Foundations of the Social-ecological Approach to Employee Health Risk Factor Reduction in the Workplace

Presentation to Meeting 4 of the Maine Worksite Wellness Initiative

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Outline

1. **Theory: Stokols et al.**—the "health promotive capacity of human environments"

2. **Formative Research: Oldenburg et al.**—the "Checklist for Health Promotion Environments at Worksites" (CHEW)

3. **Field Research: Ross and Manocchia**—the "Worksites overweight/obesity control/prevention trial"

4. **Translation: Manocchia and Ross**—the "Organizational Risk Assessment" (ORA)

1. Theory: Stokols 1992

Stokols D. Establishing and maintaining healthy environments. Toward a social ecology of health promotion. Am Psychol. 1992 Jan;47(1):6-22.

- Earlier research on health promotion has emphasized behavior change strategies rather than environmentally focused interventions.

- The author offers a social ecological analysis of health promotive environments, emphasizing the transactions between individual or collective behavior and the health resources and constraints that exist in specific environmental settings.

Theory: Stokols 1996

Stokols D. Translating social ecological theory into guidelines for community health promotion. Am J Health Promot. 1996 Mar-Apr;10(4):282-98. Review.

- Health promotion programs often … are based on narrowly conceived conceptual models.
- For example, lifestyle modification programs typically emphasize individually focused behavior change strategies … neglecting the environmental underpinnings of health and illness.
- [C]ore principles of social ecological theory are used to derive practical guidelines for designing and evaluating community health promotion programs [and for] examining the role of intermediaries (e.g., corporate decision-makers, legislators).

Theory: Stokols 1996

Stokols D, Pelletier KR, Fielding JE. The ecology of work and health: research and policy directions for the promotion of employee health. Health Educ Q. 1996 May;23(2):137-58. Review.

- new research and policy [on] worksite health [posit]
  - joint influence of physical and social environmental factors on occupational health
  - effects of non-occupational settings (e.g., households, the health care system) on employee well-being.

- paradigm shift away from individually oriented wellness programs (provided at the worksite … aimed at changing employees' health behavior)
  - toward broader formulations emphasizing the joint impact of the physical and social environment at work, job-person fit, and work policies on employee well-being.

Theory: Stokols 2003

Stokols D, Grzvwacz JG, McMahan S, Phillips K. Increasing the health promotive capacity of human environments. Am J Health Promot. 2003 Sep-Oct;18(1):4-13.

- This article offers an integration of two different perspectives … community capacity for health improvement and … health supportive environments [namely]
  - the cultivation of human resources (e.g., collaborative coalitions, participatory decision-making, health education strategies)
  - the influence of material resources (e.g., the built environment, natural resources, technological infrastructure) on important health behaviors and outcomes.

- Combining [these two] yields a broader understanding of the health promotive capacity of human environments….

2. Formative Research: Oldenburg 2002

Oldenburg B, Sallis JF, Harris D, Owen N. Checklist of Health Promotion Environments at Worksites (CHEW): development and measurement characteristics. Am J Health Promot. 2002 May-Jun;16(5):288-99.

- **PURPOSE**: Health promotion policy frameworks, recent theorizing, and research all emphasize understanding and mobilizing environmental influences to change particular health-related behaviors in specific settings. The workplace is a key environmental setting.
- The Checklist of Health Promotion Environments at Worksites (CHEW) was designed as a direct observation instrument to assess characteristics of worksite environments that are known to influence health-related behaviors.

Formative Research: Oldenburg 2002

- **METHODS**: The CHEW is a 112-item checklist of workplace environmental features hypothesized to be associated, both positively and negatively, with physical activity, healthy eating, alcohol consumption, and smoking.
- The three environmental domains assessed are (1) physical characteristics of the worksite, (2) features of the information environment, (3) characteristics of the immediate neighborhood around the workplace.
- The conceptual rationale and development studies for the CHEW are described, and data from observational studies of 20 worksites are reported.

Formative Research: Oldenburg 2002

- **RESULTS**: The data on CHEW-derived environmental attributes showed generally good reliability and identified meaningful sets of variables that plausibly may influence health-related behaviors.

- With the exception of one information environment attribute, intra-class correlation coefficients ranged from 0.80 to 1.00.

- Descriptive statistics on selected physical and information environment characteristics indicated that
  - vending machines, showers, bulletin boards, and signs prohibiting smoking were common
  - bicycle racks, visible stairways, and signs related to alcohol consumption, nutrition, and health promotion were relatively uncommon.

Formative Research: Oldenburg 2002

- **CONCLUSIONS**: These findings illustrate the types of data on environmental attributes that can be derived, their relevance for program planning, and how they can characterize variability across worksites.
- The CHEW is a promising observational measure that has the potential
  - to assess environmental influences on health behaviors
  - to evaluate workplace health promotion programs.

3. Field Research: Ross and Manocchia 2005-07

R01 DP000108 "Worksites overweight/obesity control/prevention trial"

- Thirty-month (04/01/2005 - 09/29/2007), four-arm: 3 test, 1 control, 7 employers per arm (n=28), 957 active participants at study start. small employer: 51-249 employee worksites
- Cluster randomized control trial conducted at UVM in partnership with Blue Cross Blue Shield of Vermont.
- **Aim**: to gauge clinical and cost effectiveness—compared to Standard Worksite Wellness (SWW) no program/screening only—of three program approaches to worksite wellness:
  - Individual per se (IPS) = "Tailored Health Services."
  - Environmental per se (EPS) = "Altered Worksite Settings."
  - Integrated environmental + individual (IEI) = IPS + EPS.

