



Institute of Medicine, 2013

Session 3: Valuing Outcomes of Intervention

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# Valuing outcomes

For economic evaluations of programs for children, youth, and families, this usually involves these sectors:

- Criminal justice system
- Education
- Employment
- Substance use
- Sexual/childbearing
- Use of health & mental health services
- Public assistance
- Child abuse & neglect



# Valuing outcomes

- Well-known studies demonstrate the return-on-investment of intervention/prevention, involving various methods to value effects
- The headline is how much *total* return the program does or will generate (in economic benefits)
- Hidden behind this headline is what is included in the total dollar amount:
  - Based mostly on one sector, a combination of many, etc.?
  - Benefitting whom? (participants, taxpayers, other non-participants, combination)
  - And when does this savings or benefit occur?

# Prior research

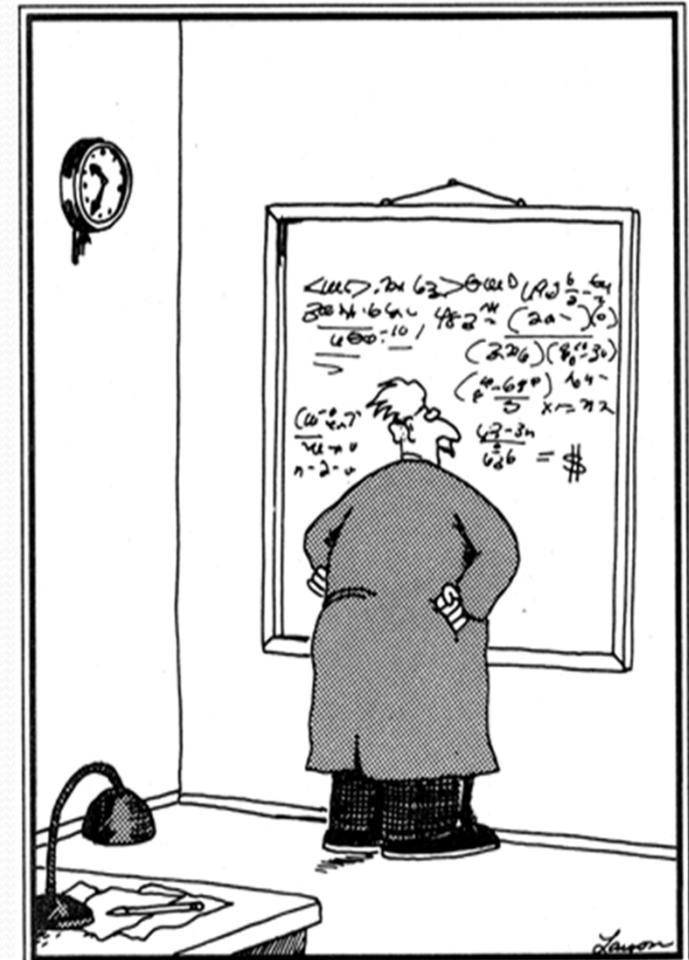
- Early childhood intervention results
  - Perry Preschool Project<sup>1</sup>
    - Lower crime rates
    - Less retention/special education use
    - Increased lifetime earnings
  - Chicago Child Parent Centers<sup>2</sup>
    - Increased earnings/tax revenues
    - Reduced costs associated with crime
    - Reduced need for special education services
  - Abecedarian program<sup>3</sup>
    - Increased lifetime earnings for participants
    - Increased maternal earnings
    - Decreased schooling costs
    - Decreased smoking-related costs

# Prior research

- Prevention
  - Communities that Care<sup>4</sup>
    - Decreased smoking-related costs
    - Reduced delinquency/likelihood for criminal involvement
  - Seattle Social Development Project<sup>5</sup>
    - Less retention
    - Higher high school graduation rates
    - Lower crime rates
  - Life Skills Training<sup>5</sup>
    - Reduced substance use
    - Lower crime rates

