitness, motor vehicle safety, nutrition, and alcohol consumption. The adjustment (health quotient [HQ]) can range from −$25 to +$25 per pay period. We examined whether appraised health improved between 1993 and 1996 and whether the HQ predicted medical claims. RESULTS: Mean HQ increased slightly (+$0.47 per pay period in 1993 to +$0.89 per pay period in 1996). Individuals with HQs of less than −$10 per pay period incurred approximately twice the medical claims of the other groups (test for linear trend, $p = .003$). After adjustment, medical claims of employees in the worst category (HQ < −$10 per pay period) were $1078 (95% confidence interval $429–$1728) greater than those for the neutral (HQ between −$2 and +$2 per pay period) category. A decrease in HQ of at least $6 per pay period from 1993 to 1995 was associated with $956 (95% confidence interval $264–$1647) greater costs in 1996 than was a stable HQ. CONCLUSIONS: The HealthPlus Health Quotient program is starting to yield benefits. Most employees are impacted minimally, but savings are accruing to the employer from reductions in medical claims paid and in days lost to illness and disability.

Am J Health Promot. 1999;13:260–7.

Financial incentives, participation in employer-sponsored health promotion, and changes in employee health and productivity: HealthPlus Health Quotient Program.

Stein AD, Shakour SK, Zuidema RA.

Employer-sponsored health promotion can improve employee health and morale and reduce medical claims and absenteeism. Effectiveness depends on the participation of those employees who are at increased risk of ill health. HealthPlus Health Quotient is an incentive/disincentive approach to health promotion. The employer's contribution to the employee cafeteria-plan benefit package is adjusted on the basis of an annual health risk appraisal. We evaluated whether this financial incentive/disincentive predicted participation in health promotion activities, and whether participation improved future health risk and productivity. In the first year, participation was proportional to overall health risk ($P < 0.01$). Participation in targeted programs was proportional to levels of body fat, cholesterol, and blood pressure. Participation in activity-related health promotion was proportional to prior-year activity or fitness scores. Health promotion participants improved their subsequent-year health risk more than did non-participants. Participation was associated with reduced illness-related absenteeism and (although inconsistently) with medical claims paid and short-term disability.

J Occup Environ Med. 2000;42:1148–55.

Utilization and cost of behavioral health services: employee characteristics and workplace health promotion.

Trudeau JV, Deitz DK, Cook RF.

The study sought to (1) model demographic and employment-related influences on behavioral health care utilization and cost; (2) model behavioral health care utilization and cost influences on general health care cost, job performance, and earnings; and (3) assess workplace-based health promotion's impact on these factors. Behavioral health care utilization was more common in employees who were female, over age 30, with below-median earnings, or with above-median general (non-behavioral) health care costs. Among employees utilizing behavioral health care, related costs were higher for employees with below-median earnings. Employees utilizing behavioral health care had higher general health care costs and received lower performance ratings than other employees. Health promotion participants were compared with a non-participant random sample matched on gender, age, and pre-intervention behavioral health care utilization. Among employees without pre-intervention behavioral health care, participants and non-participants did not differ in post-intervention utilization. Among employees utilizing behavioral health care adjusting for pre-intervention costs, participants had higher short-term post-intervention behavioral health care costs than non-participants.

J Behav Health Serv Res. 2002;29:61–74.

Closing Thoughts

By Michael P. O'Donnell, PhD, MBA, MPH

As I read through this meta-analysis written by Larry Chapman, I had two thoughts. The first, was "WOW," the evidence is quite compelling that health promotion programs can reduce medical costs and absenteeism. The second was "What will the critics say about this review and its conclusion?"

The critics may take issue with including the studies that used nonexperimental designs in this review. Dropping those would eliminate 19 studies. Critics may also take issue with including studies that used self-report with no independent verification. This would eliminate four additional studies and leave 33 studies. I would agree with the critics on excluding these articles from the analysis, but I appreciate their being included in the tables to provide a more complete view of the literature. Dropping those 23 studies would reduce the mean sick leave to 23.62 and worker's compensation savings to 23.95 and would increase the mean health cost savings to 28.04. It would also reduce the number of studies with cost/benefit ratios from 22 to 14 studies, but the ratio for the new studies would drop only slightly to $5.04 in savings for each dollar invested. Critics might also be concerned about publication and submission biases. Submission bias means that authors are more likely to submit studies that show positive returns. Publication-biased journals are more likely to publish studies that show positive returns. The critics would again have valid concerns. Overall, results published in the literature tend to reflect the better-than-average program.

So, how much evidence do we need? A few years ago, I had the pleasure of having dinner with Gerald Greenwald, former Chairman of Chrysler Motors and of United Airlines Corporation, and a current member of the board of directors of Aetna. I was lamenting that fact that only 14 studies had been published on the cost benefit analysis of workplace health promotion programs. His response was that 14 studies was more than enough for a business executive to make a decision on an investment as small as the cost of a health promotion program, and in fact, 14 studies offer more evidence than is normally available to support investments of much greater magnitude. The decisions made by General Motors (GM) are in stark contrast to that perspective. GM has widely reported that it expects to spend $5.6 billion on medical costs in 2005; this is 40% more than it earned in profits in 2004. The GM health promotion team has published more studies in the peer-reviewed literature than any other program, and these studies show a clear relationship between the high medical costs GM is experiencing and the lifestyle risk factors of its employees. Despite having a talented health promotion program staff and a medical department that knows how to create world-class health promotion programs, GM's top management continues to fund the program at a level we would not expect to produce much impact in health improvement or cost savings.

So how much evidence do we need? My colleagues in the health promotion business tell me they are experiencing the fastest growth in their history, with revenues increasing 30% to 100% for many of them. Clearly, many large employers are getting the message that health promotion programs are an important part of the solution to increasing medical costs and probably have an even greater payoff in higher productivity. These employers do not need more evidence. Unfortunately, most medium and small employers do not have health promotion programs, and most of those programs are underfunded. So, we need to continue to conduct studies on the financial impact of health promotion programs and focus on studies with rigorous methodology. Probably more important, we need to conduct studies on what works best to attract the largest possible portion of the population, what strategies are most effective and cost efficient, what strategies produce lasting changes, and what works best in small business situations.