Field Research: Ross and Manocchia 2005-07

Test period: P.I., Project Manager, Project Clinician

- manage site-level program delivery (PD) team implementation of agreements covering on-/off-site programming by Test sites.
- conduct Outcomes collection Baseline and three (3) Follow-up Clinics at Test and Control sites at which clinical and paper survey outcomes are collected.
- assess employer success implementing programs and employer evaluations of content and process of program implementation.

Outcomes collection Clinics conducted

- Baseline: October 21, '05 – April 26, '06
- 1st follow-up: April 27 – September 14, '06
- 2nd follow-up: January 2 – February 22, '07
- 3rd follow-up: July 26 – September 28, '07

Field Research: Ross and Manocchia 2005-07

- **IPS intervention** links individual health risk assessment to individual-level health risk-reduction programming, employing individual health risk screening and risk-reduction coaching as platform for delivering tailored health services (targeting unhealthy diet, physical inactivity, unmitigated stress, tobacco addiction) to sub-sets of employees identified according to risk.

- **EPS intervention** links environmental health risk assessment to environment-level health risk-reduction programming, employing worksite/building asset screening and asset-improvement coaching as platform for delivering altered worksite settings (targeting physical, informational, nutritional, grounds, neighboring, policy, educational environments) to all employees alike independent of risk.

Field Research: Ross and Manocchia 2005-07

- **The Facilitator**: IPS, EPS, IEI arms featured distinct program approaches to worksite wellness but one common facilitator, the Program Delivery (PD) team:
  - two-to-four (2-4) employee participants who cover four (4) distinct "Go-to" assignments (30-60 minute burden/week), e.g. for the Pedometer club, for the Buddy system.
  - meet weekly/bi-weekly (roundtable) to report, discuss, solve, propose, plan programming, monitoring, and evaluation.
- worked hand-in-glove with the Research team in the pre-Test and Test periods to design and implement the intervention.

Field Research: Ross and Manocchia 2005-07

- **The "Translators"**: IPS, EPS, IEI arms featured distinct program approaches to worksite wellness but two common translators:
  - **Pedometer club**, to promote daily individual or group walking and, by means of six-week Walking logs, daily/weekly step-counting/building.
  - **Buddy system**, to promote formation of buddy groups: two-to-five (2-5) participants committed to regular shared activity around modifying one behavioral health risk factor: unhealthy diet, physical inactivity, unmitigated stress, tobacco addiction.
- worked hand-in-glove with the Research team in Test period to distribute, collect Walking logs, facilitate, monitor, evaluate Buddy groups.

Field Research: Ross and Manocchia 2005-07

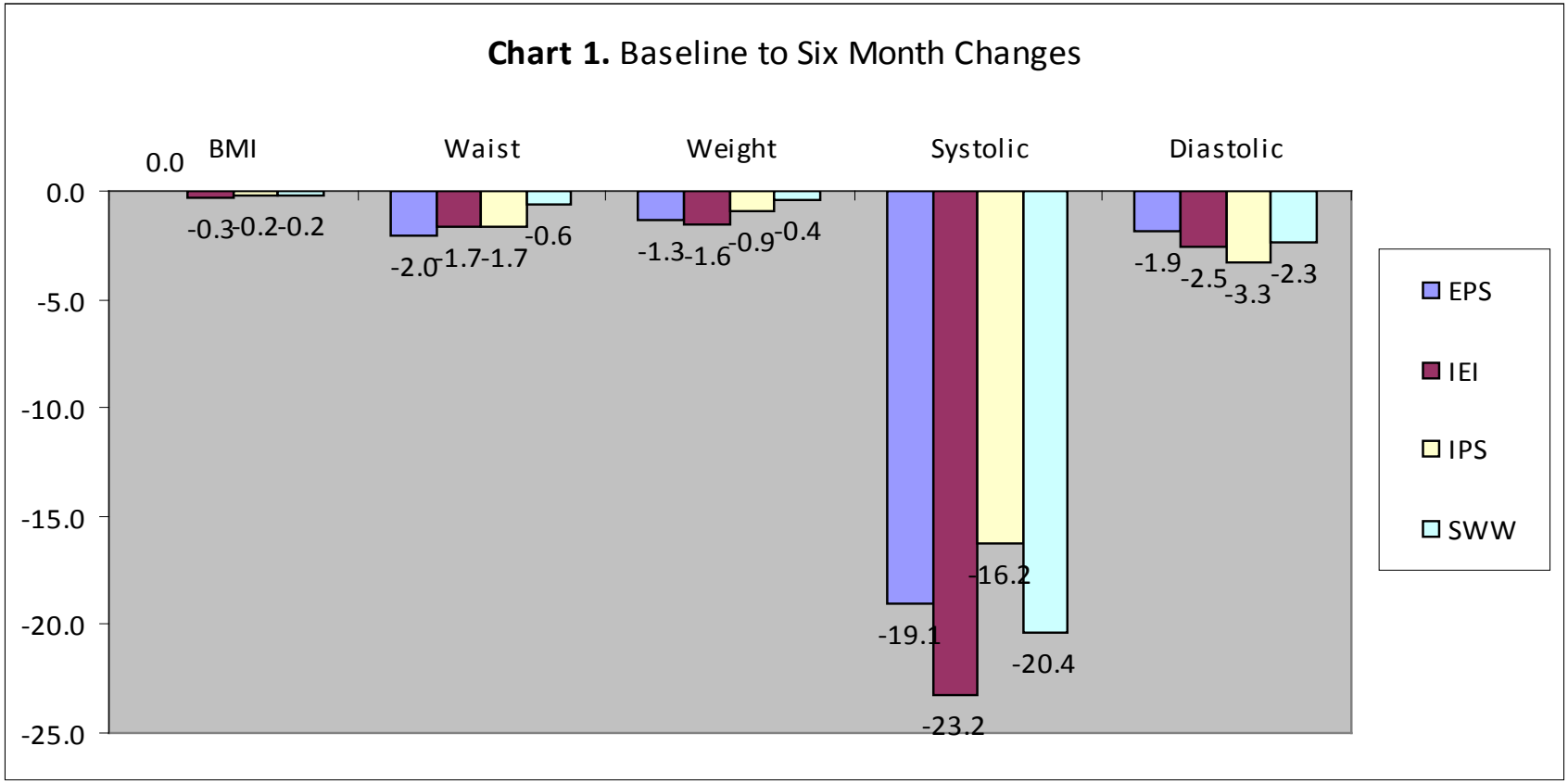
- **Delivery systems**: Ips, Eps, Iei arms alike featured Pedometer clubs and Buddy groups but the manner in which these were promoted differed according to the distinct nature of the intervention:
  - **the IPS** promoted activity always by individual means, involving personalized, face-to-face invitations and encouragements.
  - **the EPS** promoted activity always by environmental means, involving socially marketed invitations and encouragements.
  - **the IEI** promoted activity always by a combination of individual and environmental means.

