Early Child Development: A Whole Child Perspective

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Note: all photos in presentation taken by Lia Fernald, with exceptions noted
Topics for today

• **Early childhood: vulnerability and opportunity**

• What can interventions do to improve development in children?

• What does it mean to be an “integrated” intervention? How do these integrated interventions work?

• Example: Group based parenting support integrated into conditional cash transfer program (Mexico)

• Example: Parenting support integrated into preschool intervention (Malawi)
Brain Development

At birth: 25% of adult size

By age 2: 55 - 75% of adult size

By age 6: > 90% of adult size

90% of brain growth by age 6
Specific domains are more vulnerable

- Neurologic vulnerability in brain regions (Hackman & Farah, 2009)
- Language (perisylvian) and executive function (prefrontal) regions have a more protracted course of maturation (Farah et al., 2006; Kuhl & Rivera-Gaxiola, 2008; Mezzacappa, 2004; Noble et al., 2007; Noble, Norman, & Farah, 2005)

First 1000 days
Dimensions of development

- Physical growth
- Motor development
- Perceptual and cognitive development
- Communication and language
- Socio-emotional, behavioral & temperament
Risks for vulnerable children

- Poor housing, dangerous neighborhoods
- Lack of sanitation, clean water
- Larger family size, household crowding
- Less nutritious foods, malnutrition
- Exposure to infectious diseases, toxic metals, malaria
- High levels of maternal depression
- Lack of access to schools and health care centers

Photo: Tricia Kariger
Consequences of living in poverty

• Exposure to biological and psychosocial risks leads to deficits in brain structure and function

• Early exposure to risks sets children on a lower developmental path

• Long-term effects contribute to continued inequalities in the next generation.

Photo: Tricia Kariger
SES gradients increase with age

N=1282, children age 3-6 from rural regions in Madagascar

Fernald et al., Developmental Science (2011)
SES gradients before 12 months old

India: ASQ z-score by age and education categories

N=2034, children age 0-2 from India

Fernald et al., PNAS (2012)
Lack of optimal development

- Reduced long term physical and mental health benefits
- Lower work productivity, responsible citizen & parent
- Worse school performance, learning, & interpersonal relations
- Sub-optimal cognitive, motor & socio-emotional development
Multiple pathways: poverty to poor development

- Timing, dose and differential reactivity influence how exposure to risk translates into differences in brain function and structure
- Sensitive and critical periods in development

Walker et al., Lancet (2007)
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Types of ECD interventions

Rate of Return to Investment in Human Capital

Parenting programs
- Early nutrition/health interventions
- Preschool Programs

Continued nutrition/health interventions

Schooling

CCTs

Job Training

0  School  Post School

Chart source: Heckman & Masterov, 2007
# Nutrition interventions to improve child development

<table>
<thead>
<tr>
<th>Risk: Undernutrition, micronutrient deficiencies</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Severe acute malnutrition &amp; Stunting</td>
<td>-Breastfeeding</td>
</tr>
<tr>
<td>-Iodine</td>
<td>-Improved complementary feeding</td>
</tr>
<tr>
<td>-Iron deficiency anemia</td>
<td>-Energy-protein (food) supplementation</td>
</tr>
<tr>
<td>-Multiple micronutrient deficiencies</td>
<td>-Iodine fortification programs</td>
</tr>
<tr>
<td></td>
<td>-Iron supplementation</td>
</tr>
<tr>
<td></td>
<td>-Multiple micronutrient supplementation</td>
</tr>
</tbody>
</table>

Nutrition and health are essential, but...

Substantial gains in children’s development require:

• Improvements in parenting, home stimulation and early education

• Increases in protective influences such as maternal education that reduce impact of risks

• Social protection including reductions in stressful experiences including maternal depression and exposure to violence
Parenting programs – how do they work?

- Provided through home visits or sessions at community center
- Parents receive guidance and support from health providers
- Can be delivered by para-professionals
- Need clear curricula and key messages

Photo source: Susan Walker, University of the West Indies

Parenting programs: what do we know?

Interventions can:

- Promote parent-child interactions
- Improve responsive feeding
- Increase attachment
- Encourage learning, book reading, play activities
- Encourage positive discipline
- Promote better problem solving related to child development

Photo source: Shanaz Vhazir, National Institute of Nutrition

What works in parenting interventions?

- Effects are largest when:
  - Parents and children participate together
  - Parents and children have a chance to practice
  - The most disadvantaged children targeted
  - A structured, evidence-based curriculum is used

Engle, Fernald, Alderman et al. (2011), The Lancet
Photo: Meena Cabral de Mello, WHO
Parenting: what do we need to know?

- Can these effects be scaled up in larger programs?
- What works or doesn’t work at scale?
- How can parenting support be integrated with other services?

