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Lost Female Talent: Gender Differences in College Aspirations and Expectations in Germany

Discussion Paper

P 2023-002

Juli 2023

Forschungsabteilung

Forschungsgruppe der Präsidentin

Wissenschaftszentrum Berlin für Sozialforschung gGmbH
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Wissenschaftszentrum Berlin für Sozialforschung (2023)

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Lost Female Talent: Gender Differences in College Aspirations and Expectations in Germany

from Melinda Erdmann, Marcel Helbig and Marita Jacob

Our study focuses on the gender gap in college aspirations and enrolment among high school students in Germany. We build on socialisation theory, rational choice theory, and formal restrictions to college access to explain gender differences in idealistic college aspirations, realistic college expectations, and the disparities between the two. Specifically, we examine the prevalence of 'pessimistic' college expectations, where college aspirations are higher than expectations, which we expect to be more likely among young women than young men.

By analysing survey data from 1,766 upper secondary students in Germany, we find that women are equally interested in pursuing higher education as their male counterparts. They even express higher aspirations for college enrolment. However, women are more pessimistic than men about realising their aspirations. While factors such as the subjective probability of success and perceived costs impact both genders, young women are also affected by formal restrictions limiting entry to their preferred fields of study.

1 Introduction

Women's participation in higher education has risen significantly in many industrialised countries. Women outperform men academically in several countries, choose more challenging educational paths, and are more likely to qualify for university admission (Breen et al., 2010; Buchmann et al., 2008). In most OECD countries, more females than males enrol in tertiary education (OECD, 2019, p. 204). However, in several countries, such as Austria, Germany, Italy, Poland, and Switzerland, some women who are eligible to enrol choose not to do so (see Appendix Figure A1). Our study explores why female upper secondary school students may refrain from enrolment. More specifically, we examine whether and why students who aspire to enrol in higher education are pessimistic about actual enrolment.

We combine three complementary theoretical explanations for gender differences in college aspirations and expectations. First, socialisation theory proposes that men and women develop gender-specific vocational interests and career aspirations. As women's career and life goals may less frequently require a tertiary degree, they are less likely to enrol in tertiary education, even if entitled to do so (e.g. Charles & Bradley, 2002). This might be particularly common in countries where the education system offers attractive non-academic options. Second, rational choice theory suggests that gender-specific evaluations of costs, benefits, and probability of success result in gender differences in enrolment because women are less confident about succeeding in higher education and less optimistic about their labour market return potentials (Barone et al., 2017). Finally, specific constraints and formal restrictions to enrolment in some fields of study may affect men's and women's aspirations and expectations differently. For example, fields women prefer, such as medicine or psychology, have demanding admission criteria (Finger, 2016; for STEM enrolment, see Jacob et al., 2020).

Previous research on gender differences in higher education attainment has mainly focused on actual enrolment and graduation, failing to distinguish between what women *want* in an ideal situation and what they *do* in reality. For example, women and men might be equally interested in attaining a degree; however, women may be more likely to refrain from pursuing their aspirations due to lower expected returns or other specific constraints. Therefore, we propose an analytical separation of *idealistic college aspirations* and *realistic college expectations* to illuminate why women often forego

enrolment despite their entitlement. Against this background, we developed two research questions: (1) Do men and women differ in their idealistic college aspirations and realistic college expectations, and if so, why? (2) Are there gender differences in the gap between idealistic aspirations and realistic expectations and in the explanations for these disparities?

Our study extends previous research in several important ways. First, the distinction between idealistic college aspirations and realistic expectations allows us to model gender differences in unconstrained educational aspirations. We can also model potential gender differences in perceived constraints that may limit the realisation of idealistic aspirations. This approach allows us to examine possible female ‘lost talents’ who are entitled to enrol but do not. Previous research has not studied the experiences of these individuals. Second, investigating college aspirations and expectations contributes to understanding educational decisions as the outcome of a process (cf. Gottfredson, 1981). Finally, we focus on Germany and the specific setting of the post-secondary education system, contributing to the literature on the relevance of attractive non-academic pathways that may divert students from entering tertiary education (Hillmert & Jacob, 2003; Pilz et al., 2020).

From a policy perspective, understanding the factors contributing to the aspirations–expectations gap may help identify potential female (and male) ‘lost talent’. Programmes and interventions to encourage enrolment may need to consider initial educational aspirations and potential barriers to the realisation of those aspirations.

2 Background

2.1 Previous Research: Gender Differences in Educational Expectations and Aspirations

In many Western industrialised countries, women outnumber men in tertiary enrolment (e.g., OECD, 2019, p. 198). Nevertheless, this is accompanied by gender segregation by field of study (e.g., Barone & Assirelli, 2020; Galos & Strauss, 2022). Before enrolment, girls express higher educational aspirations than boys (e.g. for the UK, Berrington et al., 2016; for the US, Reynolds & Johnson, 2011; Carolan, 2017; see also Ortiz-Gervasi, 2020

using PISA 2003 data).¹

However, this pattern only exists in some countries. In a comparative study of 12 countries based on TIMSS data, Buchmann and Dalton (2002) showed that Austria, Germany, and Norway did not exhibit gender differences in expectations. Furthermore, in Switzerland, girls had lower aspirations than their male peers. McDaniel (2010, p. 29) reported similar findings based on the PISA 2005 dataset. Austria, Germany, and Switzerland were again among the ten countries where young women did not express higher expectations about their education.²

Previous research has investigated gender differences in aspirations (Berrington et al., 2016; Reynolds & Johnson, 2011) and expectations (Buchmann & Dalton, 2002; Carolan, 2017; McDaniel, 2010; Ortiz-Gervasi, 2020). Aspirations refer to students' ideal hopes and desires for educational attainment, while expectations are realistic evaluations based on perceived opportunities, barriers, and constraints (Kerckhoff, 1976). Although aspirations and expectations are related, they are conceptually distinct (as discussed in Haller's seminal 1968 work). Therefore, aspirations, expectations, and actual educational attainment may not always align (Fishman, 2019; Khattab, 2014).