Field Research: Ross and Manocchia 2005-07

- **Clinician-reported Outcomes measures**
  - BMI: overweight/obesity = BMI 25+/30+.
  - Waist circumference: overweight = >35/women, >40/men.
  - Lipids: total cholesterol, HDL, LDL, triglycerides.
  - Glucose: blood sugar.

- **Participant-reported Outcomes measures**
  - Physical, mental health status: SF12 Health survey (physical and mental component summary scales).
  - Work limitations: Work Limitations Questionnaire/WLQ-8 (percent of work time when tasks are difficult to perform: time, physical, mental, output demands).
  - Work performance: WHO Health and Work Performance Questionnaire/WHO HPQ (health problems and treatment, absenteeism, presenteeism, critical incidents).

Field Research: Ross and Manocchia 2005-07



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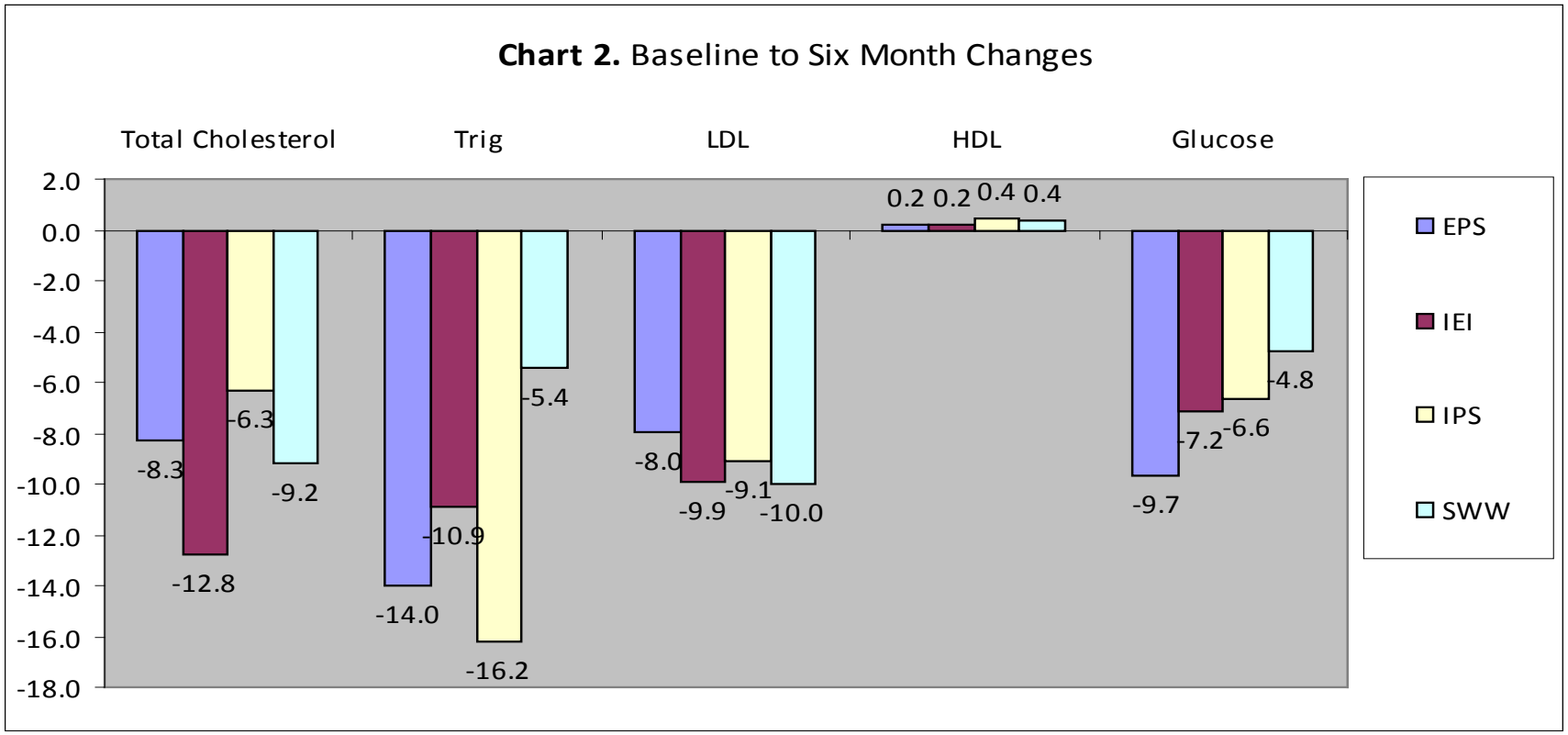

