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# **Meta-Evaluation of Worksite Health Promotion Economic Return Studies**

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## **Setting the Stage**

As health care costs continue to heat up and Congressional interest returns from the mid-term elections to legislative activity, health reform is likely to be again near the top of the agenda. As solutions to unacceptable levels of health care cost increases are considered, health promotion and prevention issues will likely be in the spotlight. In preparation for this likely eventuality, this issue of the Art of Health Promotion will revisit and update the discussion of the economic return associated with multi-component worksite health promotion programs. Our focus will be a recently completed meta-evaluation of the peer review literature concerning the economic impact of worksite health promotion programs.

The contents of this edition include excerpts from the book "Proof Positive: An Analysis of the Cost-Effectiveness of Worksite Wellness," Fifth Edition, revised and expanded in August of 2002. The book applies the meta-evaluation methodology developed and refined by Windsor and Orleans and Boyd and Windsor (Windsor, 1986 & Boyd, 1993) to studies of multi-component worksite health promotion programs. The highlights of the meta-evaluation are reprinted here with permission.

## **Overview of the Literature Search Process**

The research and evaluation literature on health promotion and wellness programs in workplace settings is both complex and voluminous. The literature is characterized by more than 450 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. For the purposes of this review and analysis, the literature was divided into original and secondary reports of worksite health promotion program evaluation efforts and the secondary literature discarded. In addition, a distinction was made in this analysis between evaluation studies of single program components or intervention (e.g., a smoking cessation program evaluation) versus multiple or more comprehensive program

interventions (e.g., smoking cessation, physical activity, cardiovascular health, weight management, stress management, etc.) Another element of the approach was a search process using both terms “health promotion,” and “wellness.” The study selection criteria used are described as follows:

## Study Selection Criteria

For the purposes of this 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.
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. **Examine Economic Variable:** Qualifying articles must evaluate one or more economic parameter associated with working populations or characteristics of organizational life as part of the evaluation design and measurement strategy. This typically includes any one or combination of: health benefit plan costs, health care utilization indicators, sick leave absenteeism, workers’ compensation costs, disability management costs or pension effects.
6. **In Peer Review Journal:** Qualifying articles must be published in a peer review 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 twelve months in duration.

## Literature Search Process

The search process used to identify the relevant literature that is analyzed in this publication 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 late June, 2002 and utilized four search terms, "health promotion," "cost-effectiveness," "worksite," and "evaluation," in an expanded string search format.

**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:

- ☑ Cost/benefit
- ☑ Cost-effectiveness
- ☑ Disability Experience
- ☑ Economic Analysis
- ☑ Evaluation
- ☑ Health Care Cost
- ☑ Health Promotion
- ☑ Health and Productivity Management
- ☑ Prevention
- ☑ Program
- ☑ Sick Leave Absenteeism
- ☑ Wellness
- ☑ Workers' Compensation
- ☑ Worksite

This search was conducted in late July, 2002 at the Health Sciences Library at the University of Washington in Seattle, WA.

**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 five 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
- ✓ Annuals 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
- ✓ Public Health Reports

**Step #5 Colleague inquiry.** A variety of professional colleagues were approached in late 2001 to determine if any applicable articles may be in publication that were likely to meet the qualifying criteria.

The literature search process described above identified forty-two (42) qualifying evaluation studies of the economic impact and return associated with worksite health promotion programs and are formally analyzed in this meta-evaluation. These studies are identified in **Figure 1**.

## **Description of Meta-Evaluation Approach**

The purpose of the meta-evaluation of the forty-two 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 is described below. The approach used is an adaptation of the methodology developed by Windsor and Orleans, and further refined by Boyd and Windsor 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 assigned for each of the meta-evaluation criteria used for each study.

The methodological criteria adapted for use in this meta-evaluation were 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 **Figure 2**.

In the meta-evaluation for each criterion, a specified number of points are assigned based on the characteristics of each evaluation study. Within this methodological approach, the higher the number of total points from all the methodological criteria, the greater the 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 the seven meta-evaluation criterion, their results are then summarized with particular attention to selected variables.

## Results of Meta-Evaluation

The results of the meta-evaluation are shown in **Figure 3**. The top ten ranked studies are indicated with an asterisk.

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 multi-component worksite health promotion programs.

## Summary of Individual Study Findings

**Figure 4** below summarizes the percent change in economic variables reported in each of the forty-two (42) studies reviewed in this meta-evaluation.

## Discussion of Findings

This meta-evaluation illustrates the 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, 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 show a surprising amount of similarity. Additional findings and a few comments about each are as follows:

- ✓ The forty-two studies presented here provide a range of meta-evaluation scores from 12 to 30. **Comment:** This demonstrates the wide range of varying quality and rigor reflected in the current literature that examines the economic return associated with worksite health promotion programs.
- ✓ The median year of publication for all forty-two (42) studies was 1992. **Comment:** Exactly half the 42 studies have been published since 1992, or within the past ten years. The more recent studies have larger average effects and higher cost benefit yields.
- ✓ The number of the combined subjects in all forty-two (42) studies was 537,319. **Comment:** This is a large number of study subjects and controls and represents a very diverse range of industries and types of organizations including public sector agencies. Given that the average duration of the 42 studies was 3.6 it means that the number of person years of observation were close to 1.5 million. This represents a significant amount of experimentation by any standard.

