

Promoting Skills to Promote Equality and Social Mobility

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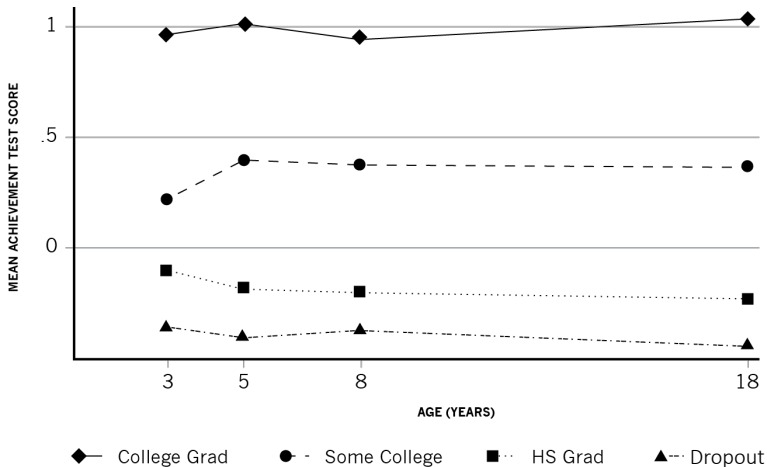
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A Skills-based Policy Tackles Many Aspects of Poverty, Inequality, and Social Mobility

Skill Gaps Open Up Early

- Gaps in skills across socioeconomic groups open up very early:
- Skills are not set in stone at birth—but they solidify as people age. They have genetic components, but are not solely genetically determined.
- Skills evolve and can be shaped in substantial part by investments and environments.

Figure 1: Mean Achievement Test Scores by Age by Maternal Education



Source: Brodsky, Gunn et al.

Capitalize On the Growing Knowledge About the Life Cycle of Skill Formation

Two Key Observations

1. Recognize the Multiplicity of Life-Relevant Skills

- **Beyond PISA scores to measure personality, health, and multiple cognitive skills in US**

2. Recognize the Importance of the Early Years in Creating Skills

Crucial Policy Question

Should One Solve Problems Only As They Arise?

Should Only the Squeaky Wheel Get the Grease?

Is Early Prevention Efficient?

How Well Can We Target and Avoid Problems?

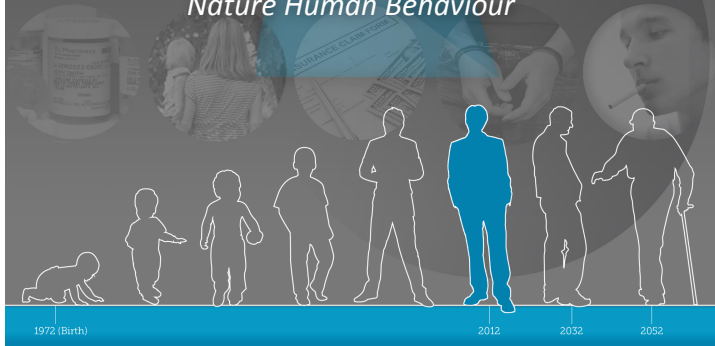
Evidence on the Effectiveness of Early Targeting to Promote Skills

- 80% of adult social problems regarding health, healthy behaviors, crime and poverty are due to 20% of the population.
- Reliable indicators of these problems by age 5 (Capsi et. al, 2016).

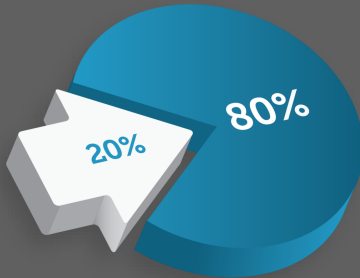
Childhood Forecasting of a Small Segment of the Population with Large Economic Burden

Caspi, Moffitt, et al. (2017)

Nature Human Behaviour



The Pareto Principle



20% of the Actors
Account for **80%**
of the Results.

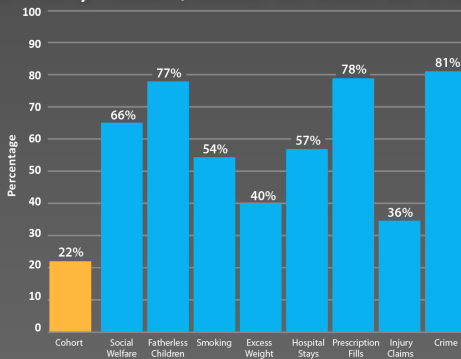
Vilfredo Pareto, 1848-1923

Age-3 Brain Health:

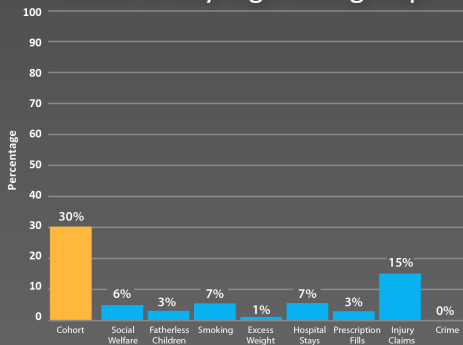
45-minute standardized assessment of Dunedin cohort 3-year-olds in 1975

- Neurologist's examination of soft signs
- Peabody Picture IQ test
- Reynell Receptive Language test
- Bayley Motor Skills test
- Examiner-rated poor behavior control

The High-need/High-cost Group in 3 or more sectors: How many health/social services do they use?



Small Footprint of cohort members never in any high-cost group:



Skills: Much More Than Years of Schooling

More Than Scores on PISA Or IQ Tests

The Importance of Character and Personality Skills

Beyond PISA scores

- Ⓐ Major advances have occurred in understanding which human capacities matter for success in life.
- Ⓑ Cognitive ability as measured by IQ and achievement tests is important.
- Ⓒ So are the **socio-emotional skills** – sometimes called character traits or personality traits:
 - Motivation
 - Sociability; ability to work with others
 - Attention
 - Self Regulation
 - Self Esteem
 - Ability to defer gratification
 - Health and Mental Health
- Ⓓ Ability to adapt to change and job complexity (executive functioning).

