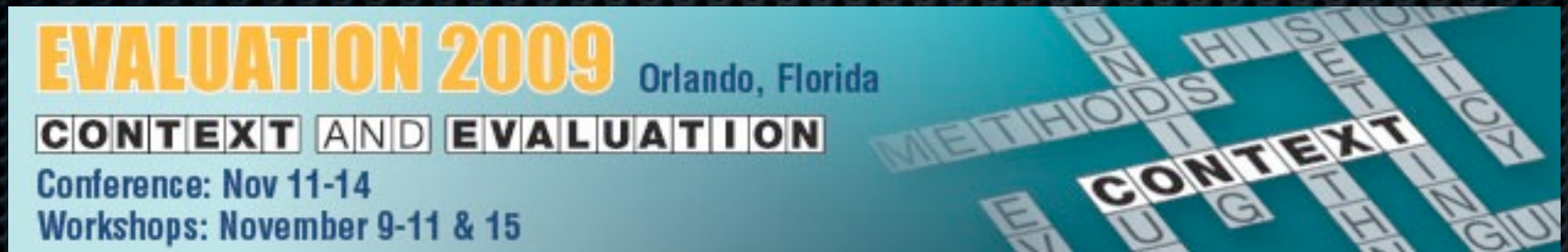


AEA

Workshop 43



Applied Cost-Effectiveness and Cost-Benefit Analysis

Patricia Herman, University of Arizona

Brian Yates, American University, Washington, DC

Download site for

- handouts
- slides
 - <http://bit.ly/aea09lib>
- title: 43. Applied Cost-Effectiveness and Cost-Benefit Analysis

workshop schedule I: pre-break

| Topic | Subtopics | Presenter |
|--|--|--------------------|
| Introductions (10 minutes) | <ul style="list-style-type: none">• purpose of workshop• intro of presenters• ground rules for participants | Brian |
| Basic orientation, definitions (30 minutes) | <ul style="list-style-type: none">• cost-inclusive evaluation• costs• effectiveness• benefits• cost-effectiveness• cost-benefit | Patricia |
| Examples of cost- inclusive evaluations (20 minutes) | <ul style="list-style-type: none">• decision(s)?• perspective(s)?• cost-<i>what</i>?• what answer did they give? | Brian and Patricia |
| Break (15 minutes) | | All of us! |

workshop schedule I: post-break

| Topic | Subtopics | Presenter |
|---|--|--------------------|
| Instruments and methods (30 minutes) | <ul style="list-style-type: none">costseffectivenessbenefits | Brian |
| Analyses examples (30 minutes) | cost-effectiveness (CEA) | Brian |
| | cost-benefit (CBA) | Patricia |
| Exercise: Calculations (30 minutes) | cost-effectiveness and cost-benefit analyses | Patricia and Brian |
| Questions & Answers (15 minutes) | problem-solving | Patricia, Brian |
| References for further learning | | handout |

Introductions

- purposes of workshop
- presenters
- ground rules for us

purposes of workshop

- **Conceptual foundations** for:

- cost-effectiveness analysis
- cost-benefit analysis

- **Concrete tools** for

- cost assessment
- benefit assessment

introduction of presenters

Patricia Herman, N.D., Ph.D.

- Evaluation, Research and Development Unit
- Department of Psychology,
- University of Arizona, Tucson, AZ

Brian T. Yates, Ph.D.

- Program Evaluation Research Laboratory (PERL)
- Department of Psychology
- American University, Washington, DC

ground rules

- 180 minutes for workshop and questions
- Quick, clarification questions throughout
- Other workshop presenter will time the presenter

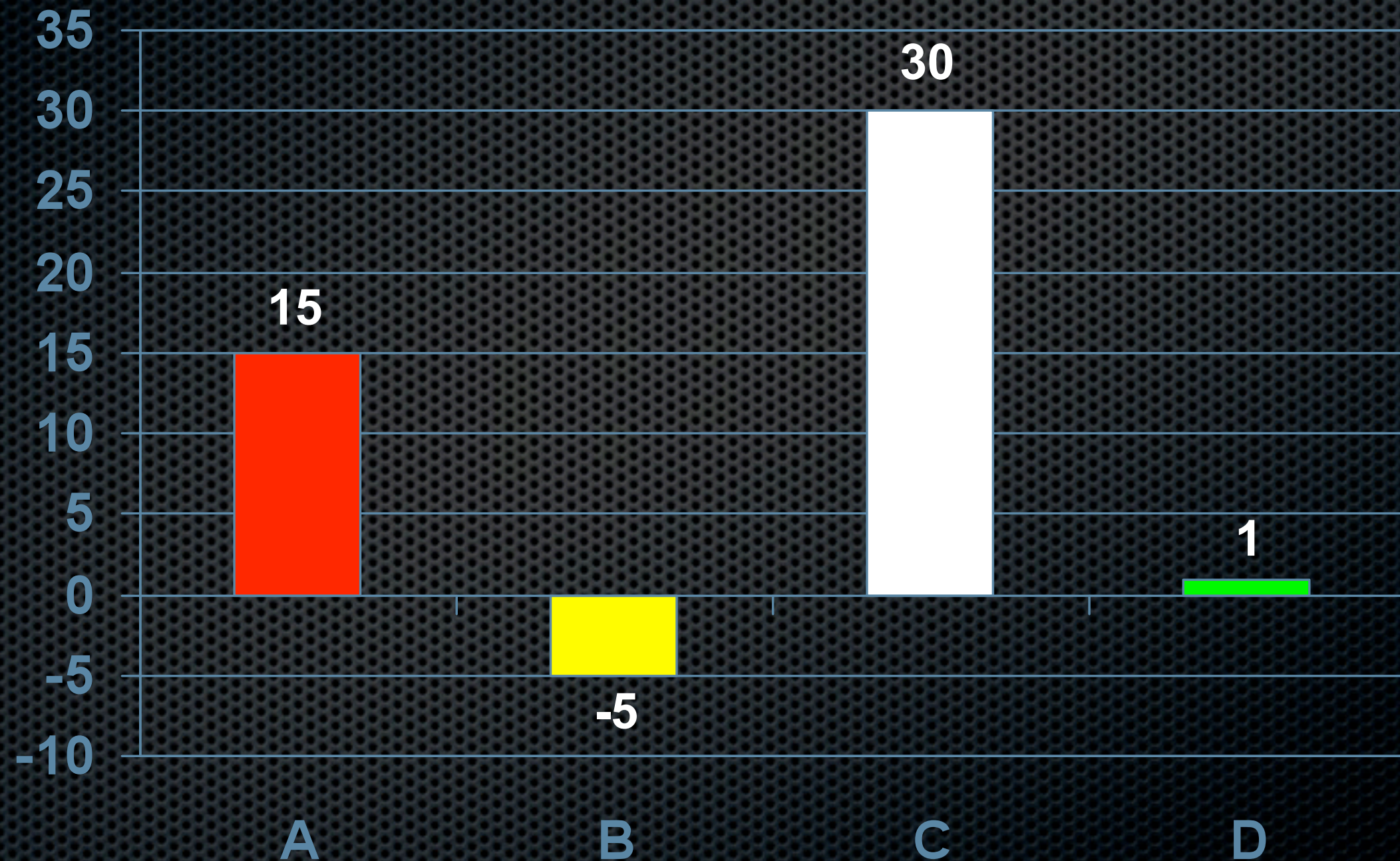
Basic Orientation, Definitions

- cost-inclusive evaluation
- costs
- effectiveness
- benefits
- cost-effectiveness
- cost-benefit

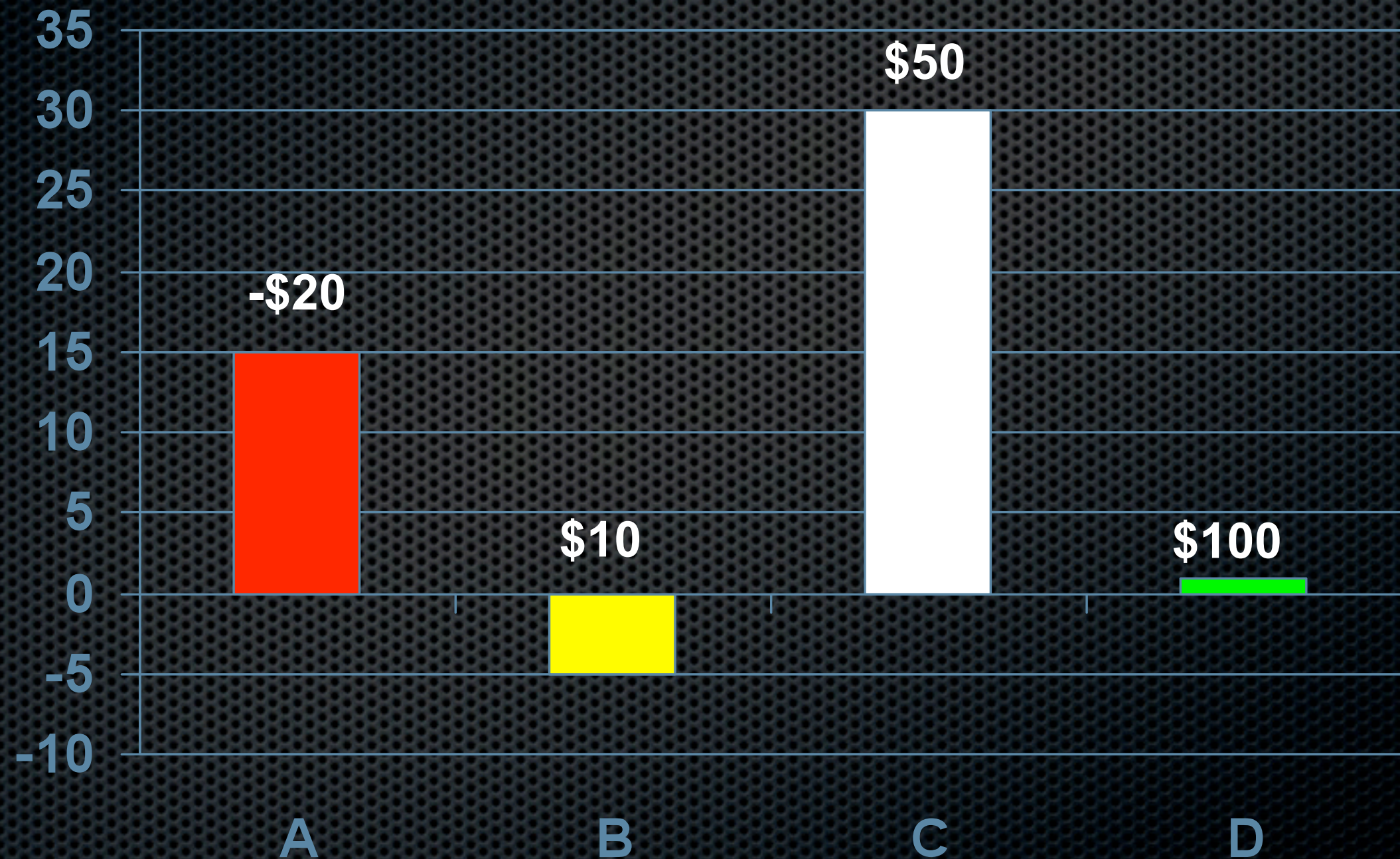
The Basics

- Why do a cost-inclusive evaluation?
- What is compared to what?
- Which type of evaluation should you do (i.e., the type of benefits)?
- Which costs should be included (i.e., the perspective of the analysis)?
- The decision we are aiming towards

Which would you consider if you only considered effectiveness?