- ✓ The use of health care utilization or cost analyses for the examination of a program's economic effect occurred in 27 studies or 64.2% of all studies. **Comment:** Health care cost escalation and the highly fluctuating pattern of health care cost increases will likely continue to make this economic variable the most significant. As a result, it is likely that health care costs will be the most frequent economic variable in future program studies.
- ✓ The use of sick leave absenteeism for the examination of a program's economic effect occurred in 23 studies or 54.7% of all the studies. **Comment:** This indicates that sick leave effects are the second most prevalent economic variable used to examine the economic impact and return associated with worksite health promotion programs. This may decrease as more employers combine sick days and vacation time in combined leave program .
- ✓ The use of a single economic measure, such as sick leave or health costs was used in 25 studies or 59.5% of all studies. **Comment:** Most studies examine a single economic variable, so total economic impact and return of a program is likely to be understated.
- ✓ There are only four studies that examine workers' compensation and/or disability management costs. **Comment:** The limited number of studies that examine these two economic variables indicates that few health promotion programs have included injury prevention or a concern for costs associated with injuries.
- ✓ Of the ten highest scoring studies in the meta-evaluation, only one was published before 1990 and the combined subjects for the ten studies included 287,985 subjects, or 53.5% of all the subjects involved in all forty-two (42) studies. **Comment:** The more recent research in the economic impact and return from worksite health promotion programs tends to be better-designed and larger studies.
- ✓ The more recent studies also tend to use the newer prevention technologies including: use of the Transtheoretical Model, Internet provided health information, tailoring, benefits-linked financial incentives, telephonic high risk intervention, self-directed or guided change and annual required morbidity-based health risk appraisals (HRAs) used for individual high risk targeting. **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 ten years have resulted in slightly more than double the average cost/benefit ratio reported in studies of traditional program models.

## Conclusion

This meta-evaluation provides a standardized look at the quality of the economic evaluation literature for multi-component worksite health promotion programs. The 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 has profound implications for all American employers and should eventually lead to the institutionalization of appropriately designed and executed worksite health promotion programming in all working populations. Based on these results, worksite

health promotion represents one of the key strategies for maintaining the productivity of American workers at a time when their average age is increasing faster than most of our global competitors.

## Table 1: Studies Meeting Meta Evaluation Selection Criteria

- #1. Aldana, Steven G., et al., (1993) Influence of a mobile worksite health promotion program on health care costs, *American Journal of Preventive Medicine*, 9(6): 378-383.
- #2. Aldana, Steven G., et al., (2002) A six year follow-up of the effect of a worksite health promotion program on health care costs, In publication.
- #3. Baun, William B., et al., (1986) A preliminary investigation: effect of a corporate fitness program on absenteeism and health care cost, *Journal of Occupational Medicine*, November; 28(1): 18-22.
- #4. Bertera, Robert L., (1993) Behavioral risk factor and illness day changes with workplace health promotion: two-year results, *American Journal of Health Promotion*, May/June; 7(5): 365-373.
- #5. Bertera, Robert L., (1990) The effects of workplace health promotion on absenteeism and employment costs in a large industrial population, *American Journal of Public Health*, September; 80(9): 1101-1105.
- #6. Blair, Steven N., et al., (1986) Health promotion for educators: impact on absenteeism, *Preventive Medicine*; 15:166-175.
- #7. Bly, Janet L., et al., (1986) Impact of worksite health promotion on health care costs and utilization: evaluation of Johnson & Johnson's Live for Life Program," *Journal of the American Medical Association*, December 19; 256(23): 3235-3240.
- #8. Bowne, Donald W., et al., (1984) Reduced disability and health care costs in an industrial fitness program," *Journal of Occupational Medicine*, November; 26(11): 809-816.
- #9. Cady, Lee D., et al., (1985) Program for increasing health and physical fitness of fire fighters," *Journal of Occupational Medicine*, February; 27(2): 110-114.
- #10. Chapman, Larry, et al., (2002) Ten-year economic evaluation of an incentive-based worksite health promotion program, *Journal of Occupational and Environmental Medicine*, In publication.
- #11. Conrad, Karen M., et al., (1990) Effect of worksite health promotion programs on employee absenteeism," *AAOHN Journal*, December; 38(12): 573-580.
- #12. Dalton, Bruce A., and Harris, Jeffrey, (1991) A comprehensive approach to corporate health management, *Journal of Occupational Medicine*, March; 33(3):338-348.
- #13. Erfurt, John C., et al., (1991) The cost-effectiveness of work-site wellness programs for hypertension control, weight loss, and smoking cessation, *Journal of Occupational Medicine*, September: 33(9): 962-970.
- #14. Fries, James F., et al., (1994) Randomized controlled trial of cost reductions from a health education program: the California Public Employees' Retirement System (PERS) study, *American Journal of Health Promotion*, January/February; 8(3): 216-223.
- #15. Fries, James F., et al., (1993) Two-year results of a randomized controlled trial of a health promotion program in a retiree population: the Bank of America study, *American Journal of Medicine*, May; 94: 455-462.
- #16. Fries, James F., et al., (1992) Health risk changes with a low-cost individualized health promotion program: effects at up to 30 months, *American Journal of Health Promotion*, May/June; 6(5): 364-371.
- #17. Fries, James F., and McShane, Dennis, (1998) Reducing need and demand for medical services in high risk persons, *Western Journal of Medicine*, October; 169(4): 201-207.
- #18. Gibbs, James O., et al., (1985) Work-site health promotion; five year trend in employee health care costs, *Journal Of Occupational Medicine*, November; 27(11): 826-830.
- #19. Goetzel, Ron Z., et. al.,(1998) Health care costs of worksite health promotion participants and non-participants, *Journal of Occupational and Environmental Medicine*, April; 40(4): 341-346.
- #20. Goetzel, Ron Z., et. al., (1998) Differences between descriptive and multivariate estimates of the impact of Chevron Corporation's Health Quest program on medical expenditures, *Journal of Occupational and Environmental Medicine*, June; 40(6):.538-545.
- #21. Golaszewski, Thomas, et al., (1992) A benefit-to-cost analysis of a work-site health promotion program, *Journal of Occupational Medicine*, December; 34(12): 1164-1172.
- #22. Harvey, Mary R., et al., (1993) The impact of a comprehensive medical benefits cost management program for the city of Birmingham: results at five
- #23. years, *American Journal of Health Promotion*, March/April; 7(4): 296-303.