Several studies in the 1970s and 1980s investigated the alignment of aspirations and expectations, showing a greater coherence between boys' aspirations and expectations than girls' aspirations and expectations (e.g. Crowley & Shapiro, 1982; Marini, 1978). These studies showed that women were more likely to adjust their educational expectations to be lower than their initially high aspirations, especially when they desired marriage and children (Haggstrom et al., 1986; Marini, 1984). Hanson (1994) introduced the term 'lost talent' to describe these disparities between educational aspirations and expectations. It refers to individuals whose initial aspirations exceeded their expectations (and later attainment).³ In the study,

¹ Over time, a considerable shift has occurred from boys' aspirations being higher than girls' expectations to the opposite (for a review of the literature before the 1980s, see Marini, 1978; for a cohort comparison, see Reynolds & Johnson, 2011).

² No significant difference in expectations was found in Denmark, Finland, Luxemburg, the Netherlands, New Zealand or Korea. In Japan, boys were significantly more likely than girls to expect that they would complete tertiary education (McDaniel, 2010).

³ The analysis was limited to students with above average achievement to identify potential talent for enrolment and successful college completion.

female high school seniors were highlighted as lost talents because they were likelier than men to have lower expectations than aspirations. Another study by Reynolds and Johnson (2011), using data from high school seniors between 1976 and 1990, found that in more recent cohorts, women were more likely than men to plan for a tertiary degree. However, they were less likely to have achieved their initial college plans and obtained a degree 11 to 12 years later.

Three aspects of the existing research motivate further investigation. First, most studies on decreasing gender inequalities in higher education have focused on the rise of female enrolment and – in some countries – the reversal of the gender gap in favour of women. This strand of research does not recognise the entitlement–enrolment gap that results in ‘stalled’ female attendance in tertiary education, such as in Germany.

Second, due to different operationalisations of aspirations and expectations (see Manski, 2004) and the lack of available data on these variables, gender differences in aspirations and expectations have not been extensively studied. Women may simply be less likely to want to enter higher education and aspire to a tertiary degree. However, it could also be that women would like to obtain a tertiary degree like their male peers, but they have lower expectations about enrolment due to specific barriers and constraints.

Third, the empirical literature on this topic often lacks a forward-looking approach when considering opportunities and constraints impacting educational expectations. Recent studies have focused on how new information about *past* academic performance influences expectations (Andrew & Hauser, 2011; Carolan, 2017; Karlson, 2015); however, research on changing expectations, particularly the disparity between aspirations and expectations resulting from perceived *future* benefits and constraints, has been relatively limited (Barone et al., 2017).

Finally, recent comparative research on educational expectations has noted the importance of national education systems in structuring students’ opportunities and constraints. Institutional constraints and enrolment opportunities in higher education include formal admission barriers and alternative non-academic options. Therefore, the educational system’s specificities must be considered when examining aspirations and expectations.

Within this context, we use Germany as a case study to examine high school seniors (students at the end of upper secondary education one year before attaining their *Abitur*; see the section below). We look at educational aspirations and expectations with a particular emphasis on gender differences and propose prospective evaluations to explain the potential disparity between aspirations and expectations. Before discussing several theoretical considerations in the ‘Theory and Hypotheses’ section, we outline some specificities of the German system in the following subsection.

2.2 Higher Education Enrolment in Germany

Two distinctive features of higher education in Germany must be considered: the admission criteria for enrolment and non-academic vocational education and training (VET) as an alternative option.

Generally, the *Abitur* or a vocationally-oriented *Fachabitur* are prerequisites for higher education enrolment.⁴ Formally, admission to tertiary education is open to all individuals who hold one of these higher education entrance certificates.⁵ However, for some high-demand fields of study, access is limited. The number of applicants in these fields, such as business and administration, psychology, and medicine, exceeds the number of available places. Enrolment in these courses is mainly restricted by grade point average (so-called *numerus clausus*).⁶ The higher the over-supply of applicants, the higher the required minimum grade point average to enter the respective field. In 2019–20, over 40% of undergraduate (bachelor) programmes in Germany were restricted to a (local) *numerus clausus*. Some fields under state supervision (*Staatsexamen*), such as medicine and law, also have high *numerus clausus* requirements.

⁴ Vocationally oriented tracks in upper secondary education provide students with a vocation-specific higher education entrance certificate (*Fachabitur*) that also allows students to enter lower-tier tertiary education.

⁵ For the past few years, higher education entry has also been possible for vocationally qualified individuals. However, the number of students enrolling without a higher education entrance certificate is small (3.7% of first-year students in 2017, Autorengruppe Bildungsberichterstattung, 2020).

⁶ In addition to grade point average, a student’s waiting time is considered. For admission to other specific fields or universities, additional requirements may apply, such as passing an entrance examination, submitting a personal letter of motivation, or attending an interview. However, these other requirements are not (yet) standard in tertiary education in Germany.

A higher education entrance certificate enhances a student's chances of entering an apprenticeship in attractive vocational training programmes. These VET programmes allow students to pursue their vocational or occupational interests outside higher education and offer potential careers with good earnings prospects, including lower and medium management positions. Furthermore, in some fields, completing a vocational training programme in a relevant occupation can be factored into a grade point average to meet *numerus clausus* requirements.

Given early tracking into academic schools, the share of students that attain the *Abitur* or *Fachabitur* at the end of upper secondary school has been slightly above 50% of the respective cohort in recent years (Autorengruppe Bildungsberichterstattung, 2020, p. 84). These students' transition rate into tertiary education is relatively high. For example, 75% of school leavers in 2014 who were entitled to enrol actually entered higher education (Autorengruppe Bildungsberichterstattung, 2020, p. 184). Less than 20% of *Abitur* holders enter vocational training after leaving school (Pilz et al., 2020; Schneider et al., 2017).⁷ Participation in academic education varies by gender: after graduating from upper secondary education, men enrol in tertiary education at considerably greater rates than women. For example, in the 2014 cohort, 77% of men enrolled, while 69% of women enrolled; this gender gap of approximately 10% has been relatively stable over the last 20 years in Germany (Autorengruppe Bildungsberichterstattung, 2020, p. 184). This gendered pattern in the transition to tertiary education is also found in half of the OECD countries mentioned above (see Appendix Figure A1). Therefore, in these countries, women who may have gone on to pursue academic careers are instead lost during the transition to higher education through such 'leaky pipelines' (Morgan et al., 2013).