Cognitive and Socioemotional Skills Strong Predictors of:

- Ⓐ Crime
- Ⓑ Earnings
- Ⓒ Health and healthy behaviors
- Ⓓ Civic participation
- Ⓔ Educational attainment
- Ⓕ Teenage pregnancy
- Ⓖ Trust
- Ⓗ Human agency and self-esteem

The Importance of Family Environments in Shaping Skills

Family Influence Is Much More Than Money

Family Environments Vary and Matter: Hart & Risley (1995)

Children enter school with “meaningful differences” in vocabulary knowledge.

1. Emergence of the Problem

In a typical hour, the average child hears:

Family Status	Actual Differences in Quantity of Words Heard	Actual Differences in Quality of Words Heard
Welfare	616 words	5 affirmatives, 11 prohibitions
Working Class	1,251 words	12 affirmatives, 7 prohibitions
Professional	2,153 words	32 affirmatives, 5 prohibitions

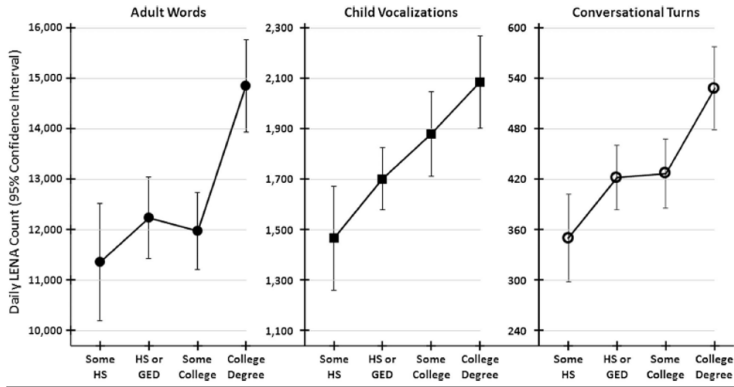
2. Cumulative Vocabulary at Age 3

Cumulative Vocabulary at Age 3	
Children from welfare families:	500 words
Children from working class families:	700 words
Children from professional families:	1,100 words

Parenting, and Not Just Money Alone, Is the Measure of Child Poverty

Figure 2: Home Environments Matter

Figure 2. Daily Language Environment Analysis (LENA) measures by mother's attained education (high school [HS]; General Educational Development [GED]). Values shown are daily (12-hr) mean counts with 95% confidence intervals averaged within participant families and socioeconomic strata.



The Science Underlying the Benefits of Early Investment

The Dynamics of Skill Formation: Two Notions of Complementarity

Static Complementarity

- The productivity of investment greater for the more capable.
 - **High returns for more capable people.**
 - **Does this justify social Darwinism?**
 - On grounds of economic efficiency, should we invest primarily in the most capable?
 - **Answer: Depends on where in the stage of the life cycle we consider the investment.**

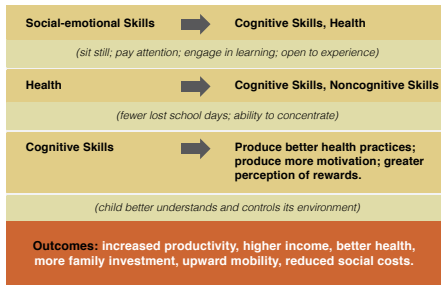
Dynamic Complementarity

- If we invest today in the base capabilities of disadvantaged young children, there is a huge return.
- Makes downstream investment more productive.
- **No necessary tradeoff between equality and efficiency goals.**

No necessary tradeoff between equality and efficiency goals

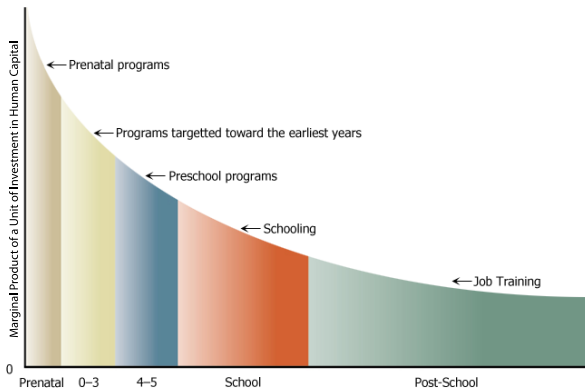
- **Both** processes are at work.
- No necessary contradiction.
- Investing early creates the skill base that makes later investment productive.
- Effective targeting has large benefits.

Skills Beget Skills



Build Skills to Benefit From Later Life Static Complementarity

Figure 3: Marginal Products Per Unit Value Invested at the Given Stage of the Life Cycle



Source: Heckman (2008)

Powerful Evidence For Effectiveness of Early Interventions

Successful Interventions Percolate Throughout the Lifetime Through Multiple Channels

Some Long-Run Evidence on the Effects of Quality Early Interventions

- Many successful early childhood interventions followed over the life cycle operate primarily through boosting **non-cognitive skills** of participants and parenting skills. IQ is often barely budged for interventions past age 3.
- Long term evaluations of interventions often provide a different assessment of the effectiveness of interventions than do short run evaluations.

Long-Term Evaluations are Essential

- Literature filled with large—even miraculous—short-term evaluation results that fade out when evaluated long-term.
- Filled with “curricula” rather than a deep understanding of the family and how successful programs replicate beneficial family environments.
- Consider some successful interventions with long-term follow up.

