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National Institute of Environmental Health Sciences (NIEHS)
Obesity and Built Environment:
Improving Public Health
Through Community Design Conference
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Environmental and Ecological Worksite-Based Health Promotion Interventions: What Works and What is Cost-Effective?

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Business Concerns About Health Care:

- The U.S. spent over $1.7 trillion in health care in 2003, that's $5,808 for every man, woman and child
- Employers pay over one third
- Employer health insurance rates increased:
  - 9.4% in 2000
  - 11.2% in 2001
  - 12.7% in 2002
  - 13.9% in 2003
  - 14.0% in 2004 (est.)

Source: Heffler et al., Health Affairs, 2/11/04

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Questions to ponder:

- Is there a “business case” to be made for health promotion?
- What is the evidence - is it good enough?
- Can we develop an ROI argument?

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It seems so logical…

…if you improve the health and well being of employees…

…quality of life improves

…health care utilization is reduced

…disability is controlled

…productivity is enhanced

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The Logic Flow:

- A large proportion of diseases and disorders from which people suffer is preventable;

- Modifiable health risk factors are precursors to many diseases and disorders, and premature death;

- Many modifiable health risks are associated with increased health care costs within a relatively short time window;

- Modifiable health risks can be improved through effective health promotion and disease prevention programs;

- Improvements in the health risk profile of a population can lead to reductions in health costs and improvements in productivity;

- Well-designed and well-implemented programs can be cost/beneficial – they can save more money than they cost, thus producing a positive return on investment (ROI).

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The Evidence

- A large proportion of diseases and disorders is preventable. Modifiable health risk factors are precursors to a large number of diseases and disorders and to premature death (Healthy People 2000, 2010, Amler & Dull, 1987, Breslow, 1993, McGinnis & Foege, 1993).

- Many modifiable health risks are associated with increased health care costs within a relatively short time window (Milliman & Robinson, 1987, Yen et al., 1992, Goetzel, et al, 1998, Anderson et al., 2000, Bertera, 1991, Pronk, 1999).

- Modifiable health risks can be improved through workplace sponsored health promotion and disease prevention programs (Wilson et al., 1996, Heaney & Goetzel, 1997, Pelletier, 1999).

- Improvements in the health risk profile of a population can lead to reductions in health costs (Edington et al., 2001, Goetzel et al., 1999).

- Worksite health promotion and disease prevention programs save companies money in health care expenditures and produce a positive ROI (Johnson & Johnson 2002, Citibank 1999-2000, Procter and Gamble 1998, Chevron 1998, California Public Retirement System 1994, Bank of America 1993, Dupont 1990).

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Poor Health Costs Money

Drill Down…

- Medical
- Absence / work loss
- Presenteeism
- Risk Factors

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Top 10 Highest-Cost Physical Health Conditions for U.S. Businesses

1. Coronary artery disease
2. GI disorders
3. Hypertension
4. Vaginal deliveries
5. Osteoarthritis

6. Back disorders
7. ENT disorders
8. Diabetes
9. Cerebrovascular disease
10. Gall bladder disease

Ref: Goetzel RZ, Ozminkowski RJ, Meneades L, Stewart M, Schutt DC. *Journal of Occupational and Environmental Medicine* 42(4) (2000): 338–351.