Photo source: Meena Cabral/Jane Lucas, WHO

What can preschool programs do?

- Preschool attendance associated with:
  - Higher scores on one or more measures of child development (e.g. literacy, vocabulary, mathematics, quantitative reasoning, behavior)

- Largest effects:
  - Higher quality programs (more teacher training, better materials, greater direct interaction with children)
  - Target most disadvantaged children

Engle, Fernald, Alderman et al. (2011), The Lancet

Photo: Patrice Engle
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Integration: Opportunities

- Health and nutrition sectors are often only services for children <3
- Possible lower costs for integrated services
- Children acquire skills through interactions – can benefit from additional contacts
- Nutrition and stimulation may work synergistically.

Integration: Challenges

- Contacts with health sector and few are scheduled after 12 months
- Health and nutrition services are overstretched.
- Limit to number of messages that any mother can absorb.
- Focus on first 1000 days may distract from later opportunities

Summary of Literature Review

- 11 efficacy trials, 2 non-randomized trials, 8 program evaluations. All included child development and health/nutrition.
- Stimulation consistently benefitted child development.
- No significant loss of effects when interventions combined.
- Little evidence of synergistic interaction of integration.

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Design of *Educacion Inicial*

- State level administration
  - Well-developed and documented theory of change
  - Materials same throughout country
  - Some variability among states on details of implementation

- Developed based on the experiences of programs to promote early childhood education in other countries
  - Focus on children 0-4 years old
  - Group sessions 1/wk with trained *Promotora*, identified by community
  - Follows academic year September to June
  - *Promotoras* retrained every August
Goal: adding parenting support to CCT

- To evaluate the effects of an early childhood stimulation program for CCT (*Oportunidades*) beneficiaries for:
  - Nutritional status and health of children
  - Cognitive, language, and socio-emotional development of children
- To examine differences between program effects when enrollment in CONAFE is “strongly encouraged” v. participation optional
- To examine if the effects of CONAFE-Op differ in communities classified as predominantly indigenous compared to non-indigenous
PARA QUE TU HIJA APRENDA A RECONOCER TU VOZ Y SE TRANQUILICE CON ELLA

- Si está llorando o está inquieta, háblale y cántale con voz suave.

Rosita es la niña más bonita...

PARA QUE TU HIJA TENGA HORIZARIOS DE SUEÑO Y ALIMENTACIÓN

- Trata de que tenga horarios regulares de comida y sueño. Prepara un lugar especial para que duerma ella sola, por ejemplo, su hamaca o cuna. Como todavía es muy pequeña, duerme mucho y cuando despierta quiere comer.

Rosita, ya es hora de dormir.

PARA QUE TU HIJA VAYA ADQUIRIENDO CONFIANZA EN AQUELLOS QUE LA CUIDAN

- ¿Qué tienes Rosita? ¿Ya te hiciste del baño? ¿O será que ya tienes hambre?

- Atiéndela cuando ll ore, háblale por su nombre y revisa si está sucia, tiene hambre o si algo le incomoda. No la dejes llorar hasta que se canse porque esto le hará sentirse insegura y desprotegida.
- Hace sonidos simples cuando tú le hablas, como una respuesta al erte.

¡Préstame tu pañal!

"Ah", "ae", "ai", "ao".

Vamos a ver a la abuela.

- Demuestra que comprende lo que dices con algún movimiento y dirige su atención y su mirada hacia los sonidos o voces.
6 meses

- Puede arrastrarse sobre su estómago para alcanzar algo.
- Se mantiene sentado cuando levanta una mano para agarrar un objeto.
- Toma tu osito.
- ¿Te gusta cómo suena la sonaja?
- Explora cosas con las manos y la boca.
- Repite acciones que tienen un efecto sobre las cosas.
- Te gusta chupar todo.
Program components

Group sessions with promotora
Often include whole family
States included and % indigenous

NOTE: Only 5.4% of total population of Mexico is indigenous.
Child assessment (3-6 years)

• McCarthy Scales of Children’s Abilities
## No baseline differences by intervention group

