Parental Education and Skill Indicators of Children: an Intergenerational Mobility Study

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PIAAC CONFERENCE
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Introduction & motivation

• Intergenerational social mobility in the context of:
  • Association between family socioeconomic status and education and economic outcomes of adults
  • Socioeconomic background: parental income, education, occupation

• In a society with low mobility it is expected to see a high association between parental education and outcomes of the adults.
  • Adults from low socioeconomic status tend to stay in the cycle of disadvantage

• Find out whether there is association between parental education and odds of study in STEM as well as gender gap in STEM.
Research Questions
Absolute mobility

What are the ranges of absolute upward mobility in education in the U.S.?

**Absolute mobility**: refers to the extent to which people do better than their parents.
Relative mobility

What is the extent of relative mobility in the U.S. using summary statistics and inferential statistics?

Does relative mobility in the outcomes of interest vary across different segments of the population (race and gender)?

Relative mobility: relative mobility studies the extent to which an individual’s chances depend on his/her parent’s status such as education

Outcomes of interest: education, employment status, occupational skill classification, earnings, and cognitive skills (literacy, numeracy, and problem-solving scores)
Relationship between parental education and STEM

- Is parental education associated with propensity to study in STEM and gender gap in STEM?
Data

- Source: U.S. PIAAC 2012/2014 Public Use Data Files dataset
- Outcome variables:
  - Cognitive skills: literacy, numeracy, problem solving, and education
  - Occupation: employment status, earnings, occupation-skill
  - STEM filed of study
- Main explanatory variables: parental education
- Control variables: age groups, gender, language, racial groups, urban city, region, and (highest level of education achieved, skilled occupation).
### Specification

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>employment</td>
<td>Multinomial logistic regression</td>
</tr>
<tr>
<td>education, occupational-skill, earnings</td>
<td>Ordinal logistic regression</td>
</tr>
<tr>
<td>Study-STEM</td>
<td>Binary logistic regression</td>
</tr>
<tr>
<td>literacy, numeracy, problem solving</td>
<td>Linear regression</td>
</tr>
</tbody>
</table>
Results
Absolute mobility

- Parent-college (18%)
  - less than high school: 11%
  - high school: 41%
  - college: 48%

- Parent-high school (44%)
  - less than high school: 14%
  - high school: 57%
  - college: 29%

- Parent-less than high school (18%)
  - less than high school: 29%
  - high school: 55%
  - college: 16%

Legend:
- □ children < parent
- □ children=parent
- □ children>parent
- □ less than high school
- □ high school
- □ college
Relative mobility

Adults with higher parental education:

- have higher quartiles of Literacy, numeracy, and problem solving scores;
- are more likely to have college degree; be employed; earn higher quartiles of earnings; engaged in skilled occupations
<table>
<thead>
<tr>
<th></th>
<th>Literacy</th>
<th>Numeracy</th>
<th>Problem Solving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent-college</td>
<td>10.05***</td>
<td>9.66***</td>
<td>6.87***</td>
</tr>
</tbody>
</table>

* p < 0.10, ** p < 0.05, *** p < .01.

- As parental education increases the additional effects are not statistically different for males than females.
- Also, there is no significant differences across racial groups.
- Control variables: age groups, gender, language, racial groups, urban city, region, and highest level of education achieved.
### Panel A.

<table>
<thead>
<tr>
<th></th>
<th>Education</th>
<th>Skilled-Occupation</th>
<th>Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent-LHS</td>
<td>0.3426***</td>
<td>0.7739**</td>
<td>0.6945***</td>
</tr>
<tr>
<td>Parent-college</td>
<td>2.4845***</td>
<td>1.1636</td>
<td>1.1064**</td>
</tr>
</tbody>
</table>

### Panel B. by gender

<table>
<thead>
<tr>
<th></th>
<th>Education</th>
<th>Skilled-Occupation</th>
<th>Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent-LHS*female</td>
<td>0.8392</td>
<td>1.3644</td>
<td>0.7699</td>
</tr>
<tr>
<td>Parent-college*female</td>
<td>1.2234***</td>
<td>0.8586</td>
<td>1.5103***</td>
</tr>
</tbody>
</table>

- Control variables: age groups, gender, language, racial groups, urban city, region, and highest level of education achieved (additional control of skilled-occupation for earnings).

\* $p < 0.10$, ** $p < 0.05$, *** $p < .01$. 
Panel A. Unemployed Out of labor force

<table>
<thead>
<tr>
<th></th>
<th>Unemployed</th>
<th>Out of labor force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent- LHS</td>
<td>1.0987</td>
<td>1.2491***</td>
</tr>
<tr>
<td>Parent-college</td>
<td>0.8071*</td>
<td>0.7518***</td>
</tr>
</tbody>
</table>

Panel B. by gender

<table>
<thead>
<tr>
<th></th>
<th>Unemployed</th>
<th>Out of labor force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent-LHS*female</td>
<td>1.1315</td>
<td>0.7694</td>
</tr>
<tr>
<td>Parent-college*female</td>
<td>1.0651</td>
<td>0.9839</td>
</tr>
</tbody>
</table>

- Hispanics have lower odds to be unemployed or out of labor force compared to whites when parental education changes from high school to LHS.
- There is no racial differences when parental education increases from HS to college.