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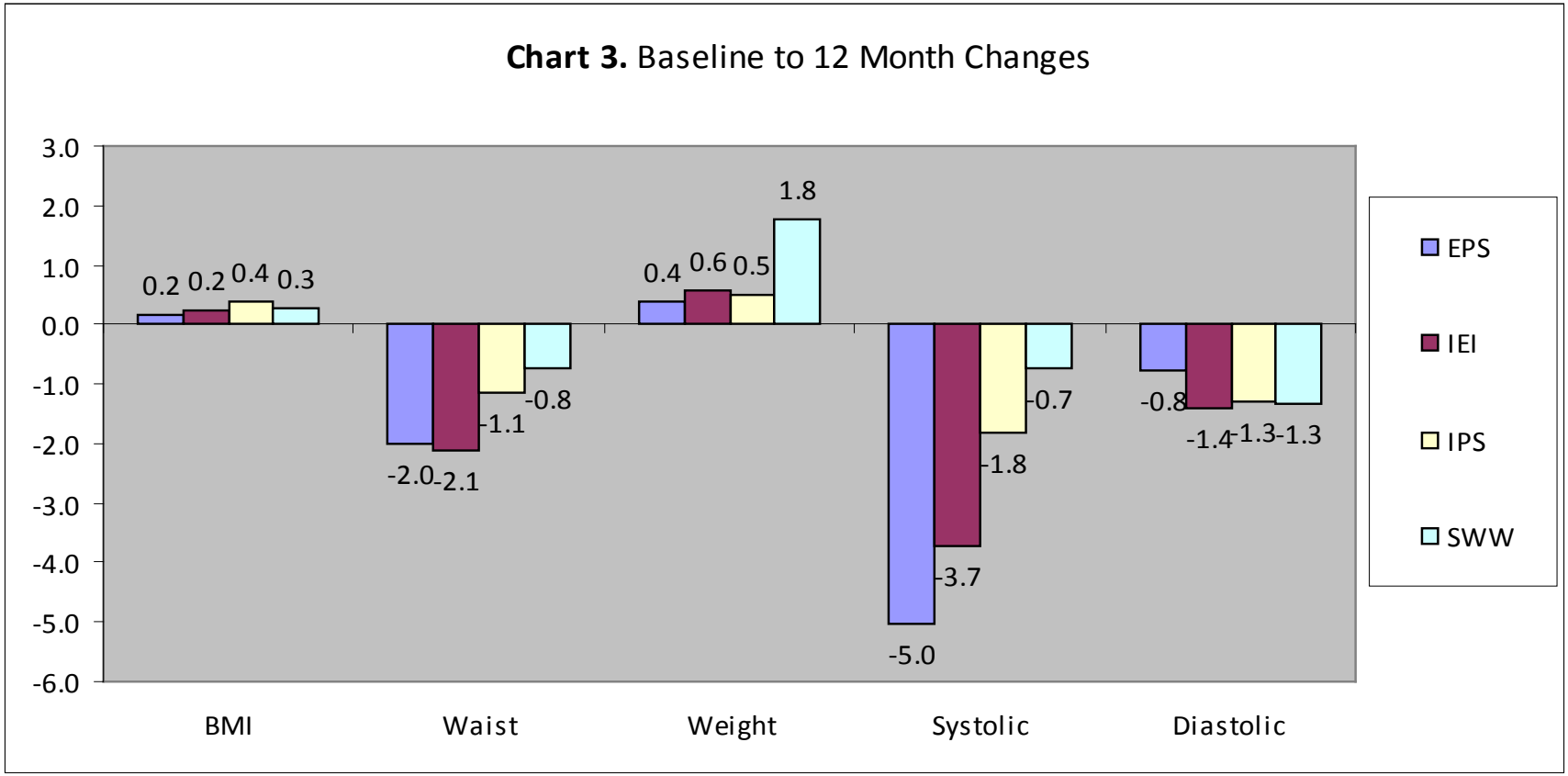