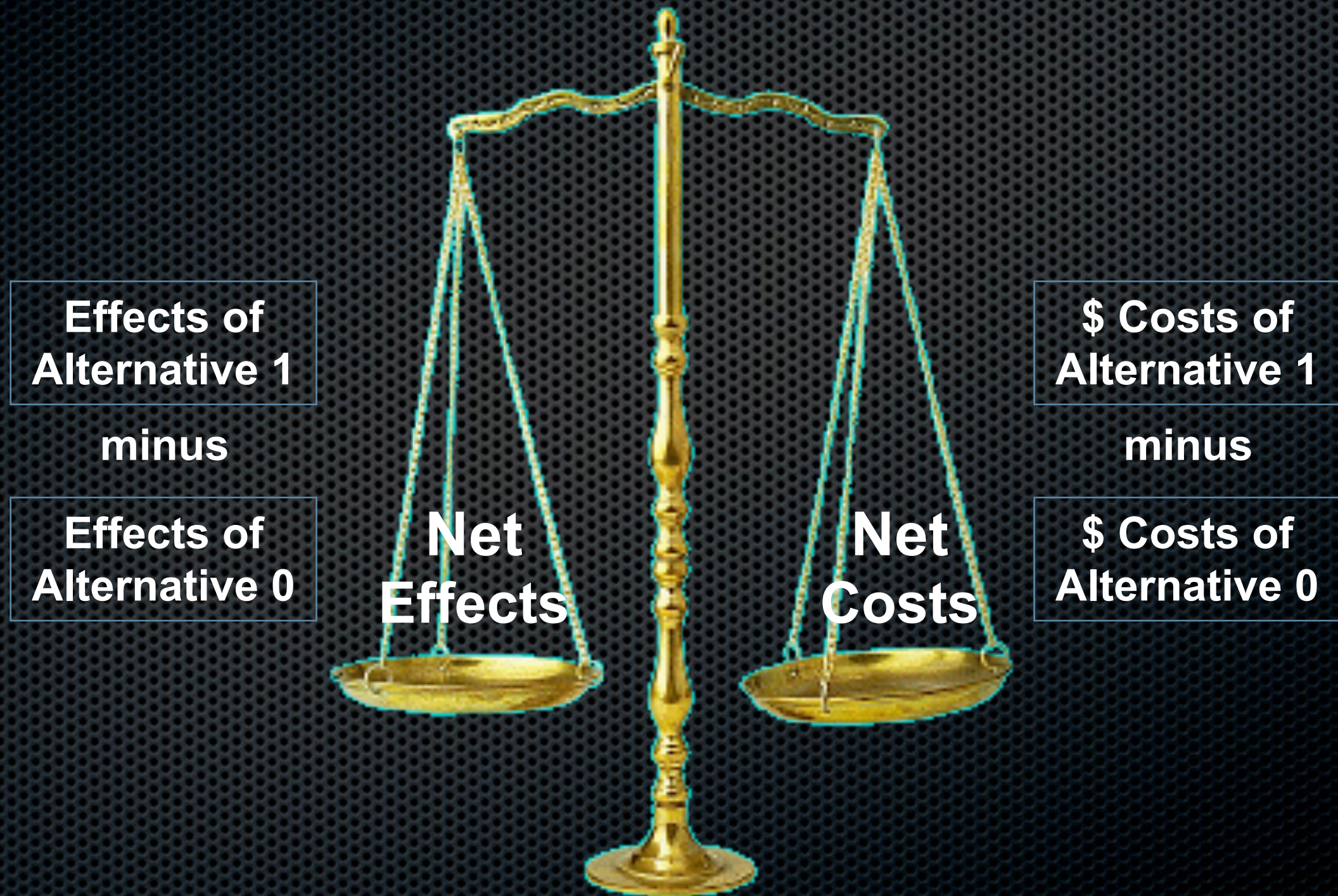
Now which one looks better?



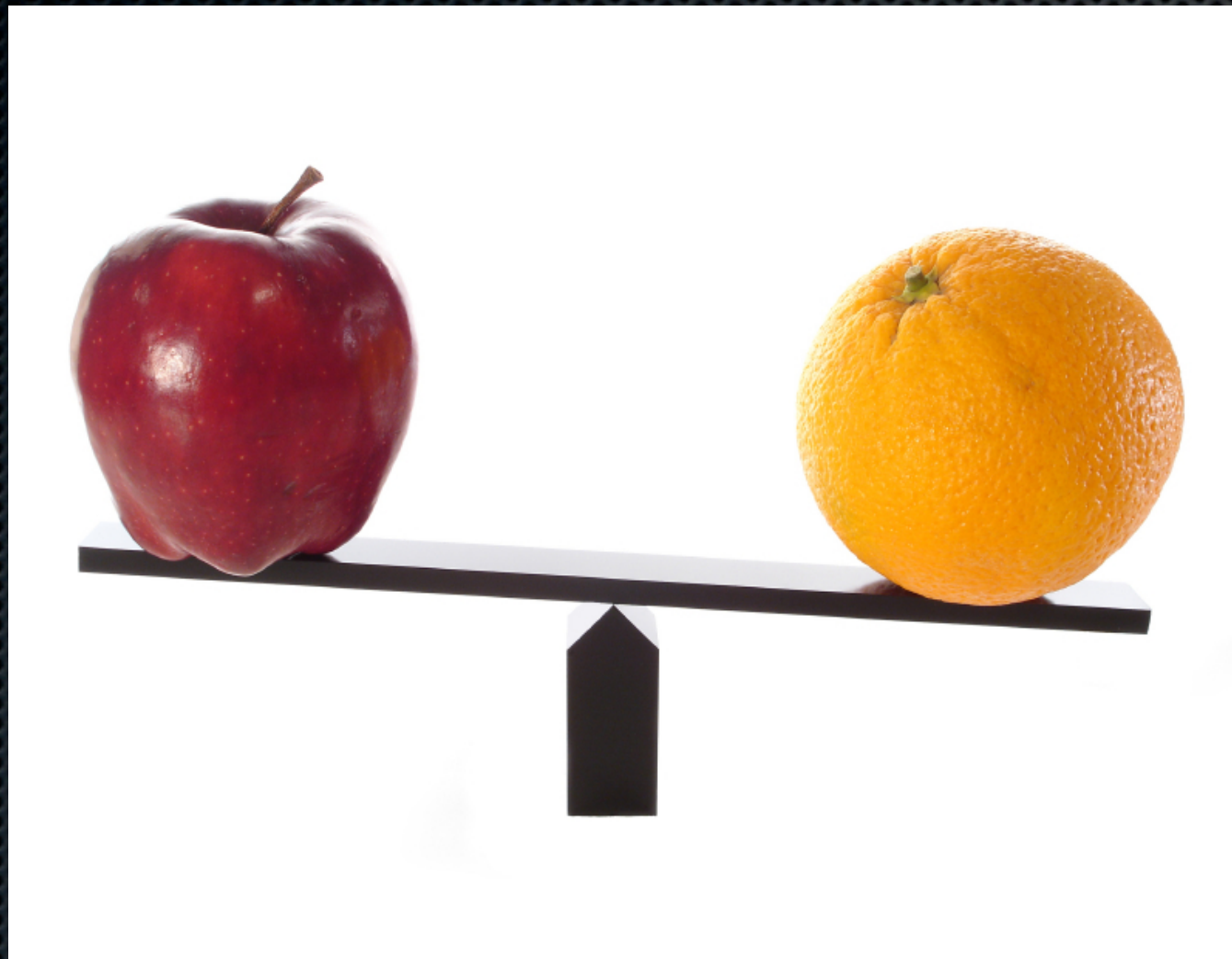
Cost-Effectiveness Decision Matrix

| | | | | |
|------------------|---|-------------|---|--|
| Improved Outcome | Definitely Adopt Alternative (Alternative Dominates) | | Decision: Are benefits worth costs? | |
| | | Indifferent | | |
| | | | | |
| No Change | | | | |
| Worse Outcome | Decision: Is health loss worth savings? | | Definitely Reject Alternative (Business as Usual Case Dominates) | |
| | | | | |
| | Cost Savings | No Change | Increased Costs | |

What is compared to what?



Appropriate comparator



- **Real life**
- **Relevant**
- **Incremental analysis**

Types of cost-inclusive evaluation

- **Cost – benefit analysis (CBA)**
 - Benefits in monetary terms
 - Allows comparison across a wide variety of outcomes
- **Cost – effectiveness analysis (CEA)**
 - Effectiveness in some relevant unit
 - Only allows comparisons across similar outcomes
- **Cost – utility analysis (CUA)**
 - Effectiveness in some generalizable unit (e.g., QALYs)
 - Allows comparison across a wide variety of outcomes



