

# *STARTING* COST-INCLUSIVE EVALUATION

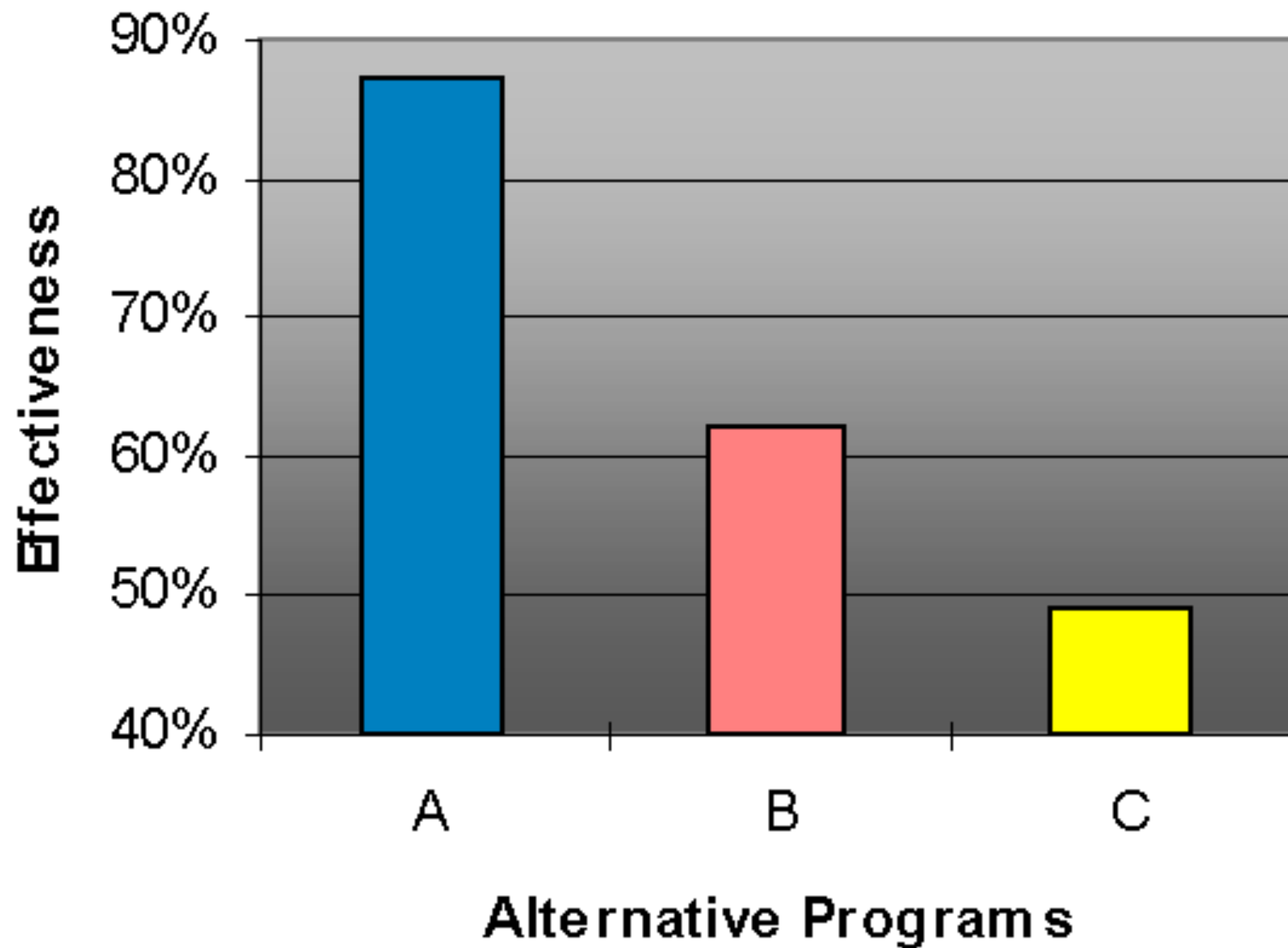


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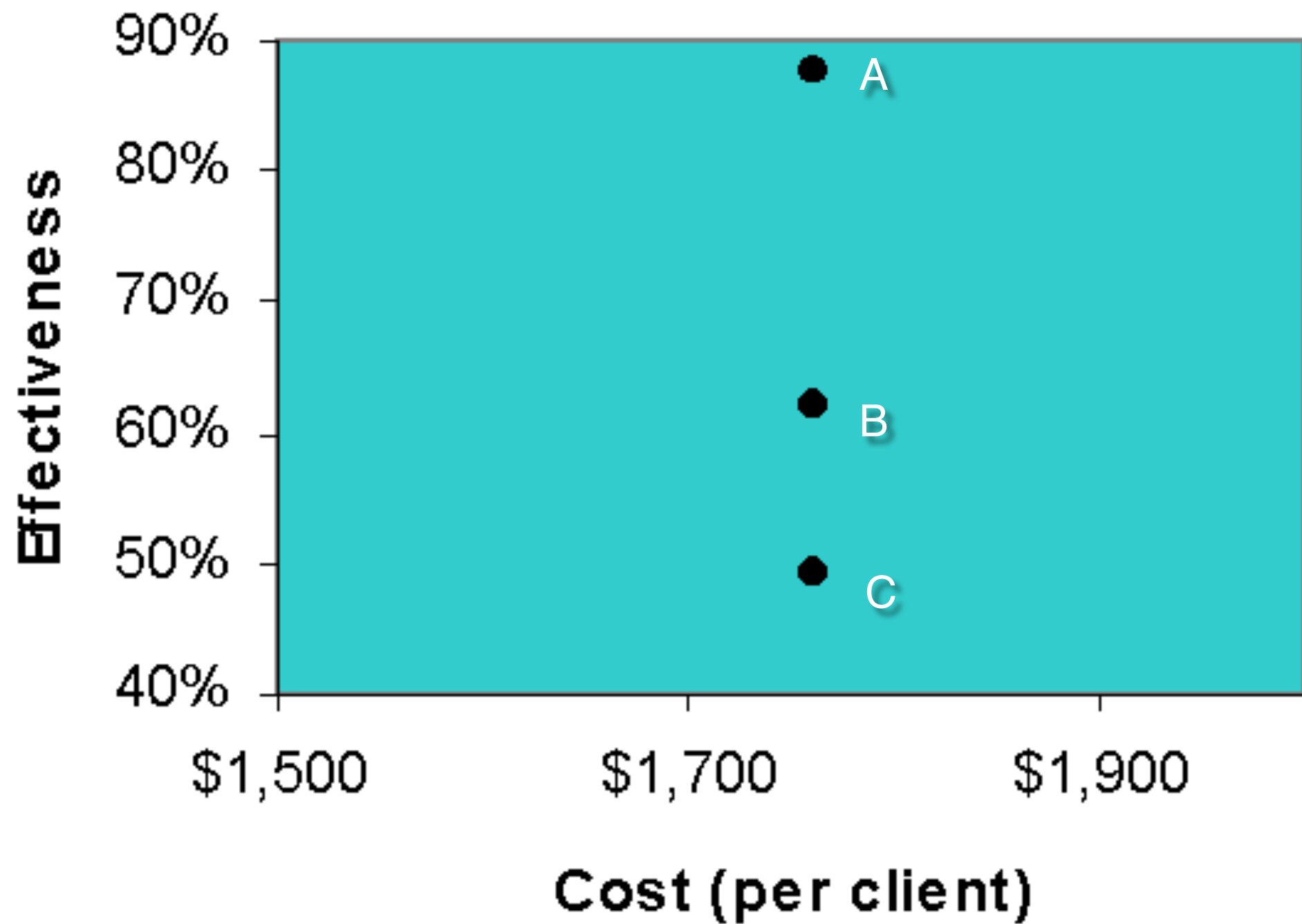
TALE OF 3 EVALUATORS ...



## Program Effectiveness

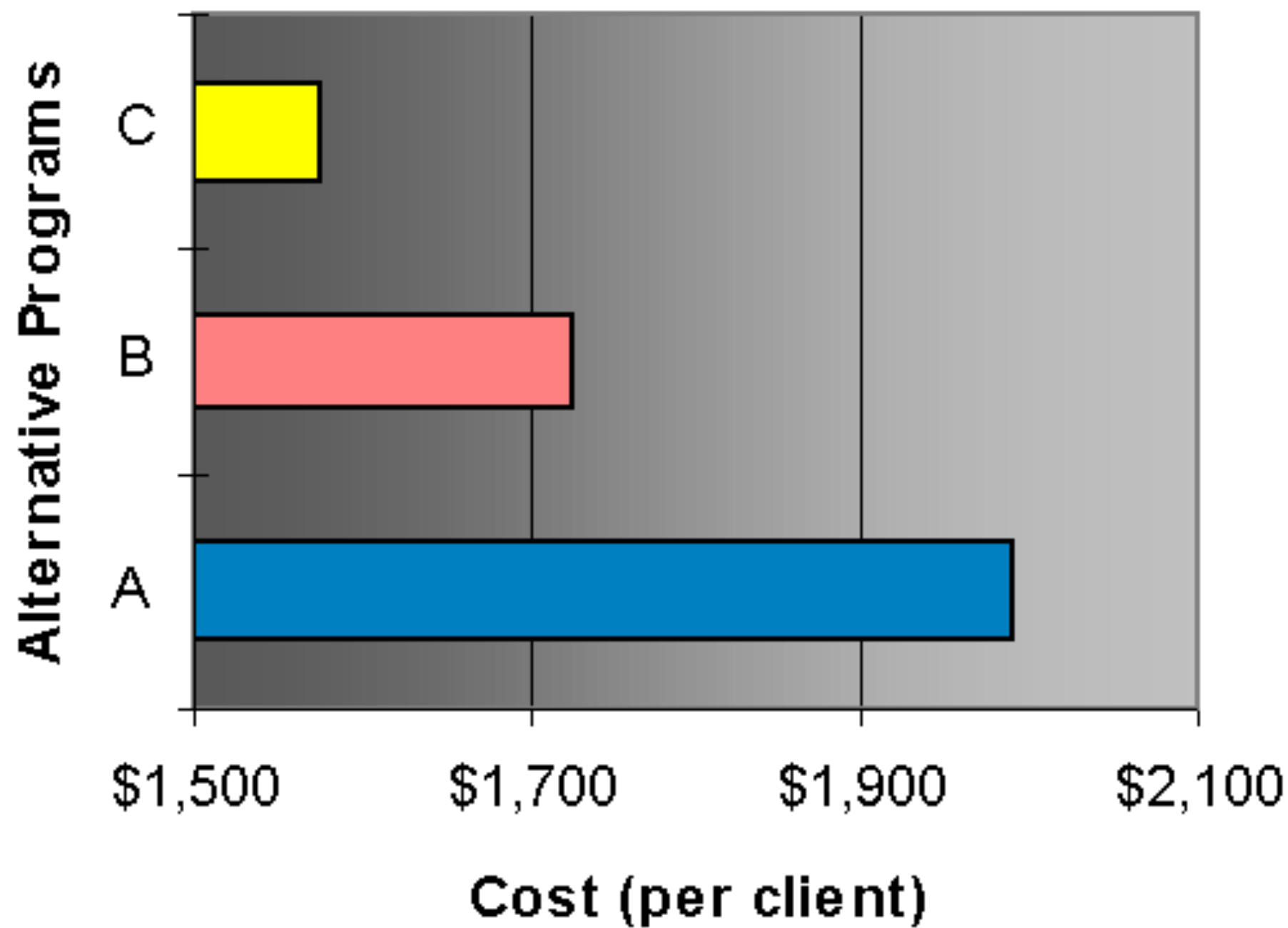


## Effectiveness, Ignoring Cost

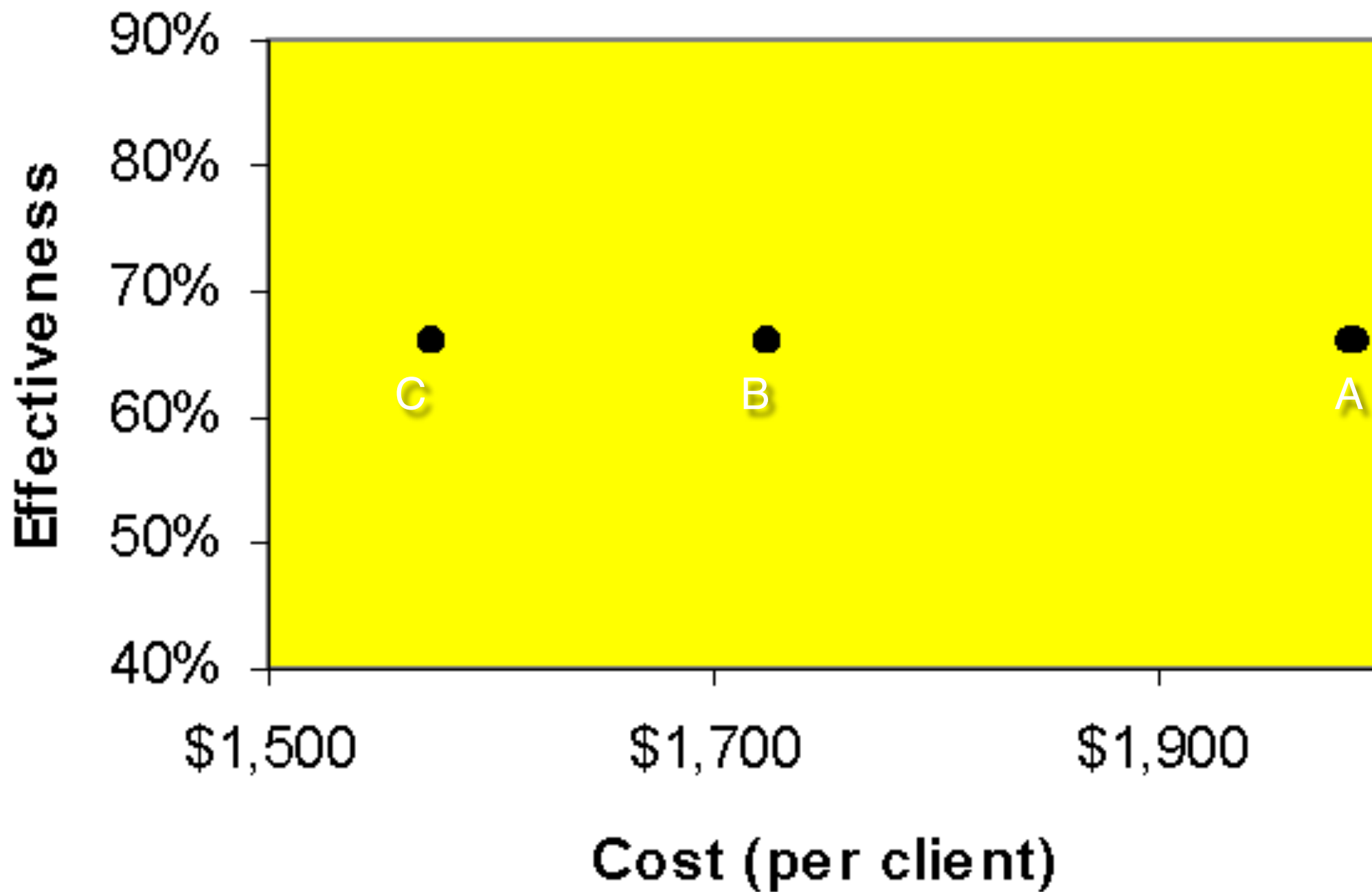




## Program Cost

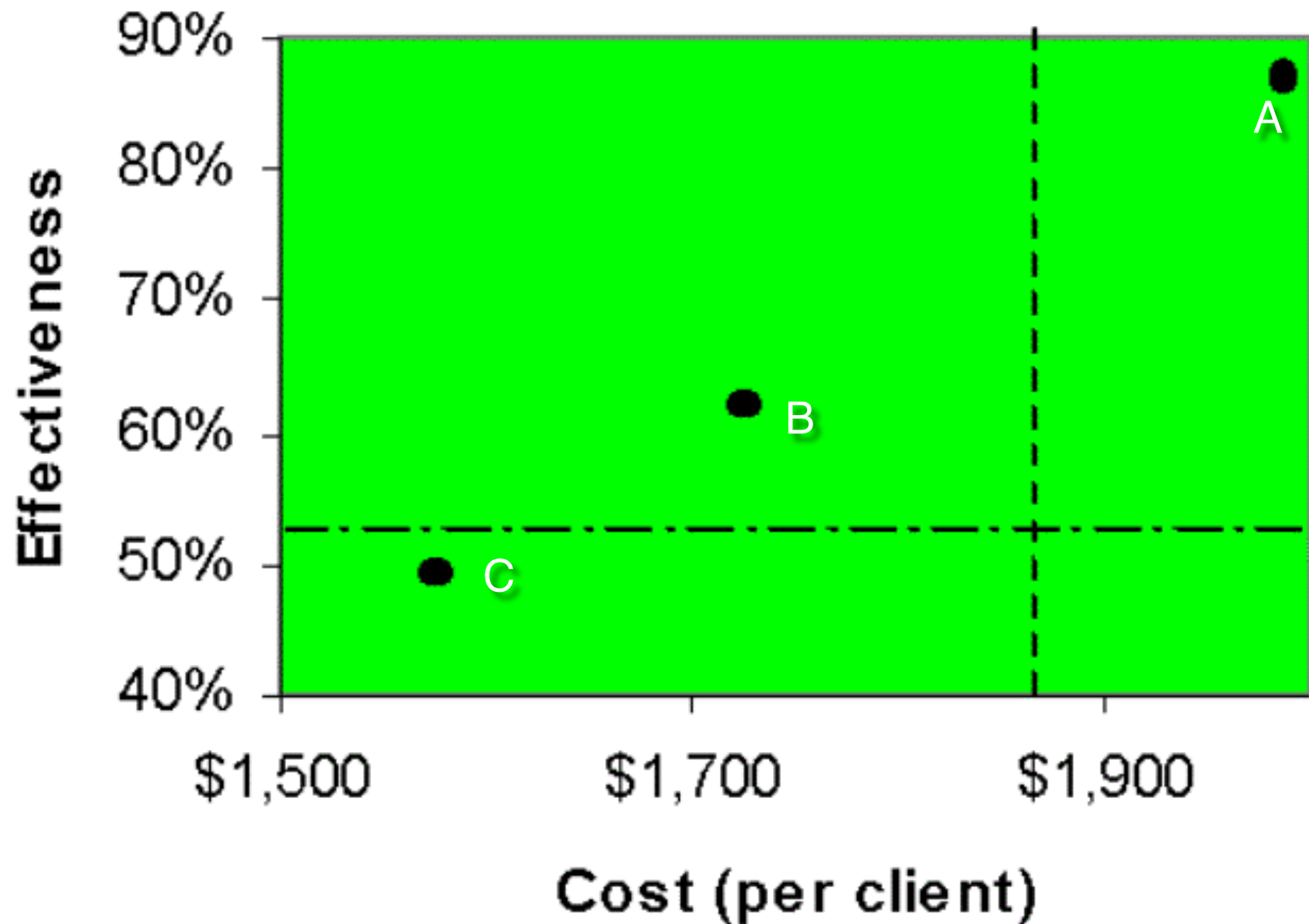


## Cost, Ignoring Effectiveness





## Cost-Effectiveness for Alternative Programs



# WHY WE DO IT

- it can augment our research
- policy-makers and funders are encouraging us to do it
- policy-makers and funders are using it
- let's be the ones providing some of the findings



# FIRST, IT'S FUN!

- understanding resource constraints' impact on program outcomes can be enlightening, and may allow adaptation of interventions to new settings with different resource mixes
- maximizing intervention outcome within budget constraints is an interesting challenge, solvable via operations research
- minimizing costs of achieving or exceeding mandated levels of effectiveness should allow more clients to be treated
- delivery systems studied in cost-inclusive research may impact outcomes, and costs, more than the intervention

# SECOND, IT'S THE RIGHT THING TO DO

- intervention costs may differ more than intervention effectiveness
- many funders care more about costs than about outcomes
- minimizing costs allows more clients to be treated for the same amount of resources



# Sometimes costs are all that matters...

## Dilbert

By Scott Adams



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# Sometimes even costs don't matter!