3 Theory and Hypotheses

To understand gender differences in aspirations and expectations, we use two theoretical frameworks: the culturalist and rational choice perspectives. The culturalist perspective helps explain gender disparities in college aspirations, while the rational choice perspective aims to explain differences

⁷ Some of these students entered higher education later after completing vocational training (see Hillmert & Jacob, 2003; Jacob & Solga, 2015).

in college expectations. We derive our hypotheses by integrating both perspectives, including formal admission criteria.

3.1 Gender Differences in College Aspirations: What Young Men and Women Would Like to Do

The culturalist perspective proposes that women may have fewer idealistic aspirations for enrolling in higher education than men if they can pursue their life goals via non-academic pathways. This perspective highlights the role of socialisation, gendered vocational interests, occupational plans, and the influence of (female) role models. Socialisation involves individuals adapting their interests and values to conform to existing social norms, thereby developing skills that receive greater social recognition and are often gender specific. A significant aspect of gendered socialisation is taking on gender-specific roles as influenced by parental and social role models (Kohlberg, 1966).

According to social cognitive approaches, children's and adolescents' identities are shaped through social affirmation or by rejecting gender-nonconforming behaviour (Martin et al., 2002). Similarly, theories on gendered preferences surrounding work and family argue that normative expectations of women as primary caregivers lead them to pursue less ambitious careers perceived as more compatible with raising children (Hakim, 2000). Consequently, men and women develop gender-specific vocational interests and career aspirations, with women tending to favour less ambitious educational paths. This may lead them to forgo college enrolment and pursue non-academic training.

Similarly, theories on gendered occupational interests argue that educational aspirations result from gendered occupational plans (Morgan, 2013), with men and women preferring different (gender-appropriate) occupations. Women may be less likely than men to enrol in college if these female-specific vocational interests and subsequent occupations can be accomplished without tertiary education.

In the socialisation process, parents and peers exert significant social influence on students' educational choices. Therefore, young women might be less likely to express college aspirations if they lack direct support from their parents and peers or indirect support from female role models in

pursuing higher education. Evidence exists that a female student's mother's education can be influential, either as a proxy for maternal/parental educational expectations or because it represents the characteristics of a female role model (Korupp et al., 2002; Minello & Blossfeld, 2016). Evidence also exists that friends influence female students' choices (e.g. Andrew & Flashman, 2017; Jonsson & Mood, 2008; Raabe & Wölfer, 2019).

3.2 Gender Differences in College Expectations: Considering Constraints and Barriers

Opportunities and barriers can constrain students' educational aspirations. When adolescents perceive obstacles, they may downgrade their idealistic aspirations (Gottfredson, 1981; Morgan, 2007). Therefore, we assume that individuals consider the opportunities, benefits, and constraints of actual enrolment when expressing their realistic college expectations. Students may adjust their realistic educational expectations if they perceive another pathway as more advantageous or if specific requirements or admission limitations restrict access.

According to rational choice theories of educational decisions, individuals evaluate the costs and benefits of enrolment, weighted by the probability of successful completion of the respective pathway (e.g. Breen & Goldthorpe, 1997; for gender, see Buchmann & DiPrete, 2006). If a cost-benefit evaluation indicates that enrolment is less advantageous for women than men, fewer women are expected to enrol than men. For example, women's awareness of the persistent gender pay gap may lead them to anticipate lower wages than men and, consequently, perceive fewer benefits from attaining a degree.

Empirically, girls tend to perceive more educational barriers than boys (McWhirter, 1997). In addition, several studies have found gender differences in the aforementioned rational choice parameters.

For example, studies conducted by Beattie (2002) and Ding et al. (2021) found that women in the United States and China, respectively, were less responsive to the economic returns of education than men. Helbig et al. (2011) examined upper secondary school leavers in Germany and discovered that women perceived fewer labour market benefits from higher education than men. Another study found women to be more sensitive to the

anticipated costs of higher education (Lörz & Mühleck, 2019) and less likely than their male peers to accumulate debt (Davies & Lea, 1995).

In addition, women express less confidence in their academic skills. As a result, they perceive a lower probability of success than men, regardless of their actual performance (for maths and science, see Steffens & Jelenec, 2011). However, in a study of the influence of academic performance on educational expectations, Carolan (2017) observed that girls' expectations were less sensitive to academic performance than boys' expectations, although the extent of these expectation adjustments was minimal.

Formal admission criteria may affect realistic college expectations, potentially constraining enrolment. This is especially relevant for fields with specific admission requirements. Consequently, two distinct patterns of educational decisions may arise. First, students might anticipate changing their preferred field. Second, students may forego higher education altogether if appealing non-academic alternatives are available. There is some empirical evidence for these processes. For example, Morgan, Gelbgiser, and Weeden (2013) and Gore et al. (2017) analysed college students' aspirations in the US and Australia, respectively. Both studies found that students who would have preferred to study medicine ultimately changed to subjects like nursing – in Germany, this would mean entering non-academic VET programmes.

3.3 Hypotheses

As described above, the entitlement–enrolment gap occurs predominantly among women in Germany. To illuminate this gap, this study examines gender differences in idealistic college aspirations and realistic expectations. Based on our theoretical considerations, we propose the following hypotheses about (1) gender differences in idealistic aspirations and (2) gender-specific disparities between idealistic aspirations and realistic expectations.

Gender differences in idealistic college aspirations: According to gender socialisation theories, various factors in the socialisation process and the social environment (such as parents and friends) lead to gender-specific work and family preferences, interest profiles, and skills. As men have traditionally emphasised having an occupational career, their educational

aspirations may be higher than women's, particularly in countries such as Germany, where attractive non-academic VET options may divert women from higher education. Therefore, we expect idealistic college aspirations to be lower for women than men (*Hypothesis 1: Lower idealistic college aspirations among women in Germany*).

Gender-specific disparities between idealistic aspirations and realistic expectations: Considerations about idealistic aspirations have been complemented by reflections on constraints and restrictions to explain how realistic expectations develop. If women are more likely to evaluate the probability of success and the benefits of higher education as less favourable, or if admission restrictions deter them, we would expect women's realistic expectations to be lower than men's. Consequently, a 'pessimistic' disparity between idealistic aspirations and realistic expectations would occur more often in women than men. (*Hypothesis 2: Disparity between idealistic college aspirations and realistic college expectations among women*).