Source: 1996 MEDSTAT MarketScan Fee-for-Service Database, N=4,106,124 lives

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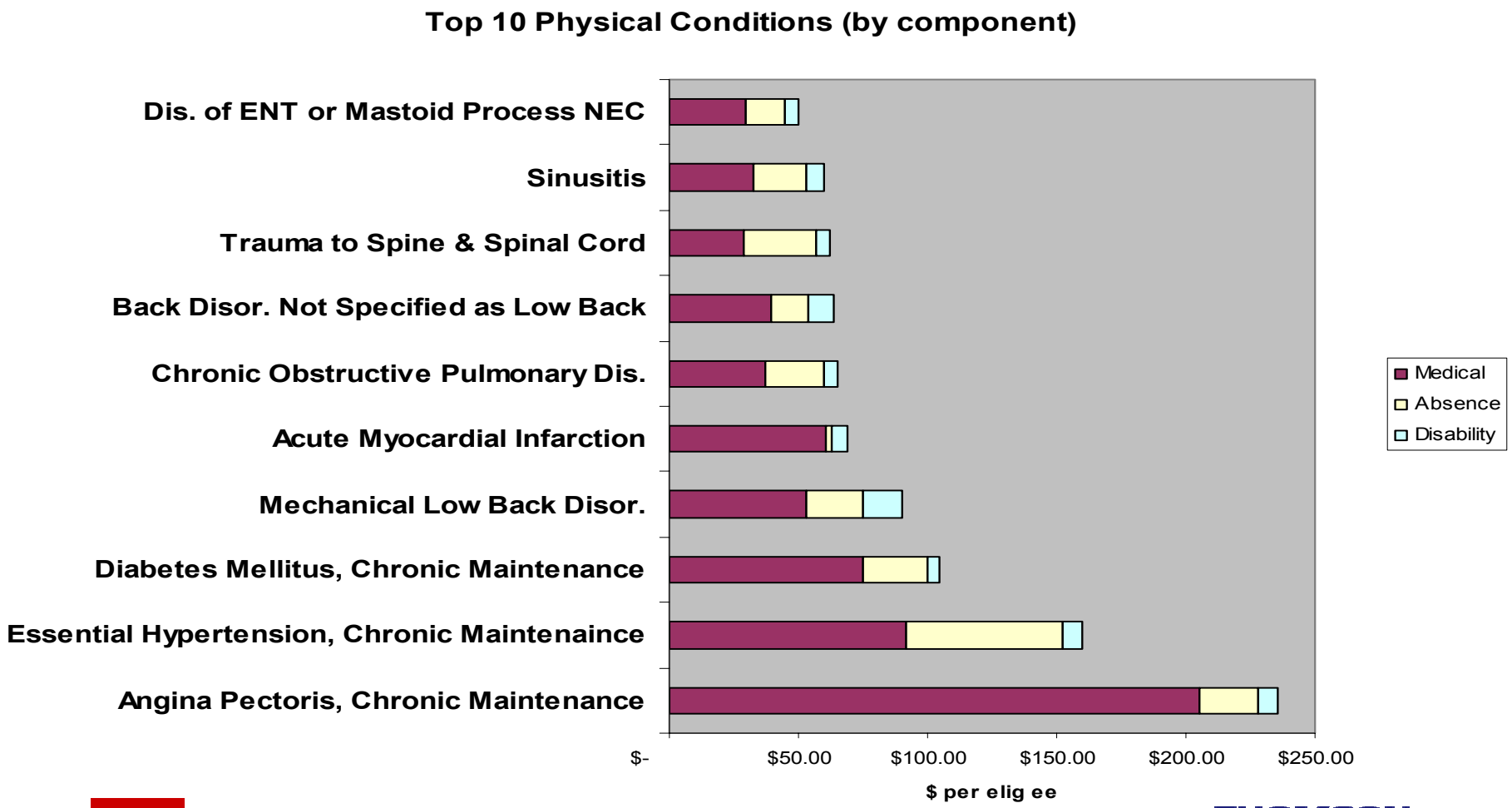
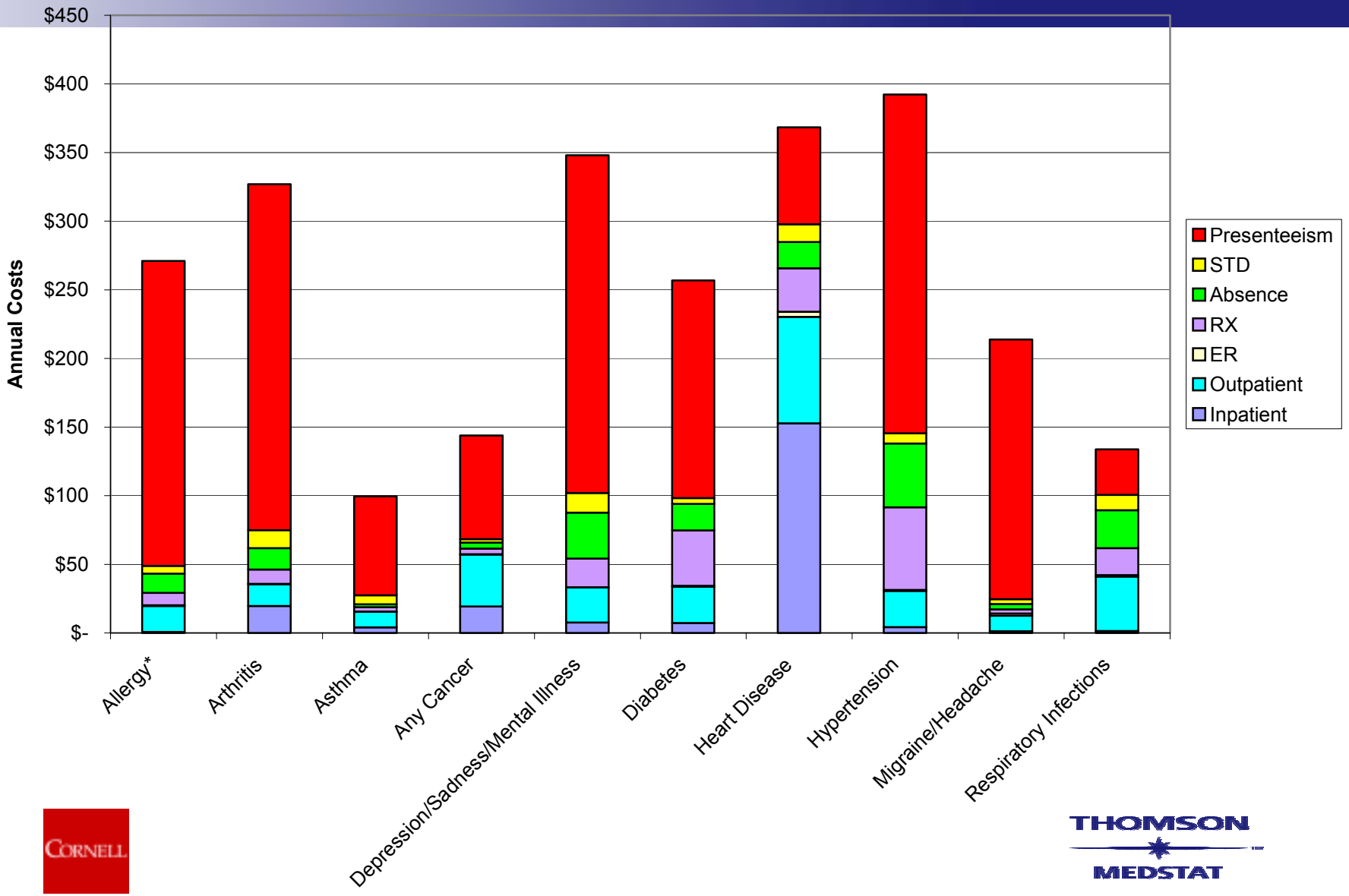
Top 10 Physical Health Conditions – Medical, Rx, Absence, STD Expenditures (1999 annual $ per eligible) –by Component



Source: Goetzel, Hawkins, Ozminkowski, Wang, *JOEM* 45:1, 5-14, January, 2003.

The Big Picture: Overall Burden of Illness, by Condition

(Using Average Impairment and Prevalence Rates for Presenteeism and $23.15/hour wage estimate) ***(Goetzel, Long, Ozminkowski, et al. JOEM 46:4, April, 2004)***



