Appendix Table 1
Baicker K, Cutler D, Song Z. Workplace wellness programs can generate savings.
Health Aff (Millwood). 2010;29(2). Published online 14 January 2010.

| No. | Program focus | Program delivery | Citation |
|---|---|---|---|
| **Studies of employee health care costs** | | | |
| 1 | N, Sm, St, W | HRA, Ol, Os, Sc | Naydeck BL, et al. The impact of the Highmark Employee Wellness Programs on 4-Year Healthcare Costs. J Occup Environ Med. 2008; 50(2): 146-156. |
| 2 | Personalized | HRA, Sc, F, Pro | Aldana SG, et al. Influence of a mobile worksite health promotion program on health care costs. Am J Prev Med. 1993; 9: 378-383. |
| 3 | Personalized | HRA, Ed, Co, I | Ozminkowski RJ, et al. A return on investment evaluation of the Citibank, N.A., Health Management Program. Am J Health Promot. 1999; 14: 31-43. |
| 4 | Sm, N, W, St, BP | HRA, CW, Os | 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. |
| 5 | Personalized | HRA, Ed, L | 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. |
| 6 | Personalized | HRA, Ed, L | 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 Promot. 1994; 8: 216-223. |
| 7-9 | W, Sm, N, St, BP, A | HRA, Ed, CW, Pro | Shi L. Health promotion, medical care use, and costs in a sample of worksite employees. Eval Rev. 1993; 17: 475-487. |
| 10 | W | Os | 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. |
| 11 | Personalized | HRA, Ed | Fries JF, McShane, D. Reducing need and demand for medical services in high risk persons. West J Med. 1998; 169: 201-207. |
| 12 | Personalized | HRA, CW, Sc, Os | Musich SA, et al. Effectiveness of health promotion programs in moderating medical costs in the USA. Health Promot Int. 2000; 15: 5-15. |
| 13 | W, BP, Sm, Ch, P | HRA, Co, I | Goetzel RZ, et al. Health care costs of worksite health promotion participants and non-participants. J Occup Environ Med. 1998; 40: 341-346. |
| 14 | Sm, W, N, A | HRA, Co, Fu | 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 Promot. 1993; 7: 374-395. |
| 15 | Sm, W, N, A | HRA, Co, Sc, Fu | Gibbs JO, et al. Work-site health promotion; five year trend in employee health care costs. Occup Med. 1985; 27: 826-830. |
| 16 | Sm, N, W, St, P | HRA, CW, I | Stave GM, Muchmore L, Gardner H. Quantifiable Impact of the Contract for Health and Wellness: Health Behaviors, Health Care Costs, Disability, and Workers' Compensation. J Occup Environ Med. 2003; 45(2): 109-117. |
| 17 | Personalized | HRA, Ed, Os, CW, Co, I | Serxner S, et al. The relationship between health promotion program participation and medical costs: a dose response. J Occup Environ Med. 2003; 45: 1196-1200. |
| 18-20 | BP | Sc, Co, Fu, Pro | Foote A, Erfurt JC. The Benefit to Cost Ratio of Work-Site Blood Pressure Control Programs. JAMA. 1991; 265(10): 1283-1286. |
| 21 | W | HRA, Os | 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. |
| 22 | W, N, St, P | HRA, Os | 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. |
| **Studies of employee absenteeism** | | | |
| 1 | Personalized | HRA, Ed, L | 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. |
| 2-4 | W, Sm, N, St, BP, A | HRA, Ed, CW, Pro | Shi L. Health promotion, medical care use, and costs in a sample of worksite employees. Eval Rev. 1993; 17: 475-487. |
| 5 | Personalized | HRA, Ed, CW, L | Mills PR, et al. Impact of a health promotion program on employee health risks and work productivity. Am J Health Promot. 2007; 22(1): 45-53. |
| 6 | Sm, W | HRA, CW, I | Jeffery RW, et al. Effects of work-site health promotion on illness-related absenteeism. J Occup Med. 1993; 35(11): 1142-1146. |
| 7 | Sm, W, St, N, BP | HRA, CW | Jones RC, et al. A study of a work site health promotion program and absenteeism. J Occup Med. 1990; 32: 95-99. |
| 8 | Sm, W, St, Ch, P | HRA, Ed, Co, Os | Bertera RL. The effects of workplace health promotion on absenteeism and employment costs in a large industrial population. Am J Public Health. 1990; 80: 1101-5. |
| 9 | W, personalized | Ed, Os, F | Blair SN, et al. Health promotion for educators: impact on absenteeism. Prev Med. 1986; 15: 166-175. |
| 10 | W | Os | 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. |
| 11 | Personalized | HRA, Ed | Fries JF, McShane, D. Reducing need and demand for medical services in high risk persons. West J Med. 1998; 169: 201-207. |
| 12 | Sm, N, W, St, P | HRA, CW | Stave GM, Muchmore L, Gardner H. Quantifiable Impact of the Contract for Health and Wellness: Health Behaviors, Health Care Costs, Disability, and Workers' Compensation. J Occup Environ Med. 2003; 45(2): 109-117. |
| 13 | W | HRA, Os | 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. |
| 14 | Personalized | HRA, Sc, Co | Schultz ALC, et al. Influence of participation in a worksite health promotion program on disability days. J Occup Environ Med. 2002; 44: 776-780. |
| 15 | Sm, W, N, P | HRA, Ed, Co, Os, F, I | 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. |
| 16 | W | Os, F | Lechner L, et al. Effects of an employee fitness program on reduced absenteeism. J Occup Environ Med. 1997; 39: 827-831. |
| 17 | Sm, W, St, N, BP | HRA, Ed, Sc, Co, F | 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: 533-536. |
| 18 | Sm, W, St, P | HRA, Ed, CW, Os, F, I | Bertera RL. Behavioral risk factor and illness day changes with workplace health promotion: two-year results. Am J Health Promot. 1993; 7(5): 365-73. |
| 19 | W | Os, F | Lynch WD, et al. Impact of a facility-based corporate fitness program on the number of absences from work due to illness. J Occup Med. 1990; 32(1): 9-12. |
| 20 | Sm, W, St, P | HRA, Ed, L, I | Wood EA, Olmstead GW, Craig JL. An Evaluation of Lifestyle Risk Factors and Absenteeism After Two Years in a Worksite Health Promotion Program. Am J Health Promot. 1989; 4(2): 128-133. |
| 21 | Sm, W, St | HRA, CW, Os, I | Stein AD, Shakour SK, Zuidema RA. Financial incentives, participation in employer-sponsored health promotion, and changes in employee health and productivity: HealthPlus Health Quotient Program. J Occup Environ Med. 2000; 42(12): 1148-55. |
| 22 | W, N, P | Ed, L, I | Aldana SG, et al. Financial impact of a comprehensive multisite workplace health promotion program. Prev Med. 2005; 40: 131-137. |