- #24. Henritz, Joanne, et al., (1992) LIFE CHECK: A successful, low touch, low tech, in-plant, cardiovascular disease risk identification and modification program, *American Journal of Health Promotion*, November/December; 7(2): 129-136.
- #25. Henritz, Joanne, and H.L. Brammell, (1989) Phase II cardiac wellness at the Adolph Coors Company, *American Journal of Health Promotion*, September/October; 4(1): 25-31.
- #26. Jeffery, Robert W., et al., (1993) Effects of work-site health promotion on illness-related absenteeism, *Journal of Occupational Medicine*, November; 35(11): 1142-1146.
- #27. Jones, Robert C., et al., (1990) A study of a work site health promotion program and absenteeism, *Journal of Occupational Medicine*, February; 32(2): 95-99.
- #28. Knight, Kevin K., et al., (1994) An evaluation of Duke University's LIVE FOR LIFE health promotion program on changes in worker absenteeism, *Journal of Occupational Medicine*, May; 36(5): 533-534.
- #29. Lechner, Lillian, et al., (1997) Effects of an employee fitness program on reduced absenteeism, *Journal of Occupational and Environmental Medicine*, September; 39(9): 827-831.
- #30. Leigh, J. Paul, et al., (1992) Randomized controlled study of a retiree health promotion program: The Bank of America study, *Archives of Internal Medicine*, June; 152: 1201-1206.
- #31. Lorig, Kate, et al., (1984) A workplace health education program that reduces outpatient visits, *Medical Care*, 23(9):1044-1054.
- #32. Lynch, Wendy D., et al., (1990) Impact of a facility-based corporate fitness program on the number of absentees from work due to illness, *Journal of Occupational Medicine*, January; 32(9): 9-12.
- #33. Musich, Shirley A., et al., (2000) Effectiveness of health promotion programs in moderating medical costs in the USA, *Health Promotion International*, 15(1): 5-15.
- #34. Ozminkowski, Ronald J., et al., (1999) A return on investment evaluation of the Citibank, N.A., Health Management Program, *American Journal of Health Promotion*, September/October; 14(1):31-43.
- #35. Ozminkowski, Ronald J., et al., (2002) Long term impact of Johnson & Johnson's Health & Wellness Program on health care utilization and expenditures, *Journal of Occupational and Environmental Medicine*, January; 44(1): 21-29.
- #36. Sciacca, John, et al., (1993) The impact of participation in health promotion on medical costs: a reconsideration of the Blue Cross and Blue Shield of Indiana study, *American Journal of Health Promotion*, May/June; 7(5): 374-395.
- #37. Serxner, Seth, et al., (2001) The impact of a worksite health promotion program on short term disability usage, *Journal of Occupational and Environmental Medicine*, January; 43(1): 25-29.
- #38. Shephard, Roy J., et al., (1982) The influence of an employee fitness and lifestyle modification program upon medical care costs, *Canadian Journal of Public Health*, July/August; 73: 259-263.
- #39. Shephard, Roy J., (1992) Twelve years experience of a fitness program for the salaried employees of a Toronto Life Assurance Company, *American Journal of Health Promotion*, March/April; 6(4): 292-301.
- #40. Spilman, Mary Ann, (1986) Effects of a corporate health promotion program, *Journal of Occupational Medicine*, April; 28(4): 285-289.
- #41. Shi, Leiyu, (1993) Health promotion, medical care use, and costs in a sample of worksite employees," *Evaluation Review*, October; 17(5): 475-487.
- #42. Wheat, John R., (1992) Does workplace health promotion decrease medical claims? *American Journal of Preventive Medicine*; 8(2): 110-114.
- #43. Wood, E. Andrew, et al., (1989) An evaluation of lifestyle risk factors and absenteeism after two years in a worksite health promotion program," *American Journal of Health Promotion*, November/ December; 4(2): 128-133.