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*Because people say we  
should*

Quotes Advocating  
Cost-Inclusive Research  
in Mental Health Services





WHO-CHOICE:

CHOICE = CHOosing Interventions that  
are Cost Effective

“Making choices in health: WHO guide  
to cost-effectiveness analysis”

<http://www.who.int/choice/book/en/index.html>



# Chambless and Hollon (1988):

“,...in evaluating the benefits of a given treatment, the greatest weight should be given to efficacy trials but that these trials should be followed by research on effectiveness in clinical settings and with various populations and *by cost-effectiveness research*.” (p. 7).





## SAMHSA's Center for Substance Abuse Treatment (CSAT):

- ✦ "CSAT improves the lives of individuals and families affected by alcohol and drug abuse by ensuring access to clinically sound, cost-effective addiction treatment that reduces the health and social costs to our communities and the nation."





American Psychological Association



# American Psychological Association's Presidential Taskforce on Evidence-Based Practice (2006):

- “APA endorses multiple types of research evidence (e.g., efficacy, effectiveness, cost-effectiveness, cost-benefit, epidemiological, treatment utilization) that contribute to effective psychological practice.” (p. 274). It is, in fact, APA policy since 2002 that evidence on clinical utility:



# APA Taskforce (continued)

“... at a minimum ... includes attention to generality of effects across varying and diverse patients, therapists, settings, and the interaction of these factors; the robustness of treatments across various modes of delivery; the feasibility with which treatments can be delivered to patients in real-world settings; and *the costs associated with treatments.*” (p. 275)



# COST-INCLUSIVE EVALUATION: THE BASICS

- measures the *types*, and *amounts*, of resources consumed by program activities
- also may measure the *types*, and *amounts*, of resources **generated** by program efforts
- ... includes **savings** of resources that otherwise would have been consumed by clients and by other services



# RESOURCES

- ... are not money.
- time
- services
- space in buildings
- manuals, books, forms
- equipment
- supplies
- utilities



# EXAMPLES

- **cost analysis** (just resources consumed)
- **cost-effectiveness analysis** (resources consumed to produce non-monetary outcomes)
- **cost-benefit analysis** (resources consumed to produce similar resources)
- **cost-utility analysis** (resources consumed to produce uniformly measured outcomes)



# Cost-Effectiveness Analysis

(Do we expect effectiveness without costs?)





# Cost-Effectiveness Analysis (CEA)

- ✦ Contrasts costs to nonmonetary outcomes
- ✦ Calculation: ratios, tabular displays
- ✦ *Examples*:
  - Cost per person whose depression was reduced below clinical threshold
  - Cost per pound gained (for anorectics)
  - Cost per drug-free day
  - Cost per tobacco-free month



# OFTEN COMPARE ALTERNATIVES' COST-EFFECTIVENESS INDEX

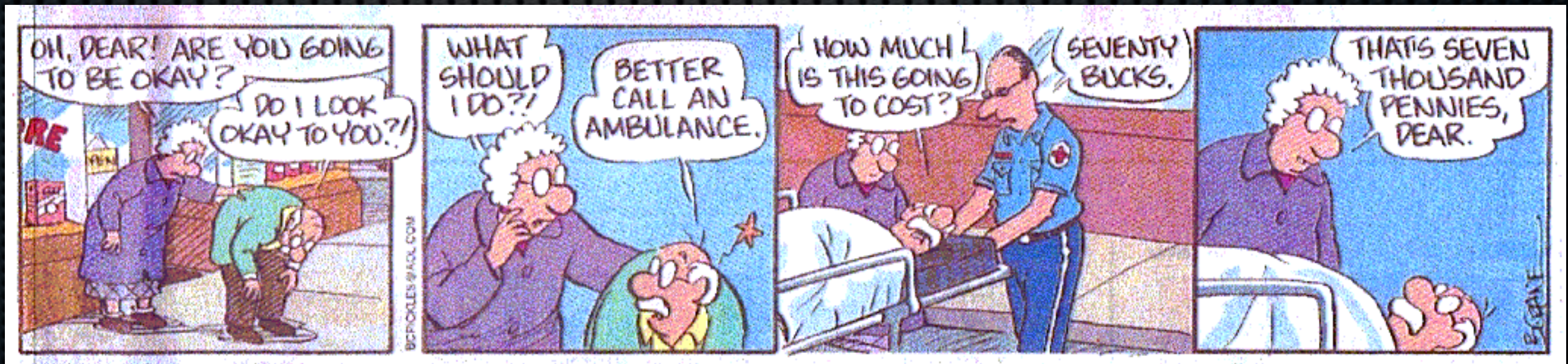
focus of these cost-effectiveness analyses:

- Incremental Cost-Effectiveness Ratio (ICER)
- null-set alternative for program: no-intervention control condition
- example:
  - "Results: The brief bibliotherapy intervention had an ICER of AU\$8600 per \_\_\_\_ and the group-based psychological intervention had an ICER of AU\$20 000 per \_\_\_\_."
  - from: Mihalopoulos, Cathrine; Vos, Theo; Pirkis, Jane; Smit, Filip; Carter, Rob  
*Australian and New Zealand Journal of Psychiatry*, Vol 45(1), Jan 2011,  
36-44. doi: 10.3109/00048674.2010.501024



# Informal Cost-Benefit Analysis

*(or, how we ignore the costs of the benefits)*





# Cost-Benefit Analysis (CBA)

- ✦ Contrasts costs to ***monetary*** outcomes
  - ✦ (usually: just use same units for costs and outcomes)
- ✦ Calculation: ratios, differences, time elapsed until benefits equal costs...



# Examples of Cost-Benefit Analysis:

- ✦ “\$1 spent on substance abuse treatment yields \$5.60 in avoided costs to the taxpayer.” (observed, Finigan, 1996)
- ✦ “Money invested in mental health coverage is recovered full within 1.7 years...” (hypothetical)



Caveats regarding  
cost-benefit analyses



# Ratios, e.g., Benefit/Cost

## ✧ Advantages:

- ✧ simple, summary, easy to remember

## ✧ Problems:

- ✧ Ratios discard important information on:

  - ✧ Economies of scale

  - ✧ Step functions

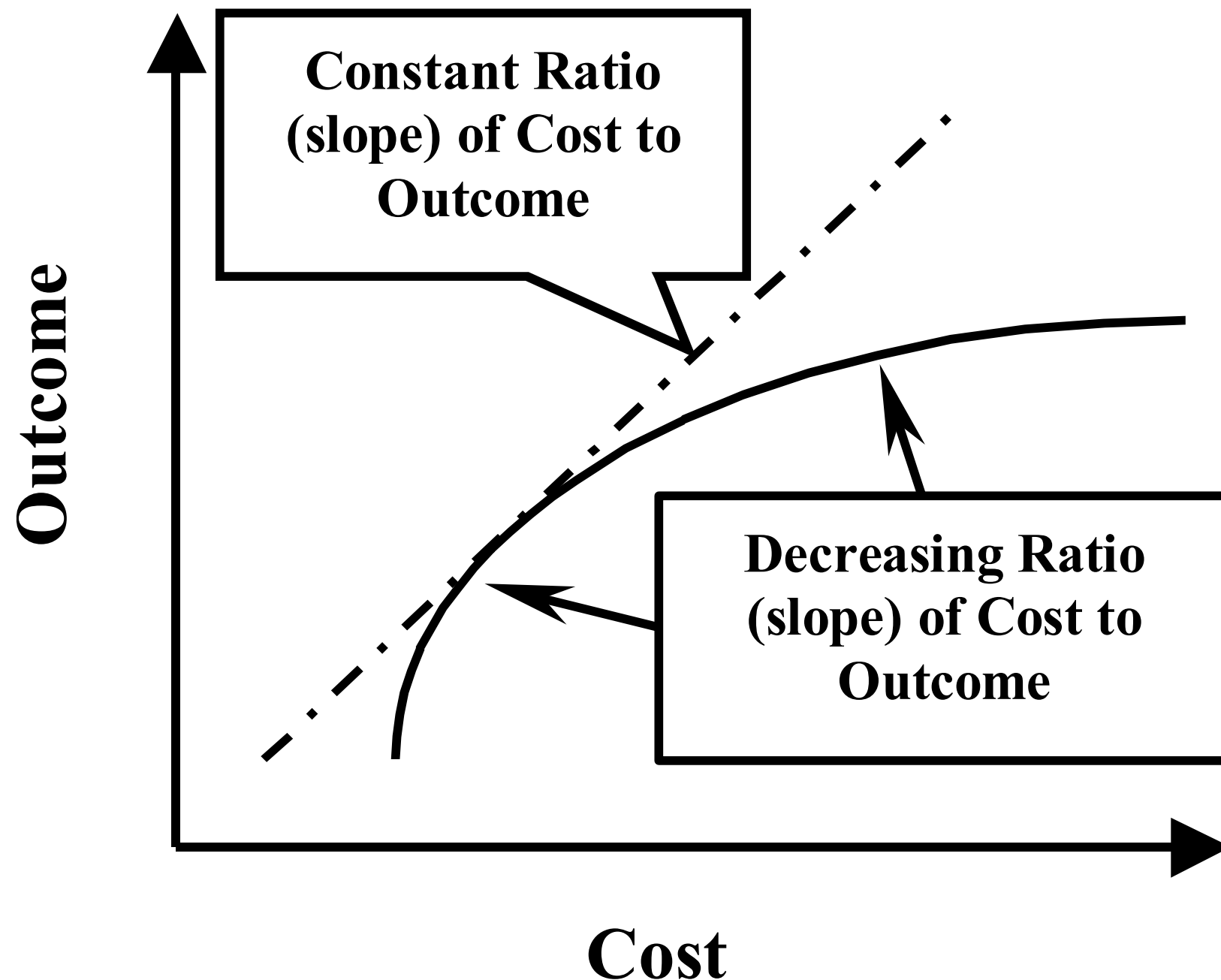
  - ✧ (possible) Diminishing returns

- ✧ Ratios are, essentially, *slopes*

  - ✧ assumes a linear cost  $\rightarrow$  outcome relationship



Are ratios accurate descriptions of cost / outcome relationships?





Consider how ratios and the numbers that compose them do or don't work in the following example...



# Average Treatment Costs & Benefits to Society for Substance Abuse Treatments

(*N* = 5,264 clients of CSAT-funded treatment programs)

Modality	Costs	Benefits	Ratio	Net
Ambulatory Outpatient	\$2,051	\$7,630	3.7	\$5,579
Long-Term Residential	\$3,813	\$13,902	3.6	\$10,089
Short-Term Residential	\$2,895	\$7,954	2.7	\$5,059
Outpatient Methadone	\$2,575	\$5,259	2.0	\$2,684
Short-Term Hospital	\$4,160	\$2,547	0.6	-\$1,613

*Full document available at: <http://neds.calib.com/products/pdfs/cost-ben.pdf>*



# Average Treatment Costs & Benefits to Society for Substance Abuse Treatments

( $N = 5,264$  clients of CSAT-funded treatment programs)

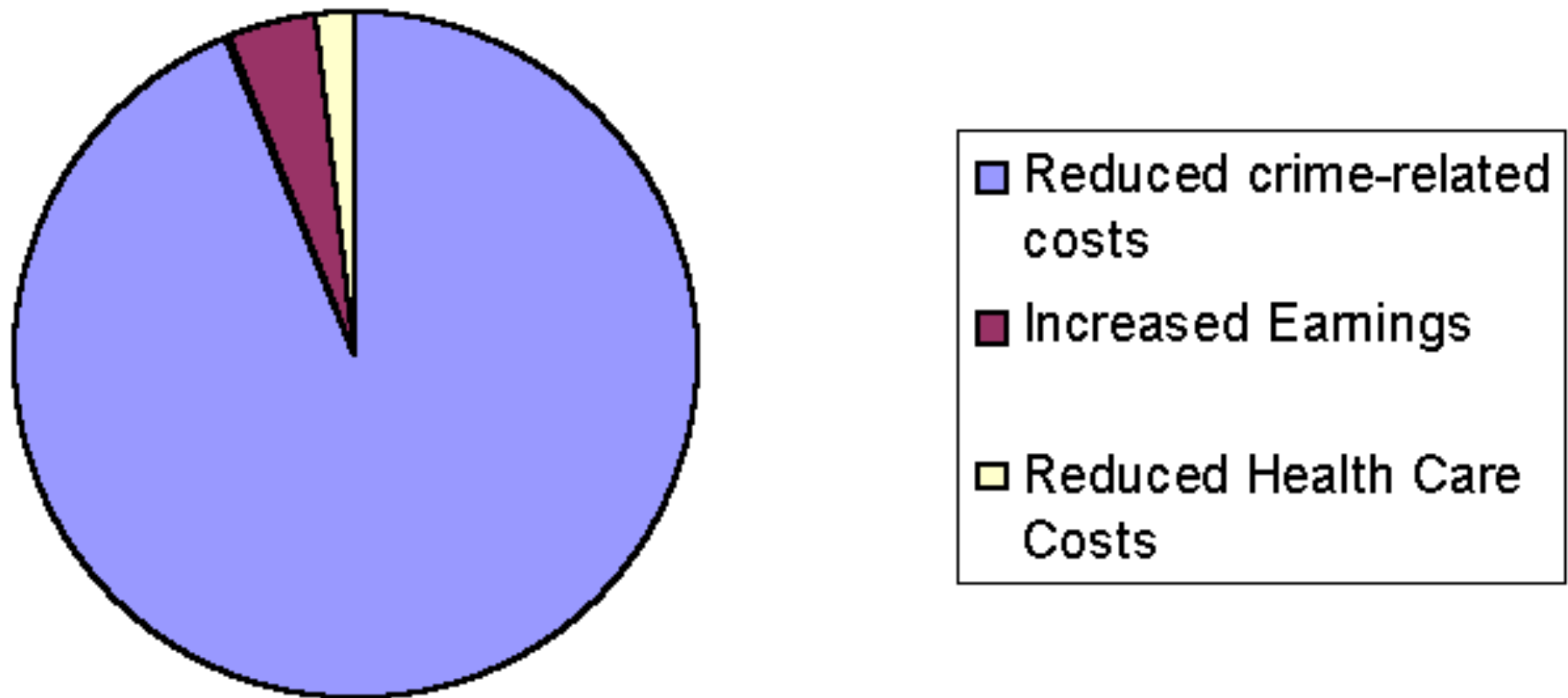


Full document available at: <http://neds.calib.com/products/pdfs/cost-ben.pdf>



Reduced criminal justice costs can exceed reductions of health care costs + income:

### **Cost-Savings from Substance Abuse Treatment (NTIES)**





# What can happen, though, when auditors strike...

- ✦ Colleague reported that a Mental Health diversion program reduced use of Criminal Justice services:
  - Reduced arrests
  - Reduced days in jail
  - Reduced court costs
- ✦ Auditor found that expenditures by police, prisons, and courts actually did not change, except:
  - Jail meals (decreased)
- ✦ And the mental health diversion program cost how \$?

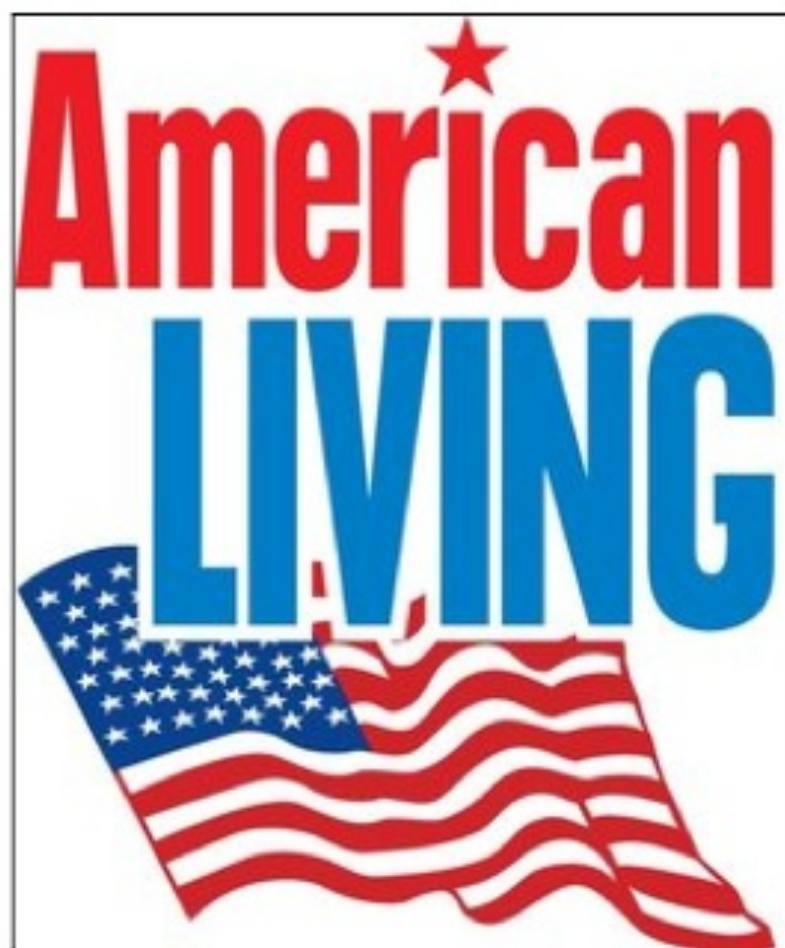


# Cost Of Living Now Outweighs Benefits

APRIL 13, 2005 | ISSUE 41•15

WASHINGTON, DC—A report released Monday by the Federal Consumer Quality-Of-Life Control Board indicates that the cost of living now outstrips life's benefits for many Americans.