*p < 0.10, **p < 0.05, ***p < .01.
<table>
<thead>
<tr>
<th>Panel A.</th>
<th>STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent-LHS</td>
<td>0.8259</td>
</tr>
<tr>
<td>Parent-college</td>
<td>0.8794***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B. by gender</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent-LHS*female</td>
<td>0.7686</td>
</tr>
<tr>
<td>Parent-college*female</td>
<td>1.1285</td>
</tr>
</tbody>
</table>

- There is no racial difference when parental education increases from HS to college.

* p < 0.10, ** p < 0.05, *** p < .01.
Conclusion

- Strong association between family socioeconomic background and adults education and economic outcomes.
  - Adults with higher educated parents are more likely to: attain college degrees, be employed, engage in skilled occupations and receive higher quartiles of earnings.
  - Higher parental education helps in reducing gender gap in skilled-occupation and earnings.
  - This study did not find any impact of parental education on the probability to study STEM as well as gender gap in STEM.
Policy implications

- Importance of adult literacy & education: improving the outcomes of the next generation as well as reducing gender gap
- Policies promoting early interventions to improve health and educational opportunities
- Effective redistributive policies to shaping equal opportunities for all children, social assistance programs (e.g. Head Start)
- Policies promoting higher parental involvement through education system.
Thank you
Specification cont.

◦ Multinomial logistic:

\[
\ln \left( \frac{P(\text{Outcome}_{\text{child}_i})}{P(\text{OutcomeRef}_{\text{child}_i})} \right) = \beta_0 + \beta_1 \text{EducCollege}_{\text{parent}_i} + \\
\beta_2 \text{EducLessHighSchool}_{\text{parent}_i} + \\
\beta_3 X_{\text{child}_i} + \varepsilon_i
\]

◦ Linear regression:

\[
\text{Outcome}_{\text{child}_i} = \beta_0 + \beta_1 \text{EducCollege}_{\text{parent}_i} + \\
\beta_2 \text{EducLessHighSchool}_{\text{parent}_i} + \beta_3 X_{\text{child}_i} + \varepsilon_i
\]
**Specification cont.**

- **Interaction terms:**

\[
\ln \left( \frac{P(\text{Outcome}_{\text{child}_i})}{P(\text{OutcomeRef}_{\text{child}_i})} \right) = \beta_0 + \beta_1 \text{EducCollege}_{\text{parent}_i} + \\
\beta_2 \text{EducLessHighSchool}_{\text{parent}_i} + \beta_3 \text{EducCollege}_{\text{parent}_i} * \\
\text{popcharacter}_{\text{child}_i} + \beta_4 \text{EduLessHighSchool}_{\text{parent}_i} * \text{popcharacter}_{\text{child}_i} + \\
\beta_5 X_{\text{child}_i} + \varepsilon_i
\]

- **Stem-Study:**

\[
\ln \left( \frac{P(\text{STEM}_{\text{child}_i})}{P(\text{NoSTEM}_{\text{child}_i})} \right) = \beta_0 + \beta_1 \text{EducCollege}_{\text{parent}_i} + \\
\beta_2 \text{EducLessHighSchool}_{\text{parent}_i} + \beta_3 X_{\text{child}_i} + \beta_r + \varepsilon_i
\]
Appendix
<table>
<thead>
<tr>
<th></th>
<th>Education</th>
<th>Occupation-skill</th>
<th>Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent-LHS*Hispanic</td>
<td>1.3790</td>
<td>1.1832</td>
<td>1.5774***</td>
</tr>
<tr>
<td>Parent-LHS*Black</td>
<td>1.4812***</td>
<td>1.0831</td>
<td>1.1642</td>
</tr>
<tr>
<td>Parent-LHS*Other</td>
<td>1.8152</td>
<td>1.3938</td>
<td>1.3177</td>
</tr>
<tr>
<td>Parent-college*Hispanic</td>
<td>0.7752</td>
<td>0.7972**</td>
<td>1.1667</td>
</tr>
<tr>
<td>Parent-college*Black</td>
<td>0.7737</td>
<td>1.1516*</td>
<td>0.9921</td>
</tr>
<tr>
<td>Parent-college*Other</td>
<td>0.8644</td>
<td>0.9685</td>
<td>1.0185</td>
</tr>
</tbody>
</table>

* p < 0.10, ** p < 0.05, *** p < .01.