**Table 2**  
**Meta-Evaluation Criteria**

**Criterion #1 *Research Design (e.g., “Design”)***

<b>Points</b>	<b>Meta- Evaluation Criteria Sub-Components</b>
5	Randomized pre-test and post-test, plus matched control group with multiple replications
4	Equivalent control group design, with pre-test and post-test with multiple replications
3	Non-equivalent control group design, with pre-test and post-test with multiple replications
2	Subjects as own controls, with pre-test and post-test with multiple replications
1	Subjects as own controls, with pre-test and post-test with single replication
1 pt bonus	For control versus experimental group equivalence

**Criterion #2 *Sample Size (e.g., “Sample”)***

<b>Points</b>	<b>Meta-Evaluation Criteria Sub-Components</b>
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 1,000 to 9,999
1	Sample size ≤ 999
1 pt bonus	For controlling for sample attrition

**Criterion #3 *Quality of Baseline Delineations (e.g., “Baseline”)***

<b>Points</b>	<b>Meta-Evaluation Criteria Sub-Components</b>
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 year of baseline conducted prior to the intervention

**Criterion #4 *Quality of Measurements Used (e.g., “Measurements”)***

<b>Points</b>	<b>Meta-Evaluation Criteria Sub-Components</b>
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 versus control groups

**Criterion #5 *Appropriateness and Replicability of Interventions (e.g., “Interventions”)***

<b>Points</b>	<b>Meta-Evaluation Criteria Sub-Components</b>
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”)***

<b>Points</b>	<b>Meta-Evaluation Criteria Sub-Components</b>
5	Observational period > 120 months
4	Observational period from 49 to 120 months
3	Observational period from 25 to 48 months
2	Observational period from 13 to 24 months
1	Observational period = 12 months
1 pt bonus	For equal observation period for experimental and control group observations

**Criterion #7 *Experimental Time Period (e.g., “Recentness”)***

<b>Points</b>	<b>Meta-Evaluation Criteria Sub-Components</b>
5	Last year of intervention conducted after 1992
4	Last year of intervention conducted from 1989 to 1991
3	Last year of intervention conducted from 1986 to 1988
2	Last year of intervention conducted from 1983 to 1985
1	Last year of intervention conducted prior to 1983

**Table 3**

#	Author	Meta-Evaluation Criterion Scores								
		#1	#2	#3	#4	#5	#6	#7	Total	Rank
1	<b>Aldana*</b>	4	2	4	4	4	3	4	<b>25</b>	<b>6</b>
2	<b>Aldana</b>	4	2	4	3	3	3	5	<b>24</b>	<b>12</b>
3	<b>Baun</b>	1	1	2	3	2	2	2	<b>13</b>	<b>40</b>
4	<b>Bertera</b>	3	3	4	3	4	3	3	<b>23</b>	<b>14</b>
5	<b>Bertera</b>	4	4	3	3	5	3	2	<b>24</b>	<b>13</b>
6	<b>Blair</b>	4	3	5	4	3	2	2	<b>23</b>	<b>15</b>
7	<b>Bly*</b>	4	3	4	4	5	4	2	<b>26</b>	<b>3</b>
8	<b>Bowne</b>	3	2	4	3	1	4	1	<b>18</b>	<b>31</b>
9	<b>Cady</b>	2	2	4	3	1	4	1	<b>17</b>	<b>34</b>
10	<b>Chapman*</b>	3	2	4	3	4	5	5	<b>26</b>	<b>4</b>
11	<b>Conrad</b>	3	2	2	3	2	4	3	<b>19</b>	<b>28</b>
12	<b>Dalton</b>	2	2	4	3	4	3	3	<b>21</b>	<b>22</b>
13	<b>Erfurt</b>	5	2	2	2	3	3	3	<b>20</b>	<b>25</b>
14	<b>Fries*</b>	5	5	5	4	4	3	4	<b>30</b>	<b>1</b>
15	<b>Fries*</b>	5	2	4	3	5	2	4	<b>25</b>	<b>7</b>
16	<b>Fries</b>	2	5	2	2	4	3	4	<b>22</b>	<b>20</b>
17	<b>Fries*</b>	3	5	3	2	5	2	4	<b>26</b>	<b>5</b>
18	<b>Gibbs</b>	2	2	2	3	2	4	1	<b>16</b>	<b>35</b>
19	<b>Goetzel</b>	5	2	0	4	4	3	5	<b>23</b>	<b>16</b>
20	<b>Goetzel</b>	3	2	2	4	4	3	5	<b>23</b>	<b>17</b>
21	<b>Golaszewski*</b>	2	4	2	3	4	5	5	<b>25</b>	<b>8</b>
22	<b>Harvey*</b>	4	3	5	4	5	4	4	<b>29</b>	<b>2</b>
23	<b>Henritze</b>	1	1	1	3	3	1	4	<b>14</b>	<b>39</b>
24	<b>Henritze</b>	2	1	1	1	3	4	3	<b>15</b>	<b>38</b>
25	<b>Jeffery</b>	5	3	4	2	2	3	4	<b>23</b>	<b>18</b>
26	<b>Jones</b>	4	2	1	4	4	3	1	<b>19</b>	<b>29</b>
27	<b>Knight</b>	3	2	2	4	4	4	4	<b>23</b>	<b>19</b>
28	<b>Lechner</b>	1	1	4	4	3	1	5	<b>19</b>	<b>30</b>
29	<b>Leigh*</b>	5	2	5	4	5	1	3	<b>25</b>	<b>9</b>
30	<b>Lorig</b>	2	2	2	3	3	2	1	<b>16</b>	<b>36</b>
31	<b>Lynch</b>	3	2	3	4	2	3	3	<b>20</b>	<b>26</b>
32	<b>Musich</b>	2	2	2	3	2	4	5	<b>20</b>	<b>27</b>
33	<b>Ozminkowski*</b>	4	3	3	3	4	3	5	<b>25</b>	<b>10</b>
34	<b>Ozminkowski</b>	2	3	3	4	4	4	5	<b>25</b>	<b>11</b>
35	<b>Sciacca</b>	3	1	3	4	2	4	1	<b>18</b>	<b>32</b>
36	<b>Serxner</b>	3	2	2	3	4	3	5	<b>22</b>	<b>31</b>
37	<b>Shephard</b>	3	1	2	3	1	1	1	<b>12</b>	<b>41</b>