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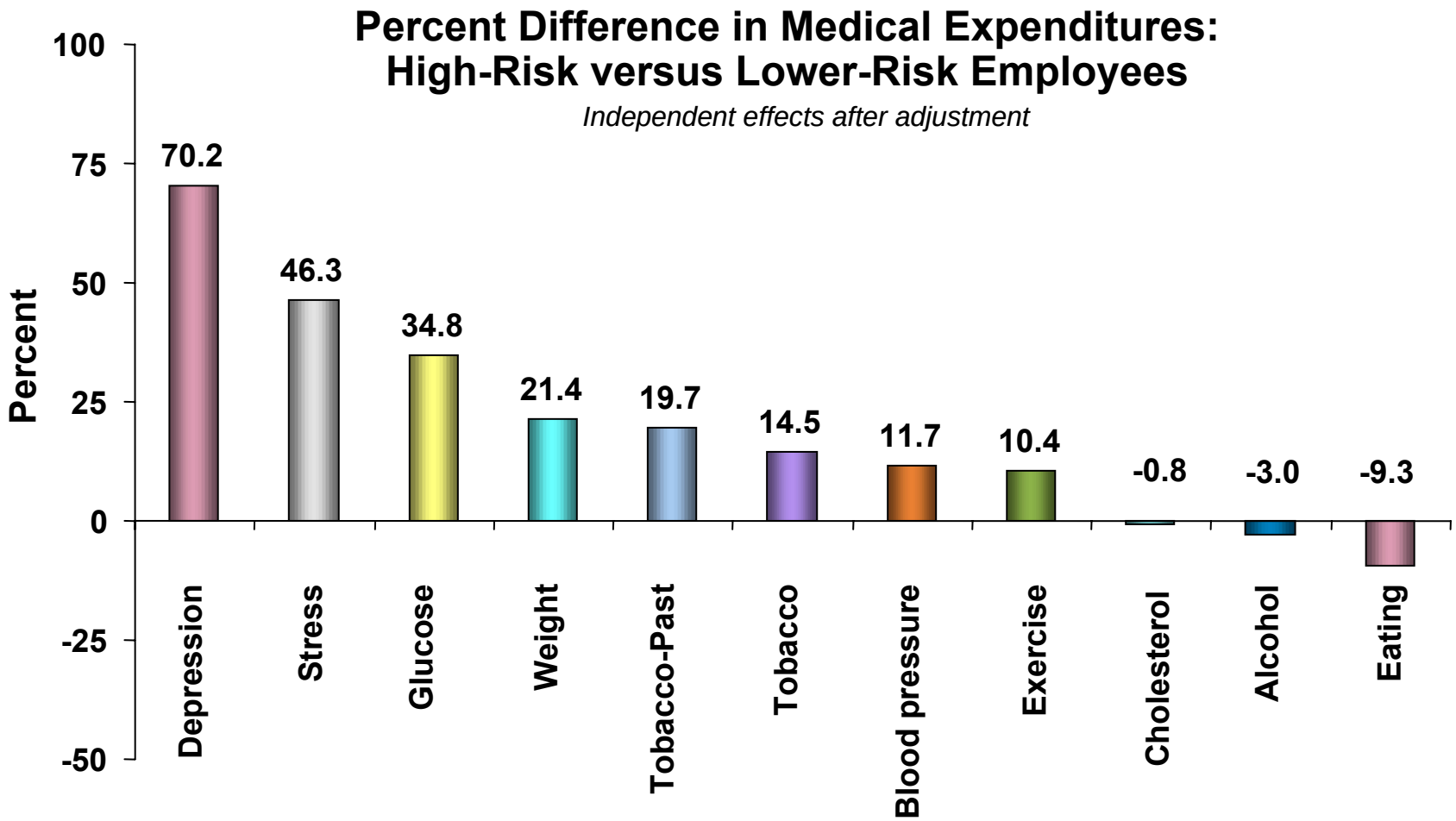
Incremental Impact of 10 Modifiable Risk Factors on Medical Expenditures

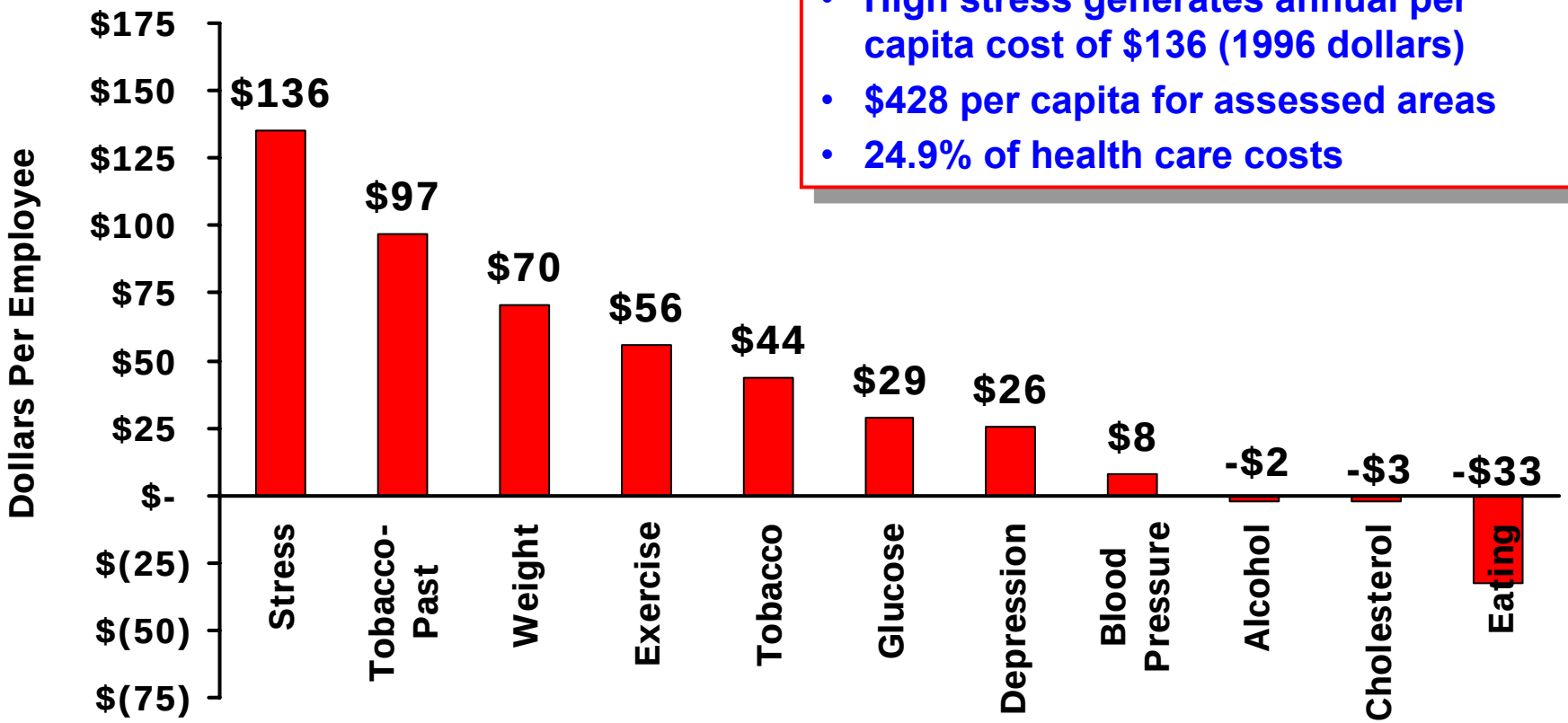


Goetzel RZ, Anderson DR, Whitmer RW, Ozminkowski RJ, et al,
Journal of Occupational and Environmental Medicine 40 (10) (1998): 843–854.