4 Data, Variables, and Methods

To empirically analyse college aspirations and expectations, we used data from 'Future and Career Plans Before High School Graduation (ZuBAb)', a survey of upper secondary students administered approximately 1.5 years before they took the final *Abitur* (Pietrzyk et al. 2019). The primary survey was conducted in upper secondary schools in North-Rhine Westphalia with sociostructurally disadvantaged neighbourhoods.⁸ North Rhine-Westphalia is a German federal state with a particularly low rate of women with university entrance qualifications who transition to university (Helbig et al., 2015).

At the beginning of 2018, we carried out written surveys in 42 schools and conducted 1,766 interviews. The data include information about students' career aspirations, plans, and assessments of different post-secondary educational pathways. Information about the students' socio-economic backgrounds was also collected.

⁸ The selection of schools (*Gymnasien* and *Gesamtschulen*) was based on an index of socio-structural disadvantage provided by Isaac (2011).

Dependent variables: Our main dependent variables were idealistic college aspirations and realistic college expectations. The question about idealistic college aspirations was, 'If it were up to you alone, how strongly would you want to enrol in college?' Students were asked to respond on a scale from 1 ('not at all') to 5 ('very strongly'). The question on realistic college expectations was, 'How would you rate the probability that you will actually enrol?' Again, students responded on a scale from 1 ('very unlikely') to 5 ('very likely') (see Manski, 2004 for a discussion of the advantages of such probabilistic measurements).

In addition, we assessed the disparities between idealistic college aspirations and realistic expectations using a binary variable. This variable was assigned a value of 1 when an individual's idealistic college aspirations exceeded their realistic expectations and 0 otherwise. This operationalisation highlights respondents' tendency to be less inclined to pursue higher education in reality compared to their ideal scenario. We refer to this discrepancy as 'pessimistic college expectations'. Students with pessimistic college expectations might become 'lost talent' if they refrain from enrolling in tertiary education at the end of upper secondary school.

Independent variables: Our primary independent variable was gender. We used several variables to test three theoretical explanations for gender differences in idealistic aspirations and pessimistic college expectations. For socialisation, we used parents' educational backgrounds⁹, the proportion of friends at college or who intended to enrol, and adolescents' life plans. We included two contrasting items to represent gender-stereotyped life goals: having children and achieving career success. To model the parameters of rational choice theory, we used several measurements of respondents' evaluation of the benefits and costs of higher education and their subjectively ranked probability of success. To consider constraints to college access, we used the students' average grades, indicating whether their choices could be restricted by the *numerus clausus* and the formal admission restrictions for the respondents' preferred field of study. For details of the operationalisations, see Table A1 in the Appendix.

⁹ We decided to include missing information for this question as a separate category if the student answered that they did not know their parents' educational background or refused to answer.

Table 1 shows the descriptive statistics of these variables by gender. On average, women's idealistic college aspirations were higher than men's, while realistic college expectations did not differ by gender (see Figure 2). Pessimistic college expectations – higher college aspirations than expectations – were more common among women (see Table 1). Regarding the independent variables, women were slightly more likely to have friends who planned to enrol or were already attending college. For the rational choice parameters, women perceived the salary increase associated with an academic degree as significantly lower than men. Additionally, women considered the cost of attending university as higher than men. Furthermore, women tended to achieve higher grades than men but were also more interested in fields of study with admission restrictions.

Table 1 Descriptive statistics of the dependent and independent variables by gender

	<i>Female</i>			<i>Male</i>			<i>p</i>	<i>miss</i>
	<i>mean</i>	<i>sd</i>	<i>n</i>	<i>mean</i>	<i>sd</i>	<i>n</i>		
Gender	57.22	%	1,010	42.78	%	755		
<i>Dependent Variables</i>								
Idealistic aspiration	3.99	1.22	1,004	3.81	1.26	746	***	1 %
Realistic expectation	3.71	1.22	987	3.71	1.23	723		3 %
Pessimistic expectation (idealistic aspiration > realistic expectation)	35.67	%	984	26.14	%	723	***	3 %
<i>Independent Variables</i>								
Academic background: father	39.92	%	947	44.67	%	685	*	8 %
Academic background: mother	37.60	%	960	38.56	%	695		6 %
Friends with college intention or at college	4.51	1.39	1,004	4.24	1.43	745	***	1 %
Life goal: being successful in career	4.18	0.86	1,004	4.23	0.83	753		1 %
Life goal: having children	3.65	1.31	1,007	3.70	1.18	749		1 %
Salary bonus with academic degree in 100€	11.55	11.12	837	18.27	27.10	673	***	14 %
Prospects for an interesting job	4.26	0.79	995	4.22	0.82	744		2 %
Direct cost	3.12	1.13	998	2.94	1.12	743	***	1 %
Expected probability of success	3.87	0.93	1,004	3.98	0.91	749	**	1 %
Average grade	9.26	2.29	945	8.88	2.21	697	***	7 %
Restricted admission	0.62	0.24	927	0.54	0.23	650	***	11 %

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In the following section, we first analyse gender differences in college aspirations and expectations. We then examine disparities between idealistic aspirations and realistic expectations (pessimistic college expectations), estimating linear probability models that allow us to compare coefficients across models and samples (Breen et al., 2018). As shown in Table 1, some variables have missing information (last column 'miss'). Some of this missing information, such as for the 'restricted admission' variable, is due to filtering in the questionnaire.¹⁰ To manage the missing information, we use imputed data calculated using a multiple imputation procedure with additional variables from the survey (see Appendix Table A2) in the regression analysis.

5 Results

5.1 Gender Differences in Idealistic Aspirations and Realistic Expectations

Figure 1 presents the average aspirations and expectations by gender. Contrary to Hypothesis 1, young women, on average, expressed significantly higher aspirations to enrol in tertiary education than men. However, when students' expectations for actual enrolment were examined, no significant difference emerged between men and women. Therefore, a significant disparity surfaced between women's average aspirations and expectations; the difference was smaller among men and not statistically significant. Thus, although eligible young women have stronger aspirations to enrol in tertiary education than eligible young men, this may not translate into a female advantage in tertiary attendance because women are less likely to expect actual enrolment.

¹⁰ Students who indicated that they did not wish to enrol in higher education were not asked which subject they wanted to study. Therefore, no information about admission to the aspired subject is available for these students.