38	<b>Shephard</b>	2	1	2	1	1	5	4	<b>16</b>	<b>37</b>
39	<b>Shi</b>	5	2	1	3	4	2	4	<b>21</b>	<b>23</b>
40	<b>Spilman</b>	3	2	3	3	4	1	2	<b>18</b>	<b>33</b>
41	<b>Wheat</b>	2	2	1	2	2	1	2	<b>12</b>	<b>42</b>
42	<b>Wood</b>	3	1	2	4	4	4	3	<b>21</b>	<b>24</b>

\* = Top ten ranked study

Note: 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 4**  
**Percent Reported Change in Economic Variables and Cost/Benefit Ratios**

#	Author	Study Rank	Percent Change in Sick Leave Absenteeism	Percent Change in Health Costs	Percent Change in WC/DM <sup>1</sup> Costs	Cost Benefit Ratio
1	Aldana	<b>6</b>		-16.0% <sup>2</sup>		<b>3.60</b>
2	Aldana	<b>12</b>		7.0%		
3	Baun	<b>40</b>	-33.4%	-47.2%		
4	Bertera	<b>14</b>	-12.2%			
5	Bertera	<b>13</b>	-14.0%			<b>2.05</b>
6	Blair	<b>15</b>	-24.0%			
7	Bly	<b>3</b>		-7.4% <sup>3</sup>		
8	Bowne	<b>31</b>	-20.1%	-45.7%	-31.7%	<b>2.90</b>
9	Cady	<b>34</b>			-25.6%	
10	Chapman	<b>4</b>	-49.1%	-32.4% <sup>4</sup>		<b>6.52</b>
11	Conrad	<b>28</b>	-16.3% <sup>5</sup>			
12	Dalton	<b>22</b>		-18.4%	-43.2%	<b>7.00</b>
13	Erfurt	<b>25</b>				
14	Fries	<b>1</b>		-30.4%		
15	Fries	<b>7</b>	-35.2%	-48.8%		<b>5.96</b>
16	Fries	<b>20</b>				
17	Fries	<b>5</b>	-23.3%	-26.7%		<b>6.00</b>
18	Gibbs	<b>35</b>		-24.2%		<b>2.51</b>
19	Goetzel	<b>16</b>		-14.2%		
20	Goetzel	<b>17</b>		-32.4%		
21	Golaszewski <sup>6</sup>	<b>8</b>	-19.0%			<b>3.40</b>

<sup>1</sup> WC/DM refers to workers’ compensation costs and disability management claims cost.

<sup>2</sup> For consistency, whole integers reported in the literature have been written as a decimal with an “x.0” and for cost benefit ratios an addition significant number has been added (“x.y0”)

<sup>3</sup> 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%.

<sup>4</sup> The comparison provided is for external controls.

<sup>5</sup> This number is the average found with two of the three studies. The third study found no significant change.

<sup>6</sup> This study also examined offsetting pension costs, decreased life insurance costs, increased productivity and program revenue generation.

#	Author	Study Rank	Percent Change in Sick Leave Absenteeism	Percent Change in Health Costs	Percent Change in WC/DM <sup>1</sup> Costs	Cost Benefit Ratio
22	Harvey	2		50.1%		19.41 <sup>7</sup>
23	Henritze	39				10.10
24	Henritze <sup>8</sup>	38	-68.2%			
25	Jeffery	18	-22.0%			
26	Jones	29	-31.6% <sup>9</sup>			
27	Knight	19	-33.5%			
28	Lechner	30	-52.4%			
29	Leigh	9	-12.1%	-32.0%		4.73
30	Lorig	36		-7.2%		
31	Lynch	26	-13.8%			
32	Musich	27		-19.6%		
33	Ozminkowski	10		-41.0%		4.64
34	Ozminkowski	11		-9.7%		
35	Sciacca	32		-12.0% <sup>10</sup>		
36	Serxner	31			-20.0%	
37	Shephard	41		-34.5%		
38	Shephard	37				4.85
39	Shi	23	-21.7%	-28.4%		3.07 <sup>11</sup>
40	Spilman	33				
41	Wheat	42		-31.0%		
42	Wood	24	-36.3%			3.50
<b>Number of Studies</b>			19	23	4	16
<b>Averages<sup>12</sup></b>			-28.3%	-26.1%	-30.1%	5.93

A growing body of literature documents the importance of the health and productivity management perspective for American business. Abstracts of some of these articles are included in the abstracts section that follows.