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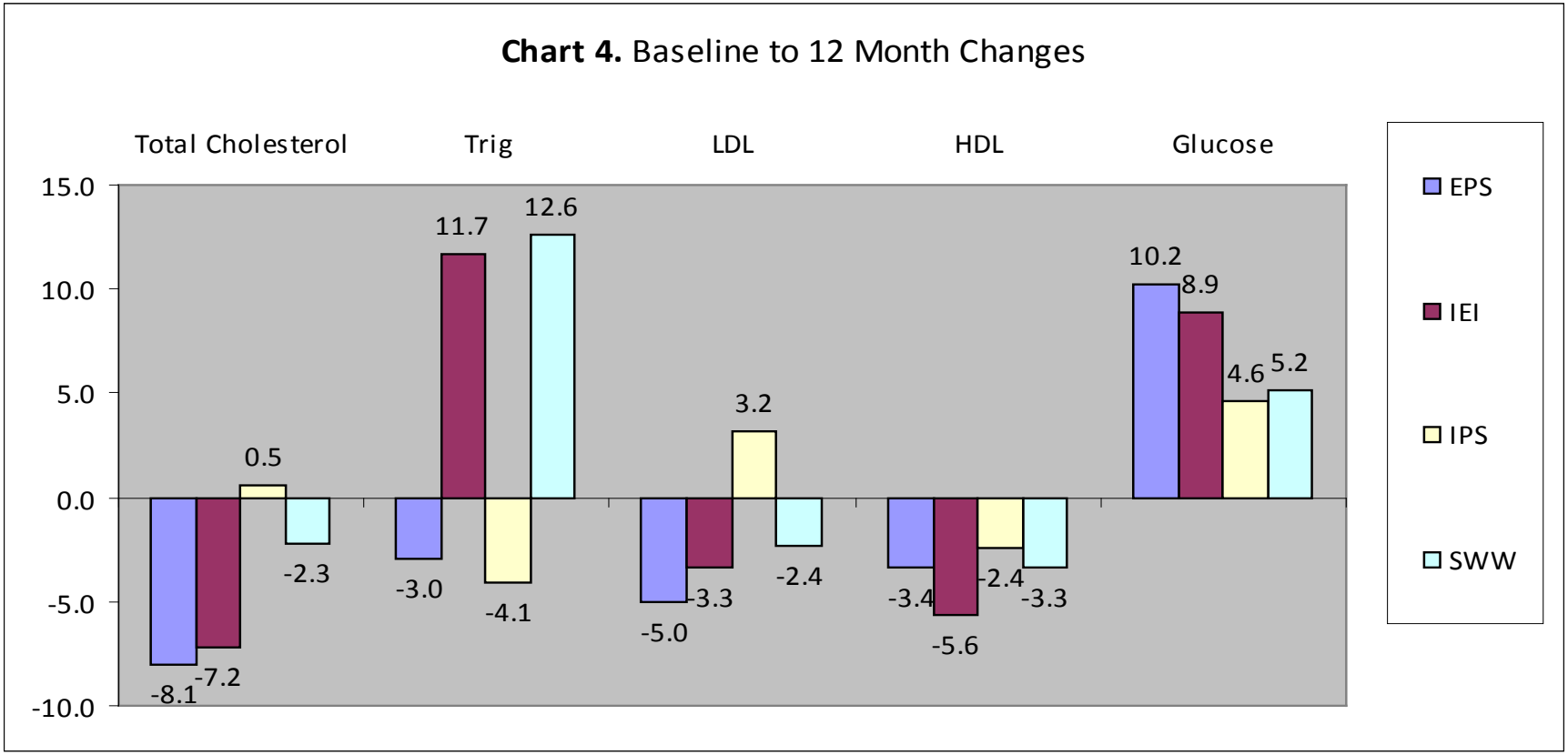

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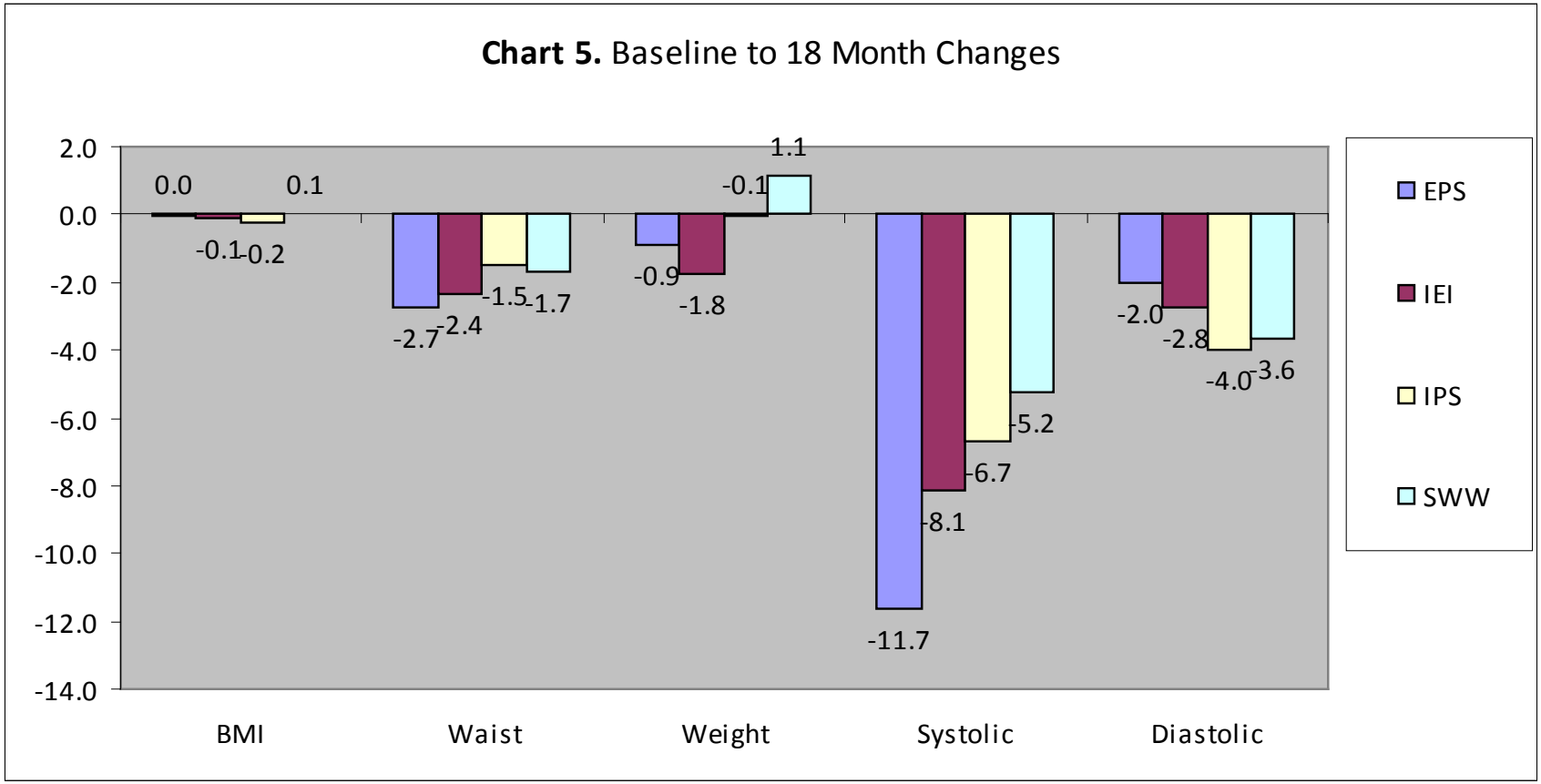