Cost

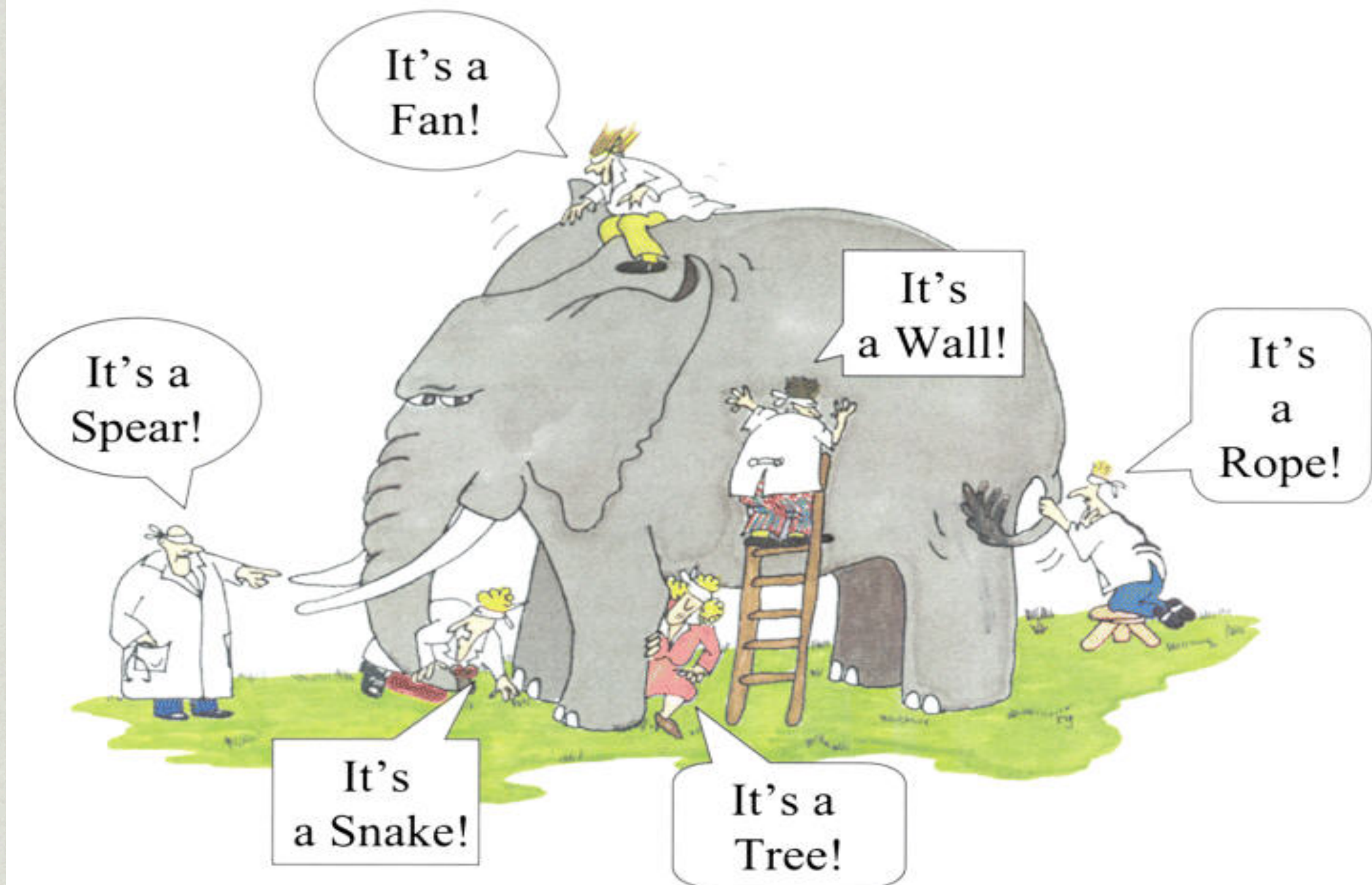
- Can be positive (consumption of resources)
OR negative (resources made available)
- Resource use * Unit price
- Unit “price” = opportunity cost =
 - Value in next best use
- Do not need to measure costs in common



Alternative Futures



Importance of *perspective*



Which costs should be included?

- **Different stakeholders (decision makers) will have different views (perspectives) as to costs**
- **Common perspectives:**
 - Individual (eg, participant, student, patient, client)
 - Direct providers of the alternatives
 - (eg, mental health agency, hospital)
 - Other consumers (eg, insurance premium payers, other ratepayers)
 - Society as a whole



Energy Conservation Program Example

| | Participant | Utility | Rate (NP) | Society |
|-------------------------------|-------------|---------|-----------|---------|
| Rebate | | | | |
| Cost of fridge | | | | |
| Cost of program | | | | |
| Bill reduction | | | | |
| Reduced production | | | | |

Energy Conservation Program Example

| | Participant | Utility | Rate (NP) | Society |
|-------------------------------|-------------|---------|-----------|---------|
| Rebate | X | | | |
| Cost of fridge | X | | | |
| Cost of program | | | | |
| Bill reduction | X | | | |
| Reduced production | | | | |

Energy Conservation Program Example

| | Participant | Utility | Rate (NP) | Society |
|-------------------------------|-------------|---------|-----------|---------|
| Rebate | X | X | | |
| Cost of fridge | X | | | |
| Cost of program | | X | | |
| Bill reduction | X | | | |
| Reduced production | | X | | |

Energy Conservation Program Example

| | Participant | Utility | Rate (NP) | Society |
|-------------------------------|-------------|---------|-----------|---------|
| Rebate | X | X | X | |
| Cost of fridge | X | | | |
| Cost of program | | X | X | |
| Bill reduction | X | | X | |
| Reduced production | | X | X | |

Energy Conservation Program Example

| | Participant | Utility | Rate (NP) | Society |
|-------------------------------|-------------|---------|-----------|---------|
| Rebate | X | X | X | |
| Cost of fridge | X | | | X |
| Cost of program | | X | X | X |
| Bill reduction | X | | X | |
| Reduced production | | X | X | X |

How should (can) costs be measured?

- **Records (e.g., charts, claims, study)**
- **Self-report / questionnaire**
- **Expert opinion**
- **Literature**
- **Prospective or retrospective**
- **Balance between expense/difficulty in obtaining and importance/size of cost**

General Cost Categories

| | Intervention (Input) Costs | Cost Outcomes (Consequences) |
|-----------------------|---|--|
| Direct costs | <p>Costs of the intervention, including:</p> <ul style="list-style-type: none"> • Staff • Materials • Facilities • Participant time | <p>Changes in future costs due to the outcomes of the intervention within its targeted sector</p> <p>--e.g., reduced future healthcare costs due to a health promotion program</p> |
| Indirect costs | | <p>Changes in future costs due to outcomes in other sectors</p> |

Terminology

| | Society | Institution | Individual |
|------------------------|---|---|--|
| \$ Benefits | Cost-benefit analysis from a societal perspective | Cost-benefit analysis from an institutional perspective | Cost-benefit analysis from an individual perspective |
| Effects | Cost-effectiveness analysis from a societal perspective | Cost-effectiveness analysis from an institutional perspective | Cost-effectiveness analysis from an individual perspective |
| Utilities/QALYs | Cost-utility analysis from a societal perspective | Cost-utility analysis from an institutional perspective | Cost-utility analysis from an individual perspective |

Cost-Effectiveness Decision Matrix

| Outcome | Cost Savings | No Change | Increased Costs |
|------------------|---|-------------|---|
| Improved Outcome | Definitely Adopt Alternative (Alternative Dominates) | | Decision: Are benefits worth costs? |
| No Change | | Indifferent | |
| Worse Outcome | Decision: Is health loss worth savings? | | Definitely Reject Alternative (Business as Usual Case Dominates) |

Cost-Effectiveness Decision Matrix – Graph Form



A few more details...

- **Time horizon – long enough to capture main costs and benefits**
- **Discounting and inflation**
 - For studies longer than 1 year in duration
 - Discount both costs and benefits (effects)
- **Sensitivity analysis**
 - Sample uncertainty
 - Assumption uncertainty

Examples of cost-inclusive evaluation

... drawn from the current evaluation literature

Examples of *cost-inclusive* evaluations

- a. The cost-effectiveness of raising the legal smoking age in California.
- b. Economic evaluation of delivering hepatitis B vaccine to injection drug users.
- c. A cost-benefit analysis of transitional services for emancipating foster youth.
- d. Befriending carers of people with dementia: A cost-utility analysis.
- e. An economic evaluation of a participatory ergonomics process in an auto parts manufacturer.

The cost-effectiveness of raising the legal smoking age in California

Sajjad Ahmad

2005

Medical Decision-Making

25, 330-340

(direct quotes from abstract)

The cost-effectiveness of raising the legal smoking age in California

- Costs and benefits were estimated from a societal perspective using a dynamic computer model that simulates changes to the California population in age, composition, and smoking behavior over time.
- Secondary data for model parameters were obtained from publicly available sources.
- Population health impacts were estimated in terms of smoking prevalence and the change in cumulative quality-adjusted life years (QALYs) to the California population over a 50-year period.

The cost-effectiveness of raising the legal smoking age in California (continued)

- Economic impacts were measured in monetary terms for medical cost savings, cost of law enforcement, and cost of checking identification.
- Compared to a status quo simulation, raising the smoking age to 21 would result in a drop in teen (ages 14–17) smoking prevalence from 13.3% to 2.4% (82% reduction).
- The policy would generate no net costs, in fact saving the state and its inhabitants a total of \$24 billion over the next 50 years with a gain of 1.47 million QALYs compared to status quo.

Economic evaluation of delivering Hepatitis B vaccine to injection drug users

Yiqing Hu, Laretta E. Grau, Greg Scott, Karen Seal, Patricia Marshall, Merrill Singer, Robert Heimer

2008

American Journal of Prevention Research

35, 25-32

(direct quotes from abstract)

Economic evaluation of delivering Hepatitis B vaccine to injection drug users

Background

- Injection drug users (IDUs) are at high risk of hepatitis B (HBV) infection, and hepatitis B vaccination coverage in IDUs is low.
- The purpose ... was to determine if targeting injection drug users (IDUs) for HBV vaccination through syringe exchange programs is economically desirable for the healthcare system and to assess the relative effectiveness of several different vaccination strategies.

Economic evaluation of delivering Hepatitis B vaccine to injection drug users (continued)

Methods

- Active IDUs in Chicago IL and Hartford and Bridgeport CT (N1964) were recruited and screened through local syringe exchange programs,
- randomized to a standard (0, 1, 6 months) or accelerated (0, 1, 2 months) vaccination schedule, and
- followed from May 2003 to March 2006.

Economic evaluation of delivering Hepatitis B vaccine to injection drug users (continued)

- The vaccination program's costs were balanced against future HBV-associated medical costs.
- Benefits in terms of prevented acute HBV infections and quality-adjusted life years were estimated based on a Markov model.

Results

- HBV vaccination campaigns targeting IDUs through syringe exchange programs are cost-saving.

Economic evaluation of delivering Hepatitis B vaccine to injection drug users (continued)

Results (continued)

- The most cost-saving strategies include giving the first dose to everyone at screening, administering the vaccination under the accelerated schedule (0, 1, 2 months),
- and obtaining highly discounted vaccine from local health departments.

Conclusions

- Existing syringe exchange programs in the U.S. should include HBV vaccination.

A cost-benefit analysis of transitional services for emancipating foster youth

Thomas Packard, Melanie Delgado, Robert Fellmeth,
Karen McCready

2008

Children and Youth Services Review

30, 1267-1278

(direct quotes from abstract)

A cost-benefit analysis of transitional services for emancipating foster youth

- Over 24,000 youth “aged out” of the nation's foster care system in FY 2005.
- While independent living programs and other services are available to foster youth, and almost all states allow dependency courts to retain jurisdiction of foster youth beyond age 18, outcomes for former foster youth are disturbing.
- This paper describes a program to address these challenges by providing extended foster care benefits and support to former foster youth from their 18th to 23rd birthdays.

A cost-benefit analysis of transitional services for emancipating foster youth (continued)

- A detailed cost–benefit methodology documents expected costs and key benefits of the program.
- According to this cost–benefit analysis, a program providing funding and guardian support for former foster youth is projected to result in net benefits to the State of California over the 40-year careers of participating former foster youth.

A cost-benefit analysis of transitional services for emancipating foster youth (continued)

- The program, if successful for all youth, would increase lifetime earnings and taxes paid due to increased education and would lower use of TANF [*Temporary Assistance for Needy Families*] and prison, resulting in a benefit–cost ratio of 1.5 to 1, using discounted present value dollars.
- Even at 75% success, the ratio is 1.2 to 1, showing a net benefit to society.

Befriending carers of people with dementia: A cost-utility analysis

Edward Wilson, Mariamma Thalanany, Lee Shepstone, Georgina Charlesworth, Fiona Poland, Ian Harvey, David Price, Shirley Reynolds, and Miranda Mugford

2009

International Journal of Geriatric Psychiatry

24, 610-623

(direct quotes from abstract)

Befriending carers of people with dementia: A cost-utility analysis

Objective

- The BEfriending and Costs of CAring (BECICA) trial aimed to establish whether a structured befriending service improved the quality of life of carers of people with dementia, and at what cost.

