Network resources, resource deficits and the consequences of homophily on educational outcomes. Evidence from school class networks in 4 European countries.

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Abstract
Residential segregation, national admission policies for higher secondary education and perceptions of residential status result in school compositions that are segregated in terms of parental status and SES. This paper investigates the effects of resources available in the school-related networks of students and their perceived value in gaining access to others' resources. We assume that social ties grow across additional resources and that benefits of education-related resources are higher. We examine that social ties grow across additional resources and that benefits of education-related resources are higher. We explore whether students from lower SES families access to students from higher SES backgrounds. Researchers students from a European countries, we find pronounced status differences in terms of the resources that are available to students through these social ties which follows previous selection processes. Our results support the hypothesis that homophily in peer selection, educational outcomes are affected by the status composition of the social network and also the status homophily on the class level. However, these effects are rather weak.

Research questions
- Does the composition of ego-networks influence educational outcomes of students (given the prior selection into schools)?
- Are class-level density and socio-economic status homophily systematically related to the educational outcomes?

Theoretic Considerations
- Educational outcomes are a result of previous resources from family (t) or others: 

\[ R_{i,t-1} = R_{i,t-1} + R_{i,t-1} \]

- Students from lower socio-economic (SES) families are less adjusted to the demands in school because they enter with lower educational resources.

\[ R_{i,t-1} \]

- Bourdieu (1983) and Coleman (1988) popularized the idea that social ties have an instrumental value in gaining access to others' resources. The specific utility of peer ties stems from their potential to increase either knowledge and skills, or by altering the effect in learning (e.g. by motivating contagion).

\[ R_{i,t-1} \]

- H1-1: Students with more social ties perform better because they can access additional education-related resources. However, the returns to additional ties are decreasing.

- Since education-related resources depend on the familial SES, the performance effect of ties is shaped by their SES composition:

\[ R_{i,t-1} \]

- H1-2: Students who are connected to peers from higher family status background will perform better, because they can access more education-related resources and at average higher motivation.

- Beyond effects of individual direct ties, we hypothesize effects of class-level properties of networks on educational outcomes:

\[ R_{i,t-1} \]

- H2: Students in denser classes perform better, because the overall circulation of education-related resources is higher.

- H3: Students in classes that are less status-homophilous and less segregated perform better, because the overall circulation of education-related resources is higher and less redundant.

- All those mechanisms can be analyzed for their impact on the inequality of educational outcomes. Following Lin (2001), the total effect of class networks on IEO can be driven by SES-based differences in peer ties (resource deficits) or differential returns of those ties (return deficits).

\[ H1-1: \text{Students from lower socio-economic status have higher educational returns to social ties, because of a higher likelihood of augmenting their familial resources and higher benefits, given the same information input.} \]

\[ H2-2: \text{A higher SES composition of ties is especially beneficial for lower SES students, because their return of gaining from the transfer of resources is higher.} \]

Used Dataset
We researched those questions by using the The Children of Immigrants Longitudinal Survey (CILS4EU, Kalter et al., 2017) which is covering 18'700 14 year-old students from 4 European countries: Germany, Netherlands, Sweden and the UK. The strength of this dataset is the detailed measurement of social relationships and especially the school-related friendship and learning networks of students at different points in time. We generated social network graphs for every class and estimated the resources embedded in the ties of every student, the density of the class and SES-homophily.

Descriptive findings: Substantial resource deficits of students from lower SES families

- a) Students from lower SES families have less ties.

- b) The SES of the network partners of students from lower SES families is at average lower.

Preliminary results for (homework network)
- We specified the following status-sensitive resource indicator:

\[ (R_{i,t-1}) = (\log(n_i) * (\sum_{j \neq i} R_{j,t-1}(f_i)/n_i)) \]

- We computed a value-added model for math grades measured two years after (including students from NDL and GER) that controlled for the math grades.

- SES-segregation was operationalized by usage of ERG models that estimated whether in classes of given composition students choose more students from the same SES.

References
