Prevention, Return on Investment, and Early Childhood Programs

Arthur J. Reynolds, Session Chair
University of Minnesota

April 2, 2009
SRCD, Denver
Prevention Science focuses on the etiology, development, implementation, effects, dissemination, and translation of programs, services.

Ecological Framework

Life Course Perspective
Cost Effectiveness (ROI)

ROI focuses on the efficiency of programs to better prioritize alternatives across domains.

Human Capital Framework

Promoting Skills and Competencies for Adult Well-Being
Stage of Program Development

Efficacy trial

Effectiveness trial

Sustained program & services
Early Childhood Programs

Nutrition
Home Visitation
Birth to 3 interventions (Early Head Start)
Child care and early education
State-funded Prekindergarten
Head Start and related Federal Programs
Kindergarten
Small classes in the early grades
Social skills training
PK-3 programs and practices
U.S. Children in Early Education

Source: National Center for Educational Statistics (2003, 2009)
Three Critical Topics

Generalizability of Evidence
Steve Barnett, NI EER/Rutgers

Key Principles of Effectiveness
Larry Schweinhart, High/Scope

Cost Effectiveness (ROI)
Arthur Reynolds, U of Minn
Cost-effective ECD Programs in Children’s First Decade

Arthur Reynolds, Judy Temple, and Barry White

University of Minnesota
Review

17 CBAs from 16 programs

1 study per program

Differed in follow-up and breadth

Excluded ECDs have lower effects
Early Childhood Programs

WIC
Nurse-Family Partnership
Abecedarian Project
High/Scope Perry Preschool
Child-Parent Centers (CPC)
Syntheses/Simulations of PreK
Full-day K
Small Classes
SOAR (social skills training)
CPC PK-3
Common Benefit Measures

Low birth weight
Remedial education
Achievement test scores
Child maltreatment
Educational attainment
Juvenile Delinquency
Adult crime
Substance use/tobacco
Public aid
CBA Estimates

2007 dollars
Total (societal) benefits per participant
Projected and actual benefits
Annual discount rates 3-4%
Two metrics:
  Benefit/Cost Ratio
  Benefits-Costs (Net Present Value)
Extensive robustness testing in some studies
### Birth to Age 3 Programs ($2007)

<table>
<thead>
<tr>
<th>Program</th>
<th>Benefits</th>
<th>Costs</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIC (1)</td>
<td>1,206</td>
<td>393</td>
<td>3.07</td>
</tr>
<tr>
<td>NFP (15)</td>
<td>65,737</td>
<td>16,727</td>
<td>3.93</td>
</tr>
</tbody>
</table>
## Birth-5 Maltreatment Findings

<table>
<thead>
<tr>
<th>Program</th>
<th>Prog</th>
<th>Comp</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-New York</td>
<td>5.1%</td>
<td>4.8%</td>
<td>Prenatal</td>
</tr>
<tr>
<td>HF-Alaska</td>
<td>16%</td>
<td>17%</td>
<td>Prenatal</td>
</tr>
<tr>
<td>Hawaii HS</td>
<td>1.1%</td>
<td>1.5%</td>
<td>Birth</td>
</tr>
<tr>
<td>NFP</td>
<td>24.0%</td>
<td>32.0%*</td>
<td>Prenatal</td>
</tr>
<tr>
<td>Teen PAT</td>
<td>0.0%</td>
<td>2.4%*</td>
<td>Birth</td>
</tr>
<tr>
<td>Prenatal &amp; PHS</td>
<td>9.2%</td>
<td>6.6%</td>
<td>Prenatal</td>
</tr>
<tr>
<td>CPC</td>
<td>7.8%</td>
<td>14.7%*</td>
<td>3 years</td>
</tr>
<tr>
<td>Program</td>
<td>Benefits</td>
<td>Costs</td>
<td>Ratio</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>Perry (27)</td>
<td>159,610</td>
<td>18,260</td>
<td>8.74</td>
</tr>
<tr>
<td>CPC (21)</td>
<td>86,401</td>
<td>8,512</td>
<td>10.15</td>
</tr>
<tr>
<td>ABC (21)</td>
<td>182,422</td>
<td>73,159</td>
<td>2.49</td>
</tr>
</tbody>
</table>
## Returns from Policy Simulations