Population Risk and Cost Impact

Per Capita Cost of High-Risk Status

- High stress generates annual per capita cost of $136 (1996 dollars)
- $428 per capita for assessed areas
- 24.9% of health care costs



Ref: Anderson, D.R., Whitmer, R.W., Goetzel, R.Z., et. al, *American Journal of Health Promotion*, 15:1, 45-52, September/October, 2000. Health care expenditures - 1996 dollars. Independent effects after adjustment

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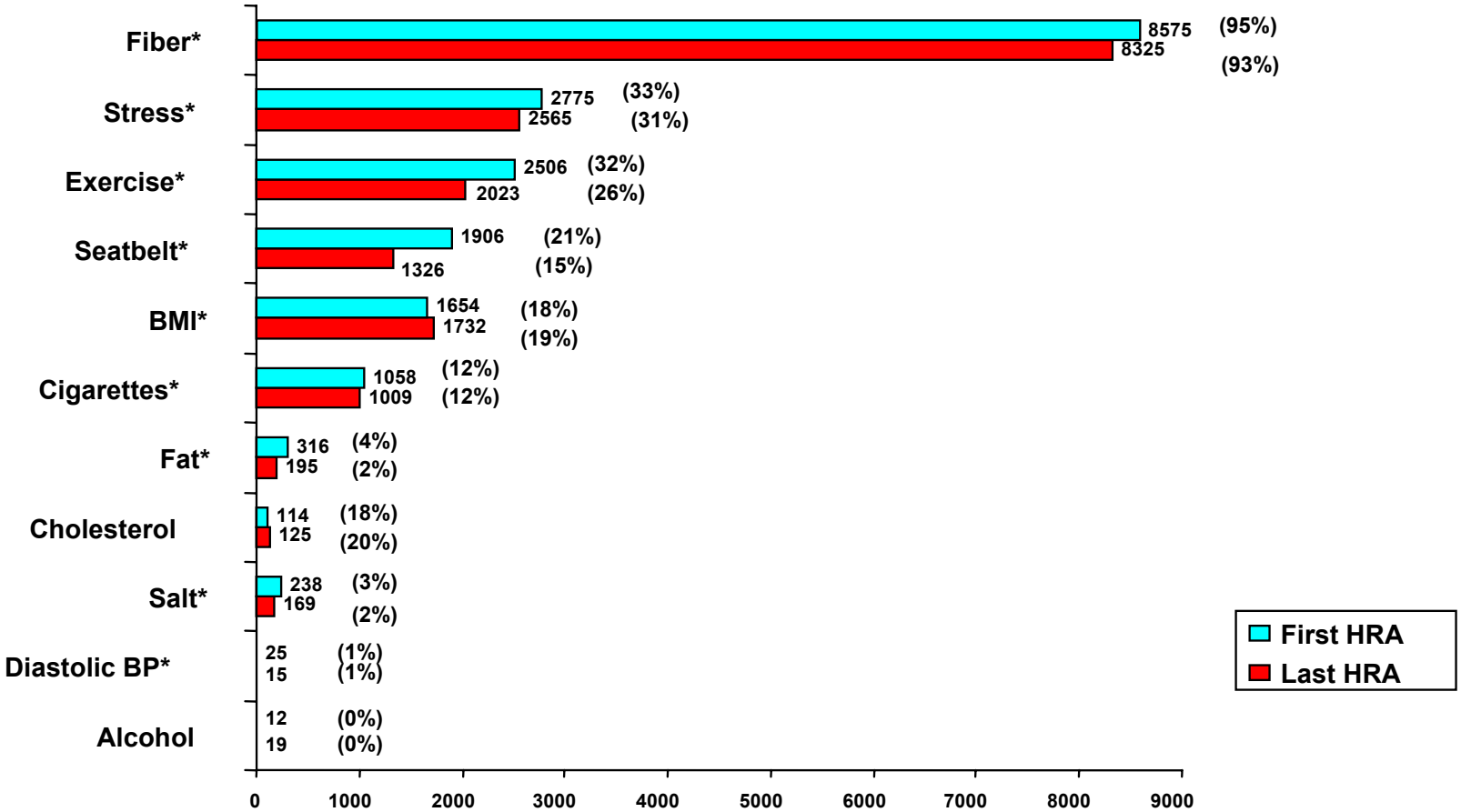
The Cost of Obesity

- The national medical cost burden attributable to overweight and obesity is estimated to be between $60 and $93 billion (in 2002 dollars), or 5.7 to 9.1% of U.S. spending on healthcare (Wolf and Colditz, 1998 and Finkelstein et al., 2003).
- The CDC estimates the total annual national medical cost burden attributable to overweight and obesity to be $117 billion, in direct and indirect costs (CDC, 2003).
- Employers pay about a third of the total nation's annual medical bill, including an estimated $13 billion on obesity related disorders (Koretz, 2000).
- Obesity is estimated to cause 39 million lost workdays and 239 million restricted activity days (Koretz, 2000).

But...Can You Change Risks? Can You Affect Costs?
Citibank Results: Number and Percent of Program Participants at High Risk at First and Last HRA by Risk Category
(N=9,234 employees tracked over an average of two years)



Percentages represent the proportion of total participants for whom data are available, by category. * Statistically significant at the p<0.05 level (McNemar Chi-square).

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Ozminkowski, R.J., Goetzel, R.Z., et al., Journal of Occupational and Environmental Medicine, 42:5, May, 2000, 502-511.