<sup>7</sup> Imputed from data provided in the study.

<sup>8</sup> Program also examined cardiac rehabilitation savings and savings from treadmill testing.

<sup>9</sup> Reductions were found in hourly employees only.

<sup>10</sup> 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 non-participants

<sup>11</sup> This cost/benefit ratio was the highest of three different program intervention models.

<sup>12</sup> 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.

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## **Related Abstracts**

### **Financial impact of health promotion programs: a comprehensive review of the literature.**

Aldana SG.

**PURPOSE:** The purpose of this review is to summarize the literature on the ability of health promotion programs to reduce employee-related health care expenditures and absenteeism.

**SEARCH PROCESS:** Using key words in a literature-searching program, a comprehensive search was conducted on the following databases: MEDLINE, Embase, HealthSTAR.

SPORTDiscus, PsycINFO, SciSearch, ERIC, and ABI Inform. **STUDY INCLUSION AND**

**EXCLUSION CRITERIA:** All data-based studies that appeared in peer reviewed journals in the English language. Theses, dissertations, or presentation abstracts that were not published in peer reviewed journals were excluded. The initial search identified 196 studies, but only 72 met the inclusion criteria and were included in the review. **DATA EXTRACTION METHODS:**

Summary tables were created that include design classification, subject size, results, and other key information for each study. **DATA SYNTHESIS:** Both the nature of the findings and the overall quality of the literature were evaluated in an attempt to answer two questions: Do individuals or populations with high health risks have worse financial outcomes than individuals or populations with low health risks? Do health promotion programs improve financial outcomes? **MAJOR CONCLUSIONS:** There are good correlational data to suggest that high levels of stress, excessive body weight, and multiple risk factors are associated with increased health care costs and illness-related absenteeism. The associations between seat belt use, cholesterol, diet, hypertension, and alcohol abuse and absenteeism and health care expenditures are either mixed or unknown. Health promotion programs are associated with lower levels of absenteeism and health care costs, and fitness programs are associated with reduced health care costs.

Am J Health Promot 2001 May-Jun;15(5):296-320

### **Shining lights: studies that have most influenced the understanding of health promotion's financial impact.**

Golaszewski T.

**PURPOSE:** To examine the literature from the past 20 years and identify those studies that support the economic merit of health promotion. **DATA SOURCE:** A panel of experts was used to identify the top studies supporting the purpose of this article. **STUDY INCLUSION AND**

**EXCLUSION CRITERIA:** Studies were chosen based on the following criteria: the study (1) examined the relationship between health risks and financial outcomes, or health promotion programs and financial outcomes; (2) provided strong and compelling financial data supporting the worth of health promotion; (3) had a high-quality methodology; (4) answered an important question or replicated important findings with superior methodology; and (5) represented U.S.-



based initiatives published since 1980. After initially nominating a group of studies for consideration, panelists rated each on a scale from 1 to 3 representing their opinion of importance. Studies rating the highest were included for this discussion. DATA EXTRACTION METHODS: Studies were analyzed by population characteristics, design, statistical tests, limitations, and results. This information was summarized for each identified article. MAJOR CONCLUSIONS: A relationship between modifiable health risk factors and health care costs is supported by research. Health promotion interventions appear to provide positive financial returns, most notably for health care costs and absenteeism reduction. Private sector initiatives seem to be driving economic-based research. Overall, health promotion shows promising results for providing financial advantages for its sponsors; however, if this discipline is to show its true worth, considerable funding is needed from government or philanthropic sources to cover the substantial costs of quality research.

Am J Health Promot 2001 May-Jun;15(5):332-40

## **The financial impact of smoking on health-related costs: a review of the literature.**

Max W.

PURPOSE: To summarize our knowledge of the economic impact of smoking on health-related outcomes and to discuss the quality of this evidence. The potential effect of smoking-related health promotion programs on reducing costs is discussed. DATA SOURCES: Studies reviewed were cited in recently published reviews, identified through database searches of MEDLINE/HealthSTAR, PsychINFO, and ABI/Inform or obtained from reference lists of other studies. STUDY INCLUSION AND EXCLUSION CRITERIA: Included are studies of the health care and other costs of smoking published in English in peer-reviewed journals during the last 20 years. Studies of annual and lifetime costs are included as are studies of employer costs. Forty-nine studies were reviewed. DATA EXTRACTION METHODS: Data extracted were total costs, medical care and other direct costs, lost productivity, and mortality costs. Underlying methodologies were described and compared. DATA SYNTHESIS: The annual cost of smoking is between 6 and 14% of personal health expenditures. Estimates have increased over time, reflecting better and more comprehensive methodologies. Smoking appears to result in increased lifetime costs, although some studies have found contrary results. In the workplace, smokers incur greater medical costs and more lost productivity than nonsmokers. They also impose costs on their nonsmoking co-workers. MAJOR CONCLUSIONS: The overwhelming body of evidence in the literature asserts that smoking imposes costs on an annual basis, that it leads to increased medical costs over the life span, and that many of these costs are borne by employers. Although the methods for studying this issue have evolved over time and are presently quite comprehensive, future research is needed to further substantiate the findings and develop further refinements.