<table>
<thead>
<tr>
<th>RAND, 2005</th>
<th>Focus</th>
<th>Benefit-Cost Ratio</th>
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</thead>
<tbody>
<tr>
<td>Universal</td>
<td>2.62-4.00</td>
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</table>

<table>
<thead>
<tr>
<th>Aos, 2004</th>
<th>58 studies</th>
<th>2.36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted</td>
<td>2.62-4.00</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Lynch, 2007 (by 2050)</th>
<th>Focus</th>
<th>Benefit-Cost Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted</td>
<td>3.18-12.10</td>
<td></td>
</tr>
<tr>
<td>Universal</td>
<td>2.00-8.20</td>
<td></td>
</tr>
</tbody>
</table>
Common Elements of Programs Showing High Returns

1. Opportunity for More than 1 Year of Participation.
2. Well-trained and Compensated Teachers.
3. Class Sizes under 18 and Child to Staff Ratios less than 9 to 1.
4. Instruction that is Diverse & Literacy Rich.
6. Average Yearly Cost per Child no Less than $5,000 (2004 dollars).
## Synthesis of Evidence from 3 Cohort Studies

<table>
<thead>
<tr>
<th>Program</th>
<th>Length</th>
<th>Ratios</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abecedarian</td>
<td>5 years</td>
<td>12 to 2</td>
<td>Health services</td>
</tr>
<tr>
<td>CPC</td>
<td>1-2 years</td>
<td>17 to 2</td>
<td>Parent program</td>
</tr>
<tr>
<td>Perry</td>
<td>1-2 years</td>
<td>23 to 4</td>
<td>Home visits</td>
</tr>
</tbody>
</table>
Validity Analysis: ECD Studies

Internal validity
External validity
Policy relevance
Generative mechanisms
## Amount of Evidence: Preschool

<table>
<thead>
<tr>
<th></th>
<th>IV</th>
<th>EV</th>
<th>PR</th>
<th>GM</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPC</td>
<td>High</td>
<td>Med</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>PPP</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Med</td>
</tr>
<tr>
<td>ABC</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
## Amount of Evidence: Home Visiting

<table>
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<th>IV</th>
<th>EV</th>
<th>PR</th>
<th>GM</th>
</tr>
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<tbody>
<tr>
<td>NFP</td>
<td>High</td>
<td>Low</td>
<td>Med</td>
</tr>
<tr>
<td>HFA</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
Class Size Reductions in Early Schooling

<table>
<thead>
<tr>
<th></th>
<th>Benefits</th>
<th>Costs</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenn. STAR</td>
<td>27,561</td>
<td>9,744</td>
<td>2.83</td>
</tr>
<tr>
<td>CPC school-age</td>
<td>8,089</td>
<td>3,792</td>
<td>2.12</td>
</tr>
</tbody>
</table>
STAR High School Graduation

- No link between small classes and graduation in total sample

- Link was found among low-income students with 3 and 4 years in small classes
Social Skills Training, Grades 1-6

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skills, Opport.</td>
<td>16,256</td>
<td>5,172</td>
</tr>
<tr>
<td>and Recog.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reading Recovery

Relatively large short-term effects become very small by third grade

Impacts may return about a third of program costs
Preschool to Grade 3: Improve Transitions to School

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<tr>
<th></th>
<th>Benefits</th>
<th>Costs</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPC PK-3</td>
<td>47,161</td>
<td>5,175</td>
<td>9.11</td>
</tr>
</tbody>
</table>
Return per Dollar Invested by Age of Entry into Intervention

Age of Entry into Intervention

Prenatal to Age 3
Preschool
Early School-age

Return per Dollar Invested ($)