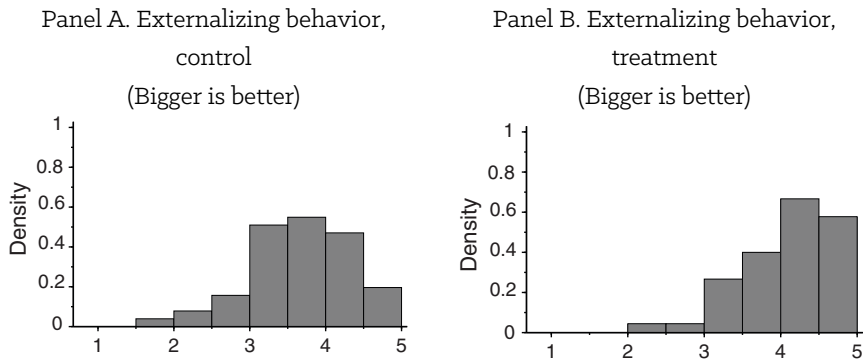
Perry Preschool Project

Starts at Age 3
2 hrs a Day -- Two Years
Curriculum: Plan, Do, Review

10% Rate of Return Per Dollar Invested

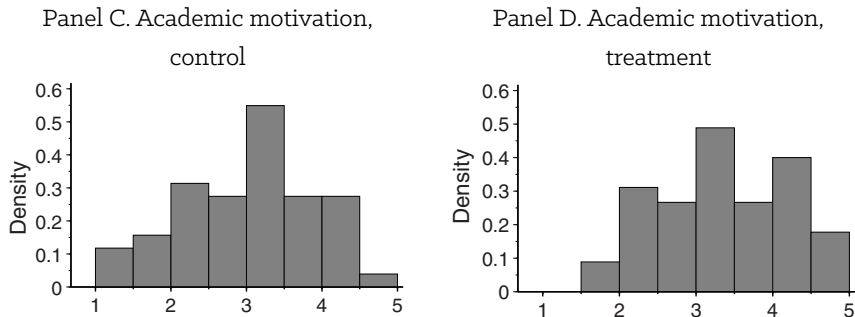
Noncognitive Factors Were Greatly Enhanced

Figure 4: Perry Preschool Program: Histograms of Indices of Personality Skills and CAT Scores



Source: Heckman et. al, 2013.

Figure 4: Perry Preschool Program: Histograms of Indices of Personality Skills and CAT Scores, Cont'd



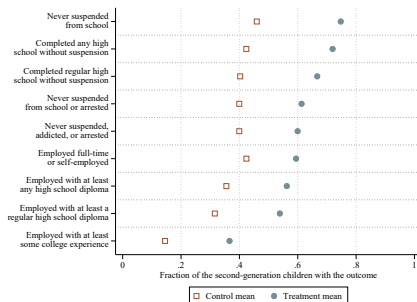
Source: Heckman et. al, 2013.

Effects of Perry Last Through the Next Generation

Recent Evidence

The Children of the Original Perry Participants

Figure 5: Statistically Significant Intergenerational Effects at the 10% Worst-Case Level*



* Note: These estimates of the intergenerational treatment effects are statistically significant at the 10% level using the conservative worst-case test procedures developed in Heckman and Karapakula (2019).

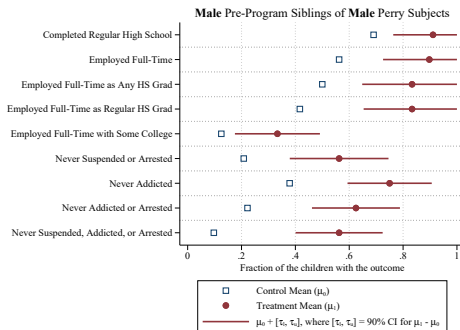
Table 1: Intergenerational Outcomes: Children of the Original Participants of Perry and ABC

	Male Children		
	Control Mean	Mean Difference (MD)	MD p-value
Panel a. Perry			
High School Graduate (Age 18 or older)	0.67	-0.01	0.582
College Graduate (Age 23 or older)	0.04	0.08	0.063
Employed (Age 23 or older)	0.48	0.19	0.040
Never Arrested (Age 18 or older)	0.37	0.14	0.089
In Good Health (Age 18 or older)	0.82	0.12	0.006
Not a Parent (Ages 14 to 22)	1.00	0.00	1.000
Never Divorced (Age 23 or older)	0.93	0.07	0.028
Panel b. ABC			
High School Graduate (Age 18 or older)	0.66	-0.06	0.718
College Graduate (Age 23 or older)	0.55	-0.08	0.683
Not Idle (Age 15 or older) [†]	0.91	0.06	0.083
In Good Health (Age 18 or older)	0.83	0.18	0.000
Not a Parent (Ages 14 to 22)	0.63	0.17	0.069

Table 1: Summary of Intergenerational Outcomes: Children of the Original Participants of Perry and ABC, Cont'd

	Female Children		
	Control Mean	Mean Difference (MD)	MD p-value
Panel a. Perry			
High School Graduate (Age 18 or older)	0.74	0.13	0.026
College Graduate (Age 23 or older)	0.31	-0.09	0.846
Employed (Age 23 or older)	0.41	0.09	0.218
Never Arrested (Age 18 or older)	0.78	0.06	0.210
In Good Health (Age 18 or older)	0.85	0.10	0.030
Not a Parent (Ages 14 to 22)	0.83	0.12	0.234
Never Divorced (Age 23 or older)	0.86	0.11	0.016
Panel b. ABC			
High School Graduate (Age 18 or older)	0.28	0.18	0.067
College Graduate (Age 23 or older)	0.18	0.25	0.068
Not Idle (Age 15 or older) [†]	0.98	0.00	0.572
In Good Health (Age 18 or older)	0.88	0.10	0.133
Not a Parent (Ages 14 to 22) 0.94	-0.01	0.584	