Methods

- We performed an economic evaluation alongside a single blind, randomised controlled trial in a community setting of 236 carers of people with a primary progressive dementia.

Befriending carers of people with dementia: A cost-utility analysis (continued)

Methods (continued)

- The intervention was contact with a Befriender Facilitator (BF), and offer of match with a trained lay volunteer befriender compared with no BF contact.
- Main outcome measures were health and social care, voluntary sector, and family care costs and quality adjusted life years (QALYs) in carers over 15 months

Befriending carers of people with dementia: A cost-utility analysis (continued)

Results

- Mean QALYs per carer over 15 months were 0.017 higher in the intervention group compared with control (95%CI: 0.051, 0.083).
- Mean costs from a societal perspective were £1,813 higher (£11,312, £14,984).
- The point estimate Incremental Cost Effectiveness Ratio (ICER) is thus £105,954 per incremental QALY gained.

Befriending carers of people with dementia: A cost-utility analysis (continued)

Results (continued)

- Probabilistic sensitivity analysis suggests a 42.2% probability that the ICER is below £30,000 per QALY.
- Inclusion of dementia patient QALYs reduces the ICER to £28,848 (51.4% probability below £30,000).

Befriending carers of people with dementia: A cost-utility analysis (continued)

Conclusions

- Befriending leads to a non-significant trend towards improved carer quality of life, and there is a nonsignificant trend towards higher costs for all sectors.
- It is unlikely that befriending is a cost-effective intervention from the point of view of society.

An economic evaluation of a participatory ergonomics process in an auto parts manufacturer

Emile Tompa, Roman Dolinschi, Andrew Laing

2009

Journal of Safety Research

40, 41-47

(direct quotes from abstract)

An economic evaluation of a participatory ergonomics process in an auto parts manufacturer

- Problem: We assess the costs and consequences of a participatory ergonomics process at a Canadian car parts manufacturer from the perspective of the firm.
- Method: Regression modeling was used with interrupted time series data to assess the impact of the process on several health measures. Consequences were kept in natural units for cost-effectiveness analysis, and translated into monetary units for cost-benefit analysis.

An economic evaluation of a participatory ergonomics process in an auto parts manufacturer (continued)

Results:

- The duration of disability insurance claims and the number of denied workers' compensation claims was significantly reduced.
- The cost-effectiveness ratio is \$12.06 per disability day averted.
- The net present value is \$244,416 for a 23-month period with a benefit-to-cost ratio of 10.6, suggesting that the process was worth undertaking (monetary units in 2001 Canadian dollars).

An economic evaluation of a participatory ergonomics process in an auto parts manufacturer (continued)

Discussion:

- Our findings emphasize the importance of considering a range of outcomes when evaluating an occupational health and safety intervention.
- Impact on industry: Participatory ergonomics process can be cost-effective for a firm.

Break

15 minutes....

Instruments & Methods

- Costs
- Effectiveness
- Benefits

Costs

- Perspectives
- Conceptualizations and the CPPO Model
- Methods and instruments
- Resource → Procedure matrices

Perspectives on Costs

- Provider perspective
- Consumer perspective
- Consumer family perspective
- Taxpayer perspective
- Community perspective
- Societal perspective

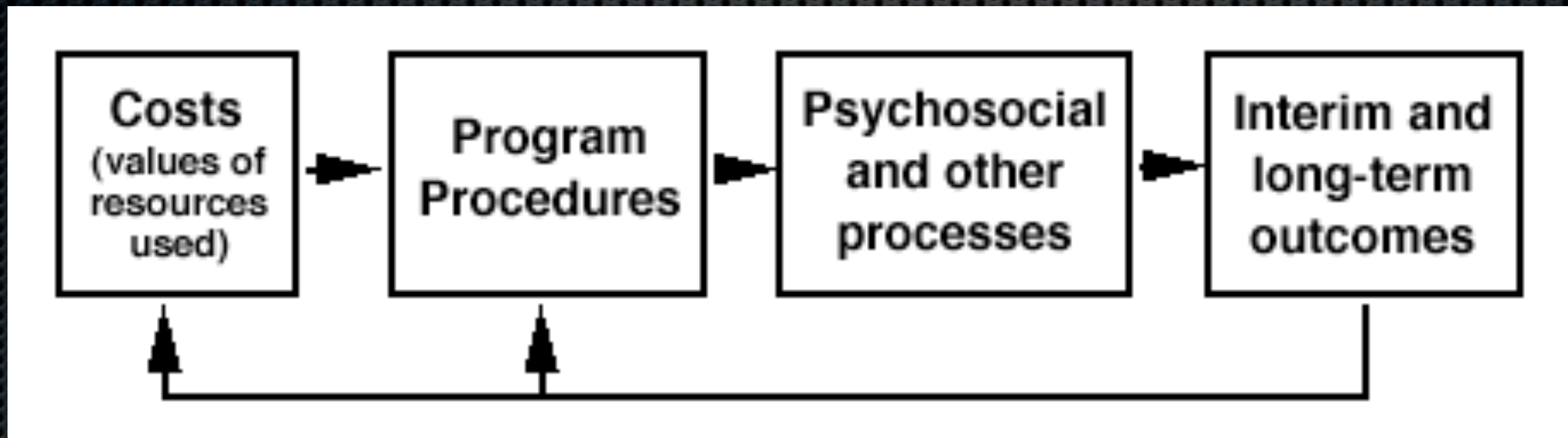
Conceptualizing Costs

- “Costs” as what is paid
 - ...to assemble the resources for a program
- “Costs” as the value of the “ingredients” of the program
 - types and amounts of resources, e.g.,
 - personnel time
 - physical plant
 - supplies

Report costs as amounts & types of resources used to...

- see contribution of volunteered services and donated facilities
- fairer comparisons between programs
- translate costs to different countries and times
- replicate program
- understand of what the program is
- improve effectiveness or reduce costs or both

Costs → Procedures → Processes → Outcomes (CPPO) Model



CPPO Model for OR

CPPO Model collects data for

- Operations Research to systematically *improve* cost-effectiveness (and cost-benefit) by either:
 - *maximizing effectiveness* within **cost** (budget) **constraints**, or
 - *minimizing costs* of meeting **mandated levels of effectiveness**
- for more info, see Yates (1980, 1996) in handout

Measure Costs:

Ask representative of each interest group to:

1. List Procedures of the program--what it does
2. For each Procedure, list the Resources spent by each interest group
3. In the resulting Resource → Procedure matrix, estimate the amount of each resource used for each procedure
4. Verify estimates with actual measurements

For more info, see Yates (1996, 1999) in handout

Procedures (examples)

- Individual Counseling
- Group Counseling
- Acupuncture
- Pharmacotherapy
- Education about HIV and STDs
- Vocational Counseling
- Case Management

Resources (examples)

- Time and skills of treatment personnel
- Administrators and office personnel
- Space, furniture, equipment
- Transportation
- Communication services
- Liability insurance
- Financing

Cost Data collection options

- Methods
 - Survey
 - Self-report
 - Observation
- Instruments
 - computer (e.g., Drug Abuse Treatment Cost Analysis Program, DATCAP)
 - paper-and-pencil

Resource → Procedure Matrix

- Provider perspective
- Consumer perspective
- Consumer family perspective
- Taxpayer perspective
- Community perspective
- Societal perspective

Resource → Procedure Matrix

| Resources ↓ | ← Procedures → | | | |
|----------------|--------------------------|---------------------|-----|------------|
| | Individual Counseling | Group Counseling | ... | Evaluation |
| Personnel | | | | |
| Space | | | | |
| ... | | | | |
| Administration | | | | |

Resource → Procedure Matrix 1: Resource Use

| Resources ↓ | ← Procedures → | | | |
|----------------|-----------------------|------------------|-----|----------------|
| | Individual Counseling | Group Counseling | ... | Evaluation |
| Personnel | 200 hours | 300 hours | ... | 40 hours |
| Space | 300 square feet | 600 square feet | ... | 60 square feet |
| ... | | | ... | |
| Administration | | | ... | |

Resource → Procedure Matrix 2: Unit Cost

| Resources ↓ | ← Procedures → | | | |
|----------------|-----------------------|----------------------|-----|---------------------|
| | Individual Counseling | Group Counseling | ... | Evaluation |
| Personnel | \$60/hour | \$40/hour | ... | \$30/hour |
| Space | \$40/ square foot | \$20/ square foot | ... | \$20/square foot |
| ... | | | ... | |
| Administration | | | ... | |

Resource → Procedure Matrix 3: Resource Cost

| Resources ↓ | ← Procedures → | | | |
|----------------|------------------------------------|------------------------------------|-----|-----------------------------------|
| | Individual Counseling | Group Counseling | ... | Evaluation |
| Personnel | 200 hours x \$60/hour | 300 hours x \$40/hour | ... | 40 hours x \$30/hour |
| Space | 300 square feet x \$40/square foot | 600 square feet x \$20/square foot | ... | 60 square feet x \$20/square foot |
| ... | | | ... | |
| Administration | | | ... | |

Resource → Procedure Matrix 3: Resource Cost

| Resources ↓ | ← Procedures → | | | |
|----------------|--------------------------|---------------------|-----|------------|
| | Individual Counseling | Group Counseling | ... | Evaluation |
| Personnel | \$12,000 | \$12,000 | ... | \$1,200 |
| Space | \$12,000 | \$12,000 | ... | \$1,200 |
| ... | | | ... | |
| Administration | | | ... | |

Resource → Procedure Matrix 4: Resource Cost

| <i>Resources</i> ↓ | ← Procedures → | | | | <i>Total of Resources</i> (vs. budget) |
|-----------------------|-----------------------|------------------|-----|------------|---|
| | Individual Counseling | Group Counseling | ... | Evaluation | |
| <i>Personnel</i> | \$12,000 | \$12,000 | ... | \$1,200 | \$50,000 |
| <i>Space</i> | \$12,000 | \$12,000 | ... | \$1,200 | \$30,000 |
| ... | | | ... | | |
| <i>Administration</i> | | | ... | | \$100,000 |

Resource → Procedure Matrix 5: Resource Cost

| <i>Resources</i> ↓ | ← Procedures → | | | | <i>Total of Resources</i> (vs. <i>budget</i>) |
|--------------------------------------|-----------------------|------------------|-----|------------|--|
| | Individual Counseling | Group Counseling | ... | Evaluation | |
| <i>Personnel</i> | \$12,000 | \$12,000 | ... | \$1,200 | \$50,000 |
| <i>Space</i> | \$12,000 | \$12,000 | ... | \$1,200 | \$30,000 |
| ... | | | ... | | |
| <i>Total Cost of Direct Services</i> | \$35,000 | \$30,000 | ... | \$7,000 | \$100,000 |
| <i>Administration</i> | | | ... | | \$100,000 |

Resource → Procedure Matrix 6: Resource Cost

| <i>Resources</i> ↓ | ← Procedures → | | | | <i>Total of Resources</i> (vs. <i>budget</i>) |
|--------------------------------------|-----------------------|------------------|-----|------------|--|
| | Individual Counseling | Group Counseling | ... | Evaluation | |
| <i>Personnel</i> | \$12,000 | \$12,000 | ... | \$1,200 | \$50,000 |
| <i>Space</i> | \$12,000 | \$12,000 | ... | \$1,200 | \$30,000 |
| ... | | | ... | | |
| <i>Total Cost of Direct Services</i> | \$35,000 | \$30,000 | ... | \$7,000 | \$100,000 |
| <i>Administration</i> | \$35,000 | \$30,000 | ... | \$7,000 | \$100,000 |

Effectiveness

- from the same perspectives as costs
- this is what evaluators are already good at!