0 1 2 3 4 5 6 7 8 9 10 11 12 13
Net Present Value by Age of Entry into Intervention

Note: Net present value estimates are in 2007 dollars.
Benefit-Cost Ratios for Child Programs

WIC Infant programs Preschool programs Full-Day K Small classes Reading Recovery SOAR
3.07 3.54 6.02 0.00 2.47 0.30 3.14

Present Value of Benefits per Dollar invested ($)

-2.00 -1.00 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00
Limitations of ROI/CBA Field

1. Few formal studies have been conducted.
2. Only 4 prospective cohort studies into adulthood.
3. Over-reliance on projected benefits.
4. Limited generalizability to sustained public-service programs.
5. Scant attention to combined programs across ages and synergistic effects.
6. ROI only one criteria of effectiveness.
### Under-Prediction of Adult Crime from Juvenile Arrest: CLS

<table>
<thead>
<tr>
<th>Projected from Juvenile Court</th>
<th>No. of Felony Arrest by age 24</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Effect</td>
<td>-.08</td>
<td>-.11</td>
</tr>
<tr>
<td>Total Savings</td>
<td>12,683</td>
<td>17,440</td>
</tr>
</tbody>
</table>
Future Directions

1. Greater focus on prenatal, birth to 3, and early school-age programs
2. Current preschool programs serving more economically diverse samples
3. Follow-up length and breadth of outcomes should be consistent with program theory
4. Establish “strong” predictors of benefits.
5. Attention synergistic effects of cross-age programs
6. Include subgroup benefits
7. Mechanisms and pathways of change
Common Paths from Early Childhood to Adult Well-Being

**Early Childhood**
Ages 3-9

- **Exogenous Conditions**
  - Gender
  - Socio-Environmental Risk
  - Neighborhood Attributes

- **Program Participation**
  - Timing
  - Duration
  - Intensity

- **Motivation**
  - Self-efficacy
  - Perceived competence
  - Persistence in learning

- **Developed Abilities**
  - Cognitive development
  - Literacy skills
  - Pre-reading/numeracy skills

- **Social Adjustment**
  - Classroom adjustment
  - Peer relations
  - Self-regulating skills

- **Family Support**
  - Parent-child interactions
  - Home support for learning
  - Participation in school
  - Parenting skills

- **School Support**
  - Quality of school environment
  - Classroom environment
  - School-level performance

**Ages 5-12**

- **Competence Behaviors**
  - School Achievement and Performance
  - School Remediation
  - Delinquency and Crime
  - Child Maltreatment
  - Participation in Social Services
  - Health & Mental Health
  - Educational Attainment
  - Economic Well-Being
  - Family Circumstances

**Adolescence to Adulthood**

- **Exogenous Conditions**
- **Motivation**
- **Developed Abilities**
- **Social Adjustment**
- **Family Support**
- **School Support**

**Key**
- MA = Motivational Advantage
- CA = Cognitive Advantage
- SA = Social Adjustment
- FS = Family Support
- SS = School Support
Recommendations

1. Strengthen investments in programs for 3-4 year-olds based on key principles of effectiveness.

2. Evidence supports increased investments in school transition programs and services.

3. Use CBA to better prioritize funding but evidence base is limited.
Further Information

Human Capital Research Collaborative
www.earlychildhoodrc.org

Chicago Longitudinal Study
www.cehd.umn.edu/icd/cls/
ajr@umn.edu
<table>
<thead>
<tr>
<th>Study</th>
<th>Recovery Rate</th>
<th>Years of Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornell Consort.</td>
<td>55%</td>
<td>10-15</td>
</tr>
<tr>
<td>Early Head Start</td>
<td>69%</td>
<td>2</td>
</tr>
<tr>
<td>Head Start Impact</td>
<td>81%</td>
<td>End of Prog</td>
</tr>
<tr>
<td>ECLS-K</td>
<td>50%</td>
<td>8-9</td>
</tr>
</tbody>
</table>