Am J Health Promot 2001 May-Jun;15(5):321-31

## **Getting closer to the truth: overcoming research challenges when estimating the financial impact of worksite health promotion programs.**

Ozminkowski RJ, Goetzel RZ.

The authors describe the most important methodological challenges often encountered in conducting research and evaluation on the financial impact of health promotion. These include selection bias, skewed data, small sample size, metrics. They discuss when these problems can and cannot be overcome and suggest how some of these problems can be overcome through a creating an appropriate framework for the study, and using state of the art statistical methods.

Am J Health Promot 2001 May-Jun;15(5):289-95

## **Conceptual framework, critical questions, and practical challenges in conducting research on the financial impact of worksite health promotion.**

Anderson DR, Serxner SA, Gold DB.

A conceptual framework to guide research on the financial impact of health promotion programs is described. Important questions that must be answered within this framework are discussed and brief summaries of the research addressing these questions are summarized. Key issues and challenges that are encountered in designing and implementing financial outcome research are reviewed.

Am J Health Promot 2001 May-Jun;15(5):281-8

## **A review and analysis of the clinical- and cost-effectiveness studies of comprehensive health promotion and disease management programs at the worksite: 1998-2000 update.**

Pelletier KR.

**PURPOSE:** This article is the fifth in a series of critical reviews of the clinical effectiveness and cost-effectiveness studies of comprehensive, multifactorial health promotion and disease management programs conducted in worksites. As with the previous reviews, the purpose of this article is to review and assess the randomized control trials that have focused on both clinical and cost outcomes of worksite health promotion and disease management programs. For this current review, a new category of quasi-experimental studies has been added because this represents a major new trend in such interventions over the last 2 years. Comprehensive worksite programs are those that provide an ongoing, integrated program of health promotion and disease prevention that integrates specific components into a coherent, ongoing program that is consistent with corporate objectives and includes program evaluations of both clinical and cost outcomes. **DATA SOURCES:** A comprehensive search was conducted using a multistage

process that included MEDLINE, ERIC, ADI, EDGAR, CARL, Inform, and Lexis-Nexis databases and direct inquiries to worksite researchers. **INCLUSION AND EXCLUSION CRITERIA:** The search identified 27 new studies to which the following inclusion criteria were applied: research conducted in the United States; results published in English; methodological quality of nonexperimental (pre- and postmeasures but no comparison group); quasi-experimental to randomized control trials; and both clinical and cost outcomes. Exclusion criteria were studies outside of the United States; non-English publications; and clinical or cost outcomes only. Fifteen studies remained for this review. **FINDINGS EXTRACTION METHODS:** Findings extraction and analysis of the 15 studies was done by extracting the relevant population, intervention design, clinical results, and cost outcomes from the published article. As in previous reviews, findings are summarized in a table format that extracts and describes each study by the following: (1) study author(s); (2) corporate site; (3) purpose of the evaluation; (4) employee population; (5) percentage of program participants; (6) number of employees included in the evaluation; (7) brief description of the intervention; (8) evaluation design; (9) evaluation period; (10) outcomes; (11) research rating; and (12) findings. **FINDINGS SYNTHESIS:** Based on these 15 studies, a methodological critique was conducted with brief reference to appropriate prior studies. Conclusions regarding study quality and new trends over the time period of 1998 to 2000 are discussed. **MAJOR CONCLUSIONS:** Results from randomized clinical trials and quasi-experimental designs suggest that providing individualized risk reduction for high risk employees within the context of comprehensive programming is the critical element of worksite interventions. Despite the many limitations of the current methodologies of the 15 new studies, the vast majority of the research to date indicates positive clinical and cost outcomes.

Am J Health Promot 2001 Nov-Dec;16(2):107-16

### **A review and analysis of the clinical and cost-effectiveness studies of comprehensive health promotion and disease management programs at the worksite: 1995-1998 update (IV).**

Pelletier KR.

The fourth in a series of critical reviews, this study examines the clinical and cost outcome evaluations of 10 worksite health promotion programs that were comprehensive, multifactorial, and directed at risk management. The studies, conducted between 1994 and 1998, indicate favorable clinical and cost outcomes and suggest characteristics of worksite interventions that may be critical for effectiveness

Am J Health Promot 1999 Jul-Aug;13(6):333-45, iii

### **Clinical and cost outcomes of multifactorial, cardiovascular risk management interventions in worksites: a comprehensive review and analysis.**

Pelletier KR.