Benefits

- types of benefits
- measurement and monetization strategies

Types of benefits

- Cost-savings
 - reduced use of health services
 - reduce transfer payments (e.g., income maintenance)
- Income enhancement
 - employment income
 - productivity

Converting effectiveness to benefits

- Monetization strategies for cost-savings benefits
 - (why one often can't find actual cost-savings \$)
 1. measure number times each service is used
 2. find cost per service use (program policies, records)
 3. multiple service use x cost per service use
- Income
 - actual income, from self-report or records
 - estimated income, given profession or hours worked

Possible Cost Savings, I

| Effectiveness (program- induced change in ...) | Transformation example: | Cost-savings Benefit: |
|--|---|--------------------------------------|
| criminal acts | \$___ per theft, \$___ per assault | savings to victims, society |
| drugs not purchased | \$___ per day of opiate use | money not spent on drugs |
| criminal justice services | \$___ per arrest,\$___ per court day,\$___ per jail day | reduced criminal justice expenses |

Possible Cost Savings, II

| Effectiveness (program- induced change in ...) | Transformation <i>examples:</i> | Cost-savings Benefit: |
|--|---|--------------------------------------|
| drug abuse treatment | \$___ per day of treatment | savings to patient, society |
| disability payments | \$___ per day of disability support | savings in disability support |
| health services | \$___ per ER visit, \$___ per inpatient day | savings in use of health services |

Analyses

- Cost-effectiveness analysis (Brian)
- Cost-benefit analysis (Patricia)

Cost-effectiveness analyses

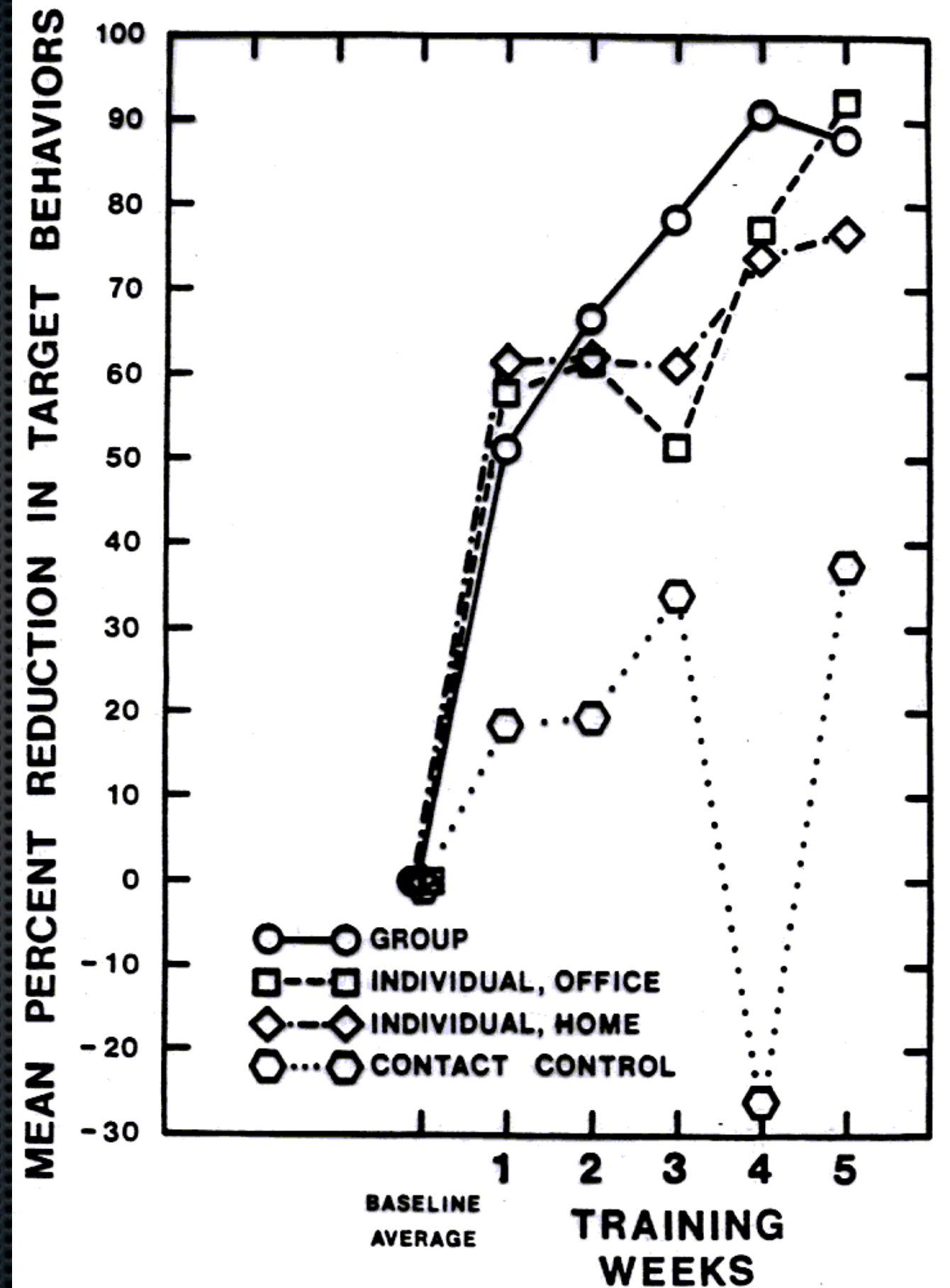
- Alternative delivery systems for child management training
- Alternative treatments for depression

Alternative Delivery Systems for Child-Management Training

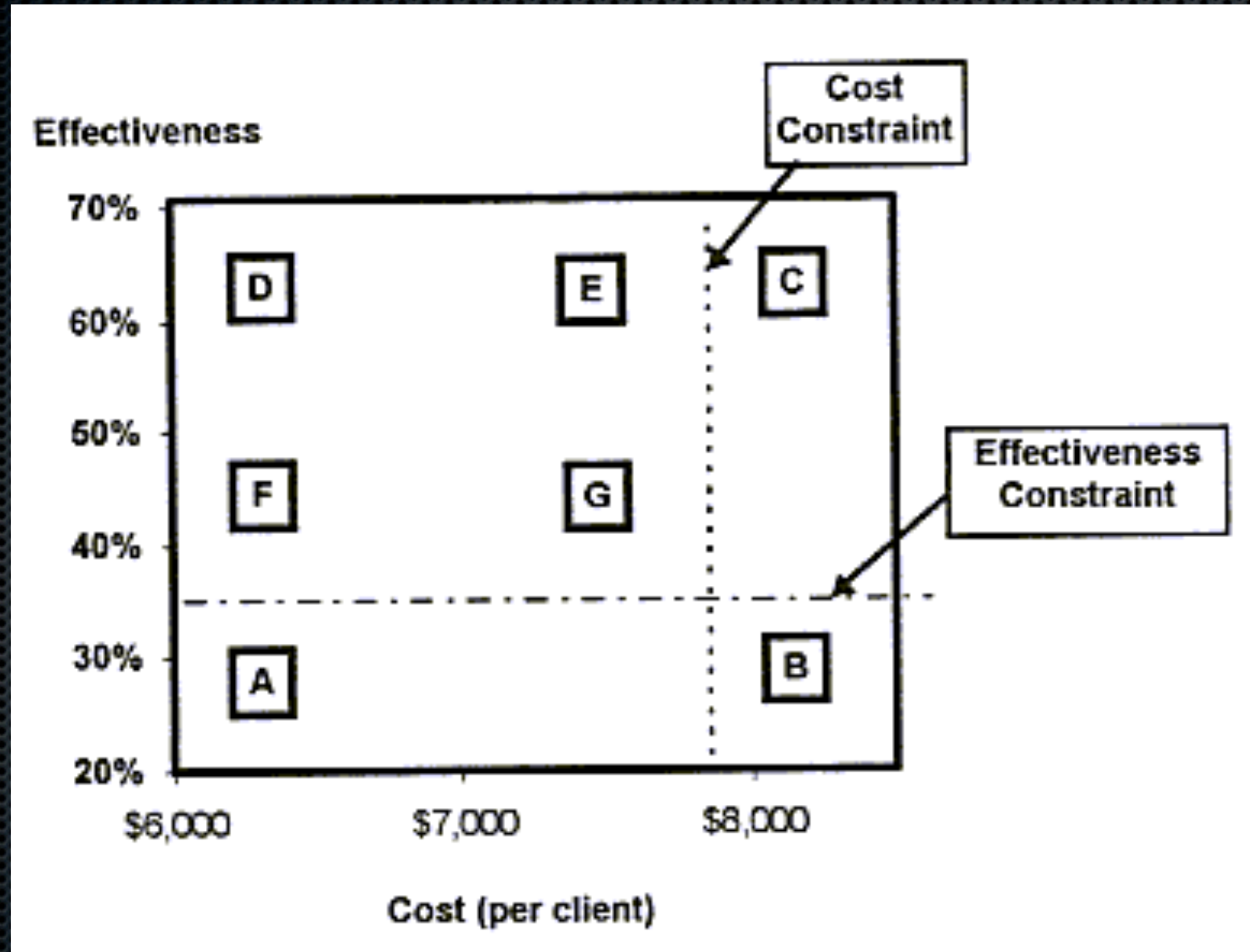
Siegert, F. A., & Yates, B. T. (1980). Cost-effectiveness of individual in-office, individual in-home, and group delivery systems for behavioral child-management. *Evaluation and the Health Professions*, 3, 123-152.

