Creating Opportunity and Promoting Social Mobility by Investing in Skills: A Life Cycle Perspective

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CENTER FOR THE ECONOMICS OF HUMAN DEVELOPMENT
THE UNIVERSITY OF CHICAGO
Gini 1971-2011, Hong Kong

Source: Y C Richard Wong, Endowed Professorships Public Lecture Series: The University of Hong Kong 11 April 2014
Inequality P90/P10 in Hong Kong

Household Income P90/P10

Individual Income P90/P10

Source: Y C Richard Wong, Endowed Professorships Public Lecture Series: The University of Hong Kong 11 April 2014
Figure 1: Intergenerational Mobility and Inequality: The “Gatsby Curve” Including Hong Kong, Predistribution-Gini

\[
\text{IGE: } \ln Y_1 = \alpha + \beta \ln Y_0 + \varepsilon
\]

Income in current generation

Income of parents


Note: Inequality is measured after taxes and transfers. Gini index defined on household income. IGE measured by pre-tax and transfer income of individual fathers and sons.
Figure 2: Intergenerational Mobility and Inequality: The “Gatsby Curve” for Hong Kong, Post-Gini

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Income in current generation \quad Income of parents


Note: Inequality is measured after taxes and transfers. Gini index defined on household income. IGE measured by pre-tax and transfer income of individual fathers and sons.
The traditional approach to inequality is “alms to the poor” or “redistribution.”
This approach ignores the point that capabilities are major determinants productivity of inequality.
Today, I outline a strategy based on creating capabilities
Capabilities: “Capacities” or “Skills”
● The Capacities to Act and to Create Future Capacities
Eight Lessons from the Recent Research Literature on Creating Capabilities
1. Multiple Skills
2. Gaps in Skills
3. Capabilities Can Be Created by Investment
4. Critical and Sensitive Periods in the Technology of Skill Formation
5. Family Investments
6. Resilience and Targeted Investment
7. Parent-child/Mentor-child Interactions Play Key Roles in Promoting Child Learning
8. High Returns to Early Investment
Dynamic Complementarity
Predistribution, Not Just Redistribution
A Comprehensive Understanding of Capability Formation
To effectively produce capabilities, society should take a more comprehensive approach to understanding the economics of skill development.

Need to formulate policies that clearly recognize what skills matter, how they are produced and at what stage of the life cycle it is most productive to invest, and how we should prioritize public policy toward producing skills.

Doing so avoids fragmented and often ineffective approaches to public policy that miss the pervasive importance of skills.

The skills problem is at the core of many social and economic problems that plague societies around the world.
Fragmented solutions are often ineffective.
Examples of Fragmented Solutions
- For crime, have more police.
- To promote skills, build more schools, hire better teachers, and raise test scores.
- For health, have more doctors and medical facilities. Promote nutrition: micro- and macronutrients.
- To reduce obesity, have behavioral promotional campaigns.
- For teenage pregnancy, conduct pregnancy prevention programs.
- To reduce inequality, give cash transfers and promote housing programs for the poor.
- More police reduce crime, but a more cost-effective strategy is to promote secondary school graduation (Lochner and Moretti).
- I am not saying that such policies are necessarily wrong, just that they often miss important synergisms and modern understanding of the process of capability formation.
Today I sketch a **unified** approach to policy that addresses these problems and others using a strategy of human development to promote social mobility and productivity and reduce inequality.
Prevention, not just remediation.
The Ingredients of Effective Capability Formation Strategies
The powerful role of family life and the early years in shaping adult capabilities.
Multiple capabilities shape the ability of agents to function in society. A core set of capabilities promotes success in many aspects of life.
The technology of capability formation: that capabilities beget capabilities. There is a fundamental synergism associated with capability formation. Different capabilities interact dynamically to shape the evolution of future capabilities. There are different periods of effective investment for the development of different capabilities.
Modern Understanding of Human Development
The family lives of children are the major producers of cognitive and socio-emotional skills.
• **Supplementing** the family and its resources, engaging it in enriching the life of the child, in supporting the child in school, and in giving sound advice to children, are effective policies. So are policies that enhance the skills of parents to be parents.

