


# Misconceptions of earnings and their consequences for social stratification in vocational aspirations and attainment

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## ABSTRACT

This paper makes two contributions to the literature on social stratification in vocational attainment. First, we evaluate whether labour market literacy, as measured by knowledge about earnings in different occupations, is socially stratified. Second, we analyse whether differences in expected earnings between high-income and low-income occupations contribute to the social stratification in vocational aspirations and attainment using serial mediation based on data from the German National Educational Panel Study. We find that students are well informed about earnings, on average, but substantially underestimate earnings in some occupations. Students from low socio-economic status (SES) families underestimate earnings more than those from high SES families, particularly earnings in high-status occupations. Therefore, low SES students expect smaller earning differences between high-income and low-income occupations than high-SES students. In turn, small expected differences between high-income and low-income occupations are associated with lower vocational aspirations as well as attainments. Differences in expected earnings of high-income and low-income occupations mediate 4% of the differences in vocational aspirations by parental SES and 2% of the differences in vocational attainment.

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## Introduction

Germany is widely known for its vocational and educational training (VET) system, which provides those students who are ineligible for university with a smooth transition to the labour market (Brzinsky-Fay 2007). VET can also be an attractive option for students who would be eligible for university, as it offers a salary from the very first month and the outlook of a good, stable job thereafter. At the same time, the VET system provides access to a wide range of

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occupations with widely varying prospects for income, career and prestige (Baethge and Wolter 2015). Due to the strong credentialism in the German occupational system, the transition to VET is crucial for a young person's future career. Finding a good position represents a great opportunity for social upward mobility for students from lower social classes. However, the transition to high-paying and high-prestigious VET positions is socially selective (Beicht and Walden 2015; Protsch and Solga 2016; Achatz, Jahn, and Schels 2020).

To date, little is known about the underlying mechanisms that drive social stratification in attaining VET positions. Yet, this knowledge is necessary for identifying potential policy interventions to counteract social inequality. While resources and aspirations that vary with social class can explain some of the differences in vocational attainment (Iannelli and Smyth 2008; Schoon and Polek 2011), many of the disparities remain unexplained. One mechanism that is relevant to aspirations and attainment and could easily be targeted by policy intervention, but largely remains unexplored, is labour market literacy (Higgins, Nairn, and Sligo 2010), including information about earnings and labour market prospects of different occupations. If students from lower social classes are poorly informed about the various alternatives and benefits of VET in different occupations, they may be more likely to pursue occupations that are common in their social networks and readily available than to pursue VET positions with better job prospects.

Existing research on university attendance and choice of field of study supports this claim: Most studies find that students from lower social classes underestimate the returns attributable to attending university (Betts 1996; Webbink and Hartog 2004). If students are provided with correct information, then they are more likely to enrol in university and to choose fields of study with better labour market prospects (Baker et al. 2018; Wiswall and Zafar 2015). Moreover, additional information reduces social stratification in university attendance (Bleemer and Zafar 2018; Peter and Zambre 2017).

Yet, most studies are restricted to expected returns on university degrees and their consequence for enrolment in tertiary education. These studies are also limited to students who are (potentially) eligible for university enrolment – in Germany, this only applies to half of the students who attend the highest secondary school track. Except for the qualitative study by Higgins, Nairn, and Sligo (2010), little is known about the role that labour market literacy in general and knowledge about earnings in particular play in the development of vocational aspirations and attainment. This gap remains in the literature, even though students consider labour market prospects and earnings – particularly long-term career earnings – when choosing a VET position (Hoxtell 2019).

This study addresses this research gap by examining the role of earnings misconceptions for vocational aspirations and attainment and related social stratification using large and representative data from the German National Educational Panel Study (NEPS). First, we explore students' knowledge about

earnings in different occupations and whether this knowledge is socially stratified. Second, we examine whether expected earnings differences in high-income and low-income occupations contribute to the gap in vocational aspirations and attainment by social class.