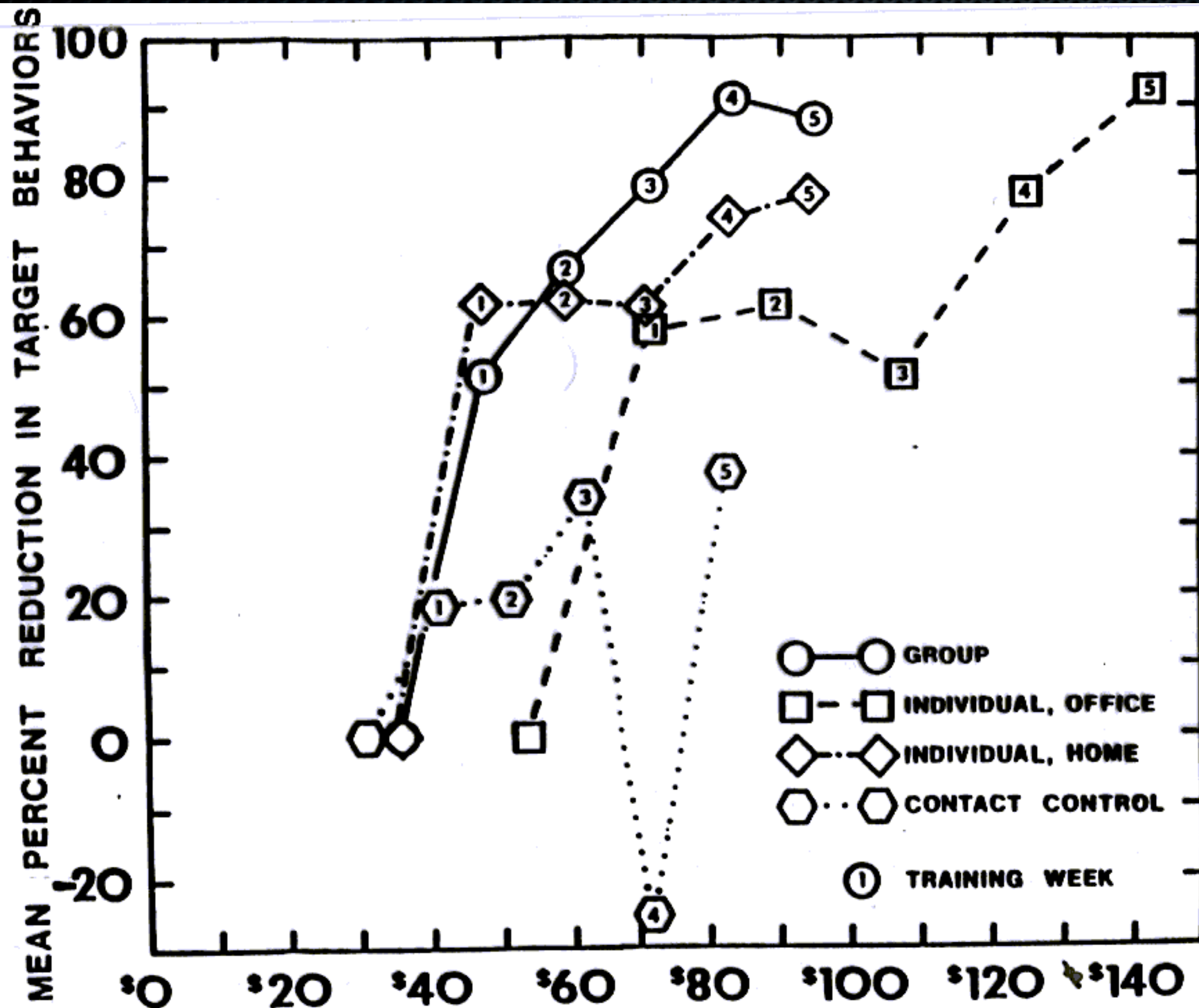
Siegert & Yates (1980):

Outcomes = $f(\text{Procedures})$



Decision-Making in Cost → Outcome Graphs

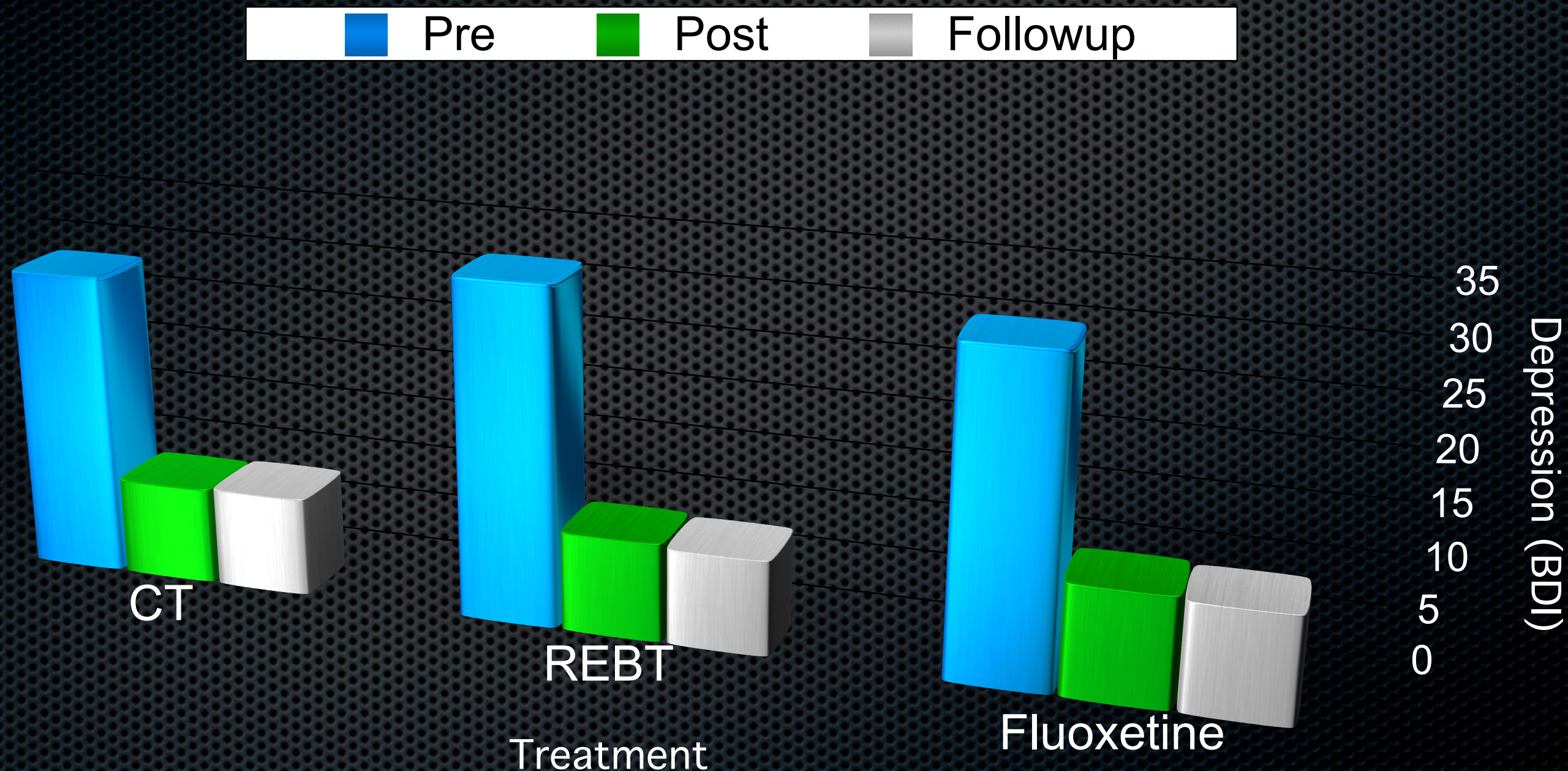




Alternative Treatments for Depression

Sava, F. A., Yates, B. T., Lupu, V., Hatieganu, I., Szentagotai, A., & David, D. (2009). Cost-effectiveness and cost-utility of cognitive therapy, rational emotive behavioral therapy, and fluoxetine (Prozac ®) in treating depression: A randomized clinical trial. *Journal of Clinical Psychology, 65*, 36-52

Depression (Beck Depression Inventory) Before and After Treatment, and at Followup



Calculation of Psychotherapy and Pharmacology Costs Using a Resources x Procedures Matrix (\$US)

| Resource type | Unit measure | Unit Cost | Total Resource Used per Client | | | Total Cost per Client | | |
|-------------------|---------------------|-----------|--------------------------------|---------|-------------|-----------------------|-----------|------------|
| | | | REBT | CT | Fluoxetine | REBT | CT | Fluoxetine |
| | | | | | (Prozac ®) | | | (Prozac ®) |
| Provider Time | | | | | | | | |
| CBT | 1 hour (h) | \$ 6.59 | 20.98 h | 20.41 h | 0 h | \$ 138.25 | \$ 134.49 | \$ 0 |
| Therapists | | | | | | | | |
| Medication | 1hour (h) | \$ 8.09 | 0 h | 0 h | 6.95 h | \$ 0 | \$ 0 | \$ 56.25 |
| Psychiatrists | | | | | | | | |
| Assessor | 1hour (h) | \$ 4.56 | 0.33 h | 0.33 h | 0.33 h | \$ 1.51 | \$ 1.51 | \$ 1.51 |
| Research | 1hour (h) | \$ 3.55 | 0.30 h | 0.30 h | 0.29 h | \$ 1.06 | \$ 1.06 | \$ 1.03 |
| Assistant | | | | | | | | |
| Space + Utilities | 1m²/1hour | \$ 0.16 | 274.74 | 267.64 | 102.95 m²/h | \$ 43.52 | \$ 42.39 | \$ 16.31 |
| | | | m²/h | m²/h | | | | |

more

Calculation of Psychotherapy and Pharmacology Costs Using a Resources x Procedures Matrix (\$US)