  (i) If society intervenes early enough and in a consistent fashion over the life cycle of a child, it can promote cognitive and socioemotional capabilities, as well as the health and wellbeing of children born into disadvantage.

  (ii) Through multiple channels, these effects percolate across the life cycle and across generations.

  (iii) For example, high-quality early interventions reduce inequality by promoting schooling, reducing crime, and reducing teenage pregnancy.

  (iv) They promote health and healthy behaviors.

  (v) They also foster workforce productivity.
(vi) These interventions have high benefit-cost ratios and rates of return. They pass efficiency criteria that any social program should be asked to pass.

(vii) Quality early childhood policies are among the rare social policies that face no equality-efficiency tradeoff.

(viii) **What is fair is also economically efficient.**

(ix) Early interventions that build the capability base of children have much higher economic returns than later remediation and prevention programs, such as public job training, convict rehabilitation programs, adult literacy programs, tuition subsidies, or expenditure on police to reduce crime.
• Universal ingredient of all successful interventions—by families, schools, and mentors in the workplace

• “Scaffolding”

• Monitoring and mentoring the child, taking stock of where they are and taking them to the next step. Interactions and interplay are at the heart of all successful skill development approaches.
The greater return to early investment arises because of the dynamics of skill formation.
# The Importance of Early Years: Skills Beget Skills

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**Outcomes:** increased productivity, higher income, better health, more family investment, upward mobility, reduced social costs.
The Importance of Cognitive and Character Skills
• Cognitive skills measured by achievement tests are important, but so are character—personality—skills:
  • Motivation
  • Sociability; ability to work with others
  • Attention
  • Self-regulation
  • Self-esteem
  • Ability to defer gratification
  • Health and mental health
Hard evidence on “soft” skills.
Fostering and Measuring Skills:
Improving Cognitive and Non-Cognitive Skills to Promote Lifetime Success

Tim Kautz, James J. Heckman, Ron Diris, Bas ter Weel, Lex Borghans
Link to Report PDF
Figure 3: Correlations of Mortality with Non-Cognitive Skills, IQ, and Socioeconomic Status (SES)

Source: Roberts et al. (2007).

Notes: The figure represents results from a meta-analysis of 34 studies. Average effects (in the correlation metric) of low socioeconomic status (SES), low IQ, low Conscientiousness (C), low Extraversion/Positive Emotion (E/PE), Neuroticism (N), and low Agreeableness (A) on mortality. Error bars represent standard errors. The lengths of the studies represented vary from 1 year to 71 years.
Ever been in jail by age 30, by ability (males)

Note: This figure plots the probability of a given behavior associated with moving up in one ability distribution for someone after integrating out the other distribution. For example, the lines with markers show the effect of increasing noncognitive ability after integrating the cognitive ability.

**Probability of Being Single With Children**

![Graph showing the probability of being single with children across different percentiles.]

**Note:** This figure plots the probability of a given behavior associated with moving up in one ability distribution for someone after integrating out the other distribution. For example, the lines with markers show the effect of increasing noncognitive ability after integrating the cognitive ability.

**Source:** Heckman, Stixrud, and Urzua (2006).
ii. By Decile of Cognitive Factor

The data are simulated from the estimates of the model and our NLSY79 sample. We use the standard convention that higher deciles are associated with higher values of the variable. The confidence intervals are computed using bootstrapping (200 draws).

iii. By Decile of Personality
• Similar pattern for many other outcomes using the same pair of skills:
  
  i  Health
  ii  Voting
  iii  Trust
  iv  Employment
  v  Wages
  vi  Participation in welfare
The GED illustrates the power of non-cognitive skills
Figure 4: Distribution of Cognitive Ability by Educational Status (No College Sample, All Ethnic Groups)

Figure 5: Distribution of Non-Cognitive Skills by Education Group

Source: Reproduced from Heckman et al. (2011), which uses data from the National Longitudinal Survey of Youth, 1979 (NLSY79).
GEDs perform in life at the level of dropouts
Figure 6: Decomposing Variance Explained for Achievement Tests and Grades into IQ and Non-Cognitive Skills: Stella Maris Secondary School, Maastricht, Holland

Source: Borghans et al. (2011).
Note: Grit is a measure of persistence on tasks (Duckworth et al., 2007).
Gaps Open Up Early
Trend in mean by age for cognitive score by maternal education

Each score standardized within observed sample. Using all observations and assuming data missing at random.