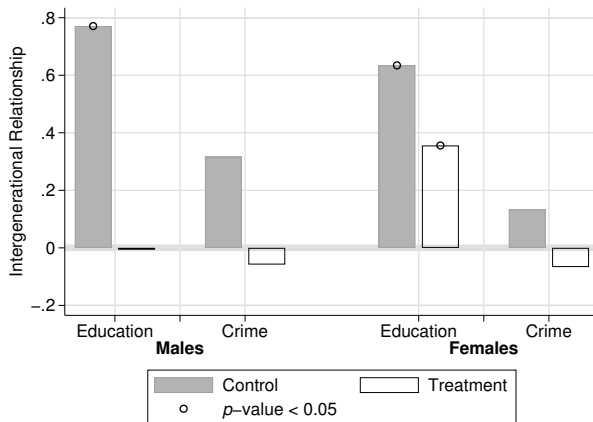
Figure 6: Treatment Effects on Male Pre-Program Siblings of Male Perry Subjects



Benefit-Cost Ratio of the Perry Preschool Project, Summary of Estimates Including Dynastic Benefits and Spillovers

	[1]	[2]	[3]
	1st Generation	Dynasty	Extended Dynasty
	(Participants)	([1] + Child Spillovers)	([2] + Sibling Spillovers)
B/C Program Benefit	9.0	9.5	11.2
(<i>p</i> -value)	(0.03)	(0.00)	(0.00)
Subtract Deadweight Loss	6.0	6.3	7.5
(<i>p</i> -value)	(0.03)	(0.00)	(0.00)

Intergenerational Dependence (Regression $Y_C = \alpha + \beta Y_P + \varepsilon_C$)



Abecedarian

- Abecedarian: a comprehensive approach.
- Starts earlier (at birth) and continues through age 5.
- 8 hours per day.
- Boosts IQ.

- Improved parenting practices and child attachment
- Positive effect on behavior and mental health
- Higher educational attainment
- Higher employment rate
- Reduced criminal activity
- Better child and adult health

Figure 7: Health Effects at Age 35 (Males) – From ABC Project

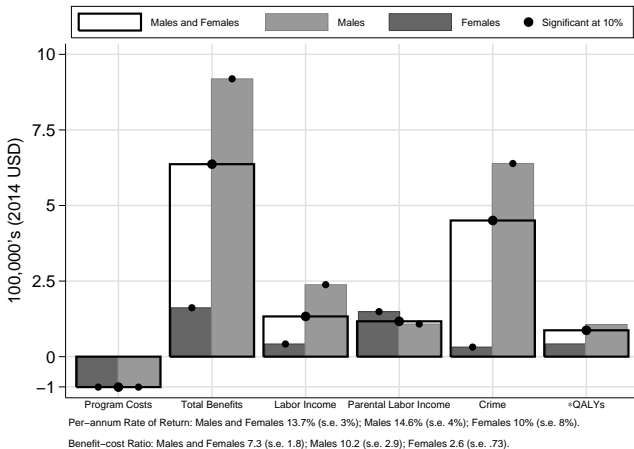
	Treatment Mean	Control Mean	Treatment p-value
Systolic Blood Pressure	125.79	143.33	0.018
Diastolic Blood Pressure	78.53	92.00	0.024
Pre-Hypertension	0.68	0.78	0.235
Hypertension	0.10	0.44	0.011
HDL Cholesterol	53.21	42.00	0.067
Cholesterol/HDL-C	3.89	4.69	0.057
Abdominal Obesity	0.65	0.87	0.136
Metabolic Syndrome	0.00	0.25	0.009

Source: Campbell, Conti, Heckman, Moon, Pinto, Pungello, and Pan (2014).

Rate of Return:

- Overall: 13.7% per annum
- Males: 14% per annum
- Females: 10% per annum

Figure 8: Life-cycle Net Present Value of Main Components of the CBA



The Enhanced Income of Mothers from the Provision of Childcare by Itself Pays for Program Costs

Figure 9: Summary of Intergenerational Outcomes: Children of Original Participants or Second-Generation Participants of the Perry Preschool and Carolina Abecedarian Projects

	Male Children			Female Children		
	Control Mean	Mean Difference (MD)	MD p-value	Control Mean	Mean Difference (MD)	MD p-value
<i>Panel a. PPP</i>						
High School Graduate (Age 18 or older)	0.67	-0.01	0.582	0.74	0.13	0.026
College Graduate (Age 23 or older)	0.04	0.08	0.063	0.31	-0.09	0.846
Employed (Age 23 or older)	0.48	0.19	0.040	0.41	0.09	0.218
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<i>Panel b. ABC</i>						
High School Graduate (Age 18 or older)	0.66	-0.06	0.718	0.28	0.18	0.067
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In Good Health (Age 18 or older)	0.83	0.18	0.000	0.88	0.10	0.133
Not a Parent (Ages 14 to 22)	0.63	0.17	0.069	0.94	-0.01	0.584

Mechanisms Underlying Effective Early Childhood Interventions

Childhood Family Environments of the Second-Generation Children

Earnings: of Original Perry Participants by their Age

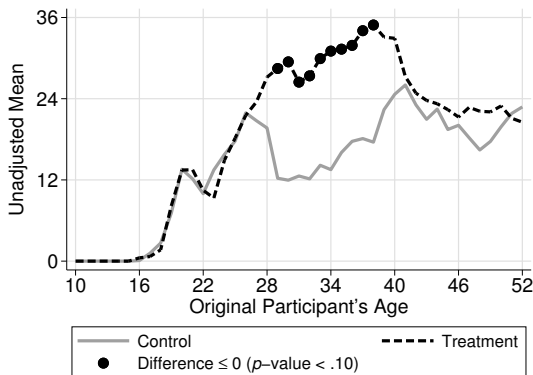
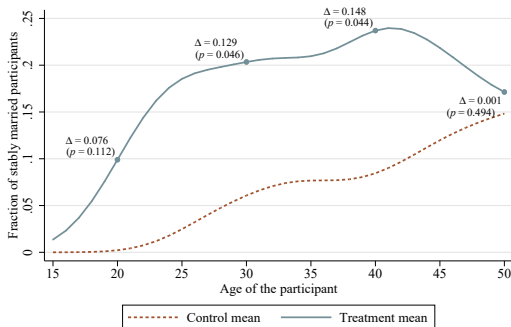