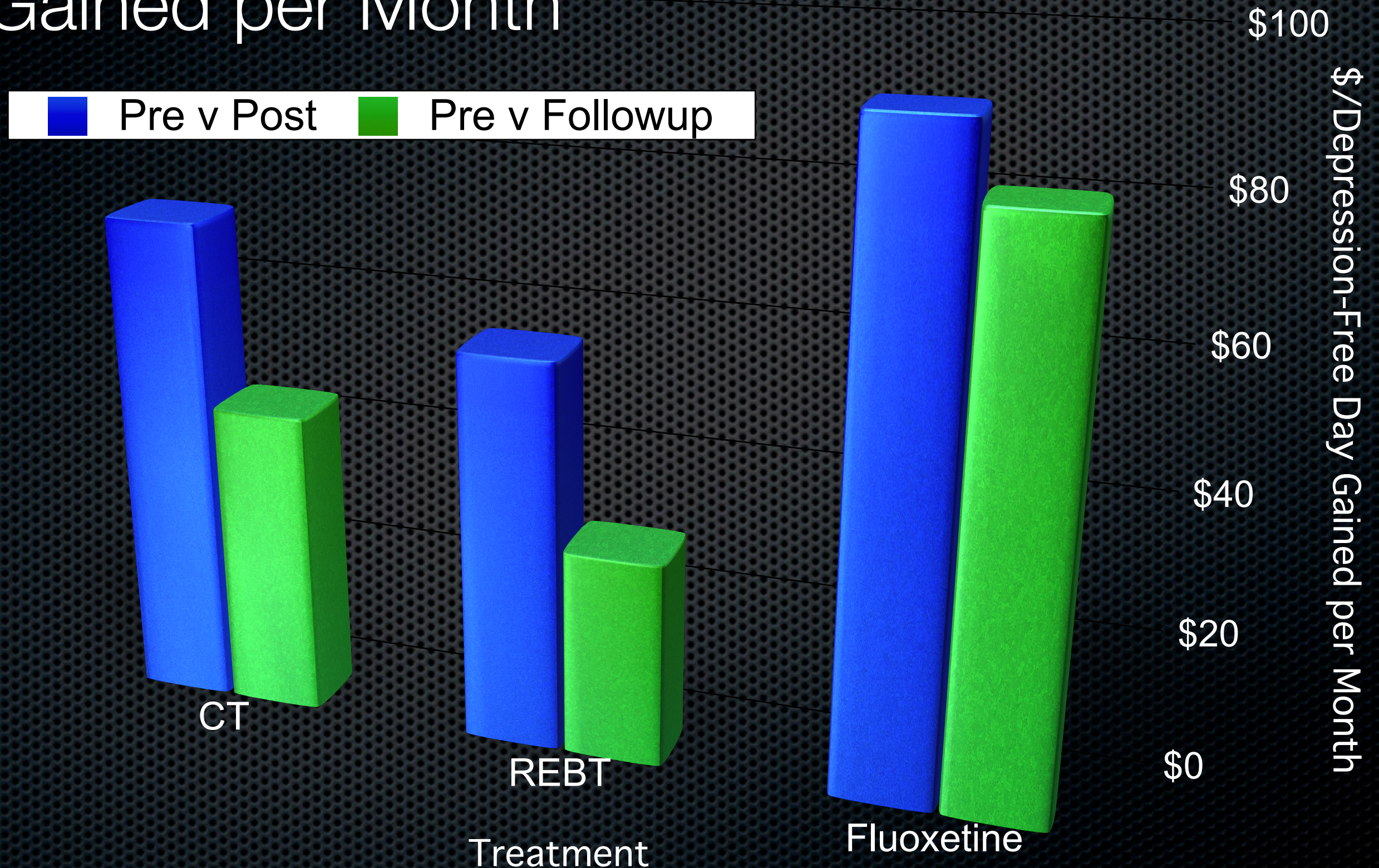
| Resource type | Unit measure | Unit Cost | Total Resource Used per Client | | | Total Cost per Client | | |
|---------------------------------|--------------------|-----------|--------------------------------|----------------|-----------------|-----------------------|------------------|-------------------|
| | | | REBT | CT | Fluoxetine | REBT | CT | Fluoxetine |
| | | | | | (Prozac ®) | | | (Prozac ®) |
| Materials | 1 testing set | \$ 1.03 | 1.91 sets | 1.89 sets | 1.86 sets | \$ 1.97 | \$ 1.95 | \$ 1.92 |
| Investment | Manual / client | \$ 0.36 | 1.00 manual | 1.00 manual | 1.00 manual | \$ 0.36 | \$ 0.36 | \$ 0.36 |
| Medication | 1 dose = 20mg | \$ 1.27 | 0 mg | 0 mg | 159.65 doses | \$ 0 | \$ 0 | \$ 202.31 |
| Maintenance Meds | 1 dose = 20mg | \$ 1.27 | 0 mg | 0 mg | 156.46 doses | \$ 0 | \$ 0 | \$ 198.27 |
| <i>Provider direct cost</i> | | | | | | <i>\$ 186.66</i> | <i>\$ 181.76</i> | <i>\$ 477. 95</i> |

more

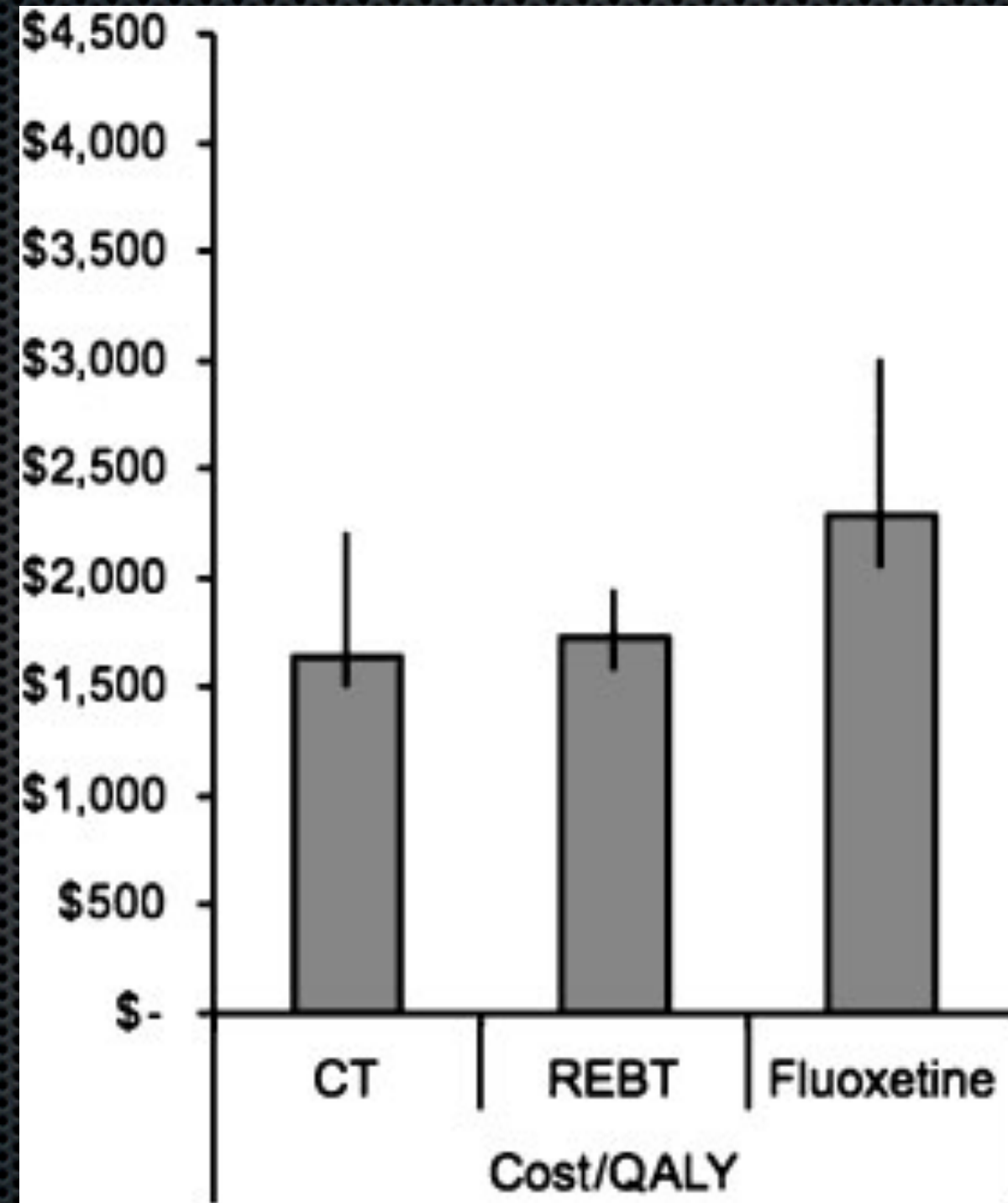
Calculation of Psychotherapy and Pharmacology Costs Using a Resources x Procedures Matrix (\$US)

| Resource type | Unit measure | Unit Cost | Total Resource Used per Client | | | Total Cost per Client | | |
|---|-----------------|-----------|--------------------------------|----------|------------|-----------------------|------------------|--------------------|
| | | | REBT | CT | Fluoxetine | REBT | CT | Fluoxetine |
| | | | | | (Prozac ®) | | | (Prozac ®) |
| <i>Overhead</i> | | | | | | \$ 93.33 | \$ 90.88 | \$ 38. 69 |
| <i>Health care cost</i> | | | | | | \$ 279.99 | \$ 272.64 | \$ 516.64 |
| Client | | | | | | | | |
| Client time | 1h | \$ 6.13 | 32.10 h | 31.25 h | 18.00 h | \$ 196.78 | \$ 191.50 | \$ 110.35 |
| Transportation | 1 round trip | \$ 1.90 | 21.98 rt | 21.41 rt | 21.02 rt | \$ 41.78 | \$ 40.70 | \$ 39.95 |
| Cost | (rt) | | | | | | | |
| <i>Client cost</i> | | | | | | \$ 238.56 | \$ 232.20 | \$ 150.30 |
| Total cost per treatment = no. patients X (Health care cost + Client Cost) | | | | | | \$ 29,557 | \$ 28,271 | \$ 38,016 |
| Total cost per average patient = (Health care cost + Client Cost) | | | | | | \$ 518.55 | \$ 504.84 | \$ 666.94 |
| Total cost per successful patient = Total cost per treatment / n success * | | | | | | \$ 703.75 | \$ 724.90 | \$ 1,056.00 |

Cost per Depression-Free Day Gained per Month



Costs per Quality-Adjusted Life Year:



Cost-benefit analyses

- Health Promotion Program for Individuals with Mobility Impairments

Cost-Benefit Analysis Example

- ✱ Both costs and benefits (effects) are in monetary terms
- ✱ Allows comparison across a wide variety of alternatives with different types of outcomes
- ✱ Results feed directly into decision makers' financial projections/goals

A Financial Cost–Benefit Analysis of a Health Promotion Program for Individuals With Mobility Impairments

Catherine Ipsen, Craig Ravesloot, Tom Seekins, and Steve Seninger, *University of Montana*

People with disabilities make up approximately 20% of the U.S. population but account for 47% of total medical expenditures (Max, Rice, & Trupin, 1996). Health promotion programs represent one strategy for both improving health and containing medical costs for this population. This study examined the financial net benefits of the Living Well with a Disability health promotion program from the perspective of a third-party payer. Net benefits were defined as reductions in health-care utilization costs minus program implementation costs. The study sample consisted of 188 people with physical disabilities who completed the Living Well health promotion program. Health-care cost outcomes were collected using a 2-month retrospective recall of health-care services multiplied by Medicare unit cost estimates. The net benefits for the first 6 months postintervention were \$2,631 per person for the entire cohort and \$127 per person for a trimmed data set. The results suggested positive financial benefits and provide grounds for further research about third-party payer support of health promotion programs for individuals with physical disabilities.