## **Theoretical model**

### ***Aspiration-Attainment link***

Following dominant theories of the antecedents of occupational status attainment originating in social psychology (Social cognitive career theory, Lent, Brown, and Hackett 2000; Wisconsin model of socio-economic; Sewell, Haller, and Portes 1969; Sewell, Haller, and Ohlendorf 1970), youths' attained socioeconomic status (SES) in the labour market in general and in the VET system in particular is – at least partially – a function of their parents' SES. Parental SES exerts its influence on the attained position through vocational aspirations, i.e. youths' expectations about their future vocation given their perceived opportunity structure including resources, abilities and obstacles (Rojewski 2005). Theories of (bounded) rational educational choices (e.g. Breen and Goldthorpe 1997) also devote particular attention to social class-specific aspirations in the process of status attainment, suggesting that higher aspirations correlate with higher attainment.

### ***Origins of social class-specific vocational aspirations: underestimating benefits***

But how do social-class-specific aspirations emerge? At the heart of (bounded) rational educational choices are utility-maximising individuals, who aspire to and select the institutionally available educational and occupational options that they expect to entail the most favourable cost-benefit ratio. The expected utility of an educational or vocational option is derived from its subjectively assessed benefit (e.g., expected income, status) minus the subjectively assessed value of its cost. The equation also includes the estimated probability of completing a course of education. According to Breen and Goldthorpe (1997), aspirations and choices are characterised by relative risk aversion, that is, families are keen to prevent the downward social mobility of their children. Due to their relative social starting position, the fear of downward social mobility varies according to social class, leading to social class-specific assessments of the costs and benefits of an educational or vocational option. While lower social class families tend to underestimate the benefits and overestimate the costs of a higher educational and vocational option, higher social class families tend to do the opposite. As a result, students from lower social classes are expected to have lower vocational aspirations and attainment than their peers from higher social classes.

### ***Origins of social class-specific vocational aspirations: information deficit***

However, students do not evaluate their different alternatives based on the actual costs but on their subjective perception of the costs and benefits (Jensen 2010; Manski 1993; Morgan 2002). If students mistakenly assume higher earnings in occupation A than in occupation B (all else being equal), they will prefer occupation A, even if the actual earnings in both occupations are the same. Thus, an alternative explanation for class-specific vocational aspirations could be that labour market literacy is socially stratified.

We assume that students from lower social classes have less information about earnings in various occupations in general and about those that confer a higher social class in particular for three reasons: First, students from lower social classes are less likely to have extra-familial networks, including weak ties to individuals from higher social classes that act as information resources about jobs and their characteristics (Granovetter 1995). Usually, families from lower social classes have mostly ties to individuals from the same socio-economic background (Solga 2009).

Second, given that career paths that confer a higher social class are less relevant to lower social class families because they are not required for status maintenance (Breen and Goldthorpe 1997), it can be assumed that these families are less concerned with the actual benefit of higher social class occupations. Consequently, there should be a systematic information bias in the expected costs and benefits of higher social class occupations, with families from lower social classes showing a paucity of information about the benefits of such occupations.

Third, lower vocational aspirations of students from lower social classes, resulting from an overestimation of costs and underestimation of the expected probability of success, may lead to a vicious cycle of lower vocational aspirations and selective (non)updating of beliefs about earnings. Following the theory of cognitive dissonance (Festinger 1957), which points to the importance of dissonance-reducing behaviour, students with lower vocational aspirations can be expected to devalue the benefits of higher social class occupations or not bother to evaluate their information about jobs, thus holding on to their initial lower vocational aspirations. This vicious circle will only be broken if students are forced to update their beliefs. In contrast, for students from higher social classes, parents are more eager to provide their children with accurate information on earnings to pursue a job that matches their motive of maintaining their social status.

In a nutshell, all three reasons lead us to assume that social class-specific differences in vocational aspirations can be traced back to social class-specific misconceptions of the benefits of higher social status occupations. Students from lower (higher) social classes will be more likely to underestimate (overestimate) the earning differentials between low-paying and high-paying occupations.