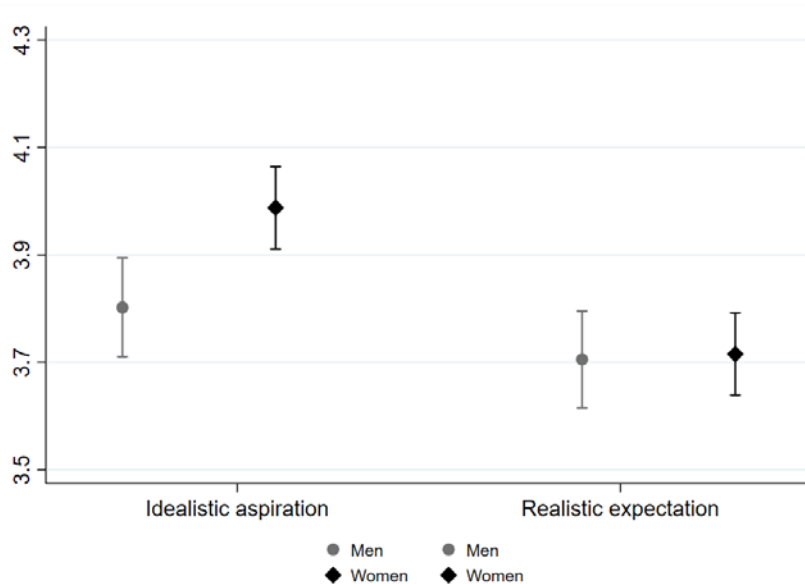


Fig. 2 Results of the linear probability models of idealistic aspirations

This descriptive difference in average aspirations and expectations foreshadows Hypothesis 2, which predicts a more significant disparity between aspirations and expectations among females. However, before we examine this, we analyse idealistic aspirations in more detail.

In contrast to Hypothesis 1, we observed higher average aspirations among females than males. To understand this pattern in more depth, we conducted regression analyses on idealistic aspirations considering several indicators: family, friends, and life goals. As depicted in Figure 2 (and detailed in Appendix Table A3), the results revealed that the coefficient for female students slightly decreased in Model 2 compared to Model 1 (the baseline model). However, it remained substantial and statistically significant. This indicated that females' higher aspirations could not be explained by controlling for variables related to family, friends, and life goals. Factors such as father's education, having friends with enrolment intentions or who are already in college, and pursuing a successful career were positively associated with higher college aspirations. Surprisingly, contrary to our assumptions, the desire to have children was not negatively linked to higher education aspirations among these adolescents.

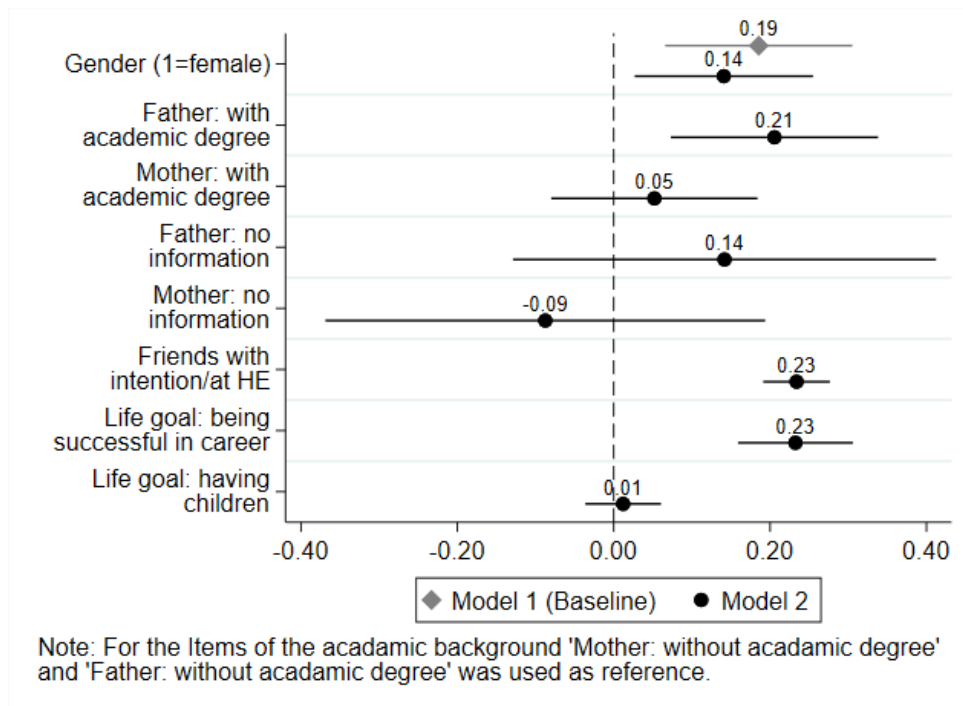


Fig. 2 Results of the linear probability models of idealistic aspirations

5.2 Gender Differences in Pessimistic College Expectations

In this section, we analyse the disparity between individual aspirations and expectations, focusing on students with higher aspirations to enrol in college but lower expectations of actually doing so (pessimistic college expectations). Table 2 presents regression results supporting our second hypothesis: women were significantly more likely than men to lower their college aspirations when asked to consider realistic expectations. The baseline bivariate Model 1 revealed that women were 9.4 percentage points more likely than men to express pessimistic college expectations.

Table 2 Linear probability models of pessimistic college expectations

	Model 1 (Baseline)	Model 2 (Full sample)	Model 3a (Females only)	Model 3b (Males only)
Gender: female	0.094***	0.080***		
Culturalist perspective				
Father: with academic background		-0.023	-0.030	-0.011
Mother: with academic background		-0.023	-0.025	-0.016
Father: no information		0.007	0.008	-0.003
Mother: no information		0.017	0.043	0.006
Friends with intentions to enrol or at university		0.004	0.005	0.002
Life goal: being successful in one's career		0.030**	0.050***	-0.003
Life goal: having children		-0.005	-0.016	0.014
Rational choice perspective				
Salary bonus with an academic degree in 100 €		-0.000	0.000	-0.000
Prospects for an interesting job		0.020	0.028	0.011
Direct cost		0.039***	0.045***	0.028*
Expected probability of success		-0.132***	-0.145***	-0.116***
Constraints				
Average grade		-0.031***	-0.028***	-0.034***
Restricted admission		0.075	0.127*	-0.019
Constant	0.287***	0.758***	0.723***	0.914***
Adjusted R ²	0.009	0.124	0.129	0.093
Observations	1,575	1,575	916	659

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: Due to the filtering in the questionnaire students that do not wish to enrol in higher education at all were excluded ($n = 126$). We used imputed data with $m = 20$.