Source: Brooks-Gunn et al. (2006).
Average percentile rank on anti-social behavior score, by income quartile
Figure 7: Performance of children from different family backgrounds on the HKECDS in Study 2

<table>
<thead>
<tr>
<th>Domains</th>
<th>Working class families $M$ (SD)</th>
<th>Middle class families $M$ (SD)</th>
<th>F (1, 228)</th>
<th>$\eta_p^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal, social and self-care</td>
<td>11.76 (.23)</td>
<td>12.89 (.36)</td>
<td>7.21*</td>
<td>.03</td>
</tr>
<tr>
<td>Language development</td>
<td>22.98 (.47)</td>
<td>26.88 (.73)</td>
<td>20.18*</td>
<td>.08</td>
</tr>
<tr>
<td>Pre-academic learning</td>
<td>32.10 (.68)</td>
<td>45.44 (1.06)</td>
<td>111.48*</td>
<td>.33</td>
</tr>
<tr>
<td>Cognitive development</td>
<td>18.22 (.24)</td>
<td>20.73 (.38)</td>
<td>31.45*</td>
<td>.12</td>
</tr>
<tr>
<td>Gross motor</td>
<td>16.36 (.48)</td>
<td>14.12 (.75)</td>
<td>6.36*</td>
<td>.03</td>
</tr>
<tr>
<td>Fine motor</td>
<td>14.63 (.38)</td>
<td>13.19 (.60)</td>
<td>4.10*</td>
<td>.02</td>
</tr>
<tr>
<td>Physical fitness, health and safety</td>
<td>8.05 (.25)</td>
<td>9.79 (.39)</td>
<td>13.84*</td>
<td>.06</td>
</tr>
<tr>
<td>Self and society</td>
<td>9.77 (.31)</td>
<td>12.13 (.48)</td>
<td>17.07*</td>
<td>.07</td>
</tr>
</tbody>
</table>

* $P<.05$

Source: Rao et.al 2013
Figure 8: Performance of children from different family backgrounds on the HKECDS in the domain of Pre-academic Learning in Study 2

Source: Rao et.al 2013
Figure 9: Performance of children from different family backgrounds on the HKECDS in the domain of Cognitive Development in Study 2

Scores in Cognitive Development

K1 K2 K3

Middle Class Families

Working Class Families

Source: Rao et.al 2013
How to Interpret This Evidence
Evidence on the early emergence of gaps leaves open the question of which aspects of families are responsible for producing these gaps.

- Is it due to genes?
- Family environments? Neighborhood and community effects?
- Parenting and family investment decisions?
- The evidence from a large body of research demonstrates an important role for investments and family and community environments in determining adult capacities above and beyond the role of the family in transmitting genes.
- The quality of home environments by family type is highly predictive of child success.
Variation in Family Environments
Children enter school with “meaningful differences” in vocabulary knowledge. **1. Emergence of the Problem** In a typical hour, the average child hears:

<table>
<thead>
<tr>
<th>Family Status</th>
<th>Actual Differences in Quantity of Words Heard</th>
<th>Actual Differences in Quality of Words Heard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welfare</td>
<td>616 words</td>
<td>5 affirmatives, 11 prohibitions</td>
</tr>
<tr>
<td>Working Class</td>
<td>1,251 words</td>
<td>12 affirmatives, 7 prohibitions</td>
</tr>
<tr>
<td>Professional</td>
<td>2,153 words</td>
<td>32 affirmatives, 5 prohibitions</td>
</tr>
</tbody>
</table>

**2. Cumulative Vocabulary at Age 3**

<table>
<thead>
<tr>
<th>Cumulative Vocabulary at Age 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children from welfare families:</td>
</tr>
<tr>
<td>Children from working class families:</td>
</tr>
<tr>
<td>Children from professional families:</td>
</tr>
</tbody>
</table>
Zero Order Correlations Between Dimensions for Family Capital and Adolescents’ Academic Achievement, Hong Kong