## Literature review

While the relationship between social class, aspirations and attainment is very well documented in the literature (e.g. Ashby and Schoon 2010; Croll and Attwood 2013; Saha and Sikora 2008; Schoon and Polek 2011), far fewer studies address the relationship between social class, information bias in expected earnings, aspirations and attainment. The existing research on information bias in expected earnings can be categorised into two strands of research that overlap only partially. The first strand of research focuses on how well students predict their future earnings and how much earnings growth they expect after college graduation compared to entering the labour market after high school graduation. The second strand of research examines whether providing additional information about costs, benefits and financial support affects the social stratification of educational attainment, concerning both the choice to attend tertiary education as well as the choice of the field of study.

### *Who can estimate income correctly?*

Most studies of earnings knowledge in the US (Arcidiacono, Hotz, and Kang 2012; Betts 1996; Dominitz and Manski 1996) and in European countries (Jerrim 2011 for the UK; Klößner and Pfeifer 2019 for Germany; Webbink and Hartog 2004 for the Netherlands; Wolter 2000 for Switzerland) conclude that, on average, students make good predictions about their future earnings (see also overview in Abbiati and Barone 2017). Fewer studies evaluate whether expected earnings are socially stratified, and the results are inconsistent: Some studies find that children from higher social classes do better in predicting earnings (Betts 1996; Smith and Powell 1990; Webbink and Hartog 2004), others find no association between social class and predicted earnings (Avery and Kane 2004; Rouse 2004; Wolter 2000). Furthermore, research shows that students from higher social classes have more vocational knowledge (Schmitt-Wilson and Welsh 2012), and that they less often have occupational aspirations that cannot be obtained given their expected educational degree (Perry et al. 2016).

### *Does information affect educational aspirations and attainment?*

While almost no studies exist on the interrelation between parental SES, labour market literacy, vocational aspirations and attainment, several experimental studies evaluate the impact of information about earnings and financial support on the intention to enrol in tertiary education and the choice of field of study.

Generally, several studies conclude that providing students with accurate information of the earnings associated with different fields of study increases their probability of graduating in a high-earning field of study in the US (Baker et al. 2018; Wiswall and Zafar 2015). Bleemer and Zafar (2018) also find for the US

that additional information about the returns of a college degree substantially increases intention to attend college and reduces the gap in attendance by parental income by 20–30%. Similarly, Oreopoulos and Dunn (2013) find that additional information increases the intention to attend post-secondary education among high school students from low-income neighbourhoods in Toronto. McGuigan, McNally, and Wyness (2016) suggest that additional information increases the intention of London schoolchildren to stay in school after finishing compulsory schooling, but does not affect the intention to enrol in tertiary education. While the effect of additional information is larger for students from lower social classes compared to students from higher social classes, the former are also less likely to seek information.

Conversely, Barone et al. (2016) show that additional information neither affects the intention to enrol in tertiary education nor does it narrow the gap in enrolment intention by social class. Additional information does, however, reduce the intention to enrol in fields of tertiary education with a weak perspective on the labour market and increase the intention to enrol in vocational tertiary education. This effect is even larger among students from lower social classes. In a large-scale experiment with Finnish high school students, Kerr et al. (2020) find that providing information on earning distributions and employment rates of different post-secondary programmes only affects the enrolment behaviour of the small subset of students with substantial misconceptions in prior expectations. However, the affected subgroup is too small to have a relevant impact on the overall application patterns.

For Germany, Peter and Zambre (2017) find that providing students with additional information on financial aid and returns on tertiary education increases the likelihood that low-SES students intend to enrol in tertiary education, while high-SES students are not affected. Ehlert et al. (2017) find that additional information increases the probability that low-SES students apply for tertiary education when they have college intentions. Both studies are based on a sample of students attending the highest secondary school track in Berlin.