This paper is a critical review of the clinical and cost outcome evaluation studies of multifactorial, comprehensive, cardiovascular risk management programs in worksites. A comprehensive international literature search conducted under the auspices of the National Heart, Lung and Blood Institute identified 17 articles based on 12 studies that examined the clinical outcomes of multifactorial, comprehensive programs. These articles were identified through MEDLINE, manual searches of recent journals, and through direct inquiries to worksite health promotion researchers. All studies were conducted between 1978 and 1995, with 1978 being the date of the first citation of a methodologically rigorous evaluation. Of the 12 research studies, only 8 utilized the worksite as both the unit of assignment and as the unit of analysis. None of the studies analyzed adequately for cost effectiveness. Given this limitation, this review briefly considers the relevant worksite research that has demonstrated cost outcomes. Worksite-based, multifactorial cardiovascular intervention programs reviewed for this article varied widely in the comprehensiveness, intensity, and duration of both the interventions and evaluations. Results from randomized trials suggest that providing opportunities for individualized, cardiovascular risk reduction counseling for high-risk employees within the context of comprehensive programming may be the critical component of an effective worksite intervention. Despite the many limitations of the current methodologies of the 12 studies, the majority of the research to date indicates the following: (1) favorable clinical and cost outcomes; (2) that more recent and more rigorously designed research tends to support rather than refute earlier and less rigorously designed studies; and (3) that rather than interpreting the methodological flaws and diversity as inherently negative, one may consider it as indicative of a robust phenomena evident in many types of worksites, with diverse employees, differing interventions, and varying degrees of methodological sophistication. Results of these studies reviewed provide both cautious optimism about the effectiveness of these worksite programs and insights regarding the essential components and characteristics of successful programs.

J Occup Environ Med 1997 Dec;39(12):1154-69

### **Self-insurance and worksite alcohol programs: an econometric analysis.**

Kenkel DS.

**OBJECTIVE:** The worksite is an important point of access for alcohol treatment and prevention, but not all firms are likely to find offering alcohol programs profitable. This study attempts to identify at a conceptual and empirical level factors that are important determinants of the profitability of worksite alcohol programs. A central question considered in the empirical analysis is whether firms' decisions about worksite alcohol programs are related to how employee group health insurance is provided. **METHOD:** The data used are from the 1992 National Survey of Worksite Health Promotion Activities (N = 1,389-1,412). The econometric analysis focuses on measures of whether the surveyed firms offer Employee Assistance Programs (EAPs), individual counseling, group classes and resource materials regarding alcohol and other substance abuse. **RESULTS:** Holding other factors constant, the probability that a self-insured firm offers an EAP is estimated to be 59%, compared to 51% for a firm that purchases

market group health insurance for its employees. Unionized worksites and larger worksites are also found to be more likely to offer worksite alcohol programs, compared to non-unionized smaller worksites. Worksites with younger work-forces are less likely than those with older employees to offer alcohol programs. CONCLUSIONS: The empirical results are consistent with the conceptual framework from labor economics, since self-insurance is expected to increase firms' demand for worksite alcohol programs while large worksite is expected to reduce the average program cost. The role of union status and workforce age suggests it is important to consider workers' preferences for the programs as fringe benefits. The results also suggest that the national trend towards self-insurance may be leading to more prevention and treatment of worker alcohol-related problems.

J Stud Alcohol 1997 Mar; 58(2):211-9

## Closing Thoughts

By Larry Chapman MPH  
Editor, The Art of Health Promotion Section

Do we have enough quality studies showing the economic impact of worksite health promotion programs to convince all skeptics? No, and we probably never will. Do we have enough studies to make a credible case to corporate America? I think so... and as a result I have stopped feeling embarrassed about making economic claims attached to worksite health promotion programs. Not that just any kind of health promotion done any way at all, will produce high levels of economic impact. Programs must be well designed and executed in an effective manner in order to produce high levels of economic impact and return.

However, why is it we tend to be so reticent to make an economic claim when forty-two studies over the past twenty years demonstrate consistently high levels of impact on health-related cost and cost benefit ratios for 16 studies that are greater than 5 to 1? We seem to have one heck of a best-kept secret. With health costs going up at over 15% a year we are sitting here with twenty-three peer review studies showing average reductions in total amount/rates of increase of health plan cost of 25% or more. What corporate executive would not jump at the chance to have greater than a 500% return from an investment of capital within a year?

As we think about the implications of these issues it becomes clear that for those of us that want to utilize health promotion as a strategic approach to enhancing the functional capability of people in work organizations we need to “follow the money.” If we are to help stop the hemorrhaging of corporate America from rising health costs we will need to fine tune our programming so that it has maximum economic impact. The Art of Health Promotion addressed that issue in a recent edition titled “Health Cost Management (HCM) Strategies for Health Promotion” (Chapman, 2001), but there are also additional variables that are likely to affect the economic impact and return associated with worksite health promotion programs.

Quickly, the issues that are associated with greater economic impact and return include the following:

### **Program Structure:**

- ◆ The stronger the degree of senior management support for the program.
- ◆ The more frequent the regular contact with the target population.
- ◆ The more aggressive outreach and follow-up for those with high health risk.
- ◆ Greater emphasis on medical self-care and consumer education.
- ◆ The lower the capital investment in programming and facilities.
- ◆ The better the continuity and follow-through on programming.
- ◆ The more “menu-driven” or choice-oriented the programming options.
- ◆ The greater the linkage and integration to all program components and to other employee benefits.
- ◆ The more adequate the level of funding for the wellness program.

**Population Characteristics:**

- ◆ The lower the level of employee turnover.
- ◆ The lower the ratio of dependents in the target population.
- ◆ The greater the occupational injury risk in the population.
- ◆ The older the work force and the lower the levels of employee distrust.
- ◆ The larger and more centralized the worksites
- ◆ The higher the amount of endemic employee absenteeism.
- ◆ The higher the prevalence of baseline lifestyle health risks among the population.

Worksite health promotion has the clear potential to make a significant positive economic contribution to employers in both the public and private sectors. Our opportunity to actually make that contribution may be closer than we think.