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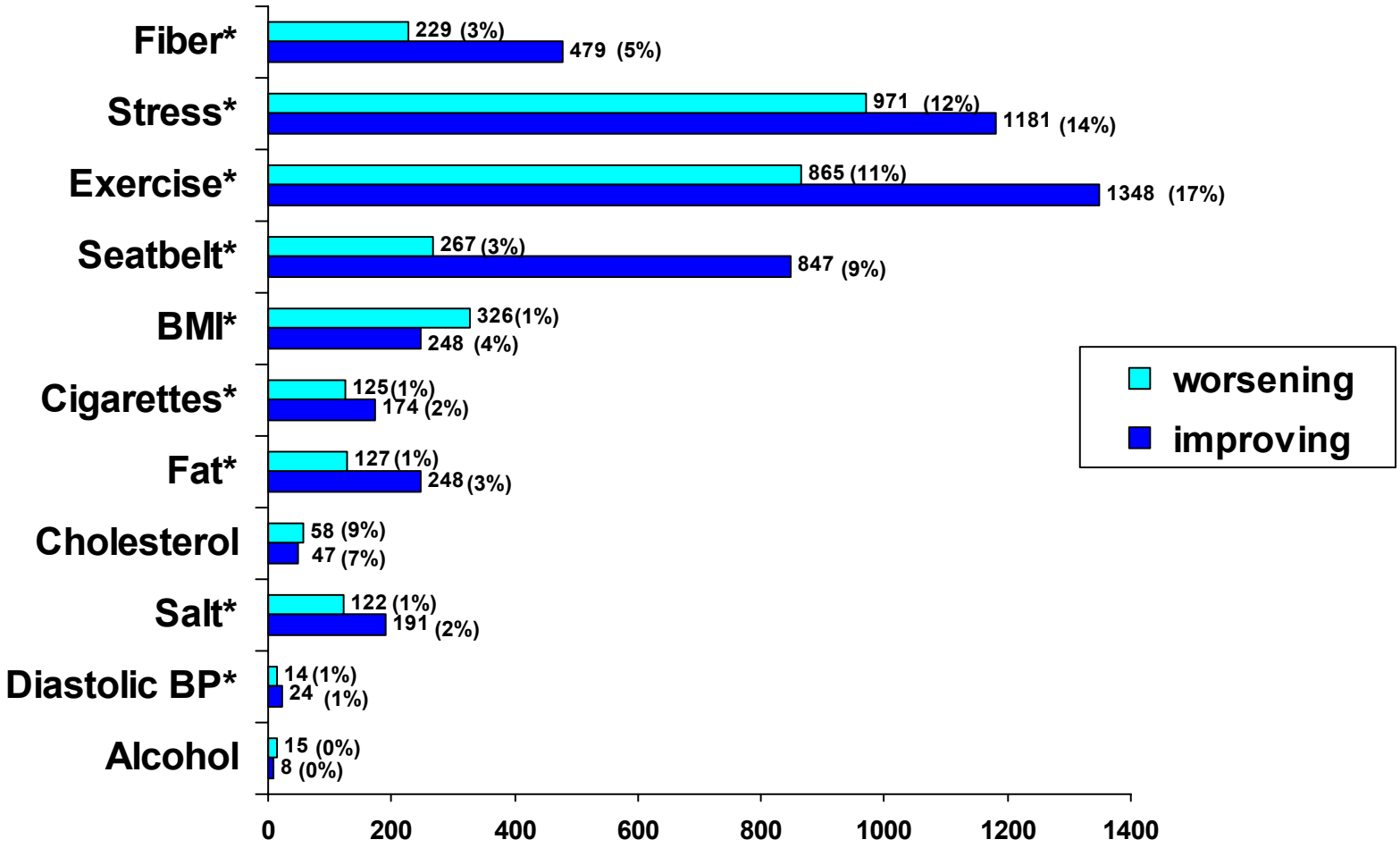
Citibank Results:
Number and Percent of Persons Who Improve or Worsen Risk, by Risk Category



Percentages represent the proportion of total participants for whom data are available, by category.
* Percent worsening and percent improving are significantly different at the $p<0.05$ level (McNemar Chi-square).

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Health and Risk Reduction Outcomes of Multi-Component Worksite Health Promotion Programs – Literature Review

Purpose: Critically review evaluation studies of multi-component worksite health promotion programs.

Methods: Comprehensive review of 47 CDC and author generated studies covering the period of 1978-1996.

Findings:

- Programs vary tremendously in comprehensiveness, intensity & duration.
- Providing opportunities for individualized risk reduction counseling, within the context of comprehensive programming, may be the critical component of effective programs.

Ref: Heaney & Goetzel, 1997 ***American Journal of Health Promotion, 11:3, January/February, 1997***

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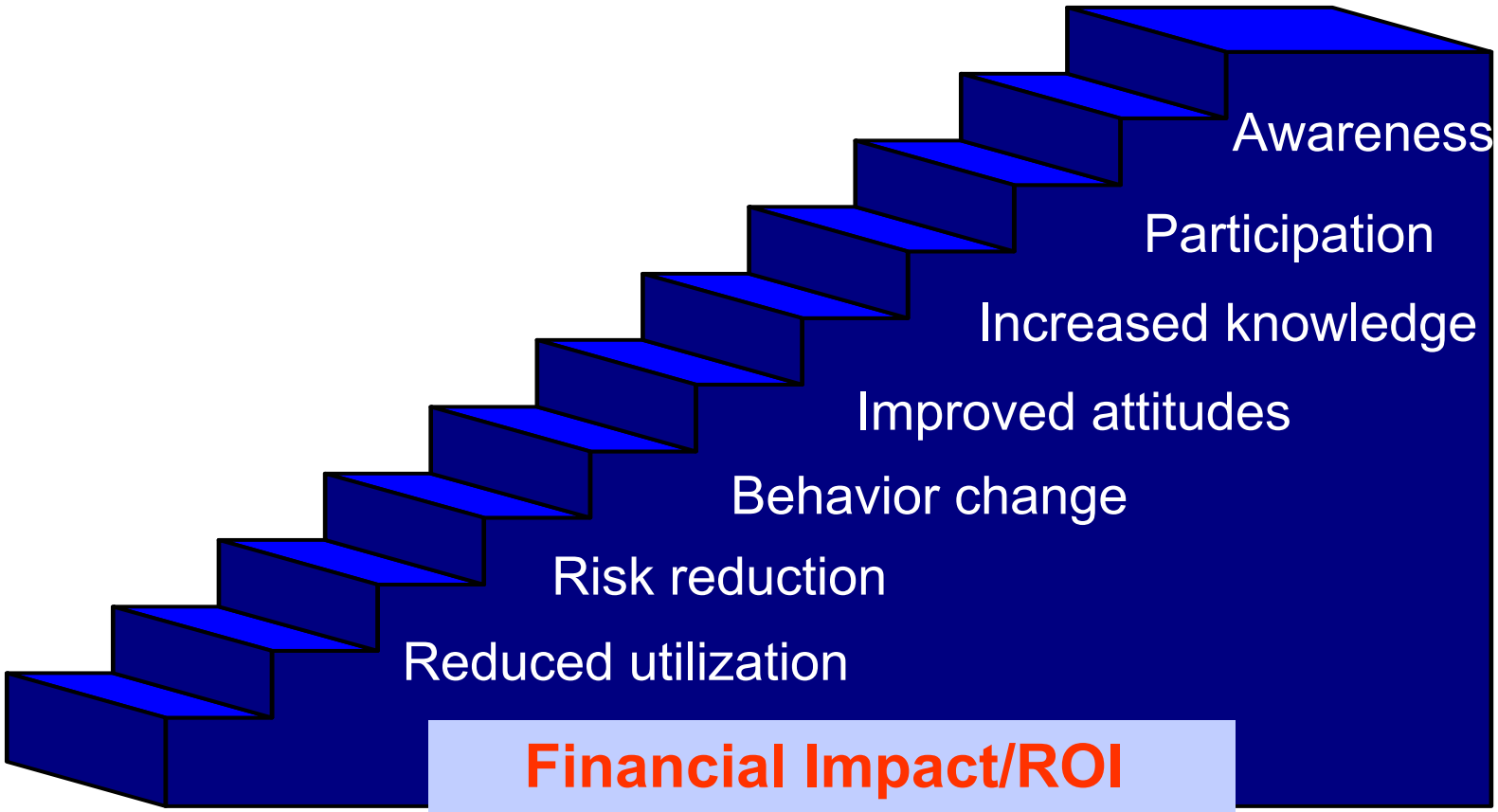
Environmental Interventions That Work