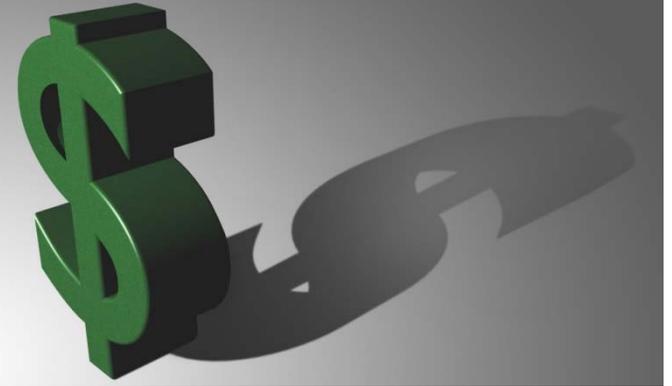
## Doing the math

- Valuing benefits involves linking among study outcomes, sometimes to outcomes that were not measured:
  - Current directly monetized outcomes-> current or future costs
  - Current non-monetized outcomes-> current or future monetized outcomes-> current or future costs
  - Current non-monetized outcomes-> current or future non-monetized outcomes->current or future costs



Einstein discovers that time is actually money.

# Shadow price



- Common shadow prices derived for valuing interventions (for example):
  - High school graduation
  - Achievement test scores
  - Criminal act
  - Early substance use
- Shadow prices are harder to determine for outcomes measured at younger ages
- It helps to have some sort of categorical result (e.g., diagnosis)
- The more projection involved to determine the price, the more uncertainty



# Standards

- Essentially there are none, especially when it comes to preventive interventions in the behavioral sciences
- Economic evaluations are carried out in widely varying ways as far as:
  - approach of the analysis (benefit-cost analysis, cost-effectiveness analysis, etc.)
  - what measures are included
  - how outcomes are valued
  - with the structure of the assessment (in terms of time, reach of effects, etc.)
- Methods are more consistent when it comes to valuing more direct effects

# Standards for valuing benefits



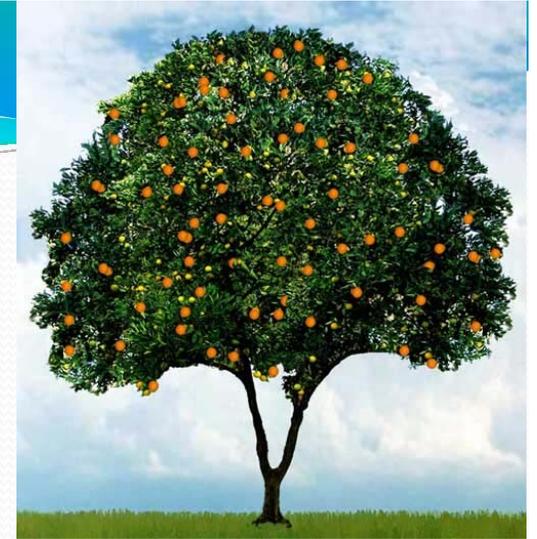
- Thinking about how to monetize:
  - Is the focus on determining how to value key study outcomes that may be indirectly linked to dollar amounts?
  - Is the focus most on how well an effective program impacts true economic outcomes (and put efforts toward measuring those)?
- The answers may be mostly influenced by the nature of the program – ages of the participants, and outcomes that are targeted

# Variation across studies in how outcomes are valued

- Studies of the economic benefits from programs for families and children are very important, but vary widely in what outcomes were monetized (if a BCA is used)
- Many outcomes are left out, partly because lack of precedence for how to monetize, e.g.,
  - Mental health outcomes
  - Social skills/competence
  - Child behavior
  - Parenting skills
- There is also much variation in how much effects are projected into the future

# Possible measures

- Outcomes are selected very differently across studies
- Focusing only on the low-hanging fruit may lead to greatly under-estimated economic impact
- The difficulty involved to include the harder to obtain outcomes can lead to error in estimates
- But, one should consider the full set of possible outcomes (both observable and those projected to) in order to achieve adequate coverage of economic impact