Source: Marjoribanks and Kwok, 1998
Note: Parents are defined as the head of the household. Children are defined as individuals under 18, living in the household, and the child of the head of household. Children who have been married or are not living with their parents are excluded from the calculation. Separated parents are included in “Married, Spouse Absent” Category.
Percentage of Children under 18 Living in Single Parent Households

Source: Social Indicators of Hong Kong
Genes, Biological Embedding of Experience, and Gene-Environment Interactions
DNA methylation and histone acetylation patterns in young and old twins

Source: Fraga, Ballestar et al. (2005).
Interventions

Early childhood interventions targeted to disadvantaged children are effective in overcoming these gaps.

- They provide evidence against purely genetic arguments.
- These provide supplementary parenting for disadvantaged children.
- A primary avenue through which they operate is personality and noncognitive skills.
- Did not boost IQ.
Cognitive Evolution through Time, Perry Males

Male Cognitive Dynamics

IQ

Treatment

Control

Entry 4 5 6 7 8 9 10
Treatment 79.2 94.9 95.4 91.5 91.1 88.3 88.4 83.7
Control 77.8 83.1 84.8 85.8 87.7 89.1 89.0 86.0
Yet the Perry Program has a statistically significant annual rate of return of around 6%–10% per annum—for both boys and girls—in the range of the post–World War II stock market returns to equity in the U.S. labor market, estimated to be 6.9%. 
• It worked primarily through noncognitive and character channels.

Early interventions reducing problem behavior lower the probability of engaging in unhealthy behaviors in adulthood.
Figure 10: Mechanisms: Externalizing Behavior, Males

Data: Perry Preschool Program.
Source: Heckman, Pinto, Savelyev (2013).
Decomposition of Treatment Effects, Males

Figure 1: Decompositions of Treatment Effects, Males

- CAT total*, age 14 (+)
- Employed, age 19 (+)
- Monthly Income, age 27 (+)
- No tobacco use, age 27 (+)
- # of adult arrests, age 27 (-)
- Jobless for more than 2 years, age 40 (-)
- Ever on welfare (-)
- Total charges of viol.crimes with victim costs, age 40, (-)
- Total charges of all crimes, age 40 (-)
- Total # of lifetime arrests, age 40 (-)
- Total # of adult arrests, age 40 (-)
- Total # of misdemeanor arrests, age 40 (-)
- Total charges of all crimes with victim costs, age 40 (-)
- Any charges of a crime with victim cost, age 40 (-)

Bars represent the contribution of each factor to the overall effect. The colors indicate the type of factor:
- **Red**: Cognitive Factors
- **Blue**: Personal Behavior
- **Green**: Socio-Emotional State
- **Black**: Other Factors
Long-Term Health Effects of Perry: Males

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Control Mean</th>
<th>Treatment Mean</th>
<th>Permutation $p$-value</th>
<th>Stepdown $p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not a daily smoker at age 27</td>
<td>0.462</td>
<td>0.581</td>
<td>0.080</td>
<td>0.080</td>
</tr>
<tr>
<td>Light or non-smoker at age 27</td>
<td>0.615</td>
<td>0.903</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>No. of cigarettes at age 27</td>
<td>8.744</td>
<td>4.291</td>
<td>0.006</td>
<td>0.007</td>
</tr>
<tr>
<td>Not a daily smoker at age 40</td>
<td>0.472</td>
<td>0.633</td>
<td>0.020</td>
<td>0.041</td>
</tr>
<tr>
<td>Light or non-smoker at age 40</td>
<td>0.743</td>
<td>0.929</td>
<td>0.011</td>
<td>0.021</td>
</tr>
<tr>
<td>No. of cigarettes at age 40</td>
<td>6.543</td>
<td>3.714</td>
<td>0.036</td>
<td>0.053</td>
</tr>
<tr>
<td>Change in diet at age 40</td>
<td>0.229</td>
<td>0.380</td>
<td>0.018</td>
<td>0.061</td>
</tr>
</tbody>
</table>