### ***Shortcomings of previous research***

Although significant progress has been made regarding how additional information influences decision behaviour, important questions remain unanswered. First, most of these studies focus on tertiary education only, meaning they ignore that misconceptions of earning expectations can also affect the choice of VET. The effect of expected earnings on vocational aspirations and attainment is particularly relevant in countries with early ability tracking, such as Germany, where almost half of a given cohort does not obtain the required secondary school certificate to enrol in tertiary education. For those students,

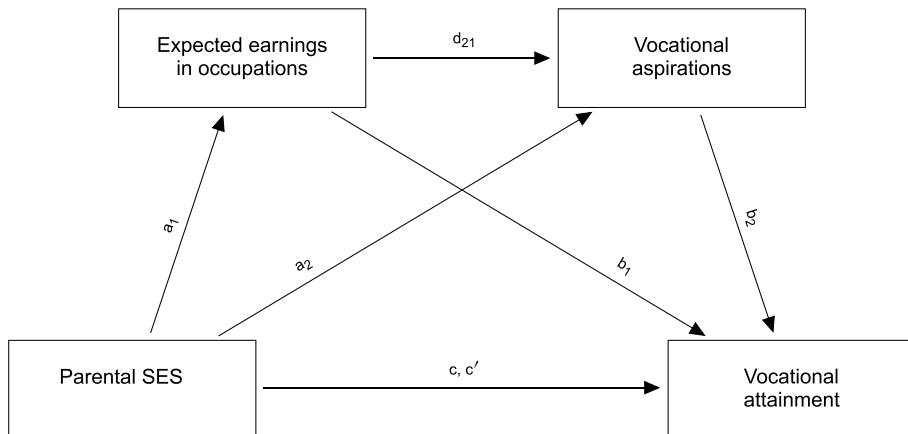
tertiary education is not an option and it is more important for them that they have accurate information about possible alternatives: the jobs that can be obtained through VET.

Second, since existing research mostly focuses on students' own earnings expectations and their returns to university attendance (exceptions: Betts 1996; Botelho and Pinto 2004; Wiswall and Zafar 2015), it remains to be explored what students know about the earnings of different occupations and whether this knowledge is socially stratified. When students are asked about their own earnings, socially stratified differences may not only reflect differences in labour market literacy but also self-confidence (Smith and Powell 1990) or expected earning premiums based on social capital. Moreover, studies looking at students' expected earnings in different fields of study mix two different kinds of knowledge: Students' knowledge about jobs that can be obtained with a degree in those fields and their knowledge about earnings in these jobs.

Lastly, the selective samples of most of the prior studies cast doubts on their generalisability. Most of the studies are restricted to one city or even certain schools or universities. Furthermore, most studies are restricted to students who decided to attend university or, in Germany, to those attending the highest secondary school track (Ehlert et al. 2017; Peter and Zambre 2017). Yet, Barone et al. (2018) show that attending these tracks is already a consequence of knowledge about the benefits of these tracks and associated career paths, and also a consequence of parental social class. Thus, these studies may include students with good knowledge of the educational system and occupations, while likely ignoring most students with less knowledge about these topics because they attend lower school tracks.

### **The present study**

This study examines the relevance of labour market literacy as measured by earning misconception across different occupations in explaining the social stratification of students' vocational aspirations and attainments. While previous research primarily focuses on expected returns to tertiary education and the choice of field of study, to the best of our knowledge we are the first to consider students' pathways within the VET system. We use representative large-scale data from the prospective cohort study 'School and Vocational Training: Educational Pathways of Students in Grade 9 and Higher' of the NEPS, which enables us to observe students' transition from general schooling to VET in Germany. This dataset includes detailed measures of students' vocational aspirations and their knowledge about the earnings in different occupations before entering the VET market. Moreover, NEPS is based on a random sample of students in all general school tracks in Germany, which makes the conclusions more generalisable.



**Figure 1.** Conceptual path model

The aim of our study is twofold: First, we attempt to show in a descriptive part, how large the information bias in expected income is for different occupations and whether it is socially stratified. We proceed exploratively, since there are hardly any studies on this topic for Germany. Second, we use path models to reveal the association between social class and vocational attainment through difference in expected earnings between low-paying and high-paying jobs as well as vocational aspirations, as shown in [Figure 1](#). Based on the findings in related literature and theoretical considerations, we derive the following hypotheses:

Low-SES students expect smaller differences in earnings of high-paying and low-paying jobs than high-SES students (as presented by path  $a_1$  of [Figure 1](#); *Hypothesis 1*).