Model 2 included our independent variables referring to the theoretical considerations. All variables related to the culturalist perspective showed no association with pessimistic college expectations, except for the desire to be successful in a career, which, in the full model, showed a significant positive

association for all respondents.¹¹ This suggested that, unlike in previous studies from the 1970s and 1980s, respondents did not perceive having children as a barrier to pursuing college aspirations. For the rational choice variables, high expected costs were positively linked to pessimistic expectations, while a high probability of success reduced pessimism. Finally, we considered students' average grades and enrolment constraints in their preferred field of study. Students with worse grades and students who faced admission barriers were more likely to express lower expectations than aspirations.

Finally, we regressed pessimistic college expectations for both genders separately (Model 3a and Model 3b). The results showed many similarities and interesting differences between men and women. Women's desire for a successful career was associated with pessimistic expectations. Furthermore, admission barriers for the preferred field of study affected female pessimism but not male pessimism.¹² By investigating preferred fields more closely, we found that women wanted to enrol in medicine (29.0% vs. 10.3%) and psychology (30.9% vs. 11.2%) more often than men (see Appendix Table A5). These fields have strong admission restrictions in Germany.

We carried out three different robustness checks for alternative analytical methods and samples. For this, (1) we used logistic regression (see Appendix Table A6) to calculate average marginal effects (AME), (2) we compared students with a negative disparity to students with no disparity (see Appendix Table A7), and (3) we used the metric depth of the disparity between college expectations and college aspirations (see Appendix Table A8). Our findings were robust to the different analytic methods and operationalisation of the disparity. Only the changes in our analytic sample's definition showed some minor changes related to the significance of

¹¹ A stepwise regression showed that in a model with only the variables from the culturalist perspective, fathers' educational background, mothers' educational background, and friends' college aspirations were associated with pessimistic attitudes. However, when the other variables were added, these associations diminished.

¹² To analyse whether the results are significantly different between women and men, we ran a regression model with interaction terms for all variables. The results show that the interaction term of the item 'being successful in career' is significantly different between genders. The differences in admission barriers showed a p-value of 0.148 (see Online Resource Appendix Table A4).

admission restrictions for women (see Appendix Table A7). This may be due to our exclusion of students with higher expectations than aspirations, which reduced the sample size. Further, the model of the metric outcome showed more significant coefficient than the model of the binary outcome (see Appendix Table A8).

6 Summary and Discussion

This study has examined high school students' aspirations to enrol in higher education and compared their aspirations with realistic college expectations. In particular, we have investigated whether women are more likely to 'downgrade' their aspirations and report lower realistic expectations than men. Two specificities of higher education make Germany a compelling case study for this research question. First, *Abitur* holders entitled to enrol in higher education may opt for attractive non-academic VET options instead. Second, access to specific fields of study that women often prefer, such as psychology, medicine, and law, is highly restricted. Building on culturalist theories of gender-specific life goals that can be achieved without a tertiary degree, we expected young women to have lower college aspirations than men. We further anticipated that rational choice considerations and formal restrictions might contribute to even lower expectations if women were especially susceptible to entry barriers to higher education. Our empirical results showed that young women report higher college aspirations than their male counterparts. However, this female advantage disappeared when women were asked about their realistic college expectations. By comparing individual disparities between aspirations and expectations, we observed that women were likelier than men to hold higher aspirations than expectations (pessimistic college expectations), suggesting that women are more likely to downgrade their aspirations when considering potential barriers. Restricted access to their preferred field of study particularly hindered women from pursuing their aspirations.

Our study contributes to previous research on so-called 'lost talent' and the 'leaky pipeline' that affects women pursuing academic careers (Hanson, 1994; Morgan et al., 2013). We confirmed Hanson's (1994) results that women are more likely to become 'lost talent' because they express higher educational aspirations than realistic expectations. However, in contrast to

Hanson (1994), we found that the predictors of this disparity do not vary significantly between genders. Furthermore, in our sample of post-millennial adolescents, we found no gender differences in the impact of parental background, life goals, or friends. The genders did not consider costs and benefits differently. Instead, gender differences in the preferred field of study tended to lower women's realistic expectations. This is particularly remarkable, as women attain higher grades than men on average, giving them a considerable advantage in the competition for scarce college places. Therefore, the first 'leak' in the academic career pipeline in Germany occurs before enrolment when women start considering their potential enrolment.

Our study has several limitations that should be considered when interpreting the results. First, we relied on cross-sectional data collected by asking upper-secondary students about their aspirations and expectations one and half years before graduation. Aspirations and, in particular, expectations may continue to change until actual enrolment. This may occur as students gain new information about study programmes, learn how to overcome perceived barriers, or change their preferences. However, Gore et al. (2017) indicate that students are more likely to downgrade their educational goals than strive for more ambitious options as they approach graduation. Second, the nature of our data and our empirical approach did not allow us to make any causal claims; it merely allowed us to detect associations, which we still consider a worthwhile endeavour given the complexity of the entitlement–enrolment gap. Third, our sample comprised students from non-affluent neighbourhoods. Gender differences in college aspirations and expectations may be less pronounced among privileged families, who are less affected by potential perceived barriers. Therefore, our results, although not representative of the entire student population in Germany, illuminate the pessimistic expectations of the specific group of students often targeted by programmes and interventions aimed at promoting higher education enrolment (for a review, see Herbaut & Geven, 2020). Finally, we expected gendered aspirations and disparities to be particularly visible in Germany due to strict admission criteria in specific fields of study and the existence of VET as an attractive alternative to enrolment. Unlike other countries where caring and nursing are offered at colleges, these occupations are often pursued through apprenticeships in Germany. Therefore, the early talent leakage in countries such as Germany, Austria, and Switzerland may stem from the specific institutional structure

of these countries' post-secondary education systems. Further comparative research should examine whether aspiration–expectation gaps exist in other countries. If so, the relevance of the institutions and context should be explored.

Finally, our study has two policy implications. First, the 'lost talent' phenomenon should be taken seriously, and initiatives and activities to support women in pursuing their aspirations should be implemented to increase female enrolment rates. However, our results indicate that boys aspire to enrol in tertiary education less often than girls. This reluctance of capable boys to gain university entrance qualifications also calls for educational interventions, lest these boys become 'lost talent' themselves.