[Enlarge Image](#)



"This is sobering news," said study director Jack Farness. "For the first time, we have statistical evidence of what we've suspected for the past 40 years: Life really isn't worth living."

To arrive at their conclusions, study directors first identified the average yearly costs and benefits of life. Tangible benefits such as median income (\$43,000) were weighed against such tangible costs as home-ownership (\$18,000). Next, scientists assigned a financial value to intangibles such as finding inner peace (\$15,000), establishing emotional closeness with family members (\$3,000), and brief moments of joy (\$5 each). Taken together, the study results indicate that "it is unwise to go on living."

"Since 1965, the cost-benefit ratio of American life has been approaching parity," Farness said. "While figures prior to that date show that life was worth living, there is some suspicion that the benefits cited were superficial and misreported."

Analyzed separately and as one, both the tangible and intangible factors suggest that life is a losing investment.

"Rising energy costs, increased prices on everyday goods and services, and the decreased value of the dollar have combined to drive the cost of living in this country to an all-time high," Farness said. "At the same time, an ever-

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increasing need for additional emotional-energy output, low rates of interest in one another, and the decreasing value of ourselves all greatly exceed our fleeting epiphanies."

Experts nationwide have corroborated the report's findings.

[Enlarge Image](#)



Gulfport, MS resident Stan Holiday weighs the cost of living against life's benefits.

"The average citizen's lousy, smelly, uncomfortable daily-transportation costs rose 2.1 percent in January," Derek Capeletti of Wells Fargo Capital Management said. "Clothing costs were up 2.3 percent, reflecting an increased need for the pleated khakis, sensible sweater-sets, and solid ties we have to wear to our awful fucking jobs. And grocery expenses were up almost 4 percent, reflecting the difficulty that light-beer, microwave-burrito, and rotisserie-chicken makers have faced in meeting the needs of a depressed economy and citizenry."

Capeletti added: "The benefits of living remained stable or decreased. Especially—surprise, surprise—in our love lives."

According to the study, high-risk, short-term, interest-based investments in the lives of others cost thousands of dollars a year and rarely yield benefits, financial or otherwise. Although conservative, long-term partnerships do provide limited returns, the study indicates that they tie up capital and limit options.

Child-rearing, a course taken by many people who choose to live, is actually contributing to the problem.

"The fact is, the supply of Americans greatly outstrips demand," said Evan Alvi of the Portland-based Maynard Institute.

"Americans seem to believe that minting more lives will increase the value of their own holdings. All they are doing, though, is inflating the supply and reducing the dividends paid by long-term familial bonds."

Despite life's depreciating value, Alvi did not recommend that shareholders divest themselves of their holdings.

"Limited dumping could result in a short-term increase in available resources for those who remain in the market," Alvi said. "However, it's a risky move that could affect perception of value, leading to mass divestiture."

Alvi added, "And let's not fail to mention that some religious experts say there are penalties for early withdrawal." 🌿



# COST-UTILITY ANALYSIS (CUA)

- Uses highly generalizable measures of effectiveness, e.g.,
  - Quality Adjusted Life Years (QALY)
    - example: 1 year of life depressed = 0.\_\_\_\_ year of life healthy
  - Cost per Quality Adjusted Life Year Added (\$/QALY)
- Example:
  - \$3,000 of depression treatment for Quality Adjusted Life Year gained



# OTHER COMMON, NONMONETARY OUTCOME MEASURE:

- DALY (Disability Adjusted Life Year)
- Example, incorporating ICERs
  - "*Results:* The brief bibliotherapy intervention had an ICER of AU\$8600 per DALY and the group-based psychological intervention had an ICER of AU\$20 000 per DALY. The majority of the uncertainty simulations for both interventions fell below the cost-effectiveness threshold value of \$50 000 per DALY."



STARTING

TO INCLUDE COSTS AND BENEFITS  
IN EVALUATION

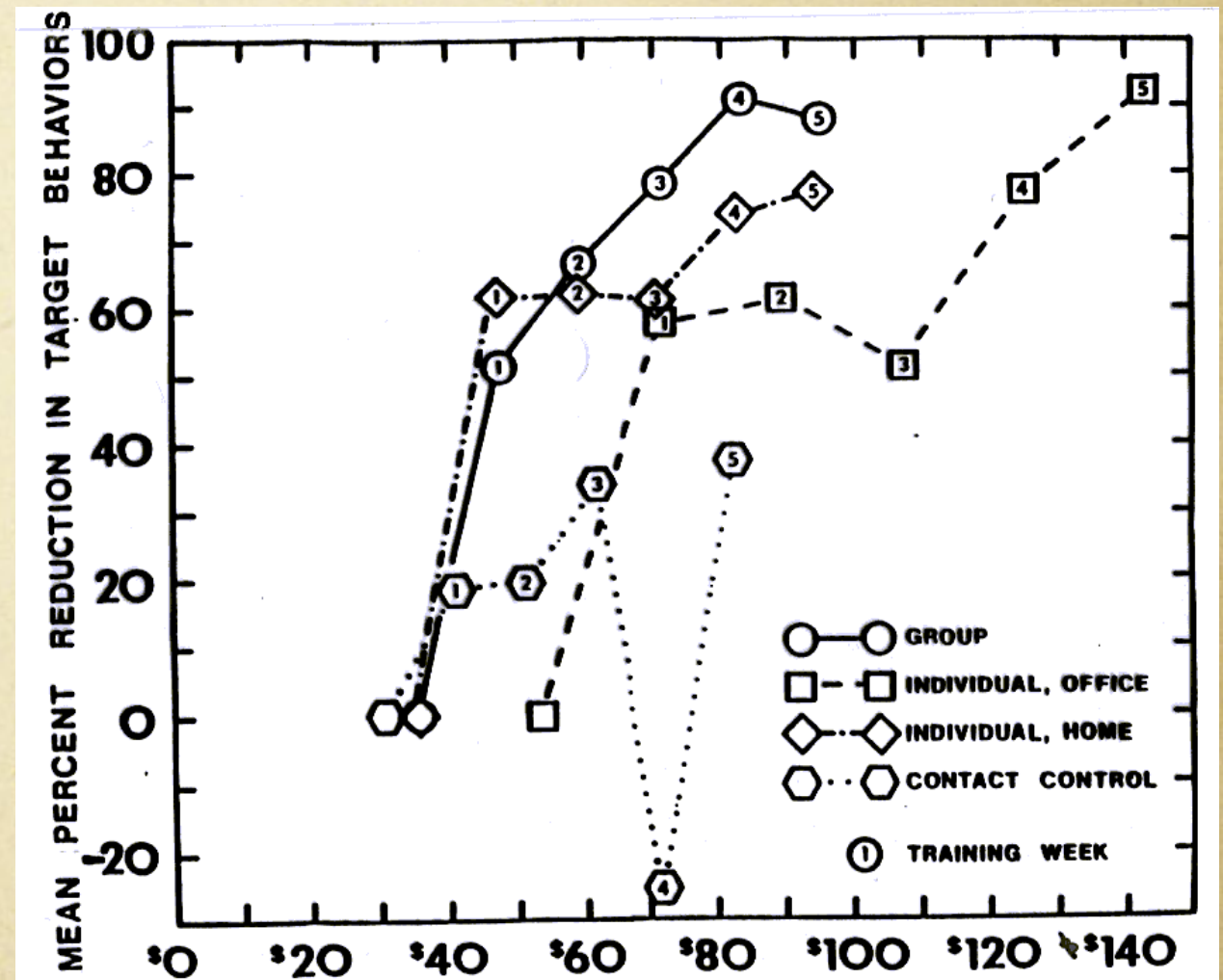
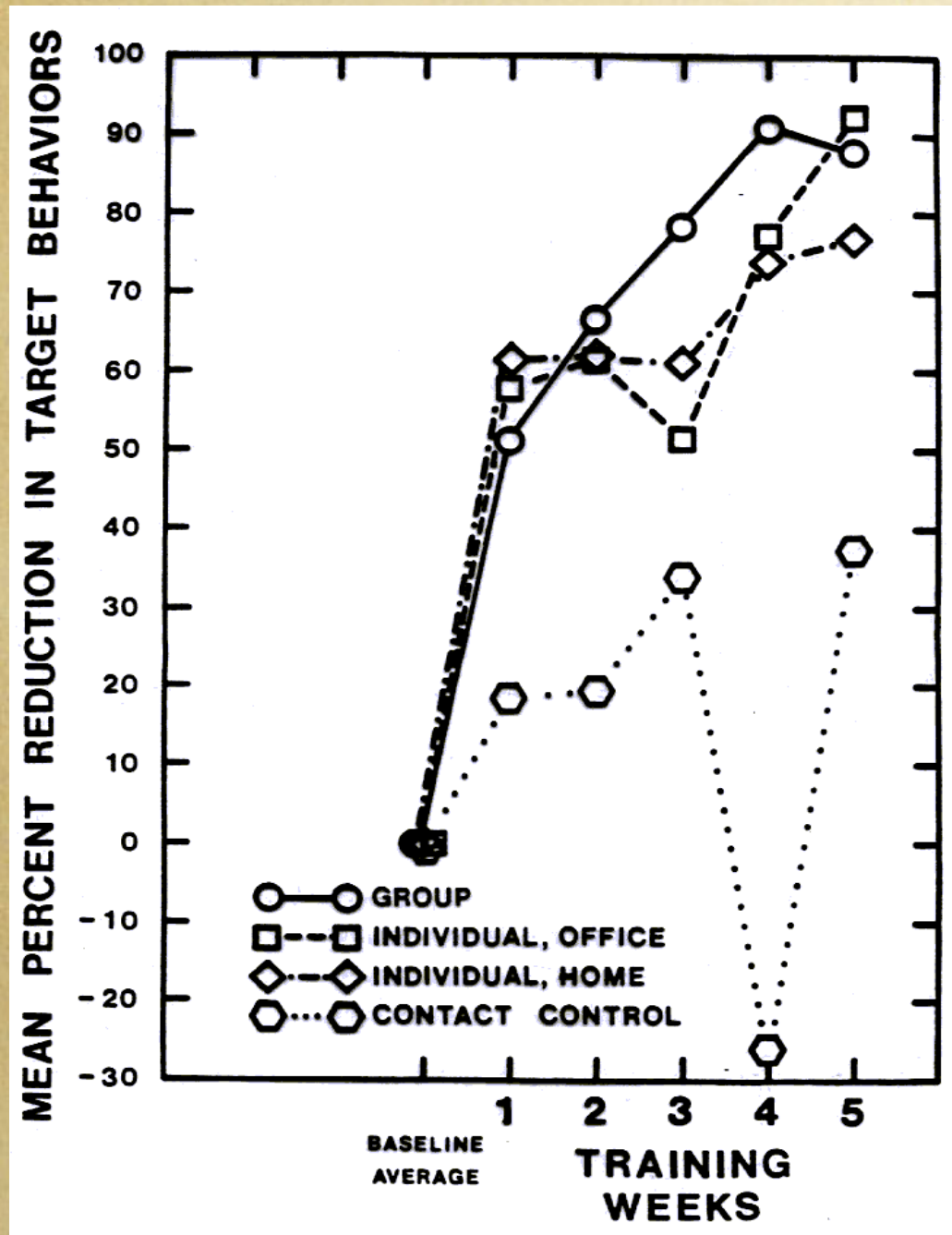


# ONE WAY TO "COST" A PROGRAM SO WE UNDERSTAND IT

- identify key activities of the program
- find the resources consumed in each activity
- multiply resources used by number of activity episodes
- add overhead (often as a percentage of activity costs)
- do this from multiple perspectives (client, funder, provider)



# Try making a variable *realer*





# TIPS FOR COST ASSESSMENT

- measure the resources used, not the price of those resources
- focus measurement efforts on the most important (for program activities) and most costly resources
- reliability and validity of costs are at least as important as reliability and validity of outcomes, and of intervention fidelity
- check resources against activities, to make sure the list is pretty complete
- constructed program model for different perspectives
- separate research costs from program costs



# RESOURCES

<i>Perspectives:</i>	provider	client	funder	community
time				
services				
space				
print materials				
equipment				
supplies				
utilities				
other				



# Assessing costs



# Costs

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



# 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



# Resources defined as

- What was paid for them (price cost)
- What it took to **get** them (price, shipping...)
- What would need to be paid for them (replacement cost)
- What they are worth to the community, society (opportunity cost)
- What they are, and how much of them was used (description & quantification)



# 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



# Perspectives on Costs

- Provider perspective
- Consumer perspective
- Consumer family perspective
- Taxpayer perspective
- Community perspective
- Policy makers
- Funders (philanthropic)
- *and: Evaluator perspective*



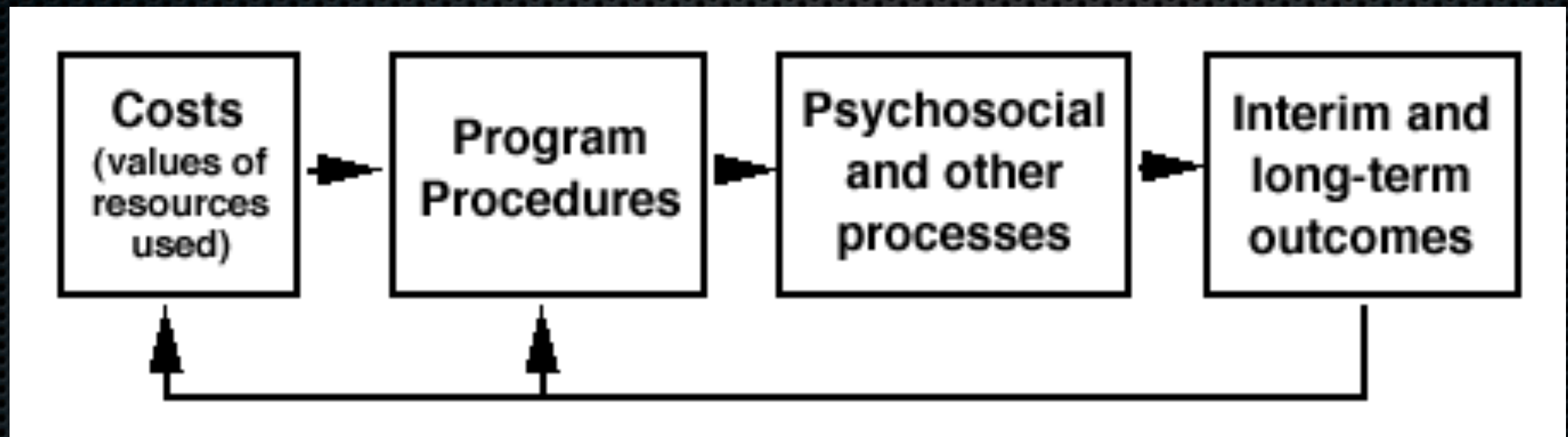
# CPPO Model for OR guides cost definition

CPPO Model collects cost and all other 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



# Costs → Procedures → Processes → Outcomes (CPPO) Model





# 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, NASBHC)



- paper-and-pencil spreadsheets



# Resource → Procedure

## Matrices

- Provider perspective
- Consumer perspective
- Consumer family perspective
- Taxpayer perspective
- Community perspective
- *and Evaluator perspective*



# Resource → Procedure Matrix

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



# Handout (pp. 4-6): resource use, unit cost, cost

Resources ↓	Procedures →				Total of Resources
	Individual Counseling	Group Counseling	...	Evaluation	
Personnel			...		
Space			...		
...			...		
Total Cost of Direct Services			...		
Administration			...		
Total of Resources					



# 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 ↓	ures →			
	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> ↓	ures →				<i>Total of Resources</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>Administration</i>			...		\$100,000



# Resource → Procedure Matrix 5: Resource Cost

Resources ↓	Resources →				Total of Resources
	Individual Counseling	Group Counseling	...	Evaluation	
Personnel	\$12,000	\$12,000	...	\$1,200	\$50,000
Space	\$12,000	\$12,000	...	\$1,200	\$30,000
...			...		
Total Cost of Direct Services	\$35,000	\$30,000	...	\$7,000	\$100,000
Administration			...		\$100,000



# Resource → Procedure Matrix 6: Resource Cost

Resources ↓	Resources →				Total of Resources
	Individual Counseling	Group Counseling	...	Evaluation	
Personnel	\$12,000	\$12,000	...	\$1,200	\$50,000
Space	\$12,000	\$12,000	...	\$1,200	\$30,000
...			...		
Total Cost of Direct Services	\$35,000	\$30,000	...	\$7,000	\$100,000
Administration	\$35,000	\$30,000	...	\$7,000	\$100,000



# Resource Cost TOTALS (worksheet *answers!*)

<i>Resources</i> ↓	Resources →				<i>Total of Resources</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
<b>Total Cost of All Services</b>	<b>\$70,000</b>	<b>\$60,000</b>	<b>...</b>	<b>\$14,000</b>	<b>\$200,000</b>



# Assessing the value of volunteered and donated resources

for Providers, Consumers, & Family Members



# Importance

- Volunteered and donated resources may exceed the value of paid-for resources in some programs
- Potential unique contributions of volunteered time from:
  - mentors
  - former clients
  - current students
- Donated resources can include space, food, equipment...



# Measuring Volunteered & Donated Resources can:

- facilitate understanding of why programs do (or don't) work
- guide replication of successful programs in new communities
- suggest where programs utilizing high amounts of volunteered and donated resources might not be replicable



$$\text{Time} \times \text{Cost per unit time} = \text{Total Value of Resource}$$

- Example
  - 10 hours x \$50/hour = \$500 of services
- Alternatives for estimate cost per unit time:
  - Opportunity cost using current payrate
  - Replacement cost



# Collecting Data on Volunteered Resources in a Human Service (Yates, Haven, & Thoresen, 1979)

## PERSONNEL TIME DATA SHEET

*Time-Study For All Learning House Participants, Cost-Effectiveness Analysis*

Participant Name: \_\_\_\_\_

Monitoring Week: \_\_\_\_/\_\_\_\_/\_\_\_\_ through \_\_\_\_/\_\_\_\_/\_\_\_\_

		Monday		Sunday		Total	
		am	pm	am	pm	am	pm
Program-Related Activities (Record as mutually exclusive and in minutes, please.)	w/LH children						
	w/LH parents						
	w/LH staff						
	community relations						
	household & shopping						
	phone contacts						
	reading						
	writing						
	preparing for counseling						
	preparing for other						
	other:						
	Totals						



# Findings for a Residential Program for Youth

## OPERATIONS AND COMMUNITY COSTS FOR LEARNING HOUSE PERSONNEL

<i>Personnel Category (Degree)</i>	<i>Operations Cost</i>	<i>Hourly Payrate</i>	<i>Time (Hours)</i>	<i>Community Cost</i>
MD, JD, CPA	\$1,462	\$45.00	32.5	\$ 1,462
PhD	849	15.67	50.9	798
MA	2,706	7.78	829.3	6,452
BA	2,972	7.66	1785.2	13,675
Paraprofessional	0	5.53	532.3	2,943
Undergraduate	0	1.70	699.4	1,189
Other (Includes Clients' Parents)	0	2.00	297.0	594
Total Personnel Cost	\$7,988			\$27,112

NOTE. These data were compiled for a single two-month period. From Yates, Haven and Thoresen (1979).