Figure 10: Stable Marriage Rate over the Life Course for Male Participants



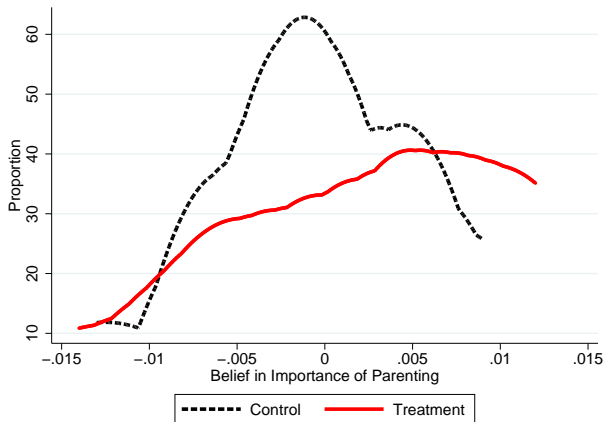
Note: Δ = augmented inverse probability weighting estimate (AIPW) of the treatment effect;
 p = worst-case maximum p -value based on approximate randomization test using studentized AIPW;
the control and treatment means are smoothed estimates using the Gaussian kernel with bandwidth of 3.

Crucial Role of Parenting

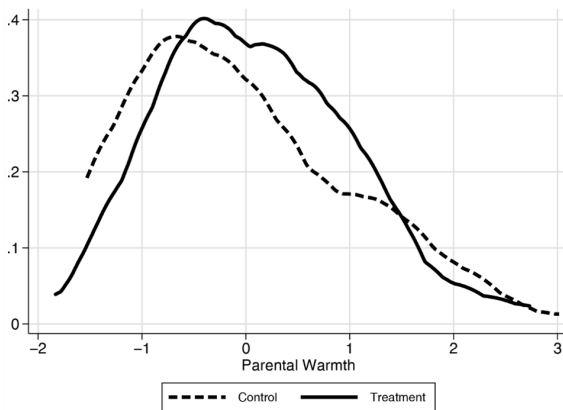
**Enriches Home Lives of Children Outside of Childcare
Center**

**Keeps Parental Engagement Active Long After the
Children Leave Pre-K**

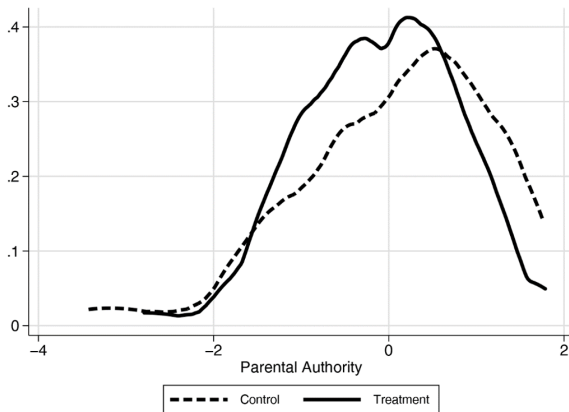
Parental response to Perry Preschool Program after 1 year experience of treatment:



Parental Warmth, Perry Preschool



Parental Authoritarianism, Perry Preschool



- These responses are the essential ingredient in the success of early childhood programs
- Do we need costly childcare centers to shape successful lives?
- Is there a more cost-effective way to promote child development?
- Parent-child interaction patterns were improved in both Perry and ABC
- These are omnibus programs

- Scientifically useful to examine programs that focus attention on this one aspect of child development
- What if we only focus on home visiting?

Home Visiting Programs

Jamaica Study

- Visit by home visitor interacting with parent to teach them how to interact with their children.
- Weekly visit of 1 hour.
- Visitors have the same background as the mothers they visit; they are just trained in the protocols of home visiting.

The Jamaican Intervention

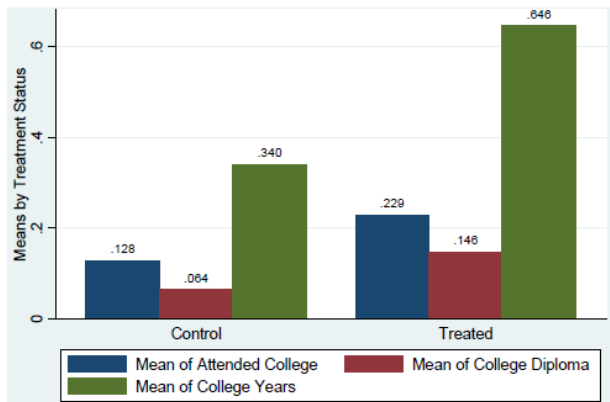
- Randomized intervention, sample of 129 children
- Stunted children between 9 and 24 months
- Designed to individualize the different effects of nutritional and cognitive stimulation
- Follow up to age 30
- Four groups:
 - ① No intervention
 - ② Nutritional intervention only
 - ③ Cognitive stimulation intervention only
 - ④ Both cognitive and non-cognitive interventions
- Plus, a matched non-stunted group as a reference
- **The long-lasting effects were found for the cognitive/socio-emotional components of interventions**