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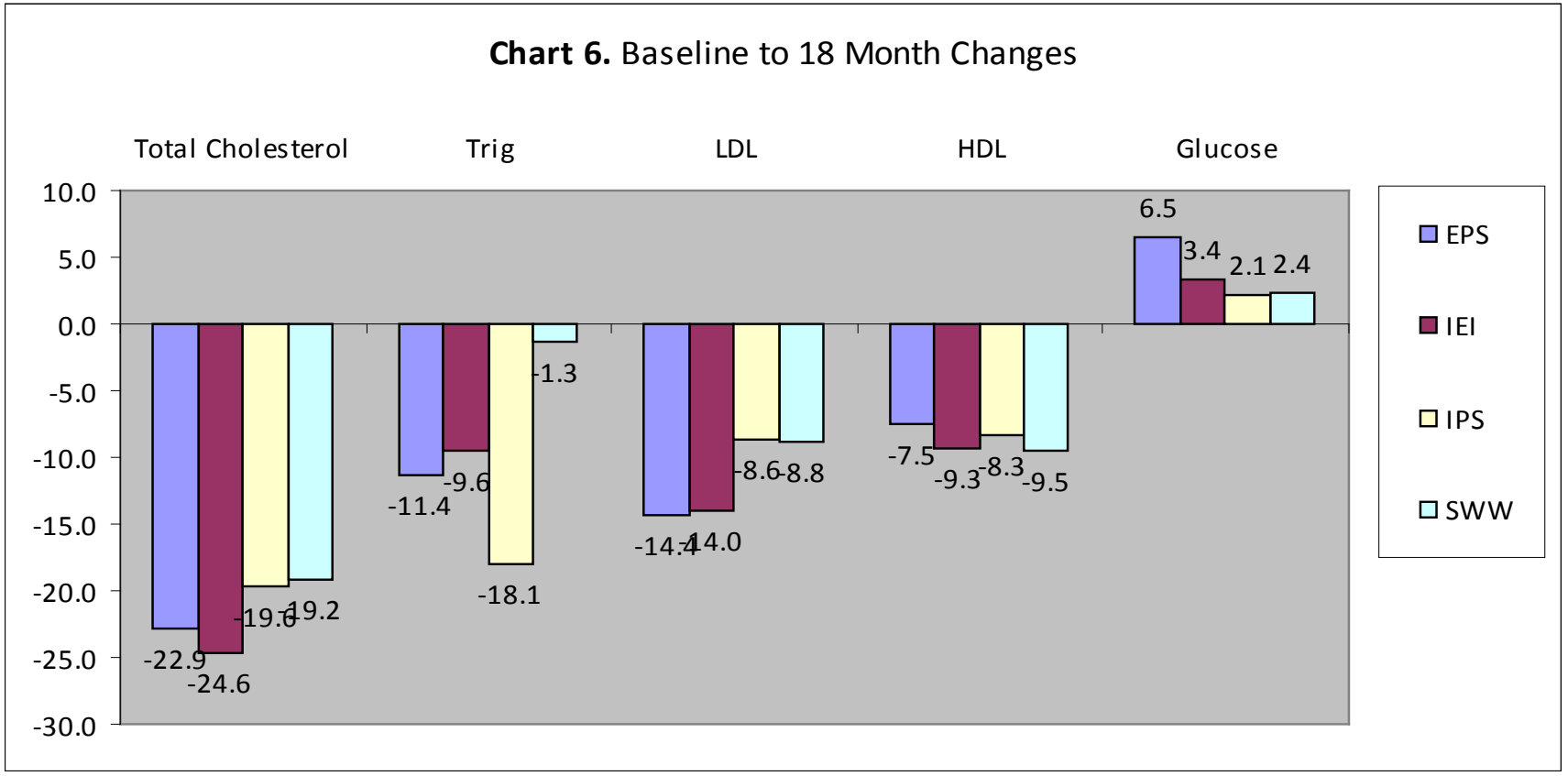