# Summary: Volunteered and Donated Resources ...

- *Can be measured ...*
  - inexpensively
  - with little resistance from program staff or sites
- *Can be important to measure to provide ...*
  - more accurate description of resources used
  - better replication of program operations in new communities
  - reveal how resources are really being used
  - contrast “cash” and replacement value of resources



# Adjustments to make to costs for temporal distortion

- ✧ currency
- ✧ inflation
- ✧ deflation
- ✧ present value



# Costs can vary over time

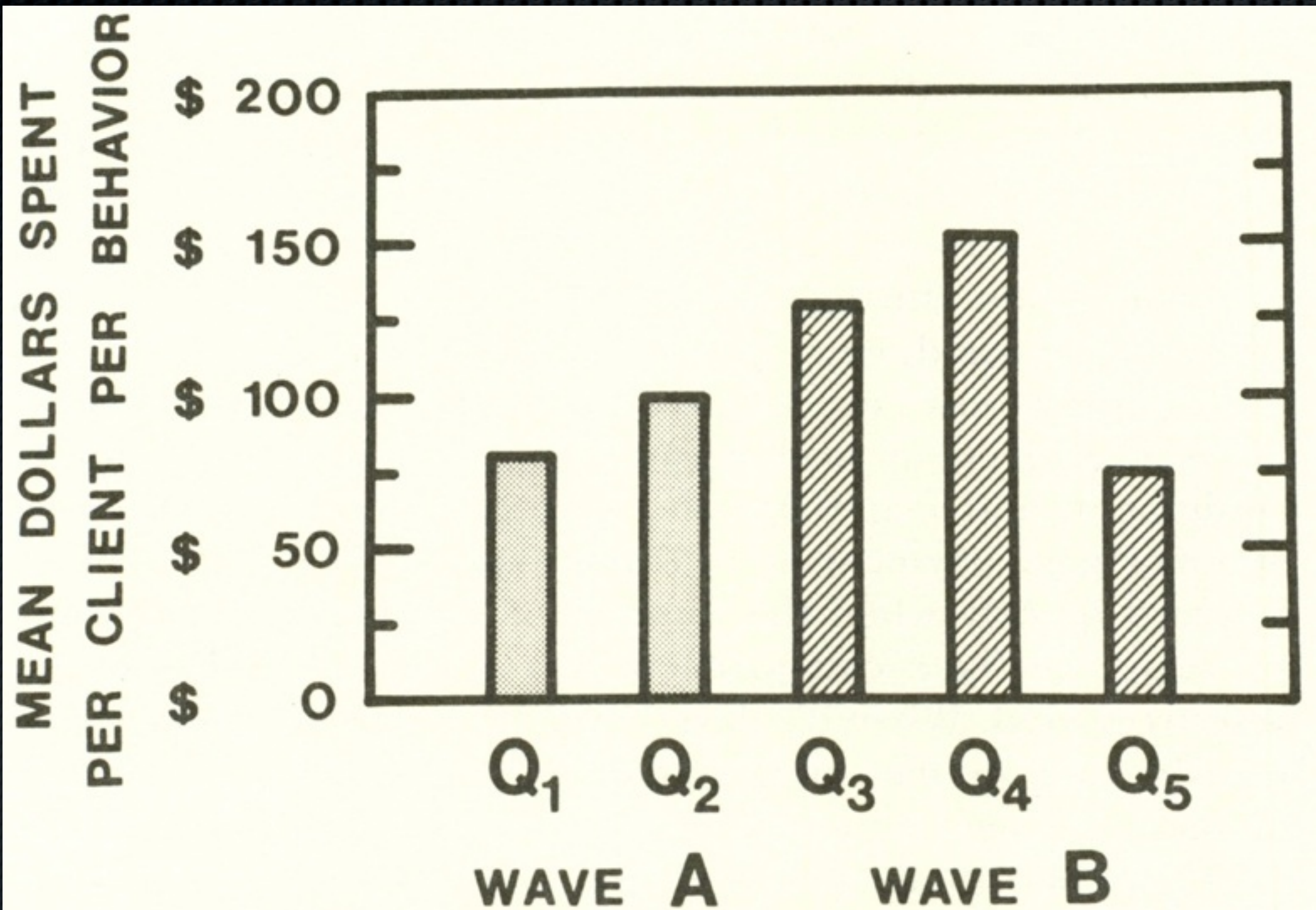


Figure 5. Average operations cost per Learning House client per behavioral effectiveness variable. From Yates, Haven, and Thoresen (1979).



QUARTERLY OPERATIONS COSTS FOR LEARNING HOUSE  
BEFORE AND AFTER ADJUSTMENT FOR INFLATION

<i>Cost Variable</i>	<i>Quarter</i>	<i>Before Inflation Adjustment</i>	<i>After Inflation Adjustment</i>
Personnel	1	\$ 6,092	\$ 6,632
	2	7,529	7,988
	3	6,740	6,909
	4	6,755	6,809
	5	5,828	5,828
	<i>average</i>	6,589	6,833
Facilities	1	\$ 1,144	\$ 1,245
	2	1,157	1,228
	3	1,112	1,140
	4	2,766	2,788
	5	914	914
	<i>average</i>	1,419	1,463
Equipment & Materials	1	\$ 1,963	\$ 2,137
	2	2,446	2,595
	3	2,407	2,468
	4	2,450	2,470
	5	2,054	2,054
	<i>average</i>	2,264	2,344
Total		\$10,272	\$10,641



# present-valuing

<sup>1</sup> The equation for the present value is

$$\$_t / (1 + i)^t$$

where  $\$ _t$  is the value of resources spend or to be spent during time period  $t$ , and  $i$  is the *discount rate* chosen for present-valuing.



# present valuing can make a difference (discount rate of 5% per year)

Year	Proposal A		Proposal B	
	plain	present-valued	plain	present-valued
2011	\$900,000	<b>\$857,143</b>	\$500,000	<b>\$476,190</b>
2012	\$500,000	<b>\$453,515</b>	\$500,000	<b>\$453,515</b>
2013	\$100,000	<b>\$86,384</b>	\$500,000	<b>\$431,919</b>
Total	\$1,500,000	<b><u>\$1,397,041</u></b>	\$1,500,000	<b><u>\$1,361,624</u></b>



## PRESENT-VALUE COSTING

### *Proposal A*

<i>Year</i>	<i>Calculations for Present Value</i>	<i>Cost</i>
1	$\$500,000/(1 + .06)^1 = \$500,000/1.06 =$	\$ 471,698
2	$500,000/(1 + .06)^2 = 500,000/1.12 =$	444,998
3	$500,000/(1 + .06)^3 = 500,000/1.19 =$	419,810
4	$500,000/(1 + .06)^4 = 500,000/1.26 =$	396,047
5	$900,000/(1 + .06)^5 = 900,000/1.34 =$	<u>672,532</u>
<i>Total Present-Valued Cost</i>		<i>\$2,405,085</i>
<i>Total Non-Present-Valued Cost</i>		<i>\$2,900,000</i>

### *Proposal B*

<i>Year</i>	<i>Calculations for Present Value</i>	<i>Cost</i>
1	$\$900,000/(1 + .06)^1 = \$900,000/1.06 =$	\$ 849,057
2	$500,000/(1 + .06)^2 = 500,000/1.12 =$	444,998
3	$500,000/(1 + .06)^3 = 500,000/1.19 =$	419,810
4	$500,000/(1 + .06)^4 = 500,000/1.26 =$	396,047
5	$500,000/(1 + .06)^5 = 500,000/1.34 =$	<u>373,629</u>
<i>Total Present-Valued Cost</i>		<i>\$2,483,541</i>
<i>Total Non-Present-Valued Cost</i>		<i>\$2,900,000</i>



# Assessing Costs to get variance between Procedures and Clients: examples

- ✦ Bowie Involvement Program for Parents and Youth (BIPPY)
- ✦ Weight management: psychological costs



# Learning House: Collecting data on resources used for treatment components

		Monday		Sunday		<i>Total</i>	
		am	pm	am	pm	am	pm
Program-Related Activities (Record as mutually exclusive and in minutes, please.)	w/LH children						
	w/LH parents						
	w/LH staff						
	community relations						
	household & shopping						
	phone contacts						
	reading						
	writing						
	preparing for counseling						
	preparing for other						
	other:						
	Totals						



# Time spent on different clients

<sup>1</sup> The equation that performed this transformation was

$$W_{c,q} = \left( \sum_{t=1}^m r_{t,c,q} \right) / \left( \sum_{c=1}^p \sum_{t=1}^m r_{t,c,q} \right)$$

where  $r_{t,c,q}$  is the rating supplied by therapist  $t$  for child  $c$  during quarter  $q$ ,  $m$  is the number of therapists, and  $p$  is the number of children being treated during quarter  $q$ .



# Costs per client need not be the same

TIME PROPORTIONS AND CORRESPONDING PER CLIENT COSTS

<i>Client</i>	<i>Time Proportion</i>	<i>Operations Cost For Client</i>
A	.17	\$1545
B	.11	1335
C	.21	1685
D	.15	1475
E	.23	1755
F	<u>.13</u>	1405
	1.00	

NOTE. These data were compiled for one quarter at Learning House. From Yates, Haven, and Thoresen (1979).



## CLINIC COMPONENT COST DISTRIBUTION SHEET

SERVICE ACTIVITIES	<i>Formal Counseling</i>	<i>Informal Counseling</i>	<i>Tutoring</i>	<i>Alternative Leisure Time Activities</i>	<i>Crisis Intervention</i>
1. Case Notes	\$ 5,532.08				
2. Telephone Follow-up	\$ 5,448.69				
3. Individual Counseling	\$12,455.99				
4. Family Counseling	\$ 4,030.92				
5. Group Counseling	\$ 2,589.98				
6. Vocational Counseling	\$ 120.46				
7. Crisis Intervention I					\$ 657.92
8. Interagency Coordination	\$ 1,645.26				
9. Intake	\$ 1,501.17				
10. Supervisory Conference					
11. Case Conference	\$ 2,594.61				
12. Staff Meeting					
13. Training					
14. Supervision					
15. Weekly Activity Evaluation					
16. Client Evaluation	\$ 1,121.24				
17. Informal Counseling		\$ 6,606.99			
18. Telephone/Info. & Referral					
19. Crisis Intervention II					\$ 194.60
20. Voc. Counsel./Job Placement		\$ 64.87			
21. Mobilizing Commun. Resources					
22. Community Development					
23. Runaway Asst. Counseling		\$ 55.60			\$ 55.60
24. Drug Education		\$ 9.27			\$ 9.27
25. Tutoring			\$ 787.65		



## DISTRIBUTION OF SERVICE PERSONNEL ACTIVITIES AMONG SERVICE COMPONENTS

<i>Service Component</i>	<i>Activities Assigned to Component<sup>a</sup></i>
1. Formal Counseling	1, 2, 3 (94%), 4, 5 (86%), 6, 8 (67%), 9, 11, 16
2. Informal Counseling	17, 20, 23 (50%), 24 (50%), 28
3. Tutoring	25, 26 (50%)
4. Alternative Leisure Time Activities	26 (50%), 27
5. Crisis Intervention	7, 19, 23 (50%), 24 (50%)
6. General Information and Referral	18
7. Community Development and Mobilizing Community Resources	21, 22
8. Parent Education Groups	5 (14%)
9. School and Court Liaison	3 (6%), 8 (33%)

NOTE. Activities to which the above numbers correspond are listed in Table XVII.

<sup>a</sup> Activities 29, 30, and 31 were administered or unspecified and were distributed equally across the nine components.



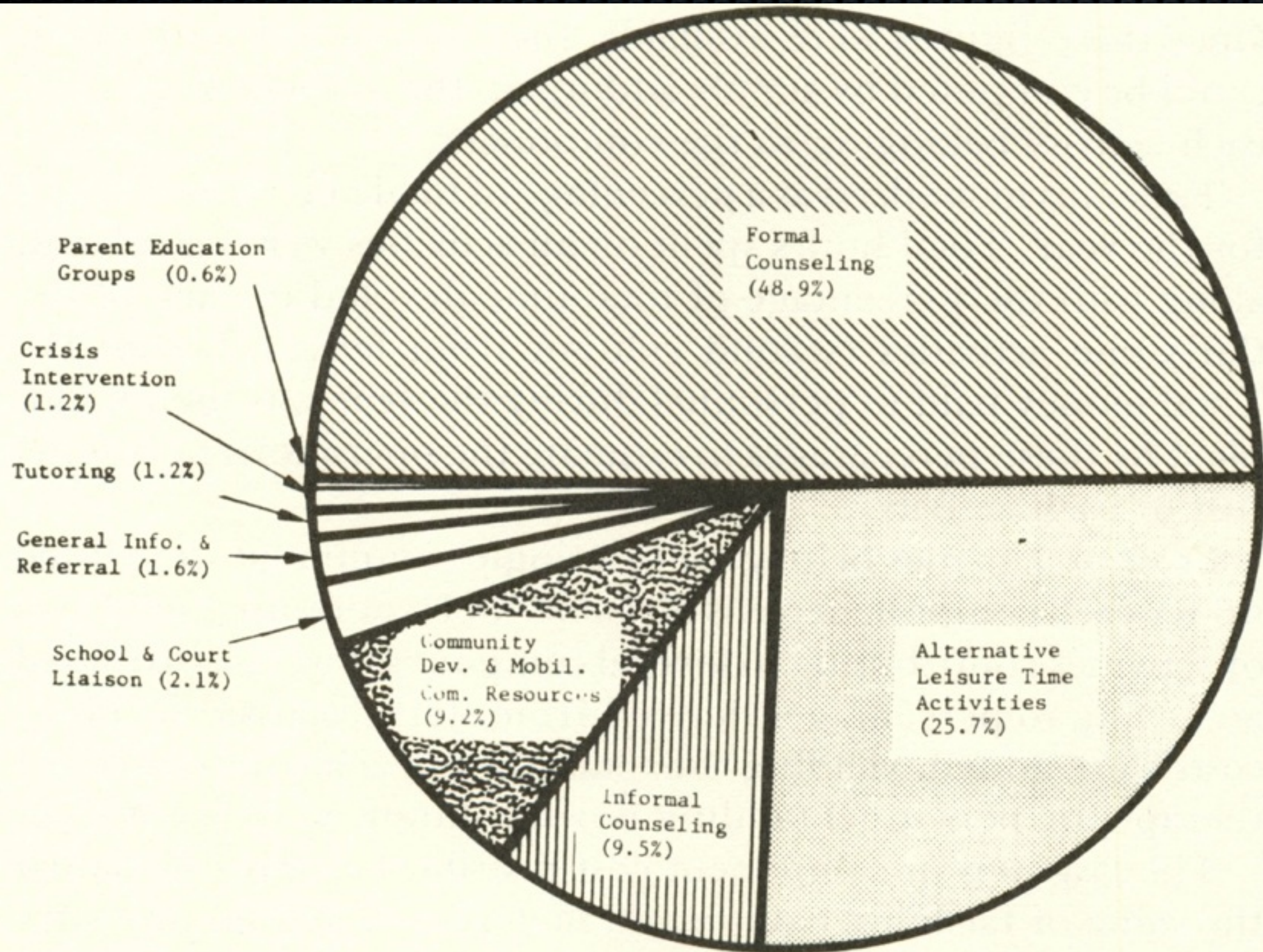


Figure 6. Pie chart showing distribution of personnel, facilities, equipment, and materials resources combined among service components of a community clinic.



Cost per Client =  $f$  (service, # clients served)?

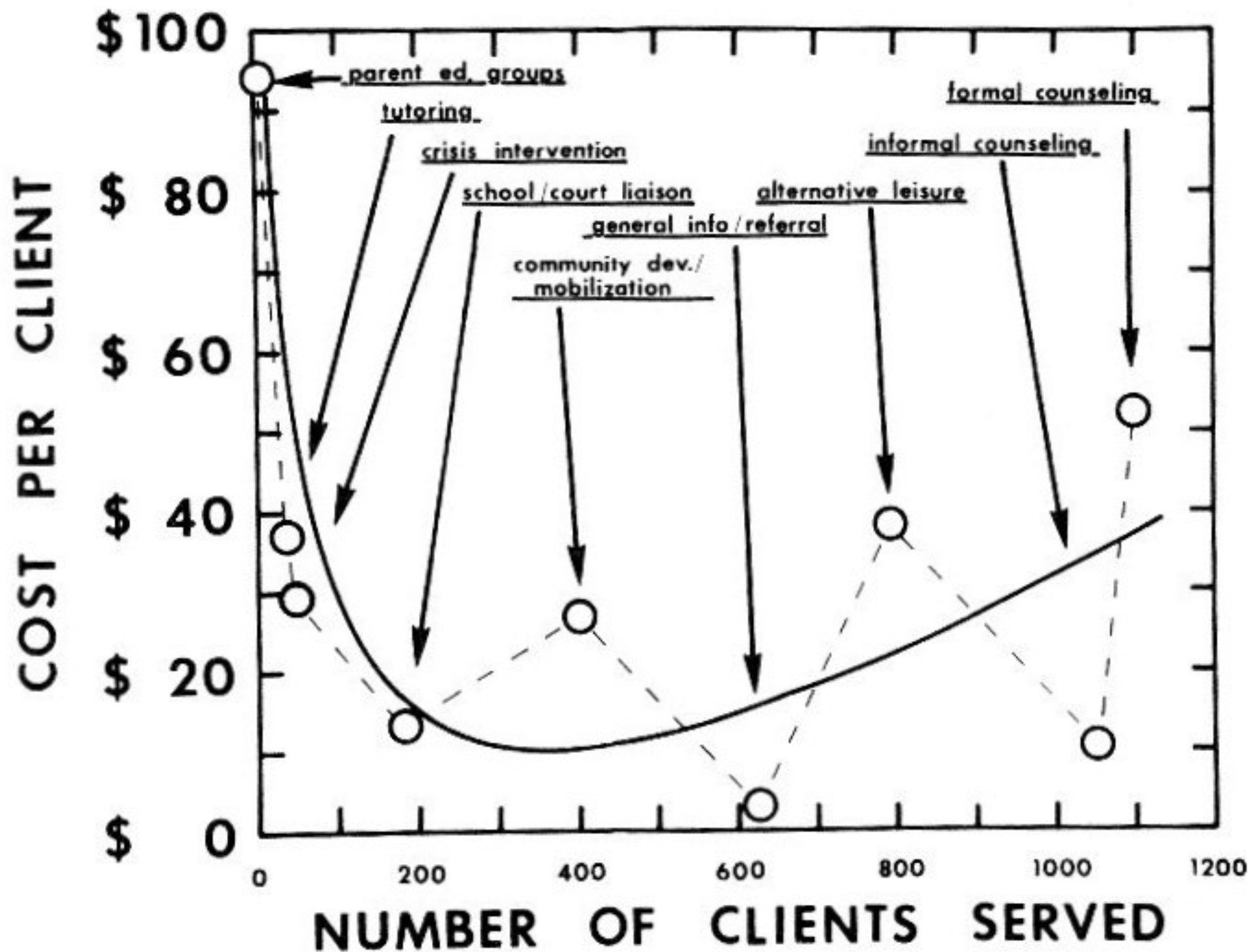


Figure 7. Examining the relationship between number of clients served in different clinic components and cost per client.