Results at Age 30

Labor Market Outcomes – Jamaica at 30

	Control Mean	Treat. Effects	Effect Size	<i>p</i> -Value
<i>Wage</i>				
Daily Wage	20.98	21.43	1.17	0.01
Daily Wage (log)	2.75	0.68	0.87	0.00
Daily Wage Last Job	22.34	18.13	0.88	0.01
Daily Wage Last Job (log)	2.78	0.57	0.71	0.01
Rank Mean	0.38	0.20	0.73	0.00

College Enrollment by Treatment Status



Psychological Measures – Jamaica at 30

	Control Mean	Treat. Effects	Effect Size	<i>p</i> -Value
<i>WASI IQ Scores</i>				
Full Scale IQ Score	73.02	4.33	0.37	0.05
Perceptual Reasoning	72.66	5.19	0.43	0.04
Verbal Composite Score	77.87	2.88	0.20	0.15
Rank Mean	0.46	0.08	0.31	0.07

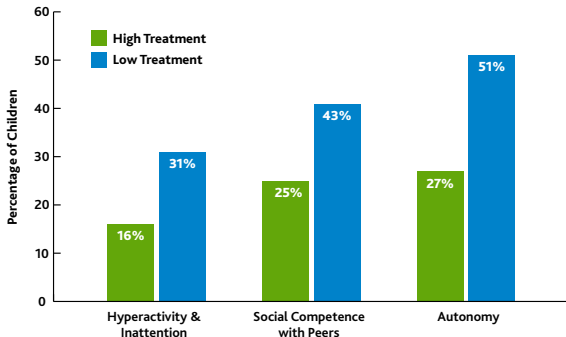
Psychological Measures – Jamaica at 30

	Control Mean	Treat. Effects	Effect Size	<i>p</i> -Value
<i>Psychological Symptoms</i>				
Depressive symptoms	−20.17	4.86	0.48	0.05
Anxiety Total Score	−42.94	2.23	0.26	0.28
Social inhibition	−6.47	0.95	0.29	0.25
Self esteem Total Score (Rosenberg)	21.68	0.96	0.18	0.17
Grit score	24.55	2.01	0.44	0.05
Self-control Measure	9.17	0.66	0.20	0.26
Rank Mean	0.45	0.09	0.46	0.01
<i>Personality Traits</i>				
Extraversion	8.51	−0.07	−0.03	0.54
Agreeableness	11.77	−0.04	−0.02	0.78
Conscientious	11.17	1.77	0.64	0.00
Emotional Stability	9.89	0.38	0.13	0.63
Open to Experience	10.49	0.01	0.00	0.84
Rank Mean	0.47	0.05	0.34	0.05

Preparing For Life (PFL, 2016) Home Visiting in Ireland – Orla Doyle

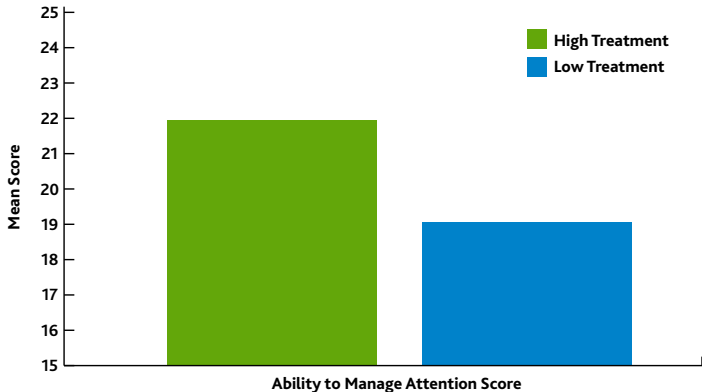
- 1 PFL provides support and education to parents from pregnancy/ birth onwards
- 2 Based on theories of attachment, social learning, & ecological development
- 3 PFL: **Fortnightly home-visits** from trained mentor - pregnancy to school entry
- 4 Mentors came from **different professional backgrounds**
- 5 **Mentor's role:** support parents about child development & parenting using role play, modelling, demonstration, discussion, encouragement, and feedback
- 6 Low intensity — one hour per month

Figure 11: Percentage of Children “Not on Track” on Measures of Social and Emotional Development At School Entry



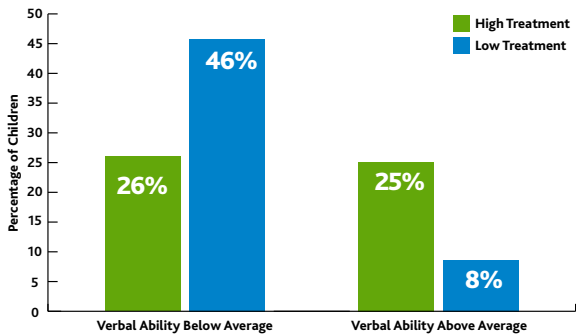
Source: PFL Evaluation Team at the UCD Geary Institute for Public Policy (2016).

Figure 12: Mean Scores of Children on Ability to Manage Attention Task At School Entry



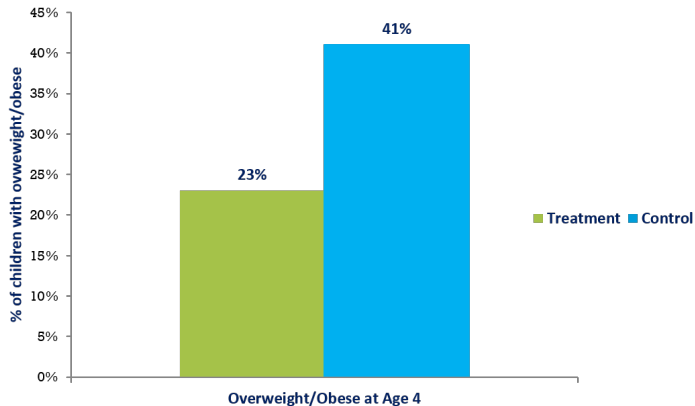
Source: PFL Evaluation Team at the UCD Geary Institute for Public Policy (2016).