Data: Perry Preschool Program. Source: Conti, Heckman et al. (2013)
## ABC Health Effects Mid 30s: Males

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<th>Stepdown ( p )-value</th>
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<tr>
<td>Diastolic Blood Pressure</td>
<td>92.000</td>
<td>78.526</td>
<td>0.023</td>
<td>0.023</td>
</tr>
<tr>
<td>Systolic Blood Pressure</td>
<td>143.333</td>
<td>125.789</td>
<td>0.020</td>
<td>0.033</td>
</tr>
<tr>
<td>Obesity &amp; Hypertension</td>
<td>0.500</td>
<td>0.111</td>
<td>0.016</td>
<td>0.016</td>
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<tr>
<td>Severe Obesity &amp; Hypertension</td>
<td>0.375</td>
<td>0.000</td>
<td>0.005</td>
<td>0.013</td>
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<tr>
<td>Hypertension &amp; Dyslipidemia</td>
<td>0.333</td>
<td>0.000</td>
<td>0.005</td>
<td>0.012</td>
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<tr>
<td>Vitamin D Deficiency</td>
<td>0.750</td>
<td>0.368</td>
<td>0.021</td>
<td>0.021</td>
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<tr>
<td>Framingham Risk Score</td>
<td>7.043</td>
<td>4.889</td>
<td>0.038</td>
<td>0.038</td>
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*Data: Abecedarian Program. Source: Campbell et al. (2014).*
Attachment, Engagement
Toward a Deeper Understanding of Parenting and Learning

- In both Perry and ABC (and many other interventions) a main channel of influence is on parent-child interactions.
- **Enhanced attachment and engagement of parents.**
- This has important implications for how we model family influence.
Dewey:

“Successful schools do what successful parents do”
—Dewey (1915)

Recent analyses would change this paraphrase to:

“Successful interventions to promote capabilities at any age do what successful parents and mentors do”
Mechanisms—producing effects

(a) Information

(b) Changing preferences of parents

(c) Parental response to child’s curiosity and interest induced by participation in the program
Understanding the Dynamics of Skill Formation: Skills Beget Skills
Synergisms: Skills Enhance Each Other
The Importance of Early Years: Skills Beget Skills

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**Outcomes:** increased productivity, higher income, better health, more family investment, upward mobility, reduced social costs.
Figure 11: Framework for Understanding Skill Development

- Prenatal Investments
- Inherited Traits
- Parenting, Environment, School
- Skills
- Skills
- Skills
- Higher Education
- Earnings
- Crime
- Health

Prenatal
Birth
Childhood
Adulthood
Critical and sensitive periods
Static complementarity: Having higher level of a skill boosts productivity of other skills in investment and performance

Dynamic complementarity: Investing today boosts the skill base for tomorrow
Dynamic complementarity increases with age
• Necessary tradeoff between equity and efficiency.
But Early Life Conditions Are Not the Full Story:
Resilience, Recovery, and Repair
Many Later Remediation Efforts Targeted to the Less Able are Costly and Often Ineffective
But Some Adolescent Policies are Effective
Mentoring and Information has a Powerful Effect
The policies that are effective for adolescents provide mentoring and integrate schooling and work. At the core of effective mentoring is what is at the core of effective parenting: attachment, interaction, and trust. Effective policies focus on developing social and emotional skills, teaching conscientiousness.
Mentoring can be effective—workplace-based intervention shape noncognitive skills.
What about promoting education?
Early development is as important as education in promoting wages, employment, and health.
Disparities by Education (Post-compulsory Education)

- Education, Wages, Employment, and Health

Schooling promotes cognitive and noncognitive abilities
Summary
Returns to a Unit HKD Invested

Rate of Return to Investment in Human Capital

- Prenatal programs
- Programs targetted toward the earliest years
- Preschool programs
- Schooling
- Job Training

Prenatal 0–3 4–5 School Post-School

Source: Heckman (2008)
• For the disadvantaged, spending in most societies is almost in reverse order.
• This diagram and its policy message have to be carefully digested.
• It presents the rate of return to a unit of investment in parenting at the beginning of the life of the child.
• Predistribution, not just redistribution.
• Prevention, not just remediation.