W = weight, Sm = smoking, N = nutrition, St = stress, BP = blood pressure, A = alcohol, Ch = cholesterol, P = prevention

HRA = health risk assessment, Ed = education materials, F = fitness, Fu = follow-up, I = incentives, L = personalized letters, Co = counseling, CW = classes or workshops, Ol = online programs, Os = on-site programs, Sc = screening, Pro = professionals involved (physicians, nurses, etc.)

**Supplemental Exhibit 3. Studies of employee health care costs**

| | | Sample size | | Treatment (T) | | | Control (C) | | | T–C | | ΔPost– |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Yrs | Treat | Control | Pre | Post | Δ | Pre | Post | Δ | ΔPre | ΔPost | ΔPre |
| **Randomized control trial or matched control group** | | | | | | | | | | | | |
| 1 | 4.0 | 1890 | 1890 | 1531 | 2907 | 1376 | 1427 | 3429 | 2002 | 104 | -522 | -626 |
| 2 | 2.0 | 340 | 340 | 1739 | 1459 | -280 | 1198 | 1107 | -91 | 541 | 351 | -189 |
| 3 | 3.2 | 11194 | 11644 | 2736 | 3411 | 676 | 2896 | 4136 | 1239 | -161 | -724 | -563 |
| 4 | 5.0 | 8451 | 2955 | 247 | 655 | 408 | 253 | 1234 | 981 | -7 | -579 | -573 |
| 5 | 1.0 | 919 | 867 | 2171 | 1695 | -476 | 1881 | 1995 | 114 | 290 | -300 | -590 |
| 6 | 1.0 | 21170 | 719 | 2336 | 2937 | 601 | 2048 | 2905 | 856 | 287 | 32 | -255 |
| 7 | 1.5 | 301 | 412 | 1891 | 1621 | -270 | 1970 | 1710 | -259 | -79 | -89 | -11 |
| 8 | 1.5 | 180 | 412 | 2036 | 1283 | -752 | 1970 | 1710 | -259 | 66 | -427 | -493 |
| 9 | 1.5 | 295 | 412 | 1986 | 1485 | -501 | 1970 | 1710 | -259 | 16 | -225 | -242 |
| **Non-randomized or unmatched comparison group** | | | | | | | | | | | | |
| 10 | 1.0 | 392 | 142 | 294 | 296 | 3 | 295 | 396 | 102 | -1 | -100 | -99 |
| 11 | 0.5 | 2586 | 50576 | 1616 | 1185 | -432 | 500 | 419 | -81 | 1116 | 766 | -351 |
| 12 | 6.0 | 1272 | 244 | 2140 | 2337 | 197 | 1825 | 2908 | 1083 | 315 | -571 | -886 |
| 13 | 3.0 | 3993 | 4341 | 1620 | 2008 | 388 | 1647 | 2596 | 949 | -27 | -588 | -561 |
| 14 | 5.0 | 388 | 355 | 1159 | 2397 | 1238 | 825 | 1701 | 875 | 334 | 696 | 363 |
| 15 | 5.0 | 667 | 892 | 695 | 1687 | 992 | 605 | 1977 | 1372 | 89 | -290 | -380 |
| **Post-intervention data only** | | | | | | | | | | | | |
| 16 | 4.0 | 1275 | 2687 | | 3222 | | | 3909 | | | -687 | |
| 17 | 5.0 | 13048 | 13363 | | 4176 | | | 4454 | | | -278 | |
| 18 | 4.0 | 337 | 321 | | 2078 | | | 1672 | | | 406 | |
| 19 | 4.0 | 367 | 343 | | 1772 | | | 1346 | | | 426 | |
| 20 | 4.0 | 183 | 184 | | 1128 | | | 979 | | | 149 | |
| 21 | 2.0 | 221 | 296 | | 1256 | | | 2424 | | | -1168 | |
| 22 | 2.5 | 950 | 6640 | | 1413 | | | 1396 | | | 17 | |