# Thinking about what's left out

- When interventions are evaluated for economic impact retrospectively, the lack of planned measures may lead to incomplete assessment of benefits
- But it could also be partly a matter of the inability to capture costs within a set of measured outcomes
- What may be vastly underestimated is the value of factors linked to long-term personal success, such as the development of interpersonal and intrapersonal skills
- The complexity of the interrelationship among different factors, e.g., cognitive and non-cognitive skills, as well as context of these factors, is not easily represented in assessment of economic benefits



# Standards for valuing benefits

- We may recognize the importance of certain skills for long-term personal success, but a challenge is determining how we capture these skills in measurable outcomes
  - It is not always clear what ages should be measured for some skills
  - How do we sort out unique contribution of various skills?
  - The approach can build on prior research establishing precedents, but there is not likely to be any standard methodology for modeling more complex associations

# Standards for interventionists and prevention researchers?

- First step: Plan ahead
  - Consider an economic evaluation component *before* establishing plans for overall program evaluation
  - Consult with economists in these plans, or recruit someone with expertise to be part of the evaluation (will help with plans to assess program costs as well)
  - Within preparation of the proposal:
    - Check prior research for what has been done for the particular program area/population/context
    - Check what standards have been established for economic evaluation, especially regarding measurement

# Standards for interventionists and prevention researchers?

- Second step: Consider the scope and reach of program effects
  - What outcome domains will be affected?
  - How far over time will these effects extend?
  - Who will be affected? Participants, Non-participants associated with participants, Non-participants not associated?
  - In what ways might the intervention lead to increased costs while also potentially generating an economic benefit?



# Standards

- Third step: Determine the best measures for economic evaluation based on the intervention logic model
  - Which of these outcomes will be measurable within the planned program evaluation and follow-up periods?
  - Which sources of potential program benefits (from step 2) will not be feasibly measured?
  - Which measures (for certain outcome domains) have been used in prior research to determine costs? Is there anything to base your approach on?
  - Which of these outcomes will rely on projections?
  - How will you represent uncertainty in valuations, especially where projections are involved?



# Standards

- Fourth step: Assess what key program outcomes cannot be valued
  - Should the evaluation incorporate other methodologies (e.g., contingent valuation) to determine economic benefits?
  - If the outcome is a primary variable in the program evaluation, should a cost-effectiveness approach be part of the economic evaluation? (it still may be a very important outcome, even if not able to monetize!!)
  - What current or future research may help determine possible valuation of these outcomes? (that could be incorporated into retrospective economic assessments later)



# Hypothetical program

- Example program:
  - Middle school program aimed at improving social skills and decreasing substance use in adolescents
  - Delivered in 6<sup>th</sup> grade with curriculum occurring during two days per week
  - Involves components such as demonstrative video modules, journal writing and role-play activities
  - Pilot study indicates multiple program effects measured at post-test, including:
    - Fewer class disruptions
    - Lower rates of bullying
    - Increased engagement in class
    - Lower rates of initiation of substance use



# Example

- In subsequent research, the evaluators want to include an assessment of economic impact:
  - They plan to assess full costs and resources necessary to deliver the program
  - They also plan to follow participants into high-school grades to assess longer-term effects
  - They need to include appropriate measures to assess economic impact
  - Prior research showing common methods for valuing outcomes in school programs help them determine what measures to include for this age group at post-test and follow-up assessment:
    - Use of special education services
    - Class grades
    - Grade retention
    - Reported substance use
    - Use of other school services (disciplinary, counseling)



# Example

- For a middle school program, participants can provide outcomes that are more readily monetized
  - We have a better sense of academic achievement (and more feasible to follow through high school)
  - We can measure substance use
  - We can measure delinquency and early justice system involvement
- But still several choices
  - How much do we only value outcomes such as those listed above (some of which involve direct costs)?
  - How much can we project costs from effects on current outcomes?
    - e.g., reduced early substance use projecting to reduced longer term problems
    - e.g., improved academic achievement to future earnings
  - Should we consider the value of outcomes that are not easily monetized??



# Example

- Clearly an important factor considering the evaluation of this effective program is how long we plan to follow the participants
  - If we follow them into young adulthood, we can now include measures post-high school
    - Whether completed high school
    - College experience
    - Early employment experience
    - Longer-term substance use patterns
    - Longer-term delinquency/criminal activity
- Evaluators could consider whom else is affected by the program
  - Teacher outcomes?
  - Broader school outcomes?
  - Other family members?

