

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 during (pre-) 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. Martins, 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?

Contributions

- Identify causal effects of the German high school reform, which reduced length of schooling leaving the overall curriculum unchanged, on adolescents' personality by considering *all* affected federal states → variation in time allows to isolate effect from other policy changes.
- Investigate how the educational change affected particular groups of students differently.
- Complement the limited and US focused research on the malleability of personality in adolescence and the impact of schooling thereon.

THE GERMAN HIGH SCHOOL REFORM

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.

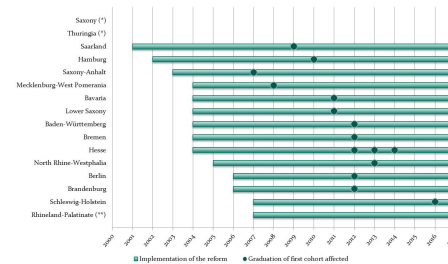
- Before: 13 school years, of which 9 years were spent in high school
- After: the required number of years at high school was reduced for newly entering students from 9 to 8

The curriculum was maintained

- 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.

Figure 1: Introduction of the reform by state



(*) Saxony and Thuringia already had established a 12-year school system since the 1990s. (** In Rhineland-Palatinate the reform has only been introduced in selected schools so far. Source: Bildungsbericht (2010). W. Bertelsmann Verlag GmbH & Co. Bielefeld.

RESULTS

1. The German High school reform...

- increased neuroticism (more than 1/4 of a standard deviation).
- increased extraversion and agreeableness in some specifications.

2. The reform affected students differently.

- Agreeableness increased for male students and students in West Germany.
- Extraversion increased for students from disrupted families and in West Germany.
- Increase in neuroticism was stronger for students in East Germany.
- Students without a working mother experienced a decrease in openness.
- Conscientiousness increased for students with migration background.

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

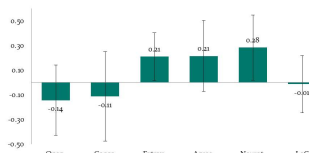


Table 1: Effects of the Reform on Personality

	Outcome Variables: Personality Traits					
	Open.	Consc.	Extrav.	Agree.	Neurot.	LoC
Reform	-0.162 (0.143)	-0.107 (0.187)	0.193* (0.104)	0.223 (0.154)	0.268* (0.142)	-0.016 (0.129)
Reform	-0.144 (0.145)	-0.113 (0.185)	0.209* (0.099)	0.214 (0.147)	0.282* (0.135)	-0.014 (0.118)
Female	-0.004 (0.059)	-0.018 (0.092)	-0.013 (0.073)	-0.007 (0.075)	0.024 (0.064)	-0.017 (0.072)
Rural area	-0.012 (0.070)	-0.096 (0.096)	0.071 (0.078)	-0.028 (0.062)	0.066 (0.059)	-0.046 (0.059)
Non-intact family	0.064 (0.053)	-0.066 (0.091)	0.087 (0.088)	-0.069 (0.069)	0.112 (0.077)	-0.096 (0.073)
Workingclass father	-0.250** (0.101)	0.081 (0.082)	-0.065 (0.082)	-0.019 (0.046)	0.140 (0.116)	-0.003 (0.077)
High parental educ.	0.019 (0.074)	-0.227** (0.054)	-0.142 (0.087)	-0.046 (0.059)	-0.018 (0.053)	0.036 (0.048)
Working mother	0.093 (0.076)	-0.076 (0.064)	0.132* (0.063)	-0.030 (0.045)	-0.121** (0.043)	-0.033 (0.075)
Christian parents	0.082 (0.065)	0.121 (0.070)	-0.041 (0.060)	-0.062 (0.061)	0.067 (0.077)	-0.021 (0.058)
Migration backgr.	0.045 (0.113)	-0.180** (0.051)	-0.023 (0.086)	-0.103 (0.092)	-0.035 (0.086)	0.046 (0.060)
Low perf. student	-0.001 (0.058)	-0.072 (0.049)	-0.126 (0.084)	0.012 (0.063)	0.030 (0.081)	-0.122 (0.081)
Observations	1047	1054	1055	1056	1052	1015

Notes: SOEPv20 waves 2005 to 2012. OLS regressions. Age, age squared and a maximum set of dummies (for state, for year of school entry, for different SOEP samples) and a constant are included. Standard errors (in parentheses) clustered at state level. * p<0.1, ** p<0.05, *** p<0.01.

CONCLUSION

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 "deterioration" 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
- 211 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

EMPIRICAL STRATEGY

We use the reform as a quasi-natural experiment

- 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:

$$y_{ist} = \alpha \text{REFORM}_{st} + X_i \beta + \sum_s \gamma_s \text{STATE}_s + \sum_t \delta_t \text{YEAR}_t + \varepsilon_{ist}$$

where

- y_{ist} is a personality measure of person i in state s entering high school in year t
- REFORM_{st} equals 1 if in state s students entering high school in year t are affected by the reform, 0 otherwise
- X_i is a vector of (pre-reform) individual characteristics, STATE_s are state dummies, YEAR_t are year dummies, ε_{ist} are error terms clustered at the state level

Figure 3: Heterogeneous Effects of the Reform on Extraversion

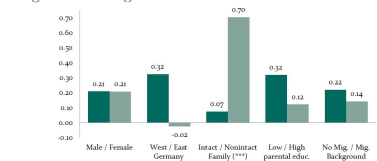
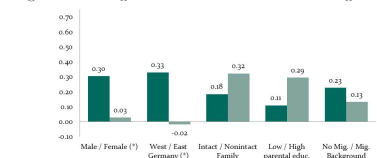


Figure 4: Heterogeneous Effects of the Reform on Agreeableness



Notes: (*), (**), (***) denote statistically significant differences with p<0.1, p<0.05, and p<0.01 respectively.

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