Social stratification and doctoral education

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Introduction
Social and educational inequality is a widely discussed phenomenon which does not stop at the boarders of universities. Worries about a shortage of young researchers, skill shortage in the STEM disciplines as well as wasted potentials due to effects of students social origin. Beyond rational arguments: Equal opportunities irrespective of social origin and irrespective of social, political or economic demands.

Aim
Aim of our research is to illustrate:
- Selectivity of doctoral education in life sciences
- Unreal effects of stratification on the success of the doctorate
- Show in how far structured models of doctoral training can moderate the effects of stratification

Theory
Primary and secondary effects of stratification (Bourdieu 1974)
- Primary effects of stratification:
  - Lack of economic and cultural capital
  - Less parental/familial support
  - Employment not related to doctorate
  - Decreased performance during doctorate
- Secondary Effects of stratification:
  - Transition from one to the next level of education
  - Rational assumptions of students and parents
  - Restricted by habitus: what is possible, what is plausible, what is unthinkable?
- Structure supposed to reduce non-metricocratic effects on outcome of doctorate

Methods
- Standardized questionnaire
- Doctoral graduates from medical or biological departments in Bavaria, North Rhine-Westphalia and Saxony (N=945)

Socio-economic status (SES)
- Highest formal education of father and mother
- Occupational position of father and mother
- Quantified via multiple correspondence analysis (MCA)

Multivariate analysis: path analysis

Results
Highly selective sample: 70% (natural sciences) and 81% (medicine) of the respondents stem from a family in which at least one parent has a higher secondary degree (A levels, Garman Abitur) or a higher degree → indication for secondary effects of stratification

Effects of stratification (Figure 1, Table 1): Only small total effects of SES on success:
- The higher SES the more articles were published during doctorate → indication for effects of cultural capital
- No effect of migration background on success
- Pronounces gender effects on success:
  - Men publish more articles during doctorate
  - Men finish their doctorate with a better grade
  - Men are more satisfied with the results of their doctorate

Structured doctorate as moderator:
- No effects of structured doctorate on the effects of SES

Versatile effects of SES on funding and employment during doctorate (Table 2)

Research related employment/funding promotes success

Non-scientific employment decreases success

Figure 1: Effects of social stratification on success of doctorate

Duration of doctorate in years

No. of articles published

Subjective success

Table 1: Path analysis: Funding and success of doctorate – total effects

<table>
<thead>
<tr>
<th>Research Associate</th>
<th>Student assistant</th>
<th>Scholarship</th>
<th>Non-scientific occupation</th>
<th>Parents/relatives</th>
<th>Partner/spouse</th>
<th>Benefit/student loan</th>
<th>Subjective success</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.428* (0.210)</td>
<td>0.466*** (0.127)</td>
<td>0.254* (0.125)</td>
<td>0.445* (0.151)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>0.428** (0.107)</td>
<td>0.610** (0.127)</td>
<td>0.412** (0.247)</td>
<td>0.517* (0.247)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>0.711*** (0.144)</td>
<td>0.225* (0.114)</td>
<td>-0.318** (0.319)</td>
<td>0.208* (0.247)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.382* (0.208)</td>
<td>-0.261* (0.142)</td>
<td>0.386</td>
<td>0.347</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R²: 0.283, 0.264, 0.386, 0.347

Notes: only significant effects shown:** p<0.001, * p<0.01, . p<0.05. F: p<.05. Unstandardized coefficients; standard error in parentheses. All coefficients estimated in one path model. N: 945. Variable in the model: SES, SES², migration background, structured doctorate, discipline, gender, age, success of doctorate

Table 2: Path analysis: SES and funding of doctorate—direct effects

<table>
<thead>
<tr>
<th>Research associate</th>
<th>Student assistant</th>
<th>Scholarship</th>
<th>Non-scientific occupation</th>
<th>Parents/relatives</th>
<th>Partner/spouse</th>
<th>Benefit/student loan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.260*</td>
<td>0.601*</td>
<td>0.543*</td>
<td>1.178*</td>
<td>1.718*</td>
<td>2.783*</td>
<td>0.482*</td>
</tr>
<tr>
<td>0.918</td>
<td>1.008</td>
<td>0.995</td>
<td>0.968*</td>
<td>1.079*</td>
<td>0.824*</td>
<td></td>
</tr>
<tr>
<td>0.552</td>
<td>0.077</td>
<td>0.366</td>
<td>0.773*</td>
<td>0.472*</td>
<td>0.124*</td>
<td>0.088</td>
</tr>
</tbody>
</table>

Notes: ** p<0.001, * p<0.01, . p<0.05. F: p<.05. Odds ratios. All coefficients estimated in one path model. N: 945. Variable in the model: SES, SES², migration background, structured doctorate, discipline, gender, age

Conclusion

- High degree of selection before doctorate
- Primary measures to reduce stratification before doctorate
- Only small effects of stratification
- Likely due to a lack of cultural capital
- Funding and employment
- Extension of research-close funding and employment opportunities to improve results of doctorate
- Further research:
  - Focus on gender and discipline
  - Elaborate the effects of cultural capital and habitus

References

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