# Example

| Program economic benefits (by recipient): Possible short-term proximal effects  |   |  |   |   |
|---|---|--|---|---|
| <u>On students</u><br>-Improved academic performance<br>-Lower rates of grade retention<br>-Lower rates of special education placement<br>-Less problem behavior*<br>-Higher class engagement*<br>-Increased positive attitudes/motivation*<br>-Fewer bullying victims*<br>-Increased school bonding*<br>-Fewer office referrals/suspensions<br>-Lower rates of substance use /later initiation | <u>On teachers</u><br>-Job satisfaction*<br>-Student relationships*<br>-Lower stress*<br>-Better mastery/self-efficacy*<br>-Less time needed for class disruptions* | <u>On host school</u><br>-Improved climate*<br>-Improved reputation* | <u>On family</u><br>-Improved family relationships*             | <u>On society</u><br>-Reduced use of mental health services<br>-Fewer police contacts/court costs<br>-Less crime/delinquency  |
| Program economic benefits (by recipient): Possible long-term distal effects   |   |  |   |   |
| <u>On students</u><br>-Higher educational attainment<br>-Employment success<br>-Quality of life*  |   |  | <u>On family</u><br>-Quality of life*<br>-Family relationships* | <u>On society</u><br>-Reduced need for public (financial) assistance<br>-Increased tax contributions<br>-Lower health/mental health costs<br>-Fewer health consequences |

\* Non-monetized outcome

# Consider programs for younger children

- Certain programs are at a disadvantage for economic evaluation, based on the nature of the process:
  - Evaluations of interventions for young children usually do not follow participants far beyond the timeframe of program delivery
  - Outcomes measured *at* young ages are not readily monetized (usually)
  - Intervention effects that are linked to future costs are typically subject to down-weighting (discounting, fade-out)



# Programs for young children

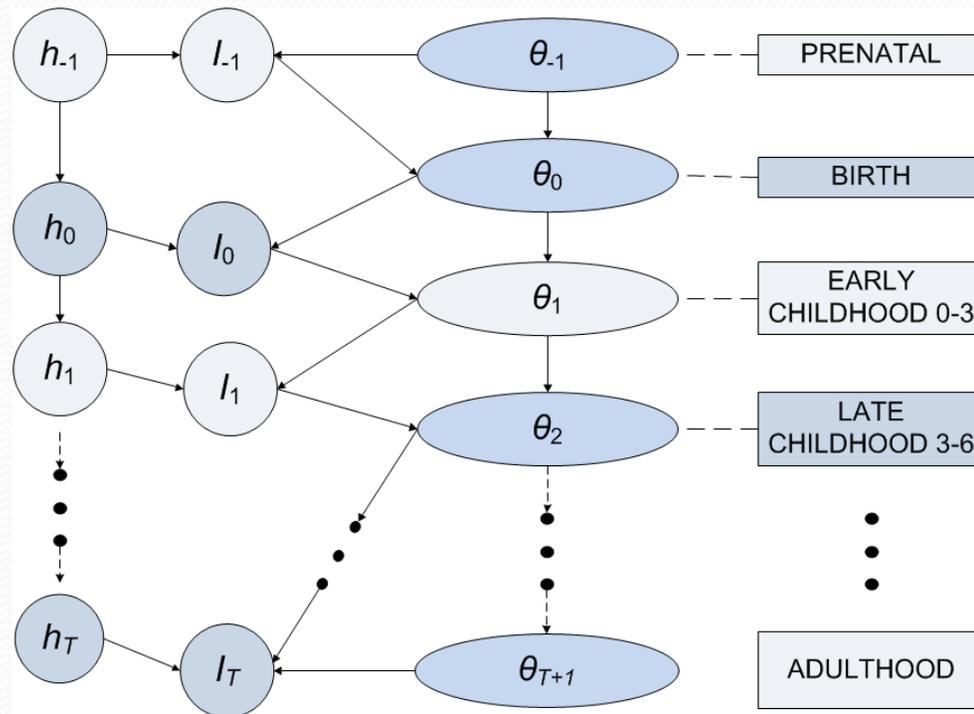
- Yet, lasting effects may rely on delivering services to children during key developmental periods (i.e., early)
- Research has demonstrated the importance of early intervention (e.g.):
  - Skill formation for long-term personal success (Cunha & Heckman, 2008)<sup>6</sup>
  - Developmental cascades (Dodge et al., 2008)<sup>7</sup>
  - Pre-school intervention (Barnett, 2011)<sup>8</sup>
- Challenge: how to value outcomes when the process may be complex (involving multiple dynamic, interacting factors)?