- Signs that prompt staircase use increase such use (Blamey et al., 1995; Brownell et al.; 1980, Brownell et al., 1980; Russell et al., 1999).
- Reduced prices for healthy foods increase sales of those foods (French et al., 1997; Biener et al., 1999; French et al., 1997; Jeffery et al., 1994).
- Food labeling produced a decrease in caloric intake and fat consumption (Zifferblatt et al., 1980; Sorenson et al., 1992).
- Individual and group competitions, financial incentives (Pescatello, Murphy, Vollono, Lynch, Berne, & Constanzo, 2001; Poole, Kumpfer & Pett, 2001)and/or goal setting at workplaces to increase participation in weight loss interventions (Glanz, Sorenson, & Farmer, 1996).
- Worksites that included individualized risk reduction, a menu of risk reduction programs, and a social setting that supported behavior change (Erfurt et al. 2001).

The sequence of critical success factors



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Citibank Results: Impact of Improvement in Risk Categories on Medical Expenditures per Month

	Unadjusted Impact**	Adjusted Impact**
Net Improvement* of at least 1 category versus Others (N = 1,706)	-$ 1.86†	- $1.91
Net Improvement* of at least 2 categories versus Others (N = 391)	- $ 5.34	- $3.06
Net Improvement* of at least 3 categories versus Others (N = 62)	-$146.87†	- $145.77‡

Total Sample Size = 5,143 employees for whom claims data were available

*Net Improvement refers to the number of categories in which risk improved minus number of categories in which risk stayed the same or worsened.

**Impact = change in expenditures for net improvers minus change for others. Negative values imply program savings, since expenditures did not increase as much over time for those who improved, compared to all others

† $p < 0.05$ ‡ $p < 0.01$

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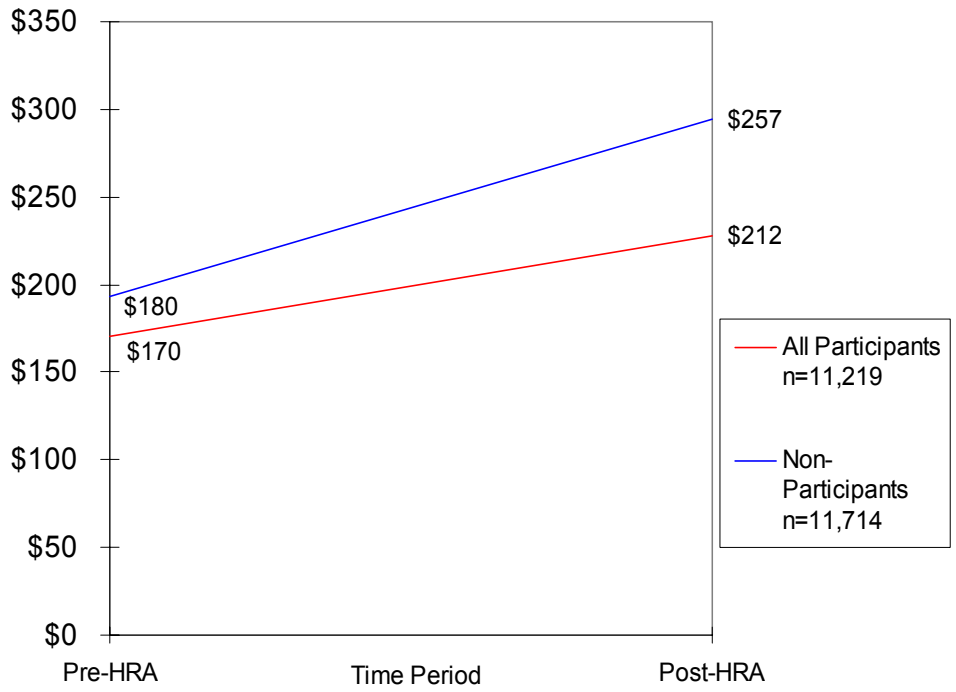
Citibank Health Management Study (N=22,838 – Ozminkowski et al, 1999)

Medical—Adjusted Mean Net Payments

Citibank Medical Population
Adjusted Mean Net Payments for the Pre- and Post-HRA periods



Total savings associated with program participation for 11,219 participants over an average of 23 months post-HRA is $8,901,413*

* Based on $34.03 savings and 23.31054 months post-HRA for 11,219 participants

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Program Return on Investment

- Program costs = $1.9 million*
- Program benefits = $8.9 million*
- Program savings = $7.0 million*