<table>
<thead>
<tr>
<th></th>
<th>Volunteer (n=406)</th>
<th>Compulsory (n=341)</th>
<th>Control (n=366)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline ASQ Z-Scores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>0.08 (1.19)</td>
<td>0.10 (1.69)</td>
<td>0.08 (1.35)</td>
<td>0.99</td>
</tr>
<tr>
<td>Perception</td>
<td>-0.01 (1.59)</td>
<td>0.10 (1.31)</td>
<td>0.13 (1.17)</td>
<td>0.37</td>
</tr>
<tr>
<td>Motor Skills</td>
<td>0.01 (1.29)</td>
<td>-0.04 (1.63)</td>
<td>0.11 (1.03)</td>
<td>0.30</td>
</tr>
<tr>
<td>Overall Score</td>
<td>0.03 (1.47)</td>
<td>0.06 (1.70)</td>
<td>0.14 (1.22)</td>
<td>0.53</td>
</tr>
<tr>
<td><strong>Child characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girl</td>
<td>188 (46%)</td>
<td>175 (51%)</td>
<td>180 (49%)</td>
<td>0.37</td>
</tr>
<tr>
<td>Cohort Age (months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 – 6</td>
<td>137 (34%)</td>
<td>125 (37%)</td>
<td>157 (43%)</td>
<td>0.12</td>
</tr>
<tr>
<td>7 -12</td>
<td>139 (34%)</td>
<td>100 (29%)</td>
<td>108 (30%)</td>
<td></td>
</tr>
<tr>
<td>13-18</td>
<td>130 (32%)</td>
<td>116 (34%)</td>
<td>101 (28%)</td>
<td></td>
</tr>
<tr>
<td><strong>Parental characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father Present</td>
<td>385 (95%)</td>
<td>310 (91%)</td>
<td>339 (93%)</td>
<td>0.29</td>
</tr>
<tr>
<td>Mother Education</td>
<td></td>
<td></td>
<td></td>
<td>0.83</td>
</tr>
<tr>
<td>Kinder or less (≤1yr)</td>
<td>65 (16%)</td>
<td>69 (20%)</td>
<td>67 (18%)</td>
<td></td>
</tr>
<tr>
<td>Primary (7 yrs)</td>
<td>293 (72%)</td>
<td>224 (66%)</td>
<td>246 (67%)</td>
<td></td>
</tr>
<tr>
<td>Secondary (10 yrs)</td>
<td>40 (10%)</td>
<td>40 (12%)</td>
<td>43 (12%)</td>
<td></td>
</tr>
<tr>
<td>High School and above (≥13 yrs)</td>
<td>8 (2%)</td>
<td>8 (2%)</td>
<td>10 (3%)</td>
<td></td>
</tr>
<tr>
<td><strong>Household characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indigenous locality</td>
<td>190 (47%)</td>
<td>148 (43%)</td>
<td>198 (54%)</td>
<td>0.67</td>
</tr>
<tr>
<td>Number of household members</td>
<td>6.59 (0.07)</td>
<td>6.34 (0.09)</td>
<td>6.86 (0.20)</td>
<td>0.15</td>
</tr>
<tr>
<td>Asset Index Value</td>
<td>0.17 (2.71)</td>
<td>0.31 (2.08)</td>
<td>0.17 (2.17)</td>
<td>0.65</td>
</tr>
</tbody>
</table>

NOTE: P-values are generated from F-tests (for continuous variables) and chi-squared tests (for dichotomous variables) and cluster adjusted for community.

Fernald et al., in press
NOTE: Graph of means for entire sample, adjusting only for state fixed effects. **p<0.05, *p<0.10** for differences between Compulsory and Control. No significant differences between Volunteer and Control groups. Pattern remains when controlling for covariates, but results not significant. Covariates were from baseline: maternal education, household size, child cognition, wealth, piped water, indigenous status.

Fernald et al., in press
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CBCCs in Malawi

- Primary method of ECD service delivery in rural Malawi
- Community-initiated and -owned
- Volunteer part-time teachers
- Untrained teachers with low-levels of education
- Lack of play and learning materials
- Sustainability challenges
How can you approach this sector?

- The Malawian government chose to improve quality in the existing CBCCs.
- Estimated to serve 580,000 children in approximately 5,000 communities (Drouin & Heymann, 2010)
- Two key questions:
  - If teachers are provided with training and are volunteers, will retention in treatment schools be low?
  - Children spend at most a few hours a day at these centers and the rest with caregivers at home: should we not also provide resources to their primary caregivers?
Intervention groups

• **Control group:** Play and learning materials

• **Treatment 1:** Play and learning materials AND Teacher training and mentoring (5-week residential program)

• **Treatment 2:** Play and learning materials AND Teacher training and mentoring AND Teacher incentives (small monthly cash payments, $12)

• **Treatment 3 (integrated):** Play and learning materials AND Teacher training and mentoring AND Parenting education (12 group sessions for parents & children)

Ozler, Fernald et al., under review
Conclusions

• Urgent need to expand coverage and scaling-up of early child development programs to reach the most vulnerable children early in life. But quality matters!
• Integration is often the answer, but not always effective because of program/parent overload.
• Monitoring and evaluation critically important because we don’t always know “What Works” in each setting.
• Following children is critically important to see if effects are sustainable or fade-out.
Thank you!!
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