Penny Wise and Effect Size Foolish

Greg J. Duncan
Northwestern University
Consider the Tennessee Star class size experiment

- Assigned children to classes that averaged 15 vs. 22 students for a mean of 2.3 years.
- Schanzenbach (forthcoming) estimated a \( .15 \) standard deviation achievement impact on ACT test scores at the end of high school.
- According to Cohen, \( .15 \) is a decidedly small effect size.
- Are small classes bad policy?
Costs and benefits of Tennessee Star

- The smaller class translated into additional per pupil expenditures of $11,500

- The economics literature suggests that a one standard deviation increase in test scores produces a ~20 percent increase in lifetime earnings

- .15 standard deviation achievement impacts translate into lifetime earnings gains of $17,000, some 1.5 times the intervention’s cost

- Other possible benefits (e.g., crime reduction) might add to benefit total
In general, there is no “in general”

- Inexpensive programs with small effects may generate more benefits than costs and thus be worthwhile public investments.

- Expensive programs with big effects may cost more than they are “worth.”
Tricks of the trade

- Consider **total** rather than just **taxpayer** costs and benefits
  - Total social cost and benefits = participant + taxpayer costs and benefits

- Consider a wide array of potential benefits
  - => measure more than intended program targets
    - E.g., an early behavioral intervention might reduce grade failure or placement in special education, and boost test scores
Tricks of the trade - II

- Measure outcomes that can be linked to important social costs
  - E.g., grade failure, reduced crime, higher productivity (earnings)

- Try to measure “spillover” benefits and costs
  - E.g., Does improving one child’s behavior enable classmates to learn more?
  - Do immunizations prevent epidemics?
Tricks of the trade - III

- Measure outcomes that cannot be monetized
  - E.g., tolerance, citizenship
  - After monetary benefits and costs have been tallied up, ask whether these other benefits or cost might change conclusions
Tricks of the trade - III

- Measure outcomes that cannot be monetized
  - E.g., tolerance, citizenship
  - After monetary benefits and costs have been tallied up, ask whether these other benefits or costs might change conclusions

- Succumb to the cruel truth of discounting
  - Distant benefit dollars are worth much less than today’s cost dollars
The utility of order of magnitude estimates

- On cost side, staff costs usually dominate
  - Hours of profession time per subject – 10, 100, 1000?
  - Order of magnitude per subject costs?

- On benefit side, can any conceivable valuation of benefits exceed costs?
Example: Perry Preschool

- 1-2 year center-based learning-focused curriculum for 3-4 year olds
- 2.5 hours per day
- Four teachers for 20-25 students
- Weekly visits to parents
## Perry Preschool at age 27

<table>
<thead>
<tr>
<th>Major benefits</th>
<th>For Participant</th>
<th>For Public</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-12 education, e.g., grade retention</td>
<td>0</td>
<td>8,434</td>
<td>8,434</td>
</tr>
<tr>
<td>Earnings</td>
<td>40,001</td>
<td>11,063</td>
<td>51,634</td>
</tr>
<tr>
<td>Decrease in crime</td>
<td>0</td>
<td>154,762</td>
<td>154,762</td>
</tr>
<tr>
<td>Total Benefits</td>
<td>38,924</td>
<td>176,276</td>
<td>215,200</td>
</tr>
<tr>
<td>Cost of Program</td>
<td>0</td>
<td>-15,166</td>
<td>-15,166</td>
</tr>
</tbody>
</table>
Cautions

- Avoid the “Perry Preschool Shuffle”:  
  - Few if any early childhood investments are this profitable and many fail to generate benefits that exceed costs (Aos et al., 2004)
- Quality matters – less intensive programs do not appear to be as profitable
- Model programs may not scale up (TN Star and the CA class size initiative)
Some best bet programs based on evaluation evidence

- VERY speculative
- Many guesses about long-run benefits
<table>
<thead>
<tr>
<th>Prenatal</th>
<th>0-2</th>
<th>3-5</th>
<th>K-5</th>
<th>6-8</th>
<th>9-12</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Prenatal</th>
<th>0-2</th>
<th>3-5</th>
<th>K-5</th>
<th>6-8</th>
<th>9-12</th>
</tr>
</thead>
</table>

**Access to health care**

- Nurse-Family Partnership for high-risk families
- High quality Pre-K
- Healthy and safe child care
- K-5 aligned to Pre-K
- Proven programs and curricula
Access to health care

- Brain architecture can be damaged by:
  - Alcohol
  - Cocaine
  - Environmental toxins
  - “toxic” stress

- Pediatric visits can identify:
  - Early hearing, vision and other problems
<table>
<thead>
<tr>
<th>Prenatal</th>
<th>0-2</th>
<th>3-5</th>
<th>K-5</th>
<th>6-8</th>
<th>9-12</th>
</tr>
</thead>
</table>

**Work supports for low-wage work**

**Access to health care**

- Nurse-Family Partnership for high-risk families

**Healthy and safe child care**

**High quality Pre-K**

**K-5 aligned to Pre-K**

**Proven programs and curricula**
Nurse-family partnerships

- Targeted to very high risk pregnancies
- Weekly visits by a trained nurse beginning in 2nd trimester through neo-natal period; less frequent after that
- Most effective for low SES first-time mothers
- Less intensive versions are often ineffective
<table>
<thead>
<tr>
<th>Prenatal</th>
<th>0-2</th>
<th>3-5</th>
<th>K-5</th>
<th>6-8</th>
<th>9-12</th>
</tr>
</thead>
</table>

**Work supports for low-wage work**

- **Access to health care**
  - Nurse-Family Partnership for high-risk families

- **Healthy and safe child care**
  - High quality Pre-K
  - K-5 aligned to Pre-K
  - Proven programs and curricula
High quality pre-K

- Perry Preschool evidence is well known, but how relevant today?
- Study of pre-K programs in five states:
  - .25 sd impacts for receptive vocabulary and math
  - .65 sd impact on print awareness
- Tulsa pre-K program:
  - .80 sd impacts on pre-reading skills
  - .40 sd impacts for math
<table>
<thead>
<tr>
<th>Prenatal</th>
<th>0-2</th>
<th>3-5</th>
<th>K-5</th>
<th>6-8</th>
<th>9-12</th>
</tr>
</thead>
</table>

**Work supports for low-wage work**

Access to health care

- Nurse-Family
- Partnership for high-risk families

Healthy and safe child care

High quality Pre-K

K-5 aligned to Pre-K

Proven programs and curricula
<table>
<thead>
<tr>
<th>Prenatal</th>
<th>0-2</th>
<th>3-5</th>
<th>K-5</th>
<th>6-8</th>
<th>9-12</th>
</tr>
</thead>
</table>

**Work supports for low-wage work**

- Access to health care
- Nurse-Family Partnership for high-risk families
- High quality Pre-K
- K-5 aligned to Pre-K
- Proven programs and curricula
- Healthy and safe child care
Impacts of Welfare Programs on Young Children’s Achievement

Effect Size

Human Capital Development

- Work First
- Earnings Supplements

- No Impacts on Family Income
- All with Impacts on Income
Policy should be guided by:

- Convincing evaluation designs
- Focus on benefits relative to costs, not just effect sizes
- Wide-ranging look at policy options
greg-duncan@northwestern.edu