ROI = $4.7 in benefits for every $1 in costs

* 1996 dollars @ 0 percent discount

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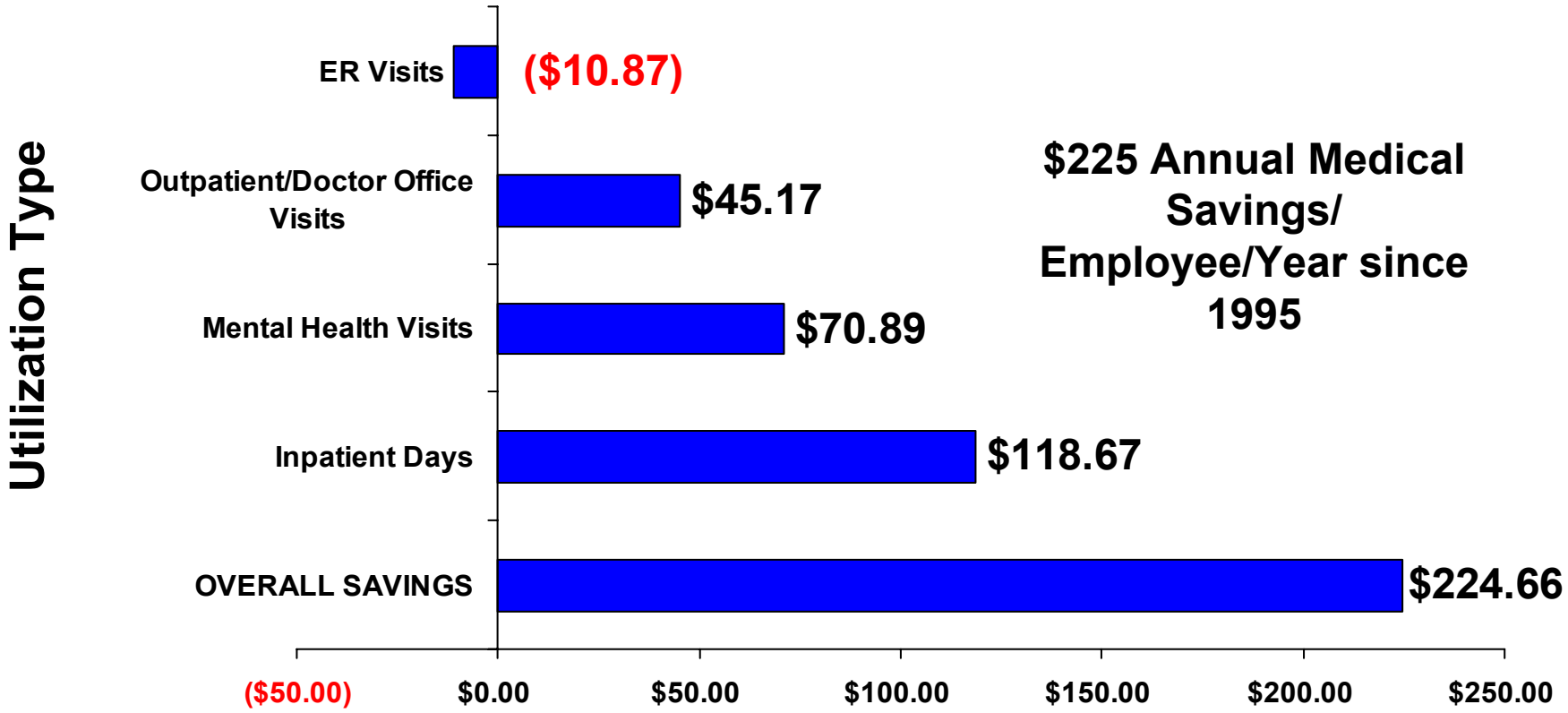
Johnson & Johnson (N=18,331 – Ozminkowski et al, 2002)
Health & Wellness Program Impact on Medical Costs
Annual Savings for Johnson & Johnson -- $8.6 - $8.8 Million



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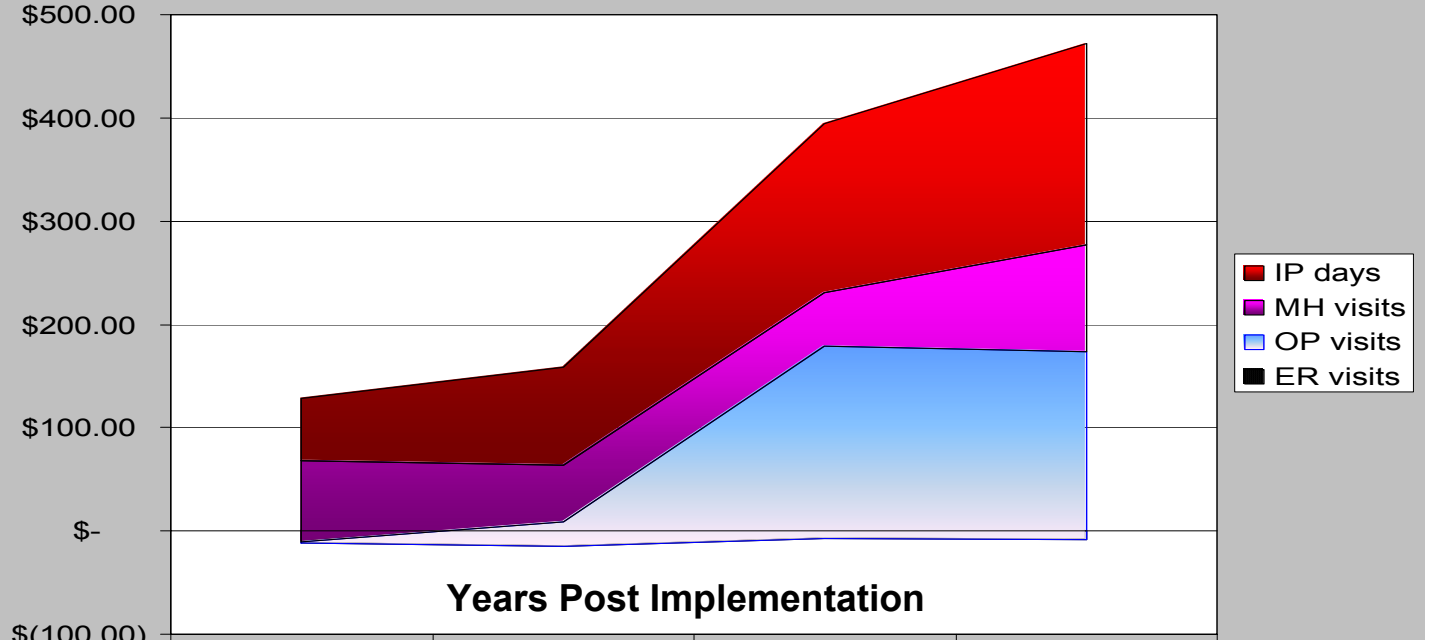
Inflation-Adjusted, Discounted Health and Wellness Program Cumulative Savings Per Employee Per Year, 1995 – 1999 -- Weighted

by sample sizes that range from N = 8,927 – 18,331, depending upon years analyzed