# SUBJECTIVE COSTS AND BENEFITS OF SELECTED OBESITY REDUCTION STRATEGIES

<i>Obesity Reduction Strategy</i>	<i>Perceived "Difficulty"</i>		<i>Perceived "Usefulness"</i>	
	<i>Mean</i>	<i>s.d.</i>	<i>Mean</i>	<i>s.d.</i>
Eating Only in Designated Eating Place	4.6	(3.1)	7.3	(3.0)
Reducing Number of Eating Episodes	5.1	(3.3)	8.5	(2.4)
Reducing Number of Snacks	6.4	(3.1)	8.9	(2.0)
Eating at Regular Times	4.8	(3.5)	7.5	(3.1)
Graphing Weight	1.8	(1.5)	5.8	(3.3)
Leaving Some Food on Plate	7.3	(3.4)	6.9	(3.2)
Shopping for Food from a List	3.0	(2.8)	7.8	(2.9)
Keeping a Food Diary	4.2	(2.9)	8.5	(2.5)
Counting Calories and Choosing Foods Lowest in Calories	5.4	(3.2)	8.4	(2.6)
Imposing a Delay Between an "Urge" to Eat and Eating	7.1	(3.2)	8.0	(2.6)
Keeping Foods in Kitchen and in "See-Proof" Containers	2.9	(2.6)	6.1	(3.4)

NOTE. "s.d." = standard deviation. Adapted from Yates (1978).



# Assessing Effectiveness

- from the same perspectives as costs
- this is what researchers are already good at!
- ... how to incorporate multiple outcomes?
- ... how to compare the effectiveness of different programs?



# When outcomes are multiple ...

Common in human services, and in most organizations: examine their mission statements!



[illegible][illegible]



# operational definitions for effectiveness

meetings and instrument testing. For example: “Complaining/Bitching/Crying to Adults” was defined as

... occurring in the absence of (i.e., at least 5 minutes after) any denial of child-initiated requests. *6N* [the behavior] is the critical, verbal expression of dissatisfaction with the present state of affairs. Crying, denoted by tears, and whimpering, are also members of the *6N* category. *6N* behaviors are usually preceded by “Why . . .?” as in “Why are we having spinach again?” “I hate Learning House” and “I feel like a dead horse” are also examples of *6N* behaviors. *6N* is never recorded during family meetings, when complaints and constructive criticism of Learning House and its clients and staff are openly solicited. Minor “tattling,” e.g., “I saw Johnny spill the cat’s milk,” also is a *6N* response.



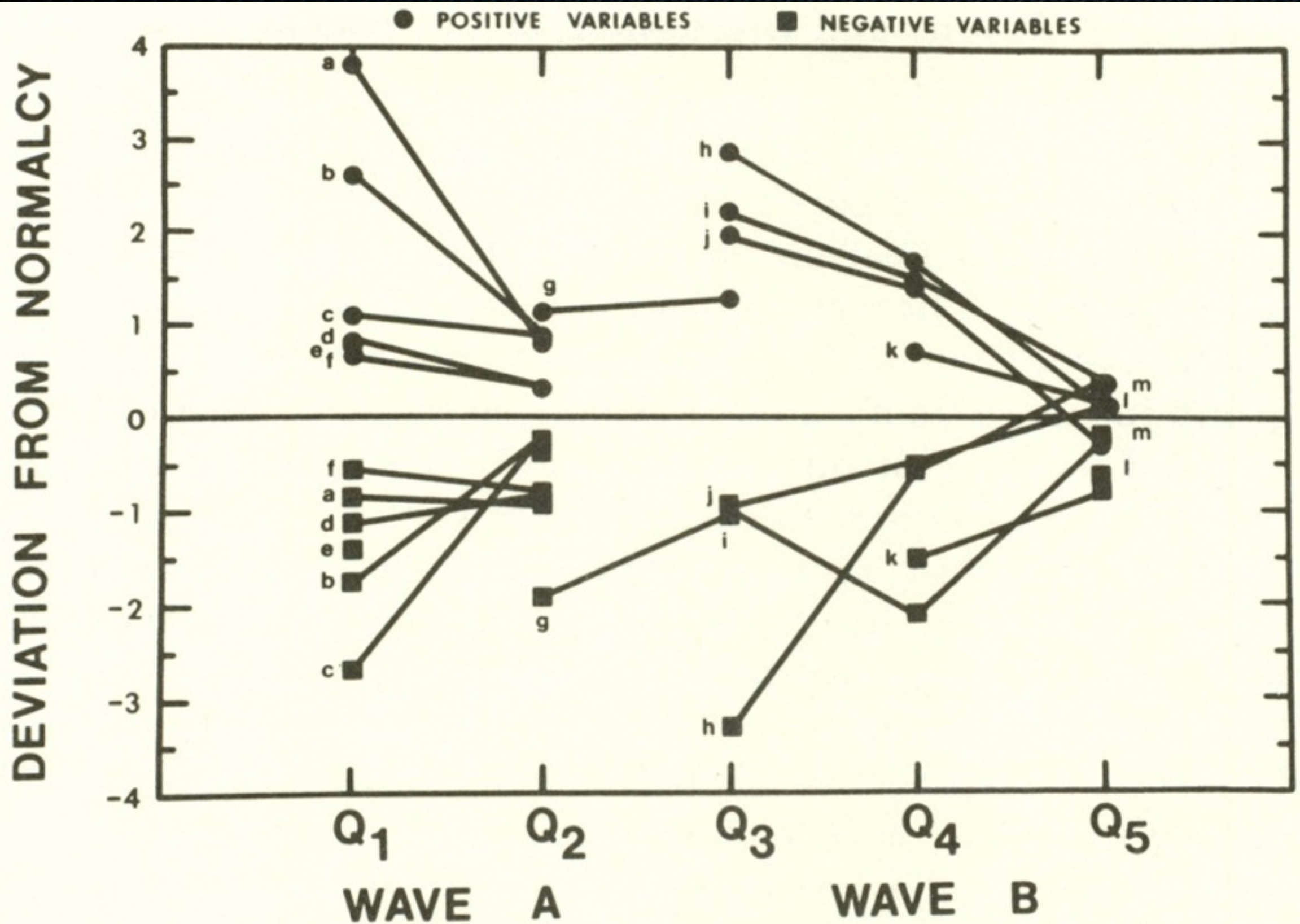


Figure 3. Mean effectiveness for positive and negative effectiveness variables for each child in two successive groups. Lower case letters indicate specific children. From Yates, Haven, and Thoresen (1979).



# When there's more than one outcome: composite indicators

## Importance Weightings

Staff discussion made it clear that some of the twenty behaviors were more important to normalize than others. Staff and researchers decided that the relative importance of each behavior could be surveyed, transformed into a number, and incorporated into an overall outcome index that would be made by combining data from all effectiveness variables. The six staff members were asked to independently rate the relative importance of each variable using ten-point scales:

(one of the behaviors) is

.....  
much *more*  
important

.....  
much *less*  
important

than other behaviors.

The staff responded to this question for each behavior on separate slips of paper, behaviors being ordered randomly.



# Importance weightings from ratings:

<sup>2</sup> Mathematically expressed, the importance weightings were computed

$$W_b = \frac{\sum_{i=1}^m [r_{i,b} / (\sum_{b=1}^n r_{i,b} / n)]}{m}$$

where  $m$  is the total number of staff members who supplied ratings,  $n$  is the total number of effectiveness variables, and  $r_{i,b}$  is the rating of importance given by staff member  $i$  for effectiveness variable  $b$ .



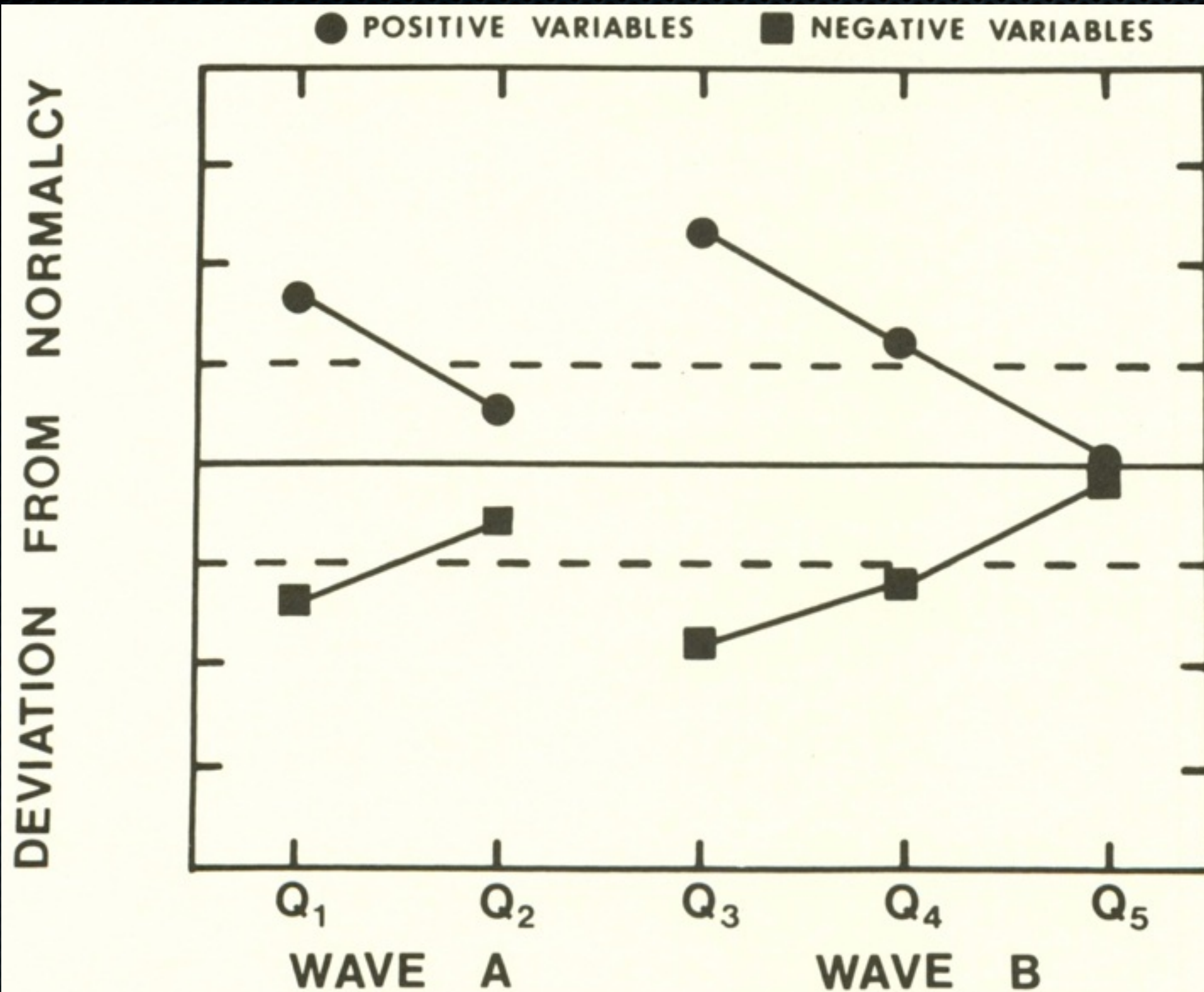


Figure 4. Average effectiveness score for positive and negative effectiveness variables of children who spent two or more quarters in a group (dash lines indicate one standard deviation from normative behavior frequencies). From Yates, Haven, and Thoresen (1979).



to compare the effectiveness  
of different programs

How do you compare apples and oranges?

- as *fruit!*



# Estimating health utilities and quality adjusted life years in seasonal affective disorder research

Freed, M. C., Rohan, K. J., & Yates, B.T. (2007) *Journal  
of Affective Disorders*, 100, 83-89



# Quality Adjusted Life Year (QALY)

- ✦ Definition of QALY
  - ✦ 1.00 QALY = 1 year in perfect health
  - ✦ 0.00 QALY = death
- ✦ Indifference Gamble, i.e., no preference between
  - ✦ 0.3 (3 out of 10) chance of depression cured  
*versus*
  - ✦ 0.7 (7 out of 10) chance of death



# Assessing benefits



# 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 \$)

2. measure number times each service is used

3. find cost per service use (*from program policies, records*)

4. multiple service use x cost per service use

- Monetization strategies for income (necessary?)

- actual income, from self-report or records

- estimated income, given profession or hours worked



# Possible Cost Savings, part I

<i>Effectiveness (program-induced change in ...)</i>	<i>Transformation example:</i>	<i>Cost-savings Benefit:</i>
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, part II

<i>Effectiveness (program-induced change in ...)</i>	<i>Transformation examples:</i>	<i>Cost-savings Benefit:</i>
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



# Assessing procedures



participation, by the client, in which  
program activities to what degree?

- ✦ program records
- ✦ reimbursement records
- ✦ client self-report
- ✦ third party self-report



# Assessing processes



# Assessment of changes in psychological and biological states

- ✦ questionnaires (self-report)
- ✦ random queries by personal information managers (e.g., smartphone & tablet applications)
- ✦ biological assays