Students, who underestimate the difference in earnings between low-paying and high-paying jobs are more likely to have lower vocational aspirations (path  $d_{21}$  in [Figure 1](#); *Hypothesis 2*) and attainment (path  $b_1$ ; *Hypothesis 3*).

Therefore, differences in expected earnings of low-paying and high-paying jobs will partially mediate SES differences in vocational aspirations (path  $a_1 \times d_{21}$ ; *Hypothesis 4*) and attainment (paths  $a_1 \times d_{21} \times b_2$  and  $a_1 \times b_1$ ; *Hypothesis 5*).

## Methods

### Data

Our analyses are based on the German NEPS, Starting Cohort 4 (Blossfeld, Roßbach, and von Maurice 2011; <https://doi.org/10.5157/NEPS:SC4:10.0.0>) which provides in-depth information on students' transition from school to VET. These data comprise a large and representative sample of initially 15,110 ninth graders in 540 regular schools (i.e. the sample of students, excluding those who attend special needs schools or private schools). The first survey was



carried out in ninth grade in the classroom via paper-and-pencil interviewing (PAPI) in autumn 2010 (Wave 1) and followed by a second survey in ninth grade in spring 2011 (Wave 2). From tenth grade onwards, subsequent surveys took place annually in the classroom via PAPI (Waves 3–8). Persons who left the general education system were interviewed biannually (Waves 3–6) and later annually (Wave 7 onwards) using computer-assisted telephone interviewing (CATI). We use data from Wave 1 to Wave 10. The last wave took place in autumn 2018. Most students left school in either summer 2012 (after the 10<sup>th</sup> grade) or summer 2014 (after the 12<sup>th</sup> grade). From this initial sample, we analyse all students who started their first either firm-based or school-based full-qualifying VET position after leaving the general school system (N = 5,646). Students enrolled in tertiary education or pre-vocational training are excluded because occupational information is not available for them. Table 1 shows the distribution of all relevant variables for both the initial sample and the analysis sample.

**Measures**

**Outcome variables**

**Aspirations and attainment.** The outcome variables of interest are students’ realistic vocational aspirations measured at the end of ninth grade (Wave 2) and the VET position they attain after leaving the general school system. Students’ aspirations express their expected occupation, i.e. what they think they will

**Table 1.** Comparison of the initial and the analysis sample.

	Initial Sample		Analysis Sample			
	Mean/Proportion	SD	N	Mean/Proportion	SD	N
Vocational Aspirations	56.012	21.074	11,362	48.530	18.691	4576
Parental ISEI	51.395	20.401	13,107	47.073	18.924	4979
Exp. Income Automechanic	1.598	0.991	11,908	1.509	0.917	4586
Exp. Income Doctor	3.753	2.973	11,992	3.304	2.658	4597
Exp. Income Banker	2.832	2.069	11,890	2.521	1.832	4568
Exp. Income Nurse	1.497	0.834	11,928	1.422	0.771	4572
Exp. Income Teacher	2.383	1.427	11,889	2.235	1.360	4549
Exp. Income Hairdresser	1.115	0.713	11,970	1.041	0.660	4583
School Track			14,893			5559
Higher Track	0.370	-		0.180	-	
Intermediate Track	0.359	-		0.466	-	
Lower Track	0.271	-		0.353	-	
Gender			15,110			5646
Male	0.503	-		0.529	-	
Female	0.497	-		0.471	-	
Migration Background			15,110			5646
Native	0.738	-		0.778	-	
1. Generation	0.064	-		0.054	-	
2. Generation	0.198	-		0.169	-	
Region			14,891			5588
East Germany	0.126	-		0.124	-	
West Germany	0.874	-		0.876	-	
N	15110	5646				

attain in the future, taking their resources and external constraints into account (Rojewski 2005). These aspirations were assessed with the open-ended question: '[...] considering everything you know now: What profession will you actually [take up] in the future?' (National Educational Panel Study, 2013, 90). For the VET position, we used students' first stable (i.e. lasting at least three months) and full-qualifying (i.e. leading to a professional qualification) VET position after general schooling using information from Waves 5–10. To map the SES associated with the aspired vocation and the attained VET position, students' answers were coded with the International Socio-Economic Index (ISEI-08; Ganzeboom 2010).