	1	2	3	4
IP days	$60.76	$94.25	$164.72	$195.80
MH visits	$78.42	$55.05	$51.49	$103.43
OP visits	$1.54	$23.57	$186.03	$181.27
ER visits	$(12.15)	$(14.43)	$(7.27)	$(8.06)

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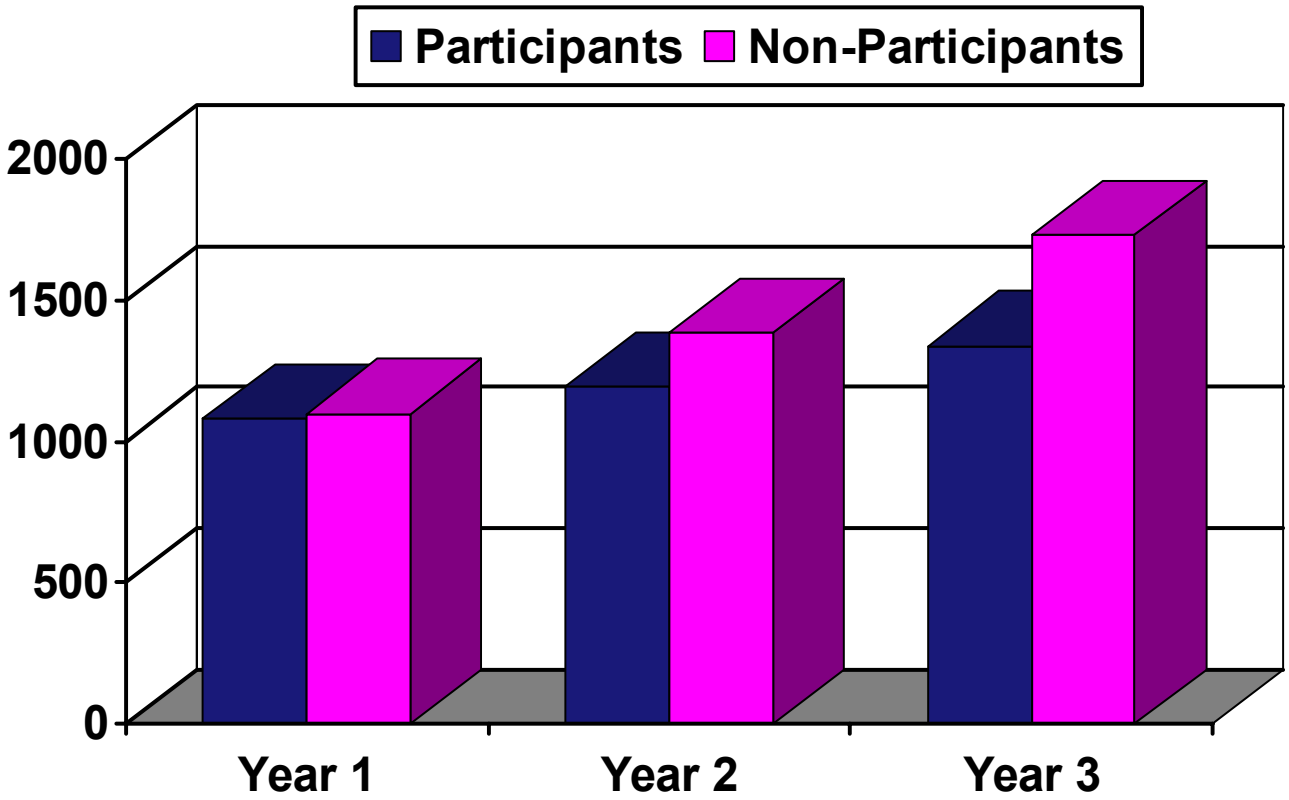
Procter & Gamble:
Total Annual Medical Costs For Participants and Non-Participants In Health Check (1990 - 1992) (N=8,334)



Adjusted for age and gender; Significant at $p < .05$
*Participant costs were 29% lower

Ref: Goetzel, R.Z., Jacobson, B.H., Aldana, S.G., Vardell, K., and Yee, L. *Journal of Occupational and Environmental Medicine,* 40:4, April, 1998.

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Health Promotion Program Studies

Review of Literature (Goetzel, Juday, Ozminkowski, 1999)

- ROI studies of health management programs at:
  - Canada and North American Life
  - Chevron Corporation
  - City of Mesa, Arizona
  - General Mills
  - General Motors
  - Johnson & Johnson
  - Pacific Bell
  - Procter and Gamble
  - Tenneco

- ROI estimates in these nine studies ranged from $1.40 - $4.90 in savings per dollar spent on these programs.

- Median ROI was $3 in benefits per dollar spent on program.

- Sample sizes ranged from 500 - 50,000 subjects in these studies.

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Financial Impact – Literature Review – Steven G. Aldana, Ph.D.

American Journal of Health Promotion, May/June, 2001, 15:5.

Focus: **Peer reviewed journals (English Language) – 196 studies pared down to 72 studies meeting inclusion criteria for review**

Scoring Criteria:

- A (experimental design)
- B (quasi-experimental – well controlled)
- C (pre-experimental, well-designed, cohort, case-controlled)
- D (trend, correlational, regression designs)
- E (expert opinion, descriptive studies, case studies)

Health promotion program impact on health care costs:

- 32 evaluation studies examined – Grades: A (4), B (11), other (17)
- Average duration of intervention: 3.25 years
- Positive impact: 28 studies
- No impact: 4 studies (none with randomized designs)
- Average ROI: 3.48 to 1.00 (7 studies)

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Generic Study Limitations – Corporate Health Promotion Research

Self-Selection

High Attrition

Treatment Diffusion

Poor Instrumentation

“Wish Bias”

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Summary

- Focusing governments (and private business) on improving the health and quality of people's lives will improve their productivity and competitiveness.
- A growing body of scientific literature suggests that well-designed, evidence-based Health Promotion/Disease Prevention Programs can
  - Improve the health of workers;
  - Lower their risk for disease;
  - Save businesses money by reducing health-related losses and limiting absence and disability;
  - Heighten worker morale and work relations;
  - Improve worker productivity; and
  - Improve the financial performance of organizations instituting these programs.

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