Field Research: Ross and Manocchia 2005-07

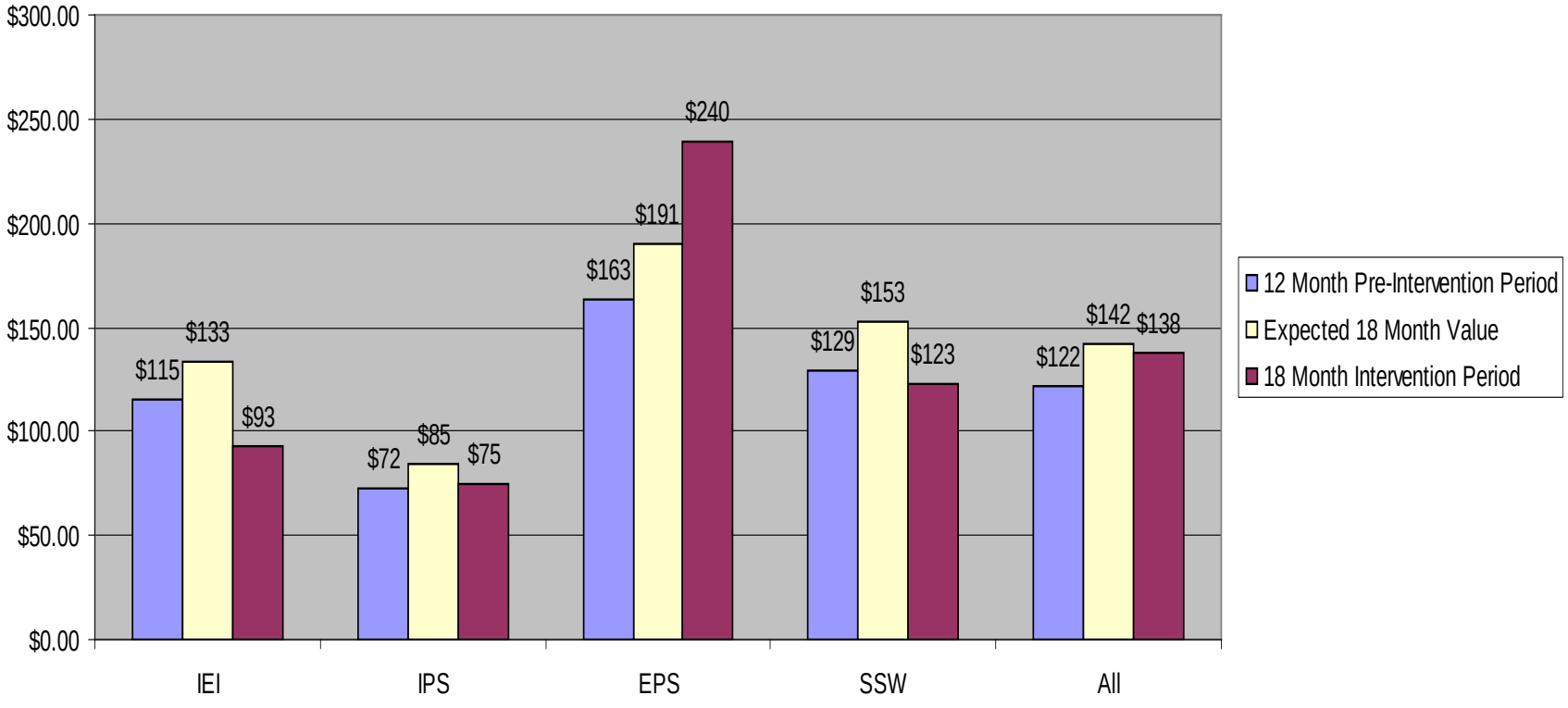
- The frequencies-based results reported in **Charts 1-6** support the "dosage exposure" hypothesis.
  - **With prediction**, the combined-program IEI arm ranks first, ahead of the single-program EPS and IPS and the no-program SWW arms; the single-program EPS and IPS arms rank between, lower than the combined-program IEI but higher than the no-program SWW arms; the no-program SWW arm ranks last, behind the combined-program IEI and single-program EPS and IPS arms.
  - **Against prediction**, the single-program EPS is a closer second than the IPS to the combined-program IEI arm.

Field Research: Ross and Manocchia 2005-07

- **Baseline to 6-month Follow-up**, the IEI performs as predicted 7-in-10 times; SWW as predicted 6-in-10 times (but not 4-in-10 times); EPS and IPS each as predicted 5-in-10 times; EPS and IPS over-perform and under-perform equally by count (5-in-10 times) and proportion (2:3 or 3:2 over-to-under-perform);
- **Baseline to 12-month Follow-up**, the IEI performs as predicted 6-in-10 times; SWW as predicted 7-in-10 times (but not 3-in-10 times); EPS and IPS as predicted, respectively, just 3-in-10 and 4-in-10 times; EPS and IPS over-perform unequally (EPS 5-in-10, IPS 2-in-10), under-perform equally (2-in-10 times);
- **Baseline to 18-month Follow-up**, the IEI performs as predicted 6-in-10 times; SWW as predicted 7-in-10 times (but not 3-in-10 times); EPS and IPS as predicted, respectively, just 3-in-10 and 1-in-10 times; EPS and IPS over-perform equally (4-in-10 times), under-perform equally (2-in-10 times).