Figure 13: Percentage of Children Scoring Above and Below Average in Verbal Ability At School Entry



Source: PFL Evaluation Team at the UCD Geary Institute for Public Policy (2016).

Figure 14: Body Mass Index at Age 4*



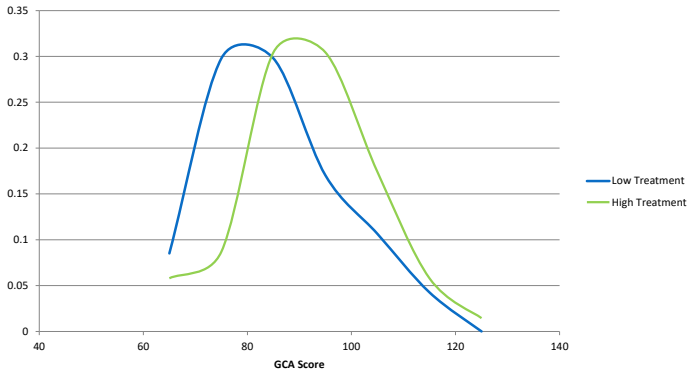
Preparing for Life (Doyle et al., 2016).

*IPW-adjusted permutation tests with 100,000 replications controlling for gender.
One tailed (right-sided) test.

End of Trial Results

- *PFL* effect sizes for cognitive outcomes
 - Similar to the Jamaica HVP study (0.88SD) (Grantham-McGregor & Smith 2016).

Age 9 Results: Distribution of Cognitive Skills



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Heckman

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Promoting Skills

Intergenerational Transmission of IQ

- Correlation between IQ scores of mothers & children in *low* treatment group
 - Age 4: $r=0.31$; $p=0.018$
 - Age 9: $r=0.57$; $p=0.001$
- Correlation between IQ scores of mothers & children in *high* treatment group
 - Age 4: $r=0.07$; $p=0.562$
 - Age 9: $r=0.18$; $p=0.148$
- Some evidence that program reduced intergeneration transmission of low IQ

China REACH in Huachi: Mai Lu, Zhou Jin, and Liu Bei (Sponsored by CDRF)

- Program closely patterned after Jamaica Reach Up and Learn.
- Visitors have the same skills as the mothers, except for the training received.
- One hour a week for 36 months started shortly after birth.

Table 2: Treatment Effects on Skills

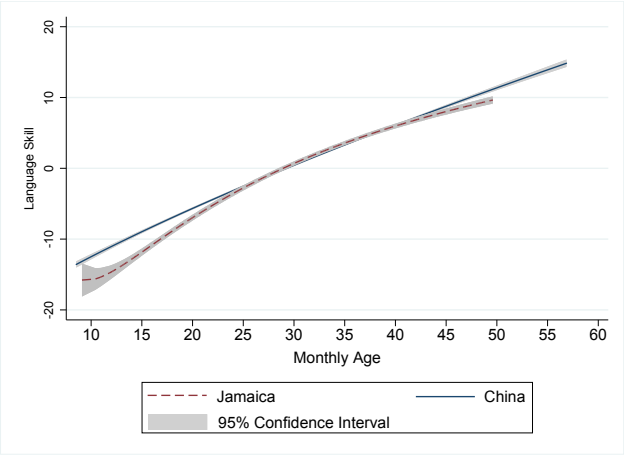
	Social-emotional	Fine Motor	Language and Cognitive	Gross Motor
Treatment	0.395*** [0.208, 0.583]	0.726*** [0.551, 0.899]	0.753*** [0.459, 1.051]	-0.095 [-0.280, 0.089]

Notes: 1. 95% confidence intervals in brackets are constructed by wild bootstrap clustered at the village level. 2. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Comparing Treatment Effects on China REACH and Jamaica Reach Up and Learn

Panel A: China REACH Latent Skills (after 21 Months' Intervention)				
Treatment	Social-emotional	Fine Motor	Language and Cognitive	Gross Motor
	0.40*** [0.21, 0.58]	0.73*** [0.55, 0.90]	0.75*** [0.46, 1.05]	-0.10 [-0.28, 0.09]
Panel B: Jamaica Griffiths Test (after 24 Months' Intervention)				
Treatment	Performance	Fine Motor	Hearing & Speech	Gross Motor
	0.63*** [0.30, 0.95]	0.67*** [0.34, 1.00]	0.50*** [0.15, 0.84]	0.34*** [0.01, 0.67]
P-value	0.35	0.78	0.39	0.15

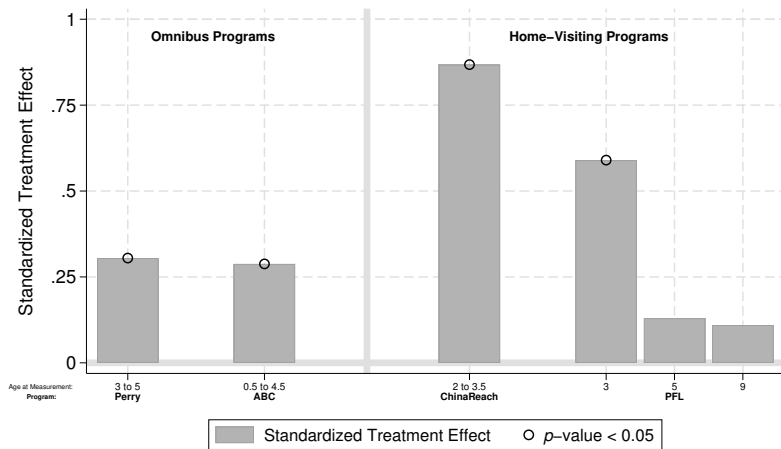
Figure 15: Cognitive and Language Skill Growth Curve Comparison: China REACH vs Jamaican Reach Up and Learn