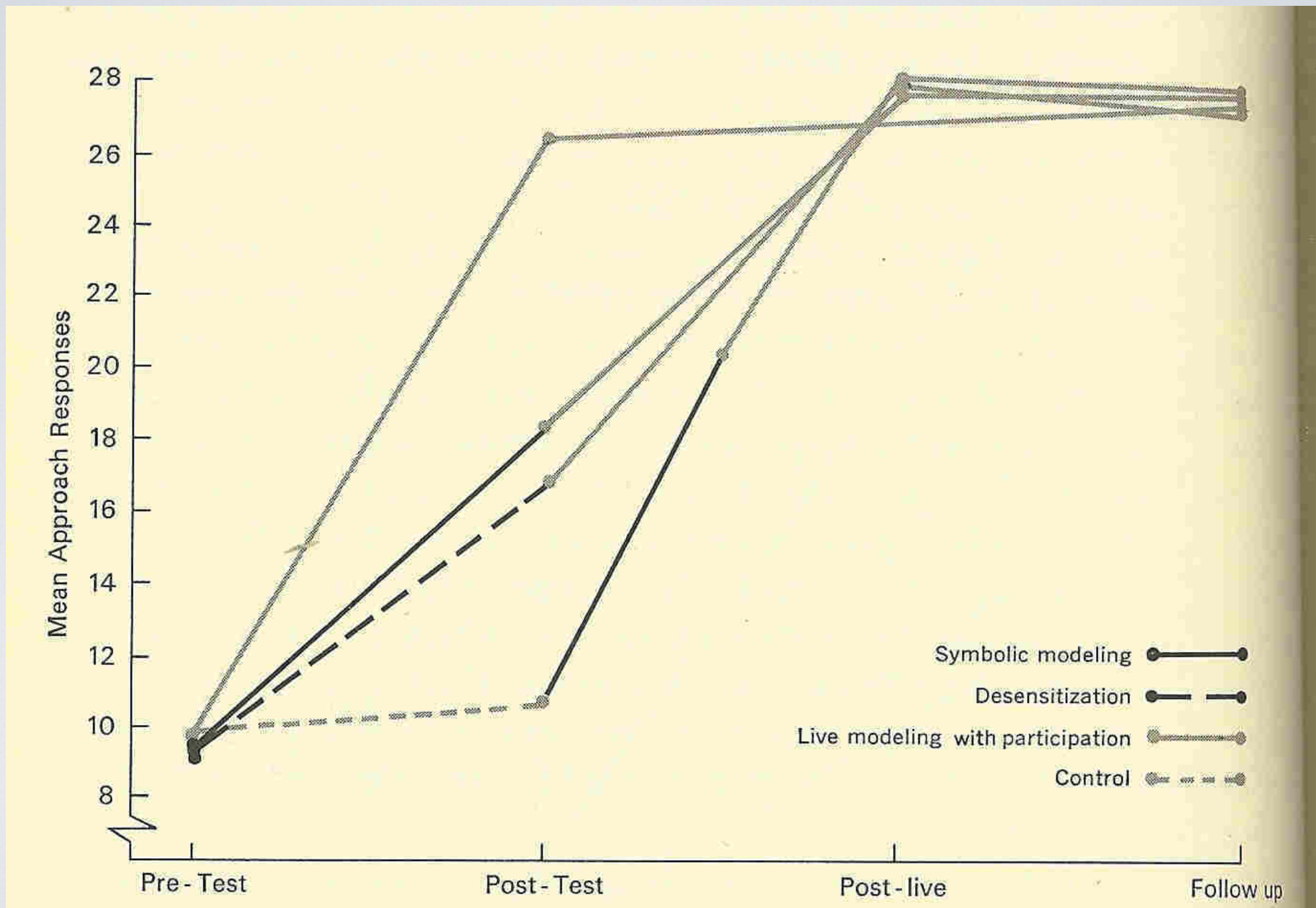


# EXAMPLES

of cost-inclusive evaluation



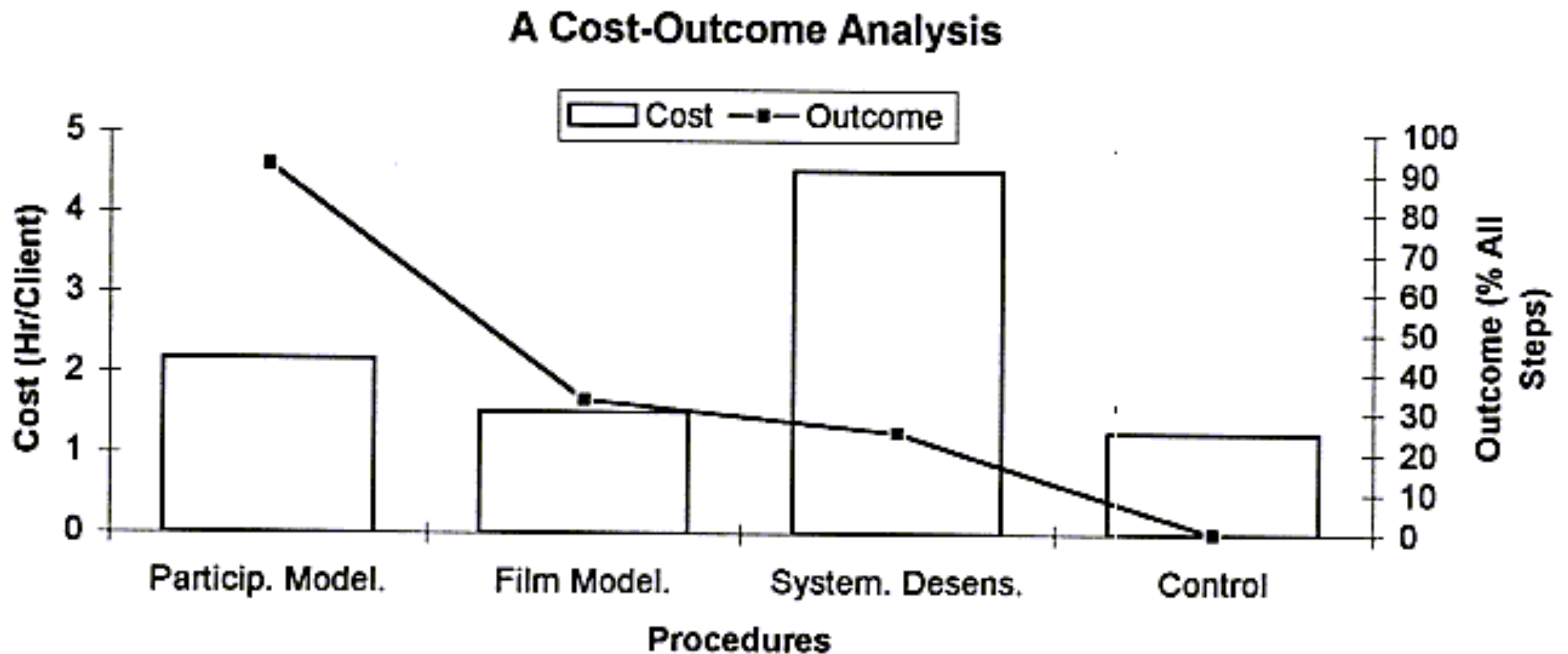
# BANDURA, BLANCHARD, & RITTER





# BANDURA, BLANCHARD, & RITTER

- never intended to be a cost study ...





Cost → Procedure → Process  
→ Outcome Analysis (CPPOA)

of Drug Abuse Prevention

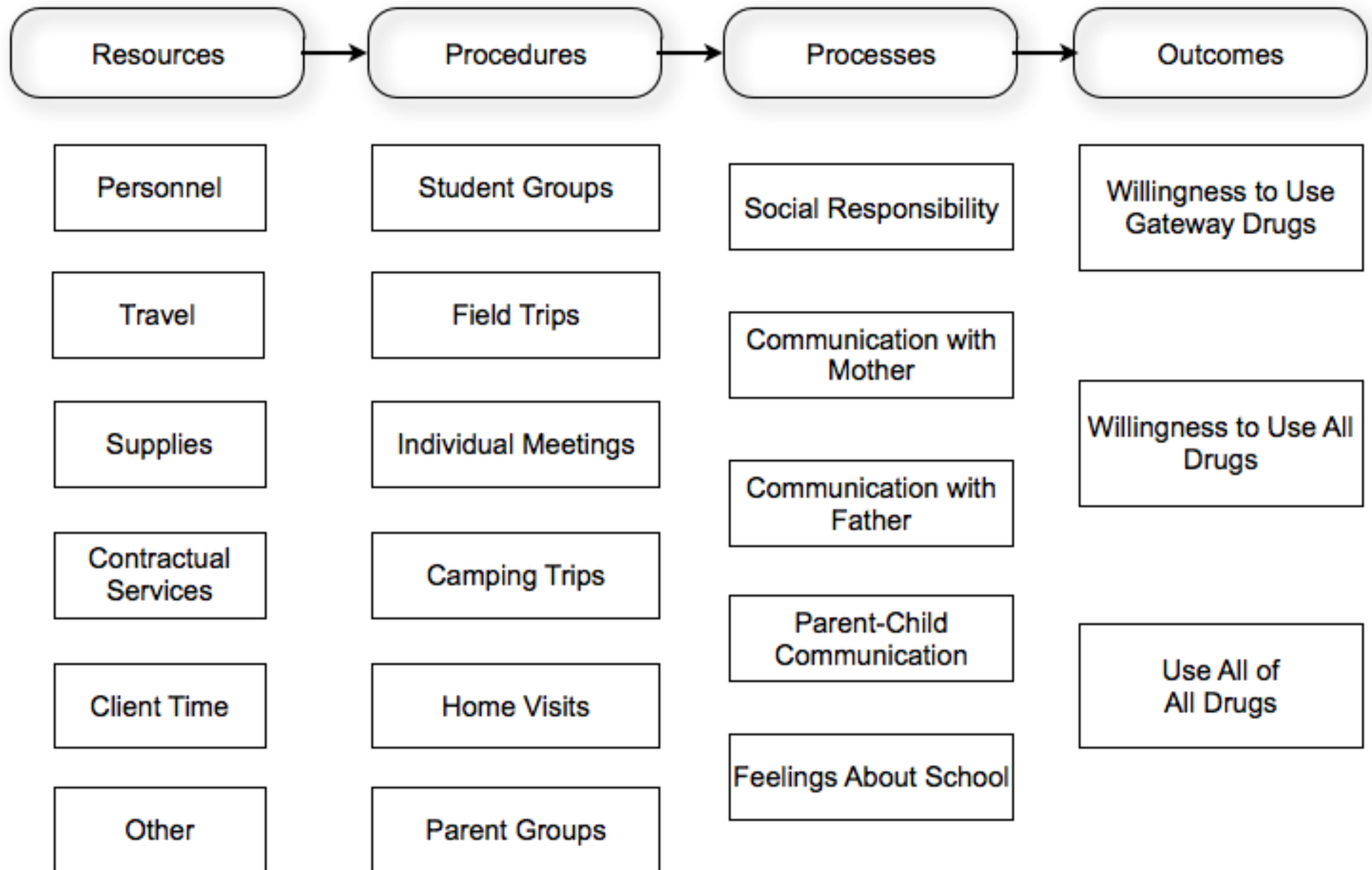
Audrey Kissel's thesis at AU



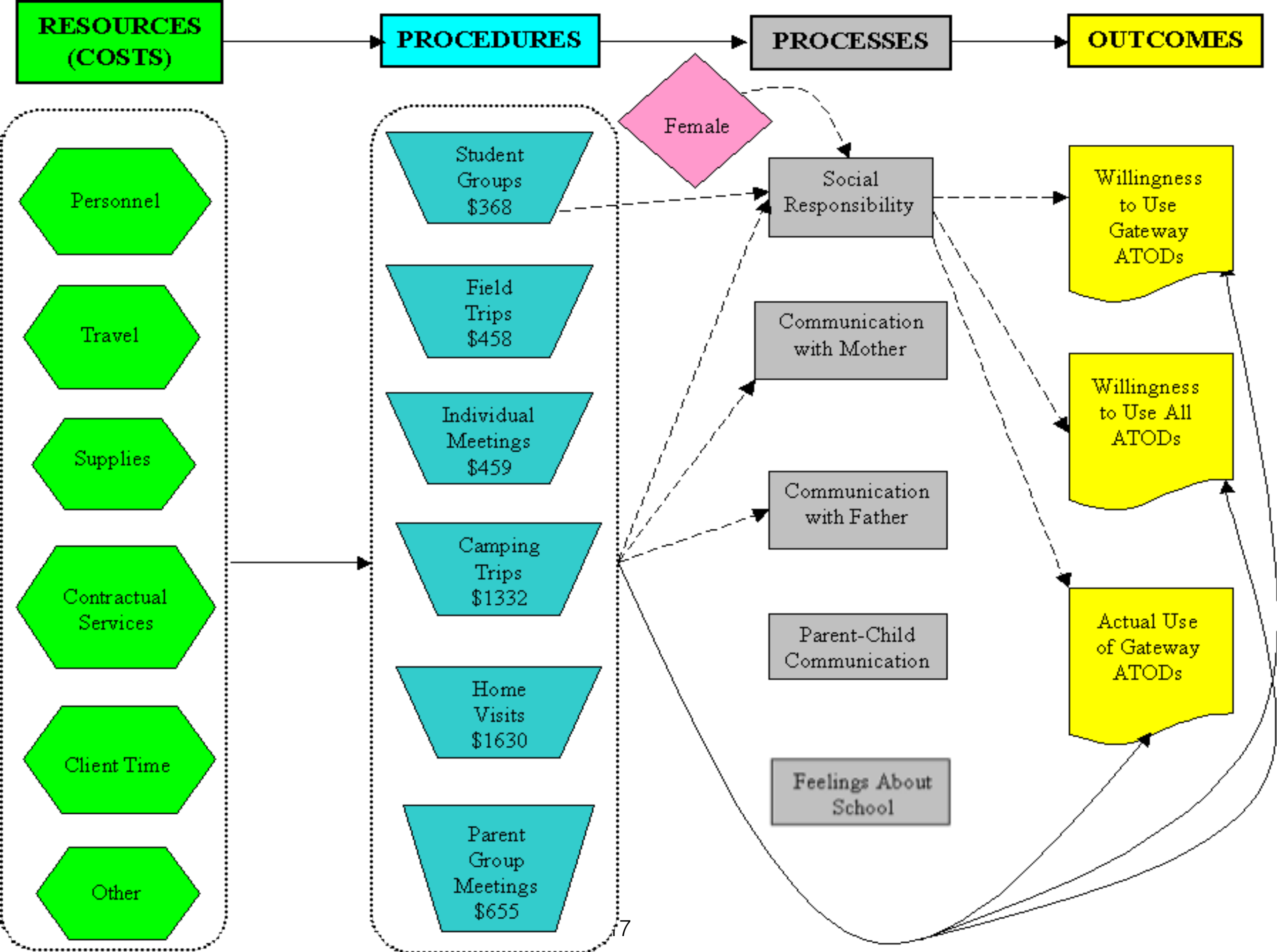
# CPPOA model of substance abuse prevention



# Draw your hypotheses ...









# WHY WE SHOULDN'T JUST EVALUATE RESOURCES "IN" AND RESOURCES "OUT"

let's *understand* the program instead!

operations research's *linear programming* can solve  
quantitative models to either:

- maximize intervention outcomes within specific resource constraints, or
- minimize resources consumed to achieve specific outcomes



# Analyzing costs and outcomes to make decisions

- a. inter-program: deciding among alternatives
- b. *intra*-program: finding the optimal service mix  
(operations research focuses on b.)



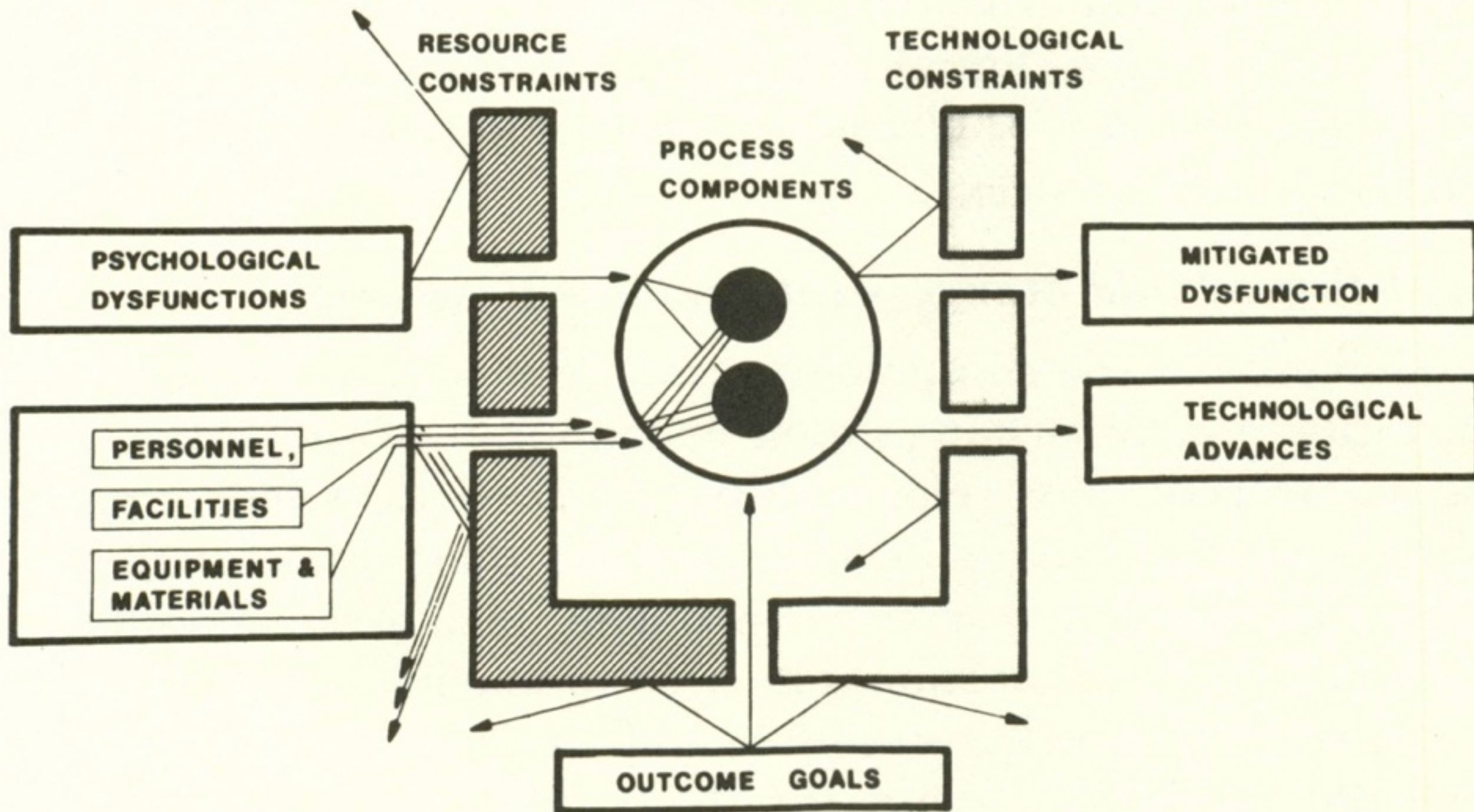
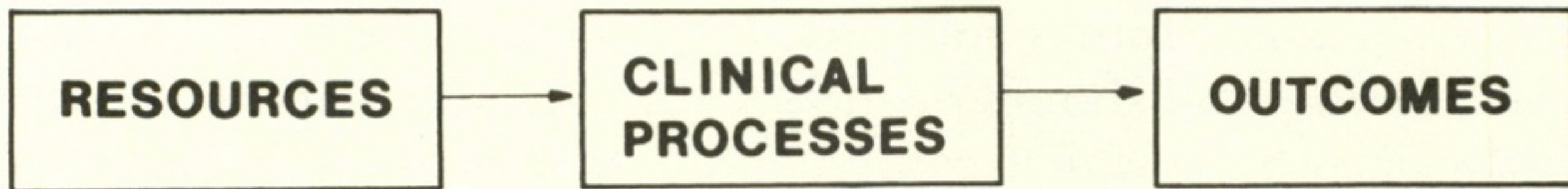
# Operations research

Maximizing effectiveness or Minimizing costs of service mixes



Service mix solutions  
(component-resource  
analysis)







*Components*

<i>Resources</i>	<i>Individual In-home</i>	<i>Group In Office</i>	<i>Resource Constraints</i>
Therapist Salary and Travel Expenses	time cost per client in <i>in-home</i> component	time cost per client in <i>group</i> component	budget limit on total time cost for all clients
Office Use	office hours cost per client in <i>in-home</i>	office hours cost per client in <i>group</i>	budget limit on total office hours
Psychological Costs to Client (Stigma)	amount required per client in <i>in-home</i>	amount required per client in <i>group</i>	ethical limit on total number tolerable
	success probability per client in <i>in-home</i>	success probability per client in <i>group</i>	