7 References

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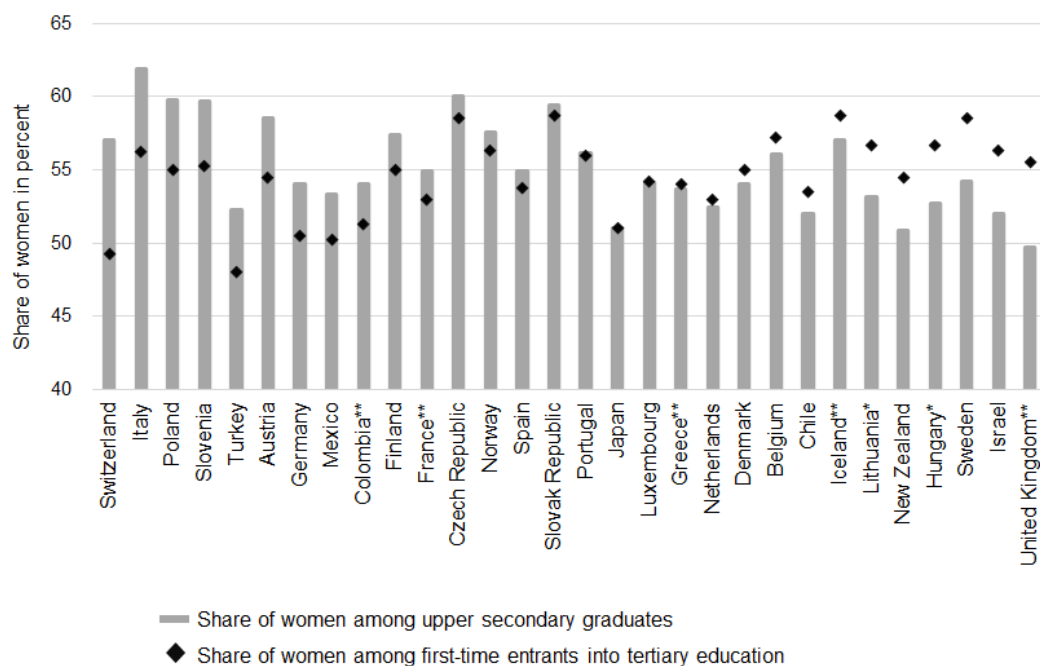
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8 Appendix



Note: The bars are sorted by the size of the gap between the former and the latter women. Source: Education at a Glance 2015, 2016, 2017, 2018. The bars represent the mean shares from the years 2013 to 2016, as not all countries provided information for all years (* missing one year/** missing two years).

Fig. A1 Share of women among upper secondary leavers and new entrants to higher education in 2013-2016

Table A1 Operationalisation

Variable	Answer options
Idealistic college aspiration	
If it were up to you alone, how strongly would you want to enrol at college? <i>Wenn es allein nach Ihren Wünschen ginge: Wie sehr würden Sie sich wünschen zu studieren?</i>	(1) not at all; (5) very strong
Realistic college expectation	
What do you think: How would you rate the probability that you will actually enrol? <i>Was glauben Sie: Wie wahrscheinlich ist es, dass Sie tatsächlich studieren werden?</i>	(1) very unlikely; (5) very likely
Pessimistic college expectation	
realistic college expectation – idealistic college aspiration < 0	0 = Difference > – 1 1 = Difference < 0
Gender	0 = male 1 = female
Parental education	
Father	0 = without academic degree
Mother	1 = with academic degree
Friends with college aspiration or at college	
How many of your friends finished college, are at college or plan to enrol at college?	(1) none; (2) almost none; (3) less than half; (4) appr. half; (5) more than half; (6) almost all; (7) all
Life goals	
Being successful in my career	(1) not important at all; (5) very important
Having Children	
Salary bonus with university degree	
Difference between estimated income with university degree and income with vocational training	Unit: 100 Euro
Direct costs	
How difficult would it be for you and your family to cover these costs if you embarked on higher education?	(1) not at all; (5) very much
Expectation of educational success	
How likely is it in your opinion that you could successfully complete higher education?	(1) very unlikely; (5) very likely
Average grade in credit points (LP) (German, mathematics, English, biology, physics, history and social sciences)	min. = 0; max. = 15
Admission restrictions Share of the study program with admission restrictions (idealistic study field)	

Table A2 Variable used for the Imputation

How likely is it in your opinion that you could successfully complete the A-Level?
 I think a lot about my vocational future.
 I know exactly what I want to do later in life.
 Did you visit following opportunities of your school to inform yourself about your occupational opportunities? How helpful did you find them?
 Project/professional orientation week
 How well informed do you feel about the possibilities, regulations and contents ...
 ... vocational training?
 ... study programs?
 How many of your friends have finished a vocational training, are in a vocational training or plan to do a vocational training?
 How many people from your relatives have...
 ... finished a vocational training?
 ... academic degree?
 How many books do your parents own?
 If you take part in class or course trips lasting several days: How difficult it is for your family,
 to pay the money for it?

Table A3 Coefficients of the linear probability models of idealistic college aspiration (imputed datasets)

	Model 1	Model 2
Gender: female	0.186***	0.141**
Father: with academic background		0.206***
Mother: with academic background		0.052
Father: no information		0.142
Mother: no information		-0.088
Friends with college intention or at college		0.234***
Life goal: being successful in career		0.232***
Life goal: having children		0.012
Constant	3.802***	1.678***
Adjusted R ²	0.005	0.116
<i>n</i>	1,701	1,701

*** p<0.01, ** p<0.05, * p<0.1

Table A4 Linear probability model with interaction terms between gender and independent variables