The Basics



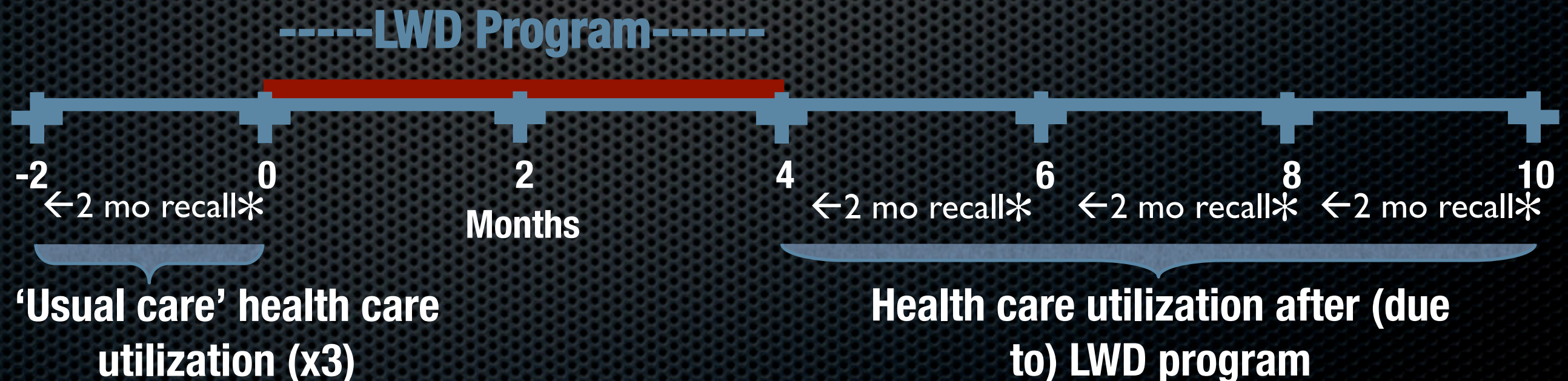
- ❖ Living Well with a Disability (LWD) health promotion program
- ❖ Compared to 'usual care' for this population (i.e., no program)
- ❖ Goal is to get Medicaid and/or Medicare to cover these programs
- ❖ Perspective: third-party payer
- ❖ Costs = cost of offering the program
- ❖ Benefits = medical care utilization cost savings

Cost of the LWD Program

| Cost component | Cost per participant |
|--|----------------------|
| • Facilitator training costs @ \$26,528 spread over 188 participants | \$141 |
| • Workshop costs @ \$2,430 per workshop with an average of 5.5 participants each | \$440 |
| • Participant workshop materials per participant | \$15 |
| Total LWD Program Costs | \$596 |
| Cost of 'usual care' (no program) = \$0 | |

Benefits (Health Care Utilization Reduction)

- Health care utilization captured by self-report (2- month recall)
- Physician visits
- Emergency room visits
- Outpatient surgeries
- Hospital days



Benefits (Health Care Utilization Cost Savings)

| | Unit Price | 'Usual Care' | | LWD Program | |
|------------------------------------|------------|------------------|-------------------|------------------|-------------------|
| | | Avg use / client | Avg cost / client | Avg use / client | Avg cost / client |
| Physician visits | \$89 | 6.7 * 3 | \$1792 | 8.6 | \$770 |
| ER visits | \$157 | 2.9 * 3 | \$1378 | 3.9 | \$613 |
| Outpatient Surgeries | \$419 | 2.1 * 3 | \$2601 | 3.3 | \$1366 |
| Hospital days | \$1073 | 0.15 * 3 | \$497 | 0.27 | \$291 |
| Total 6-Month HC Utilization Costs | | | \$6267 | | \$3040 |

HC Utilization Cost Savings = \$6267 - \$3040 = \$3227 per client

Cost-Benefit Analysis Results

Net benefits = Healthcare cost savings of \$3227
- Cost of LWD program of \$596
= \$2631 per client over 6 months

Exercise

- Example options
- Exercise calculations

Hands-On Exercise

Each of these scenarios requires a particular type of economic evaluation to be performed (cost-effectiveness analysis, cost-utility analysis, or cost-benefit analysis) from a “institutional” perspective (either a program manager or an employer), or from a societal perspective.

For the option you are assigned, use the numbers on the attached page to calculate the number(s) each decision-maker needs.

Option 1

You are a manager of a county agency charged with health promotion. You are presently offering a regular smoking cessation class and wonder how the cost per quit attributable to your class compares to that reported by other smoking cessation classes across the state.

Option 2

You are a manager of a state health agency charged with deciding how the state's limited health care budget is spent. You are considering including smoking cessation classes in your budget. Right now the mix of programs you are promoting to reduce various health risks cost up to \$10,000 per quality-adjusted life-year (QALY). Before adding these classes you want to make sure that they will increase your constituent's longevity and quality of life enough to make the program's costs worthwhile.

Option 3

You are manager in a state Medicaid agency and you are considering whether to add smoking cessation classes for your clients. As usual you have limited funding. You know these classes cost money to run, but also know that any reduction in healthcare needs that would be achieved due to smoking cessation would save you money. You want to know whether there would be a net benefit to your budget of offering these classes.

Option 4

You are a manager in the state department of health and are trying to decide whether the state should fund smoking cessation classes. You already have a number of initiatives in place to improve the longevity and quality of life of residents, and want to see if it makes sense to add smoking cessation classes to the mix. In your task you want to take all benefits and costs to the state and its population as a whole into consideration. ...

Option 4 (continued)

Therefore, worker productivity is considered because it is important to the economic health of the state; healthcare costs are important to employers, individuals, and to Medicaid; and individuals' direct benefits and costs should also be considered. At present it has been decided that interventions that cost more than \$10000 per quality-adjusted life-year (QALY) are given lower priority than those costing less.

Option 5

You are an employer and you are considering offering smoking cessation classes for your employees. You care about the welfare of your employees, but you are also a business-person and want to see a net return for this program. You are not self-insured, so you are not directly concerned with any impact on health care costs.

Inputs to Exercise calculations

| Resource | Unit | Unit price | Resource use | Cost per class |
|--|--------------------------|-------------------|---------------------|-----------------------|
| Facility costs (room and utilities) | Months | \$250 | 2 | \$500 |
| Advertising costs | Media campaign | \$1000 | 1 | \$1,000 |
| Recruiting staff | Hours | \$20 | 60 | \$1,200 |
| Facilitator time - teaching and preparation | Hours | \$30 | 50 | \$1,500 |
| Materials, postage, copying | 8-week Class | \$100 | 1 | \$100 |
| Nicotine Replacement Therapy (NRT)* | Clients using NRT | \$20 | 20 | \$400 |

*** Half this amount is paid by the program and one half is paid by the client. Also, assume that no one would purchase NRT on their own if no class was offered.**

| Resource | Cost |
|--|-----------------|
| Travel cost to class for each client @ 20 miles per class and \$0.50 per mile | \$10 |
| Number of clients per cessation class | 30 |
| Number of these clients who quit smoking | 3 |
| Number of these clients who would have quit smoking even without the class | 1 |
| Quality-adjusted life-years (QALYs) gained by each client who quits smoking | 2.5 |
| Remaining lifetime cost of cigarettes for the average client who continues to smoke | \$7,000 |
| Remaining lifetime loss in productivity for a smoker who continues to smoke | \$10,000 |
| Increase in medical costs from now to age 64 for a smoker who continues to smoke | \$2,500 |

Exercise Answers

(in Exercise Handout)

Questions and Answers!

Questions from participants



Questions from participants II



References for further learning

(in handout)

- publications
- web sites
- download handouts, slides from AEA's eLibrary

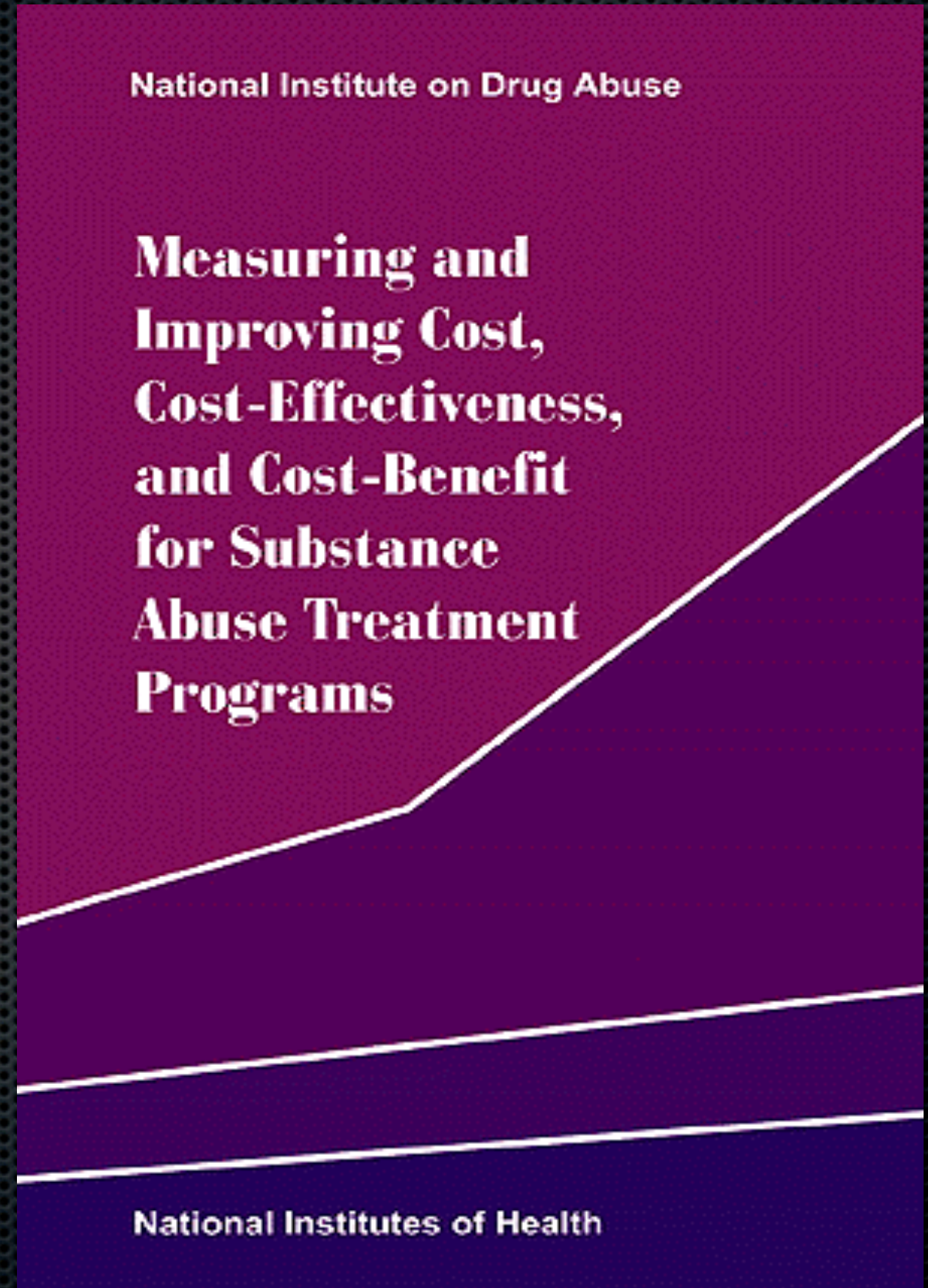
websites for cost-inclusive evaluation

- NIDA (National Institute on Drug Abuse) manual for cost-inclusive evaluation, with worksheets. (Manual is downloadable.)
- <http://www.nida.nih.gov/IMPCOST/IMPCOSTIndex.html>
- Tufts University CEA Registry, at their Center for the Evaluation of Value & Risk in Health
- <https://research.tufts-nemc.org/cear/default.aspx>

www.nida.nih.gov/impcost/impcostindex.html

US National Institute on Drug Abuse (NIDA) manual

Use on web, or
free .pdf
download only
529k!



Sage Book

ANALYZING COSTS, PROCEDURES, PROCESSES, AND OUTCOMES IN HUMAN SERVICES

Brian T. Yates

Applied Social Research Methods Series
Volume 42



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