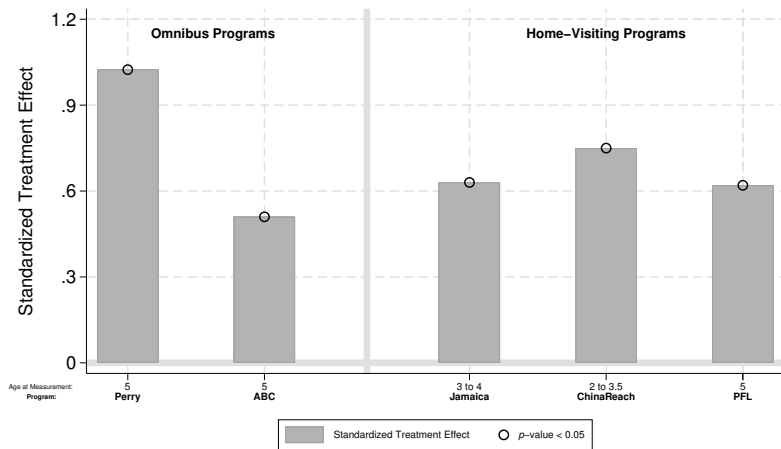
Impacts of Home Visiting Programs Compared to Omnibus

- Cost is 5% of omnibus programs or less
- Adaptable to remote rural areas and poor environments

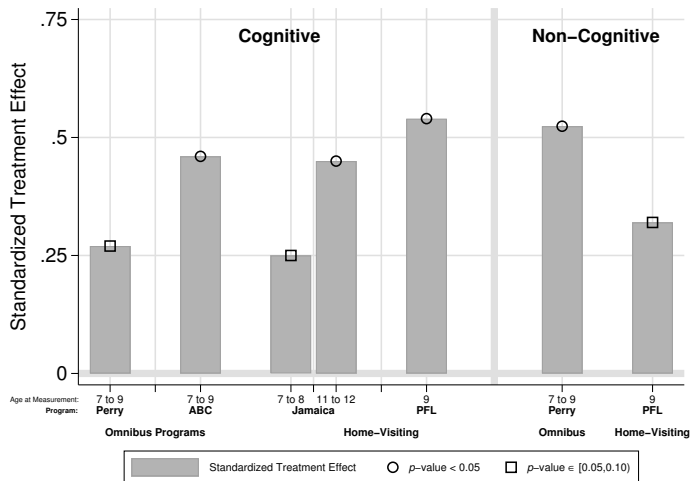
Impacts on the Home Environment, Omnibus and Home-Visiting Programs



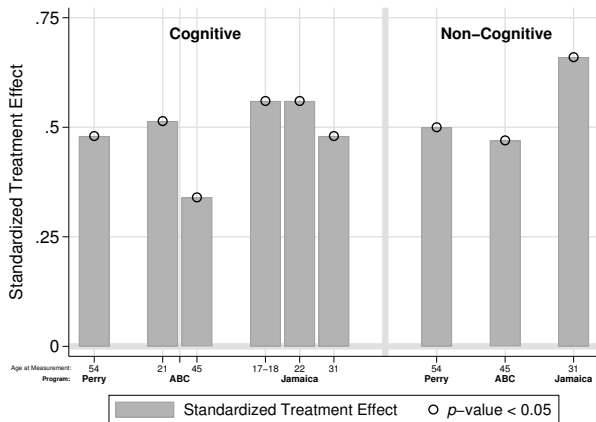
Cognitive Early-Life Skills, Omnibus and Home-Visiting Programs



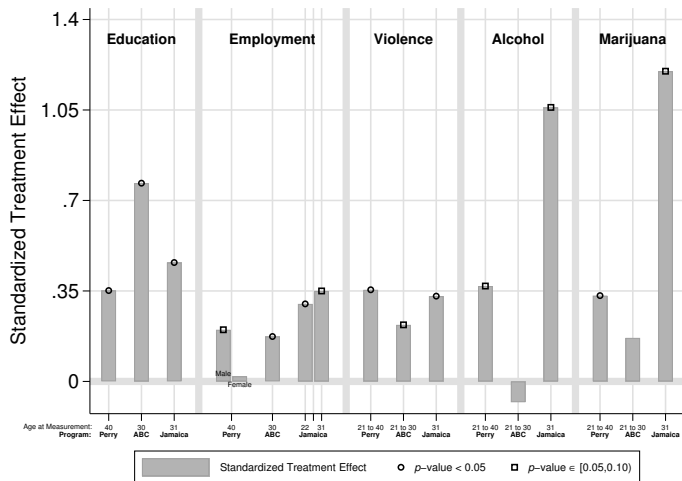
Early-Life Skills, Omnibus and Home-Visiting Programs



Adult Skills for Omnibus Programs and Jamaica



Adult Outcomes for Omnibus Programs and Jamaica



Interventions After Preschool

- Human development continues through later childhood, early adolescence, and young adulthood.
- It is a life cycle process.

Summary

- **Many countries face challenges**
- **Building skills helps meet these challenges**

- **Recognize:**

- ① Skills are multiple and measurement of program effects should recognize this
- ② Early family life a crucial determinant of life outcomes
- ③ Parenting is a central ingredient of successful interventions
- ④ Mentoring is a form of parenting

- **Early childhood interventions that stimulate parenting are effective**
 - ⓐ For children
 - ⓑ Their siblings
 - ⓒ The children of the children (intergenerational multiplier)

- **Essence of effective programs:**

- ① Interaction with children (by parents and caregivers)
- ② Jamaica “Reach Up” program is a valuable prototype

Thank You



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