Variables	coefficient	p-values
Gender: female	-0.191	0.405
Father: with academic background	-0.011	0.792
Father*gender	-0.019	0.724
Mother: with academic background	-0.016	0.681
Mother*gender	-0.009	0.870
Father: no information	-0.003	0.966
Father: no information*gender	0.011	0.916
Mother: no information	0.006	0.938
Mother: no information*gender	0.037	0.750
Friends with college intention or at college	0.002	0.888
Friends*gender	0.003	0.843
Life goal: being successful in career	-0.003	0.884
Career*gender	0.054*	0.066
Life goal: having children	0.014	0.320
Children*gender	-0.030	0.113
Salary bonus with academic degree in 100 €	-0.000	0.710
Salary bonus*gender	0.000	0.758
Prospects for an interesting job	0.011	0.647
interesting job*gender	0.017	0.601
Direct cost	0.028*	0.076
Direct cost*gender	0.017	0.428
Expected probability of success	-0.116***	0.000
Probability of success*gender	-0.029	0.357
Average grade	-0.034***	0.000
Grade*gender	0.006	0.617
Admission restriction of idealistic study program	-0.019	0.805
Admission*gender	0.146	0.148
Constant	-0.191	0.405
Adjusted R ²	0,123	
Observations	1,575	

*** p<0.01, ** p<0.05, * p<0.1

Note: We used imputed data with $m = 20$

Table A5 Gender-specific distribution of desired field of subjects (Multiple choice)

Desired field of study	Female	Male
Philosophy/History/Cultural Studies	9.7 %	7.9 %
Language/Philology	16.4 %	5.4 %
Political/Administrative/Social Science	7.8 %	11.4 %
Law	17.9 %	13.1 %
Economics/Business Administration	16.3 %	27.0 %
Psychology	30.9 %	11.2 %
Education/Pedagogy (without Teacher Training)	16.4 %	3.6 %
Mathematics/Physics	6.0 %	13.5 %
Human Medicine/Pharmacy	29.0 %	10.3 %
Chemistry/biology/nutritional sciences	15.7 %	12.4 %
Engineering/Computer Science	6.0 %	35.2 %
Performing Arts/Design/Music	5.0 %	3.2 %
Interior/Architecture	1.7 %	1.7 %
Geography/Geoscience	0.8 %	1.7 %
Sports Science	3.0 %	6.7 %
Veterinary Medicine	1.4 %	0.4 %
Media Design/Communication (including Journalism)	2.1 %	0.9 %
Teacher Training	5.7 %	2.4 %
<i>n</i>	663	466

Note: Multiple answers were possible.

Table A6 Logistic regression models of pessimistic college expectations (AME)

	Model 1 (Baseline)	Model 2 (Full sample)	Model 3a (Females only)	Model 3b (Males only)
Gender: female	0.095***	0.079***		
Culturalist perspective				
Father: with academic background		-0.027	-0.032	-0.012
Mother: with academic background		-0.025	-0.028	-0.017
Father: no information		0.006	0.001	-0.001
Mother: no information		0.012	0.040	0.002
Friends with college intention or at college		-0.004	0.005	0.002
Life goal: being successful in career		0.029**	0.050***	-0.006
Life goal: having children		-0.006	-0.017	0.015
Rational choice perspective				
Salary bonus with academic degree in 100 €		-0.000	0.000	-0.000
Prospects for an interesting job		0.019	0.026	0.011
Direct cost		0.038***	0.044***	0.028*
Expected probability of success		-0.123***	-0.139***	-0.104***
Constraints				
Average grade		-0.032***	-0.028***	-0.035***
Admission of idealistic study program		0.071	0.122*	-0.018
Observations	1,575	1,575	916	659

Table A7 Linear probability models of pessimistic college expectations without students with higher realistic expectation than idealistic aspiration

	Model 1 (Baseline)	Model 2 (Full sample)	Model 3a (Females only)	Model 3b (Males only)
Gender: female	0.103***	0.093***		
<i>Culturalist perspective</i>				
Father: with academic background		-0.016	-0.015	-0.009
Mother: with academic background		-0.016	-0.026	0.001
Father: no information		-0.013	-0.015	-0.021
Mother: no information		0.049	0.092	0.021
Friends with college intention or at college		0.005	0.005	0.004
Life goal: being successful in career		0.019	0.045**	-0.022
Life goal: having children		-0.006	-0.020	0.019
<i>Rational choice perspective</i>				
Salary bonus with academic degree in 100 €		-0.000	-0.000	-0.000
Prospects for an interesting job		0.012	0.029	-0.011
Direct cost		0.042***	0.045***	0.036**
Expected probability of success		-0.133***	-0.148***	-0.115***
<i>Constraints</i>				
Average grade		-0.037***	-0.035***	-0.036***
Admission restriction		0.068	0.109	-0.022
Constant	0.338***	0.924***	0.894***	1.096***
Adjusted R ²	0.009	0.124	0.140	0.097
Observations	1,351	1,351	792	559

Table A8 Linear regression models of difference between realistic expectation – idealistic aspiration (Please note that the interpretation is revers to the LPMs.)

	Model 1 (Baseline)	Model 2 (Full sample)	Model 3a (Females only)	Model 3b (Males only)
Gender: female	-0.140***	-0.102**		
<i>Culturalist perspective</i>				
Father: with academic background		0.042	0.072	-0.007
Mother: with academic background		0.068	0.082	0.043
Father: no information		-0.090	-0.089	-0.061
Mother: no information		0.065	0.148	-0.047
Friends with college intention or at college		-0.006	-0.006	-0.005
Life goal: being successful in career		-0.088***	-0.115***	-0.045
Life goal: having children		0.001	0.017	-0.027
<i>Rational choice perspective</i>				
Salary bonus with academic degree in 100 €		0.000	-0.002	0.001
Prospects for an interesting job		-0.072**	-0.076*	-0.069
Direct cost		-0.058***	-0.078***	-0.026
Expected probability of success		0.270***	0.294***	0.240***
<i>Constraints</i>				
Average grade		0.039***	0.026*	0.057***
Admission restriction of idealistic study program		-0.207**	-0.311**	-0.015
Constant	-0.190***	-0.690***	-0.560*	-1.011***
Adjusted R ²	0.005	0.114	0.114	0.104
Observations	1,575	1,575	916	659

Discussion Paper of the President's Research Group 2023

Melinda Erdmann, Marcel Helbig and Marita Jacob

P 2023-002

Lost Female Talent: Gender Differences in College Aspirations and Expectations in Germany

Marcel Helbig

P 2023-001

Eine „faire“ Verteilung der Mittel aus dem Startchancenprogramm erfordert eine ungleiche Verteilung auf die Bundesländer. Eine Abschätzung der Mittelbedarfe für die deutschen Grundschulen anhand der Armutsquoten in den Sozialräumen.