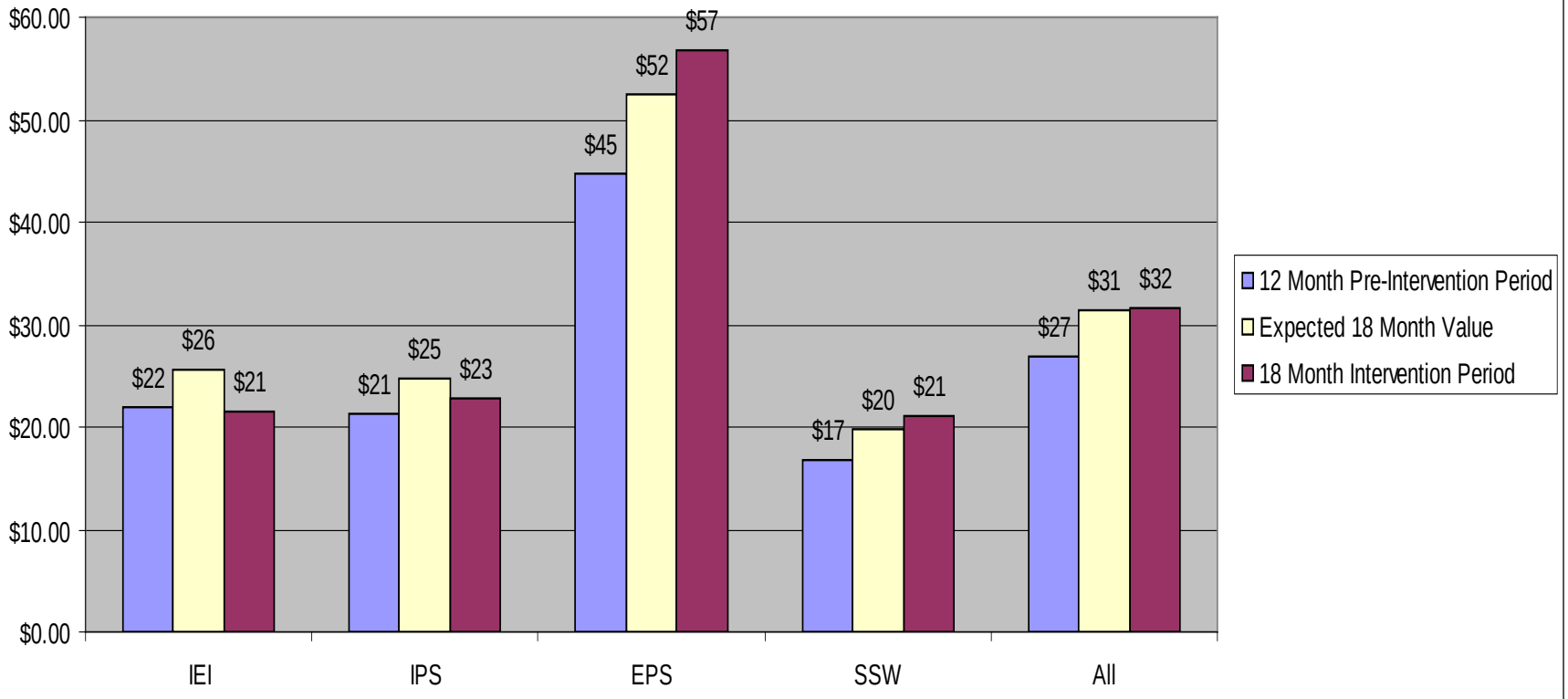
Field Research: Ross and Manocchia

Chart 7. Average Monthly Medical Claims Cost by study arm: 12 mos pre-intervention vs. 18 mos intervention period



Field Research: Ross and Manocchia

Chart 8. Average Monthly Pharmaceutical Claims Cost by study arm: 12 mos pre-intervention vs. 18 mos intervention period



Field Research: Ross and Manocchia

Chart 9. Average Monthly Total Claims Cost by study arm: 12 mos pre-intervention vs. 18 mos intervention period

Field Research: Ross and Manocchia 2005-07

- **Insurer-reported outcomes** for insured participants who completed the full 18-month intervention (n=401) compare 12-month pre-Intervention period to 18-month Intervention period average monthly cost on medical and pharmaceutical claims.

  - **Claims-based results** support the "dosage exposure" hypothesis that the combined-program arm (IEI) will report significantly more positive outcomes than either single-program arm (IPS, EPS).

  - **With prediction**, the IEI arm observably ranks first on claims performance (registering cost saving).

Field Research: Ross and Manocchia 2005-07

- **Conclusion**: Savings are maximized when individual (IPS) and environmental (EPS) programs are combined. Accordingly, participants exposed to the IEI intervention (n=85, EPS n=112, IPS n=97, SWW=107) went from

  - **unadjusted**: average monthly total claims cost ($2005-07) of $135.40 (pre-Intervention) to $113.22 (Intervention) for a savings of $22.18.
    - Annualized this is a savings of $266 per employee or $26,616 per 100 employees.

  - **adjusted** (for actual 2005-2007 percentage rise in employer premiums rates): average monthly total claims cost ($2005-07) of $156.95 (pre-Intervention) to $113.22 (Intervention) for a savings of $43.73.
    - Annualized this is a savings of $525 per employee or $52,476 per 100 employees.

Field Research: Ross and Manocchia 2005-07

Cost effectiveness outcomes

Table 1. Worksites trial Cost effectiveness ratios by study arm (n=4: IEI, IPS, EPS, SWW)

	Study arm						
	Test 1: IEI arm		**Test 2**: IPS arm		**Test 3**: EPS arm		**Control**: SWW arm
Measure	Test	Test-Control	Test	Test-Control	Test	Test-Control	Control
Change in cost from baseline per subject	$2,103	$1,895	$1,112	$904	$1,319	$1,112	$208
Change in Systolic Blood Pressure from baseline	-8.53	-3.18	-7.16	-1.82	-13.26	-7.92	-5.34
Cost/unit change in Sys Blood Pressure	N/A	$596	N/A	$497	N/A	$140	N/A
Change in Total Cholesterol from baseline	-24.76	-6.22	-20.40	-1.86	-24.28	-5.75	-18.54
Cost/unit change in Total Cholesterol	N/A	$305	N/A	$487	N/A	$193	N/A

Field Research: Ross and Manocchia 2005-07

Cost-effectiveness analysis (CEA)

- **Cost (ratio numerator)**: employer-reported fixed and variable cost of implementing screening plus programming (test arms) and screening only (control arm) and employee participation cost as well as insurer-reported pre/post medical and pharmaceutical claims cost change.
- **Effectiveness (ratio denominator)**: employee participant pre/post health risk factors incl. weight and waist circumference, blood pressure (Systolic, Diastolic), lipids (Total cholesterol, HDL-cholesterol), glucose (blood sugar).

Compared to control (Table 1)

- **Systolic blood pressure**: the EPS arm was found 3.55 (cost per unit change) more cost effective than the IPS ($497:$140) and 4.26 more cost effective than the IEI ($596:$140) arm.
- **Total Cholesterol**: the EPS arm was found 2.52 (cost per unit change) more cost effective than the IPS ($487:$193) and 1.58 (cost per unit change) more cost effective than the IPS+EPS ($305:$193).