All figures denote health care costs per employee per year, in 2009 dollars

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

**Supplemental Exhibit 4. Studies of employee absenteeism**

| | | Sample size | | Treatment (T) | | Control (C) | | T–C | | ΔPost– | Savings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Yrs | Treat | Control | Pre | Post | Pre | Post | ΔPre | ΔPost | ΔPre | in wage* |
| **Randomized control trial or matched control group** | | | | | | | | | | | |
| 1 | 1.0 | 919 | 867 | 36.0 | 34.4 | 36.0 | 38.8 | 0.0 | -4.4 | -4.4 | $721 |
| 2 | 1.5 | 301 | 412 | 5.0 | 4.7 | 5.1 | 4.8 | -0.1 | -0.1 | 0.0 | $0 |
| 3 | 1.5 | 180 | 412 | 5.2 | 3.2 | 5.1 | 4.8 | 0.2 | -1.5 | -1.7 | $280 |
| 4 | 1.5 | 295 | 412 | 5.2 | 4.1 | 5.1 | 4.8 | 0.1 | -0.7 | -0.8 | $131 |
| 5 | 1.0 | 266 | 1242 | 4.6 | 4.2 | 7.0 | 9.1 | -2.4 | -4.9 | -2.5 | $413 |
| 6 | 2.0 | 597 | 645 | 18.0 | 13.5 | 19.1 | 18.2 | -1.1 | -4.7 | -3.6 | $590 |
| 7 | 2.0 | 1406 | 487 | 5.9 | 5.6 | 5.3 | 6.0 | 0.6 | -0.4 | -1.1 | $173 |
| 8 | 2.0 | 29315 | 14573 | 5.7 | 4.9 | 5.2 | 4.9 | 0.5 | 0.0 | -0.5 | $82 |
| 9 | 1.0 | 2546 | 7143 | 5.6 | 5.5 | 6.0 | 6.2 | -0.4 | -0.8 | -0.4 | $70 |
| **Non-randomized or unmatched comparison group** | | | | | | | | | | | |
| 10 | 1.0 | 392 | 142 | 0.3 | 0.1 | 0.1 | 0.5 | 0.1 | -0.4 | -0.6 | $92 |
| 11 | 0.5 | 2586 | 50576 | 3.9 | 3.0 | 1.6 | 1.5 | 2.3 | 1.5 | -0.8 | $123 |
| 12 | 4.0 | 1275 | 2687 | 3.1 | 2.3 | 3.1 | 3.3 | 0.0 | -1.0 | -1.0 | $167 |
| 13 | 2.0 | 221 | 296 | 8.7 | 9.0 | 10.0 | 12.4 | -1.3 | -3.4 | -2.1 | $342 |
| 14 | 6.0 | 2596 | 1593 | 6.6 | 17.2 | 6.6 | 23.3 | 0.0 | -6.1 | -6.1 | $1,000 |
| 15 | 2.0 | 450 | 1178 | 29.2 | 27.8 | 33.2 | 38.1 | -4.0 | -10.3 | -6.3 | $1,033 |
| 16 | 1.0 | 469 | 415 | 12.4 | 11.0 | 14.3 | 14.2 | -2.0 | -3.2 | -1.2 | $203 |
| 17 | 4.0 | 3122 | 1850 | 9.1 | 10.2 | 9.1 | 10.8 | 0.0 | -0.6 | -0.5 | $88 |
| 18 | 2.0 | 7178 | 7101 | 3.2 | 3.0 | 2.9 | 2.9 | 0.3 | 0.1 | -0.2 | $33 |
| 19 | 2.0 | 2232 | 5863 | 4.4 | 3.7 | 5.6 | 5.5 | -1.2 | -1.8 | -0.6 | $102 |
| 20 | 2.0 | 688 | 387 | 2.5 | 2.6 | 2.9 | 4.3 | -0.4 | -1.7 | -1.4 | $225 |
| **Missing group-level data** | | | | | | | | | | | |
| 21 | 3.0 | 727 | 1950 | | | | | | | -0.7 | $115 |
| 22 | 2.0 | 1264 | 4982 | | | | | | | -3.0 | $492 |

Absenteeism figures denote absenteeism days per employee per year

* Using uniform wage rate of $20.49/hour, Bureau of Labor Statistics, 2009 (assuming 8 hours/day)

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