*Component Effectiveness*

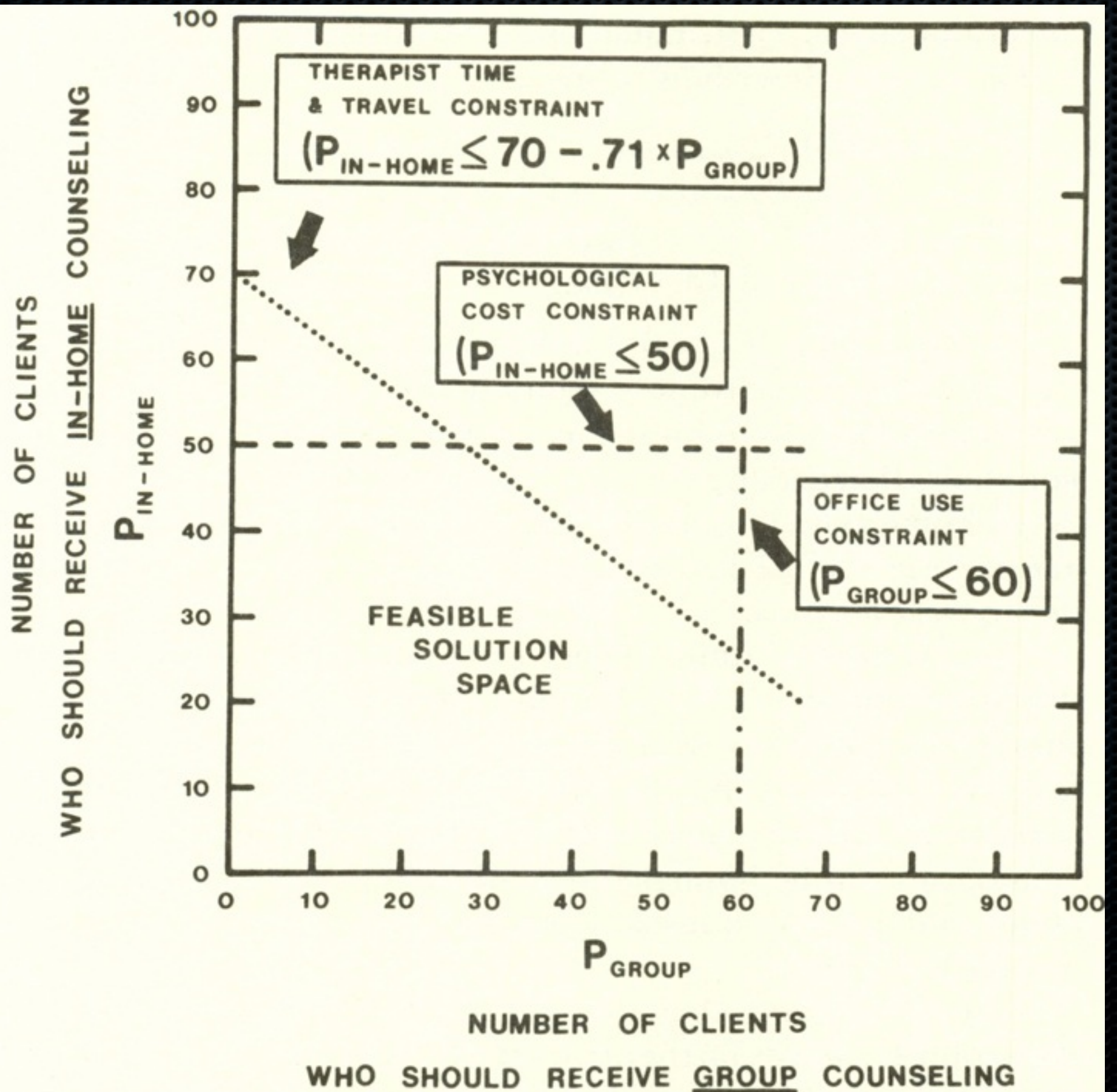


## *Components*

<i>Resources</i>	<i>Individual In-home</i>	<i>Group In Office</i>	<i>Resource Constraints</i>
Therapist Salary and Travel Expenses	\$48 per client	\$34 per client	\$3360 all clients combined
Office Use	0 hours per client	3 hours per client	180 hours all clients combined
Psychological Costs to Client (Stigma)	substantial stigma for each client	no substantial stigma	50 stigmatized clients
	.63 success probability	.71 success probability	

## *Component Effectiveness*







constraint space. First, Equation 4 is transformed algebraically into a formula describing a line:

$$E_{\max} = (.63) P_{\text{in-home, best}} + (.71) P_{\text{group, best}} \quad (4)$$

$$E_{\max} - (.71) P_{\text{group, best}} = (.63) P_{\text{in-home, best}} \quad (4a)$$

$$(E_{\max}/.63) - (.71/.63) P_{\text{group, best}} = P_{\text{in-home, best}} \quad (4b)$$

$$(E_{\max}/.63) - (1.13) P_{\text{group, best}} = P_{\text{in-home, best}} \quad (4')$$

The expression “ $E_{\max}/.63$ ” in Equation 4' describes the intersection of the effectiveness solution line on the in-home axis. The value of  $E_{\max}$  is unknown as yet, but the intersection expression shows that the larger  $E_{\max}$  is, the higher the intersection is on the in-home axis. This means that *the farther the effectiveness line is from the origin of the axes, the greater the effectiveness is for the child management program.*



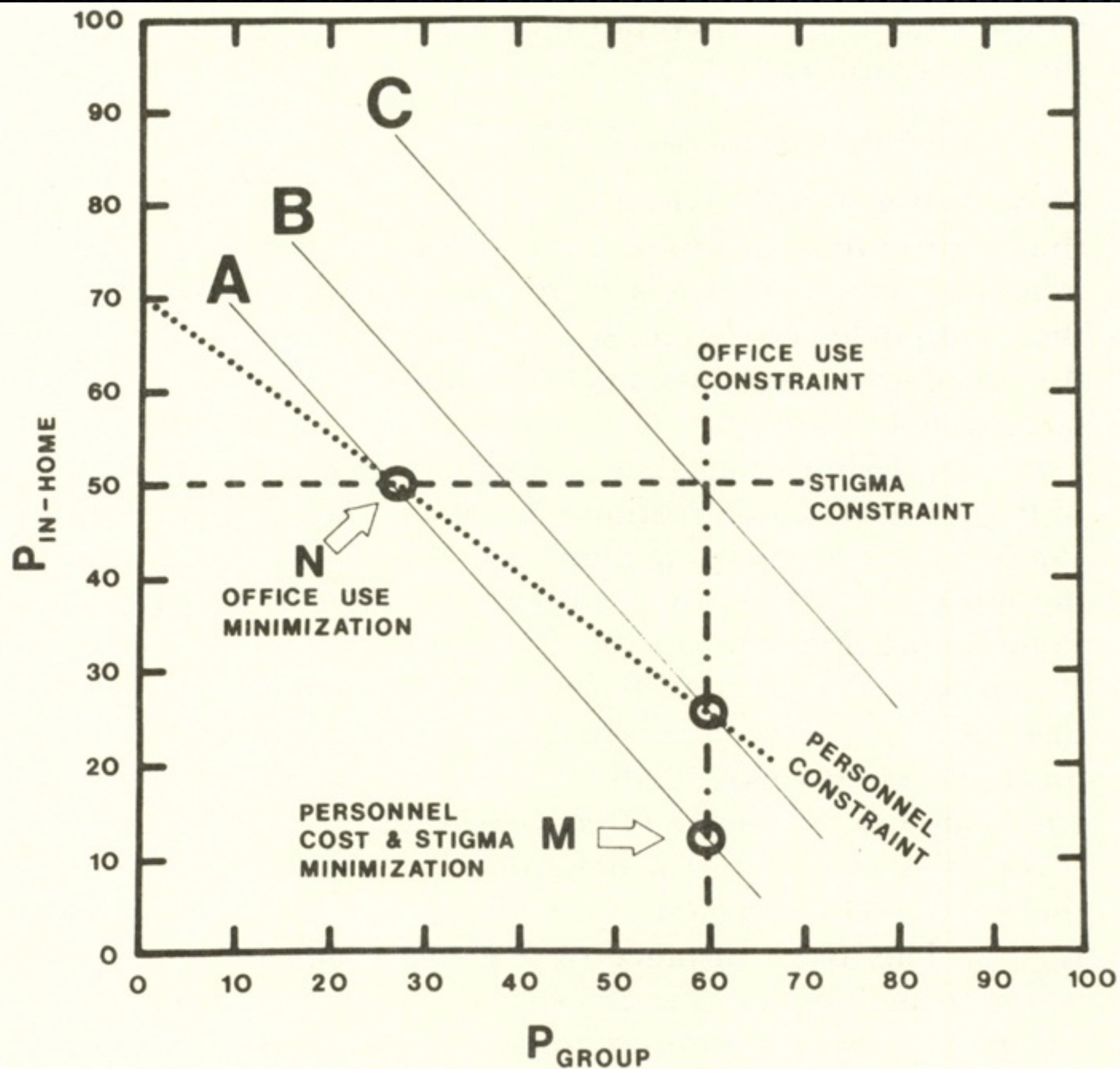


Figure 16. Minimizing costs of achieving the predetermined effectiveness expressed by Line A for different resources and resource combinations.



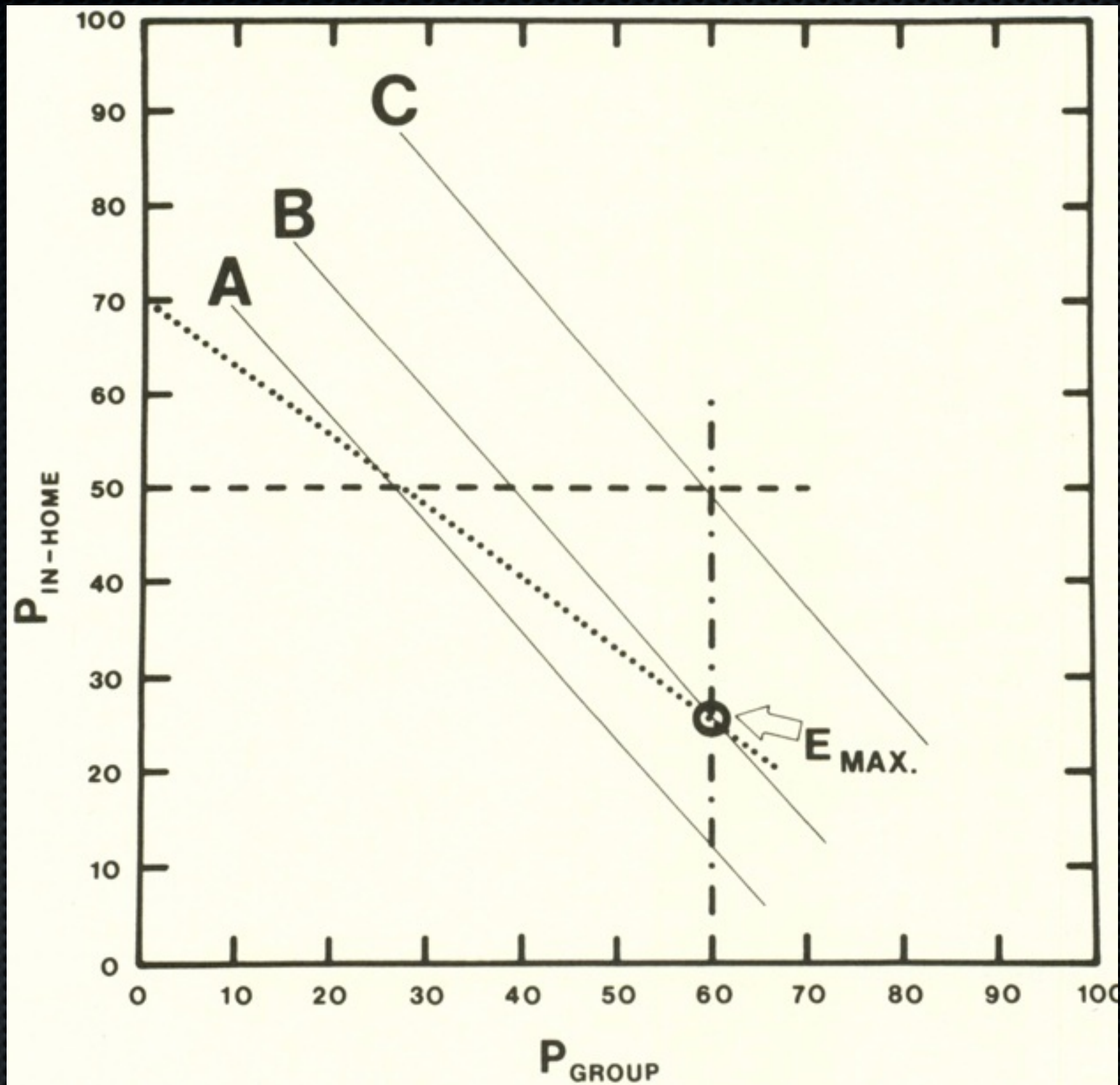


Figure 15. Finding the number of clients to train in child management skills with group versus in-home delivery systems, maximizing effectiveness within resource constraints. Line B maximizes effectiveness within constraints at  $E_{max}$ . Dotted and dashed lines represent the three resource constraints.



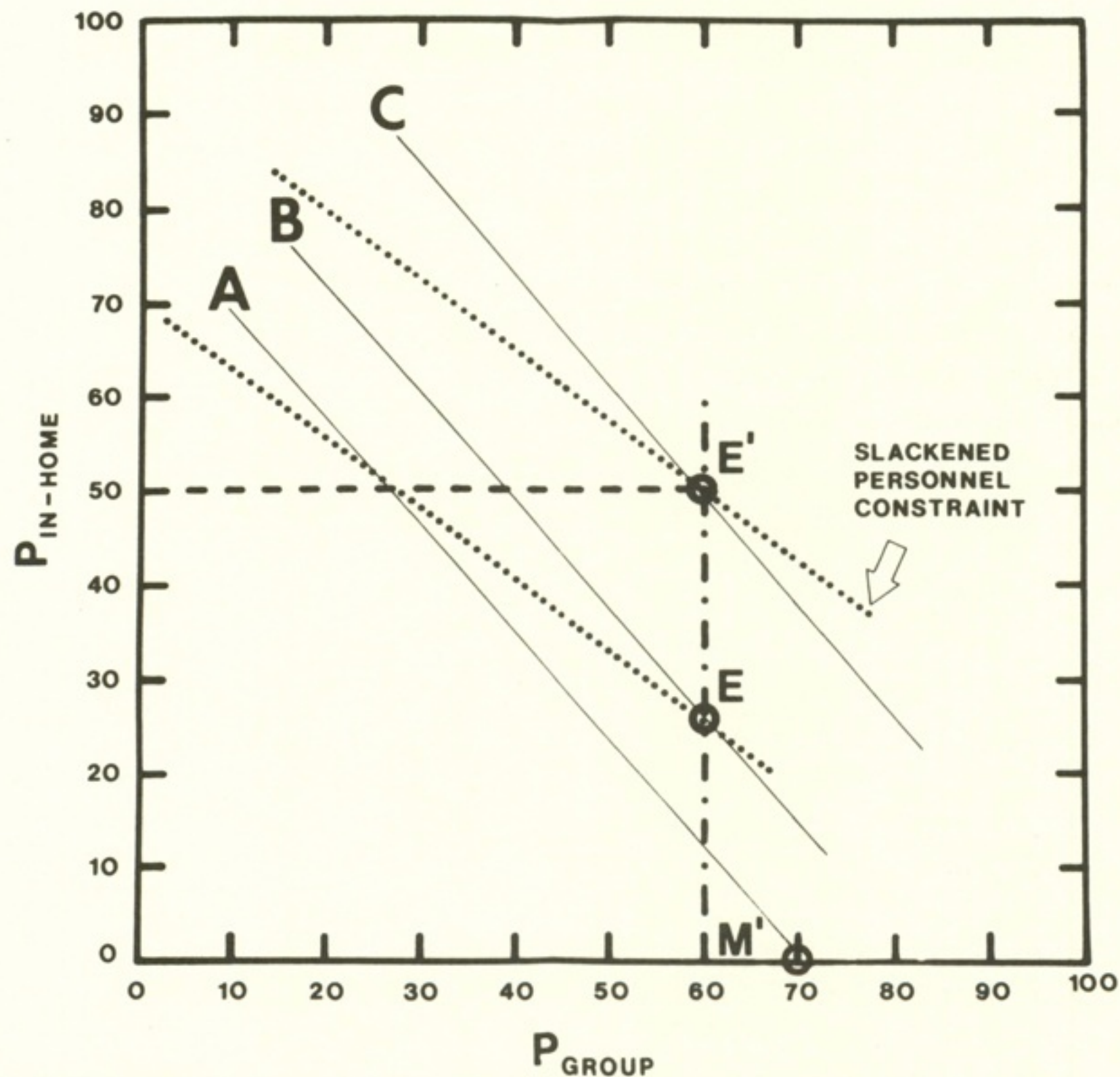


Figure 17. Finding which constraint to slacken for maximal improvement in effectiveness. Only a line farther from the origin can yield more clients who are successful in child management, and only slackening the personnel constraint can include more distant effectiveness functions (such as Line C) in the constraint space.



$$\begin{aligned}
 &(\$48) P_{\text{in-home}} + (\$34) P_{\text{group}} \leq \text{new personnel constraint} \\
 &(\$48) 50 + (\$34) 60 \leq \$4440 \qquad (7'')
 \end{aligned}$$

The personnel constraint should be moved from \$3360 to \$4440, an increase of \$1080, to increase effectiveness to the level described by Line C. This new effectiveness can be computed from the effectiveness equation:

$$\begin{aligned}
 E_{\text{max}} &= (.63) P_{\text{in-home}} + (.71) P_{\text{group}} \qquad (4) \\
 E_{\text{max}} &= (.63) 50 + (.71) 60 = 74 \text{ successes}
 \end{aligned}$$



# Making good decisions using cost as well as outcome data

- Lessons learned about programs from doing cost-inclusive evaluations
- Ethics and cost-inclusive evaluation
- Incorporating evidence-based practices into cost-inclusive evaluation



# GOING FROM ANALYSIS TO IMPLEMENTATION ...

"Conclusions: Following screening in general practice, both psychological interventions, particularly brief bibliotherapy, appear to be good value for money and worthy of further evaluation under routine care circumstances."

"Acceptability issues associated with such interventions, particularly to primary care practitioners as providers of the interventions and health system administrators, also need to be considered before wide-scale adoption is contemplated."