# “Non-cognitive” factors

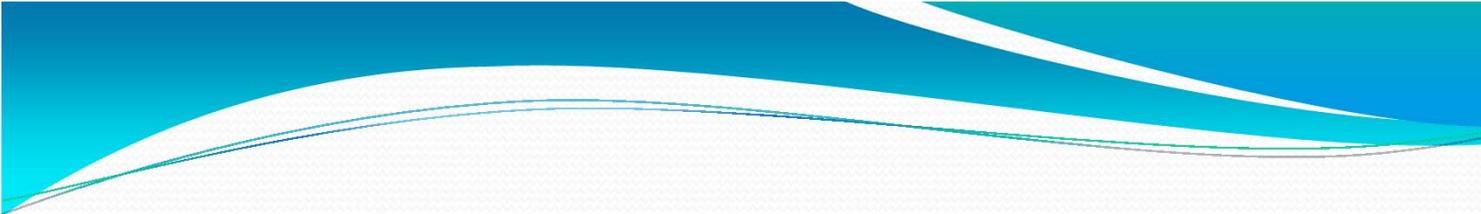
- Important new research is examining the mechanisms by which ‘non-cognitive’ factors and personality (big five) influence long-term success<sup>9</sup>
- Ideally, this research will help us understand (a) how these factors collectively influence future adult outcomes, (b) how they can be best measured in economic evaluations
- Research indicates that non-cognitive factors are perhaps more important at older ages, and more malleable (better candidate for intervention, especially for older children?)
- The role of non-cognitive skills on long-term success is not currently represented in economic evaluation of programs for children

# Conti & Heckman



10-Conti, G., & Heckman, J. J. (2012).

$\theta_T$ : Capabilities at  $T$   
 $I_T$ : Investment at  $T$   
 $h_T$ : Environment at time  $T$   
 $\theta_{T+1} = f_T(\theta_T, I_T, h_T)$



# Research to the rescue



- The field will be greatly helped by the research that establishes the links between outcomes in program evaluations and future direct or indirect costs
  - Should be based on robust methodology and multiple studies
  - Should involve causal associations
- Once those links are determined, then some consensus should occur as to *what measures* best represent these early skills
- Examples of using prior research to determine new important shadow prices include the work through by WSIPP (e.g., including links between early mental health and behavioral outcomes and future costs)<sup>5</sup>

# Research



- If certain domains (e.g., early aggression, social skills) are found to have a stronger association with economic outcomes controlling for other factors, these areas should be prioritized
- Should factor in how much these traits may fluctuate over time, and the likelihood that they may change as the chronological gap between measured skill and economic outcome is increased
- Should factor in the influence of different contexts for these associations
- Should factor in different characteristics of different populations



# Research

- Variable associations may be represented in terms of likelihood for later states to occur, e.g., an improvement in an early mental health outcome increases the likelihood for high school completion
- Around this likelihood we must understand the potential variation in causal influence
- Ranges of estimates are good! Something to factor into overall sensitivity analyses of the economic evaluation
- At our center, we are currently focusing on the links between outcomes typically measured in program evaluations for social-emotional learning programs and future adult outcomes

# The future is bright



- Economic evaluation for family/child/youth programs will only get better in the coming years
- But...we must have standards and consistent methodology in order to compare across studies
- We also must be able to fully consider the possible impact of effective programs; incomplete assessment is inadequate
- Some collective organization of determining and promoting appropriate methods and measures could help researchers in the future



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Thanks for your attention!

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