The Impact of Education on Personality – Evidence from a German High School Reform

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Motivation & Research Questions
Personality traits are important determinants of economic and social outcomes: labor market success, education, health, crime... (see Almlund et al., 2011). But there is far less evidence in the economic literature on which factors matter for skill formation:
- Nature vs. nurture
- Personality is mainly developed throughout childhood and adolescence (pre- and educational period). However there is little direct evidence on the effect of schooling on personality (almost exclusively on the US).
- Intervention studies focus on children of preschool age (e.g. Heckman et al., 2013)
- Evidence on malleability of personality in adolescence is very limited (e.g. Martin, 2010)

Research Questions
1. Does education have an impact on personality traits of adolescents in Germany?
2. Which students are most likely to change their personality following educational changes?

Conclusions
We conclude that personality traits remain malleable in adolescence and that the educational system plays a role in shaping them.

- Potential mechanisms:
  - Higher annual workload and increased learning intensity of students, the higher accumulated knowledge at the same age, stronger student-teacher or student-student interactions as a result of longer school days.
  - Change in time allocation away from non-academic activities proves to be unlikely.
  - The "delegation" of noncognitive skills constitute a potentially substantial, source of hidden costs – our findings may therefore point to the necessity for educational policies to take the impact of educational changes on personality traits into consideration.

Data
- German Socio-Economic Panel (SOEP) Study (years 2005 to 2012)
  - Adolescents aged 17 and adult respondents aged 17 to 21 who attend Gymnasium or with completed abitur
  - Exclusion of Saxony, Thuringia, and Rhineland-Palatinate
  - 231 individuals affected by the reform
  - 847 individuals not affected by the reform

Personality Traits (standardized)
- Big Five: openness to experience, conscientiousness, extraversion, agreeableness, neuroticism
- Internal locus of control

Results
- The reform (2001 to 2007) reduced the number of school years which are required to obtain a university entrance degree (Abitur) to make graduates from German high schools (Gymnasium) internationally more competitive.
- Before: 13 school years, of which 9 years were spent in high school
- After: the required number of years at high school was reduced for newly entering students from 9 to 8

The curriculum was maintained
- Longer school days, accompanied with an increase in all-day schools were not reduced: average week-hours increased from 30 to 33.
- Higher workload: 265 year-week hours from grade 5 to final grade

The reform was gradually introduced in Germany’s federal states.

Empirical Strategy
We use the reform as a quasi-experimental
- Based on date of birth and state, students belong to the treatment group (8 years of high school) or control group (9 years of high school)
- We exploit the variation in time and region to isolate effects of the reform from other influential factors, and estimate the following model:

\[ \text{Personality} = \alpha + \beta_1 \text{Reform} + \beta_2 \text{State} + \beta_3 \text{Year} + \epsilon \]

where
- \( \alpha \) is any personality measure of person \( i \) in state \( st \) entering high school in year \( y \)
- \( \text{Reform} \) equals 1 if in state \( st \) students entering high school in year \( y \) are affected by the reform, 0 otherwise
- \( \text{State} \) and \( \text{Year} \) are fixed effects

The German High School Reform
The reform subverted the number of school years which are required to obtain a university entrance degree (Abitur) to make graduates from German high schools (Gymnasium) internationally more competitive.

- Before: 13 school years, of which 9 years were spent in high school
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The curriculum was maintained
- Higher workload: 265 year-week hours from grade 5 to final grade were not reduced: average week-hours increased from 30 to 33.
- Longer school days, accompanied with an increase in all-day schools among Gymnasiums from 12% to 49%.

The reform was gradually introduced in Germany’s federal states.

Table 1: Effects of the Reform on Personality

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Treatment</th>
<th>Nature</th>
<th>State</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reform</td>
<td>-0.162</td>
<td>-0.107</td>
<td>0.109*</td>
<td>0.235</td>
<td>0.208*</td>
<td>-0.098*</td>
</tr>
<tr>
<td></td>
<td>(0.144)</td>
<td>(0.107)</td>
<td>(0.104)</td>
<td>(0.154)</td>
<td>(0.142)</td>
<td>(0.129)</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.145</td>
<td>0.050</td>
<td>0.074*</td>
<td>0.231*</td>
<td>0.206*</td>
<td>0.200*</td>
</tr>
<tr>
<td></td>
<td>(0.141)</td>
<td>(0.105)</td>
<td>(0.104)</td>
<td>(0.154)</td>
<td>(0.142)</td>
<td>(0.129)</td>
</tr>
<tr>
<td>Female</td>
<td>-0.104</td>
<td>-0.010</td>
<td>0.013</td>
<td>0.087</td>
<td>0.124*</td>
<td>-0.017</td>
</tr>
<tr>
<td></td>
<td>(0.098)</td>
<td>(0.052)</td>
<td>(0.073)</td>
<td>(0.075)</td>
<td>(0.061)</td>
<td>(0.072)</td>
</tr>
<tr>
<td>Social area</td>
<td>-0.012</td>
<td>-0.006</td>
<td>0.021</td>
<td>0.038</td>
<td>0.060</td>
<td>0.036</td>
</tr>
<tr>
<td></td>
<td>(0.070)</td>
<td>(0.054)</td>
<td>(0.075)</td>
<td>(0.082)</td>
<td>(0.079)</td>
<td>(0.059)</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>-0.064</td>
<td>-0.046</td>
<td>0.087</td>
<td>0.030</td>
<td>0.112</td>
<td>-0.006</td>
</tr>
<tr>
<td></td>
<td>(0.101)</td>
<td>(0.084)</td>
<td>(0.094)</td>
<td>(0.033)</td>
<td>(0.077)</td>
<td>(0.073)</td>
</tr>
<tr>
<td>Students without a working mother experienced a decrease in openness.</td>
<td></td>
<td></td>
<td></td>
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<td>Conscientiousness increased for students with migration background.</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Introduction of the reform by state

Figure 2: Average Effects of the Reform on Personality (with 95% CI)

Figure 3: Heterogeneous Effects of the Reform on Extraversion

Figure 4: Heterogeneous Effects of the Reform on Agreeableness

Notes: (1) ** (2) denote statistically significant differences with p < 0.05, and p < 0.01 respectively.

Selected References

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