# Lessons learned about human services, so far:

- ✦ Some providers can measure costs, and analyze cost-effectiveness and cost-benefit
- ✦ Sometimes you get what you pay for..
- ✦ More often, outcomes do not differ but costs do.
- ✦ In some cases, less expensive is *more* effective!
- ✦ Including costs can be easy, or difficult
  - ✦ This is more a function of setting--of funding politics--than of the investigator



# Ethical issues in cost-inclusive evaluation



or ...Avoiding the special  
pitfalls  
of using monetary units  
to measure  
resources "In"  
and outcomes "Out"



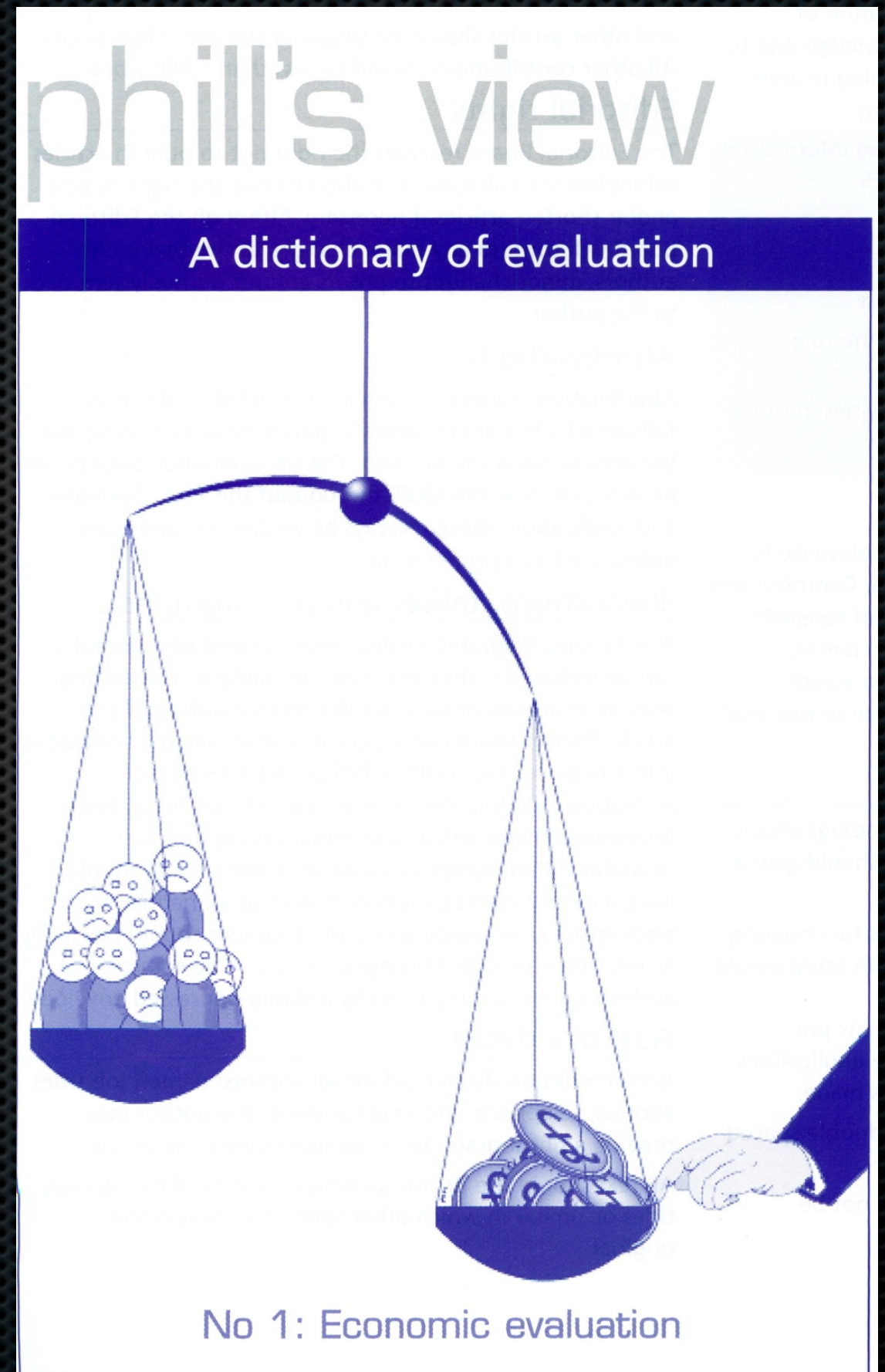
In cost-inclusive  
evaluation...

traditional ethical  
problems of research are  
**Magnified**



Cost-inclusive  
evaluation  
need not, and  
should not,  
devalue people

*i.e., not:*





# Ethical problems in cost-inclusive evaluation

- bias in funding
- bias in hypotheses
- bias in data collection
- bias in analyses
- bias in use of findings



# ethics of funding

- by defining programs to be examined, prevent examination of costs and outcomes of “sacred cows”
- focus on some problems, away from others
- some interest groups excluded from evaluation practice, input
- designs dictated preserve *status quo* which may be less effective or more costly than alternatives
- discourage involvement of representative programs or consumers
- underfund to prevent detection of smaller effects



# ethics of hypotheses

- some programs, professionals given privileged place in design
  - e.g., psychiatrists versus psychologists
- certain outcomes emphasized, others ignored
- certain costs emphasized, others ignored
- values implicit in hypotheses not made explicit for examination, questioning



# ethics of data collection

- measures favoring one over another
- costs
  - costs to clients, families ignored or underestimated
- outcomes
  - valuing years of life as
    - income earned
    - as costs avoided
  - valuing time according to discriminatory payrates
  - overgeneralizing, e.g., to different economic systems



# ethics of data analysis

- use analyses unlikely to detect differences in key variables
- dismiss qualitative differences by using exclusively quantitative analyses
- dismiss quantitative differences by using exclusively qualitative analyses
- decline to examine demographic differences in costs and outcomes of programs



# ethics and use of findings

- to justify politically-motivated funding of some programs, de- or un-funding of others
- to justify policy shifts favoring one interest group over another



A framework for categorizing  
potential ethical problems in  
cost-inclusive  
evaluation



# potential interactions of perspectives and measures

		research <b>measure</b>		
		resources	activities	outcomes
stakeholder <u><b>perspective</b></u>  (examples)	researcher			
	provider			
	consumer			



# biases possible when comparing usual and new services

		USUAL SERVICE		
		resources	activities	outcomes
NEW SERVICE	resources	=		
	activities		=	
	outcomes			=



# resources potentially ignored by mono-perspective costing

- time and services provided by crucial stakeholders
  - volunteers
  - consumers
  - family, community
  - other providers



# resources potentially ignored by mono-perspective costing

- outpatient treatment
  - patient time in transit
  - patient transportation costs
  - patient opportunity costs
- inpatient treatment
  - removal of caregiver from home



# additional instances of ignoring perspectives on costs

- deinstitutionalization cost studies ...
  - ignore costs to family, community
- underestimate costs
  - referrals cause additional costs to other services



# Excluding perspectives on outcomes

- ignoring outcomes (i.e., results of service or product) to interest group
  - volunteers
  - consumers
  - family, community
  - other providers



# Excluding perspectives on outcomes II

- misattributing outcomes (i.e., results of service or product)
- minimizing contributions of volunteers, consumers, family, community, and other providers
- exaggerating contribution of a particular provider



# Examples of ignoring perspectives on outcomes

- underestimate benefits of substance abuse treatment
  - multiplier effects on families
- deinstitutionalization outcomes on families
- over-estimate cost constraints



# Monetary valuation strategies for outcomes:

- Lifetime earnings
  - years of life added (or removed)
- Value of life
  - based on awards for loss of life
  - insurance premiums



# Alternative outcome valuation strategies

- Remove inequities in income or life value
  - standard valuation
  - statistical adjustment
- Use nonmonetary value of outcomes, e.g.,
  - Quality Adjusted Life Years (QALYs)
  - cost-utility analysis or cost-effectiveness analysis



biases introduced by low-power designs, measures with poor discriminant validity:

- reduced probability of detecting inferior outcomes of less expensive alternative
- reduce probability of detected **superior** outcomes or **more** expensive alternative



# Working with *Resistance* to Cost-Effectiveness and Cost- Benefit Analysis



is it resistance or just good critical thinking?

"SO, HOW COST-EFFECTIVE IS  
COST-EFFECTIVENESS ANALYSIS?"

and similarly important questions  
about cost-inclusive analyses



defining resistance to  
cost-inclusive evaluation



# Detecting resistance to cost-inclusive evaluation:

- ✦ Use methods developed for detecting racism and sexism in writing...
- ✦ Write down objections about costs
- ✦ Does the objection still make sense when “outcome” is substituted for “cost?”



For example ... How do these statements sound?

- ✖ "Costs are not important: they don't really matter."
- ✖ "Costs cannot be measured"
- ✖ "Costs *should not* be measured"
- ✖ "Costs are the same"
- ✖ "Costs are too different"
- ✖ "Costs don't matter"
- ✖ "Costs matter too much"
- ✖ "We don't need to measure costs until we've measured outcomes"



For example ... How do these statements sound?

- ✦ "Outcomes are not important: they don't really matter."
- ✦ "Outcomes cannot be measured"
- ✦ "Outcomes *should not* be measured"
- ✦ "Outcomes are the same"
- ✦ "Outcomes are too different"
- ✦ "Outcomes don't matter"
- ✦ "Outcomes matter too much"
- ✦ "We don't need to measure outcomes until we've measured costs"



# understanding resistance to CEA, CBA, CUA

## ✧ Triple-whammy evaluation

- ✧ Is it working?

- ✧ How much does it cost?

- ✧ Is that worth it?

- ✧ If Costs = Money, and money's not appropriate to mention in polite society...

- ✧ Is it a service, an entitlement, or an art form?

- ✧ "Service" as optional versus "Service" as needed



# WAYS TO MINIMIZE COSTS OF COST-INCLUSIVE EVALUATION

- build it in from the beginning, get perspectives & commitment
- involve all major stakeholders (providers, clients, community)
- minimize resistance from stakeholders with regular reports
- assess only the costs, activities, processes, and outcomes that matter
- use standardized measures of costs, activities, processes, outcomes, or use activity-cost estimation
- make sure there that resources for the evaluation have been reserved, including time and effort of data providers!



# Resistance as Stage #2 in typical progression (Knapp, 1999)?

- ✦ Stage #1: blissful ignorance:
  - ✦ little concern for cost or value-for-money. Assumption is that budgetary growth will solve society's problems;
- ✦ Stage #2: unbridled criticism ("resistance")
  - ✦ reaction against cost constraints imposed by economic realities. View is that decisions should be made on the basis of need and/or professional opinion, rather than efficiency considerations;



# Typical progression (continued)

- ✦ Stage #3: undiscriminating utilization
  - ✦ recognition that economic evaluation has a role to play in resource allocation decisions, but techniques are under-developed: terms are used inconsistently and design flaws pervade;
- ✦ Stage #4: constructive development
  - ✦ techniques become more sophisticated and are adapted to increase their relevance. Economic studies begin to inform, though not dominate, decision-making by policy-makers and others



# Typical progression (Knapp, 1999)

- ✦ Stage #5: sublime sophistication
  - ✦ economic methodologies are widely used, conducted well, and interpreted appropriately.



# Why providers may resist CEA, CBA:

“It’s my art,” and not a science



Practicing  
one's art may  
produce  
direct  
feedback on  
both costs  
and outcomes





# A not so hypothetical tale...

- ✦ The president of a large managed health care facility also served on the board of his community's symphony orchestra. Finding that he could not go to one of the concerts, he gave his tickets to the company's director of health care cost containment.



- ✦ The next morning he asked the director how he enjoyed the performance. Instead of the usual polite remarks, the director handed him a memo which read as follows:



- ✦ *The undersigned submits the following comments and recommendations relative to the performance of Schubert's "Unfinished Symphony" by this city's symphony orchestra as observed under actual working conditions:*



# *Item #1*

- ✦ *The attendance of the conductor is unnecessary for public performances. The orchestra has obviously practiced and has the prior authorization from the conductor to play the symphony at a predetermined level of quality. Considerable money could be saved merely by having the conductor critique the orchestra's performance during a retrospective peer review meeting.*



# *Item #2*

- ✧ *For considerable periods, the four oboe players had nothing to do. Their numbers should be reduced, and their work spread over the whole orchestra, thus eliminating peaks and valleys of activity.*



# Item #3

- ✦ *All 12 violins were playing identical notes with identical motions. This is unnecessary duplication: the staff of the section should be cut drastically with consequent savings. If a large volume of sound is required, this could be obtained through electronic amplification, which has reached very high levels of reproductive quality.*



# *Item #4*

- ★ *Much effort was expended playing 16th notes or semi-quarters. This seems an excessive refinement, as most listeners are unable to distinguish such rapid playing. It is recommended that all notes be rounded up to the nearest eighth. If this is done, it would also be possible to use trainees and lower grade musicians with no loss of quality.*



# Item #5

- ➡ *No useful purpose would appear to be served by repeating with horns the same passage that has already been handled by strings. If all such redundant passages were eliminated, as determined by the utilization review committee, this concert would have been reduced from 2 hours to about 20 minutes, resulting in substantial savings in salaries and overhead.*



# Conclusion

- ❖ *In fact, if Schubert had addressed these concerns on a cost containment basis, he probably would have been able to finish his symphony!*



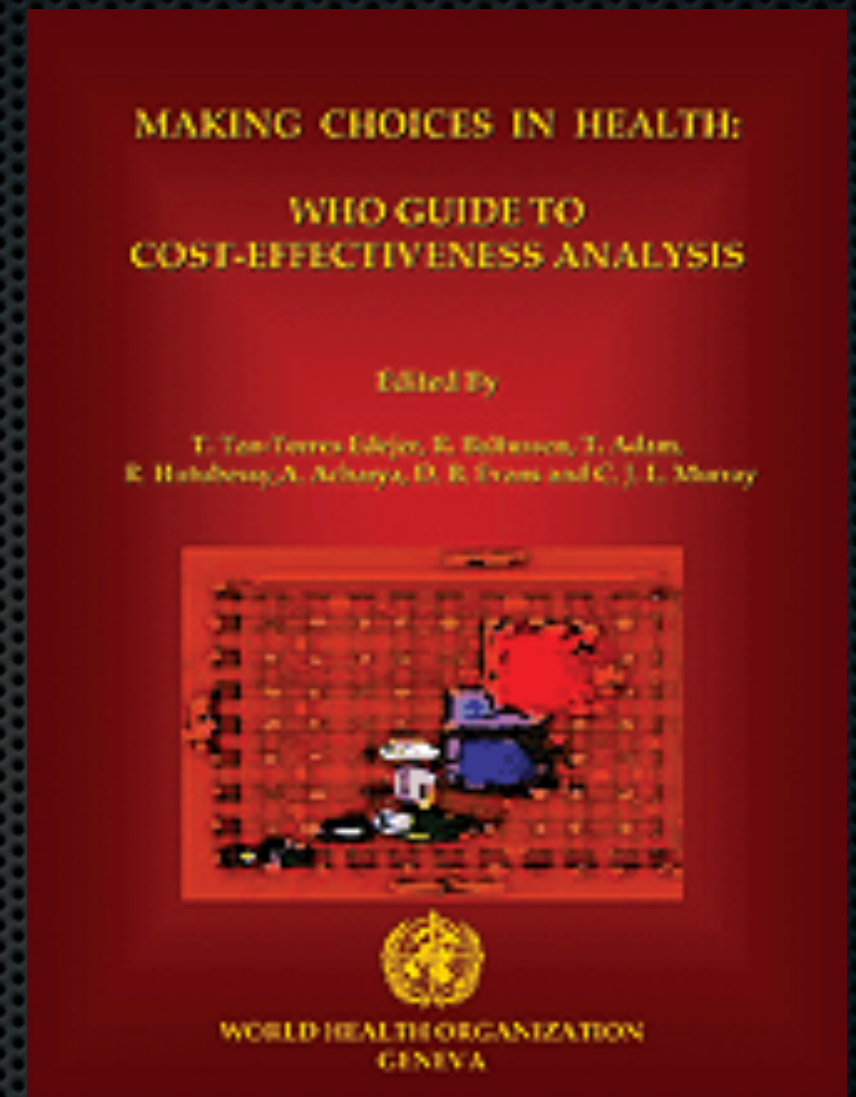


# RESOURCES

for cost-inclusive evaluation



# WHO CHOICE book



- Making choices in health: WHO guide to cost-effectiveness analysis
- <http://www.who.int/choice/book/en/index.html>



# websites for cost-inclusive evaluation

- Tufts University CEA Registry, at their Center for the Evaluation of Value & Risk in Health
  - <https://research.tufts-nemc.org/cear/default.aspx>



first book,  
1980: OR  
in MH!  
(operations  
research for  
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# IMPROVING EFFECTIVENESS AND REDUCING COSTS IN MENTAL HEALTH

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The American University, Washington, D.C.*

*With a Foreword by*

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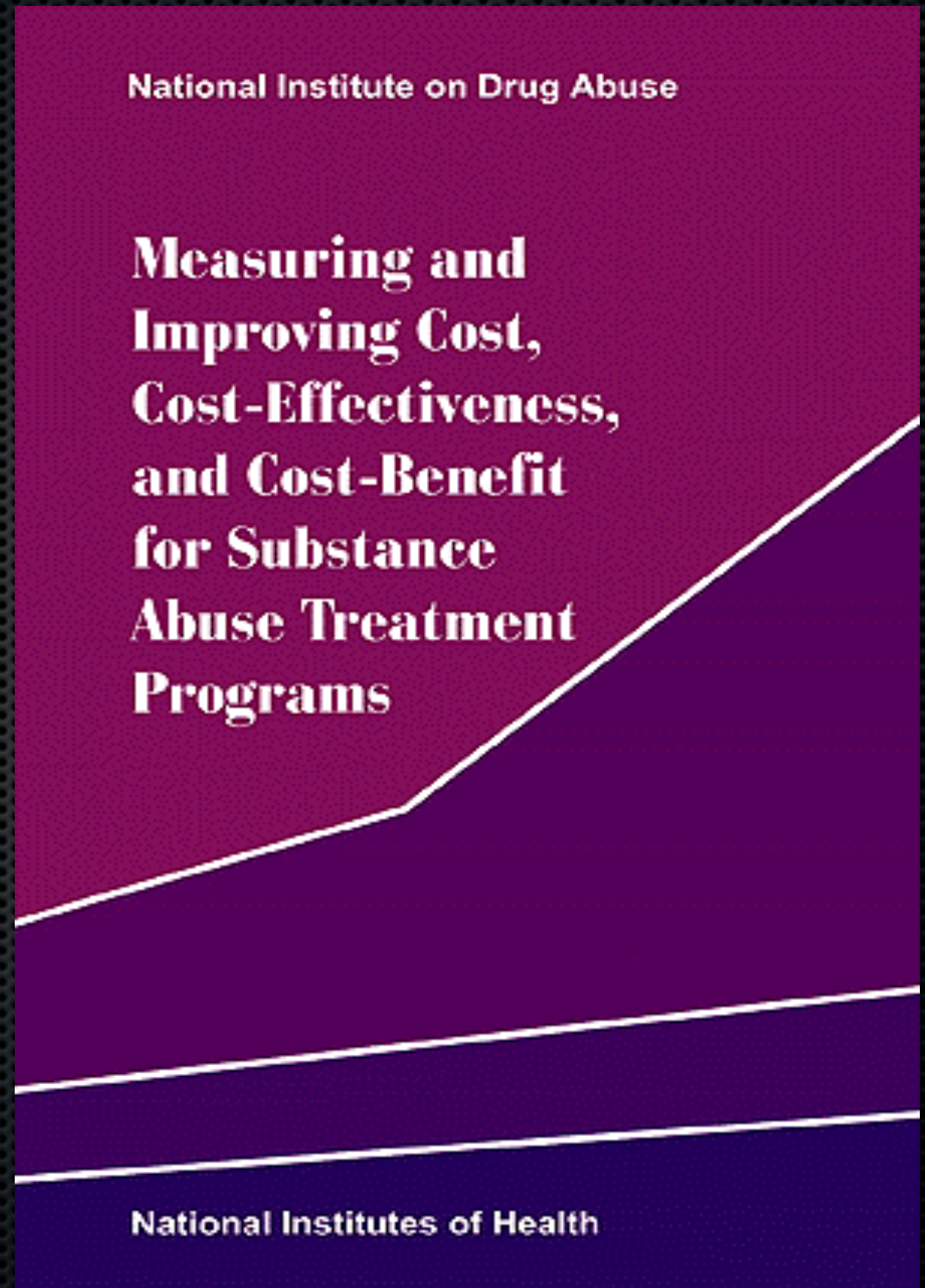
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