### *Predictor variables*

**Expected earnings.** Students' expected monthly earnings in different occupations were surveyed at the end of ninth grade (Wave 2): 'Now, we are also interested in your estimate of the amount of wages paid in certain jobs. What is in your opinion the monthly pay ... (1) of a motor vehicle mechanic?, (2) of a doctor?, (3) of a qualified bank clerk?, (4) of a qualified nurse?, (5) of a teacher?, (6) of a hairdresser?' Even though the question did not specify net income, both pre-tests and the distribution of answers show that students assumed net incomes.

True values for median gross income were obtained from the 2012 'Entgeltatlas' published by the German Federal Employment Agency (Bundesagentur für Arbeit 2020), which provides information on the earnings of all 20 million full-time employees in Germany who are subject to social insurance contributions. However, earnings in this dataset above the maximum social security contributions were redacted, i.e. those of most doctors. To calculate the median gross earnings of doctors, we use data from the 'Occupational Panel for West Germany' (Hausmann, Zucco, and Kleinert 2015) of 2010 – data in this survey was redacted based on the higher maximum social security contributions threshold for West Germany and the median gross earnings of doctors fall below this threshold. We convert gross earnings to net earnings based on the taxation rules for 2012 as described by the German Ministry of Finance (Bundesministerium der Finanzen 2020). Following Klößner and Pfeifer (2019, 586), we calculate the net earnings for a person with no children, tax class I, no tax allowances, church tax liability and statutory health insurance. Table 2 shows the resulting median gross and net earnings of the different jobs, which are hereafter referred to as 'true values.'

**SES.** Students' SES was measured by the highest parental SES, which has the same metric as students' aspirations and attainments. We categorised the highest parental ISEI into sextiles to capture non-linear associations with the outcome variables.

**Table 2.** True monthly gross and net earnings in 2012 (in EUR).

Occupation	Median Gross Earnings	Median Net Earnings	Median Expected Earnings in NEPS	Underestimation in %
Hairdresser <sup>a</sup>	1,294	1,002	950	5.2
Auto mechanic <sup>a</sup>	2,692	1,691	1,500	11.3
Nurse <sup>a</sup>	2,919	1,803	1,300	27.9
Banker <sup>a</sup>	4,220	2,417	2,000	17.3
Teacher <sup>a</sup>	4,337	2,472	2,000	19.1
Doctor <sup>b</sup>	5,557	3,011	3,000	0.4

Notes: <sup>a</sup> = data of the German Federal Employment Agency (Bundesagentur für Arbeit 2020) for 2012; <sup>b</sup> = data of the 'Occupational Panel for West Germany' (Hausmann, Zucco, and Kleinert 2015) for 2010.

**Control variables.** To rule out possible confounding of the associations of interest, we control for gender, region and migration background. The latter was determined by information on students', their parents' and grandparents' country of birth. We distinguish between natives (reference category), first-generation migrants and second-generation migrants. Gender was measured with a binary indicator (0 = male, 1 = female). Region captures whether students live in the former West (reference category) or East Germany.

### **Analysis strategy**

In a first step, we evaluate the extent to which students' expected earnings correspond with the true values and whether there is social stratification in the knowledge about earnings. We use two different measures to assess this. First, we present the mean differences between the expected earnings and the true values. This gives us an idea of whether students are correct, on average. Second, we categorise expected earnings as being underestimated (smaller than 75% of the true values), roughly correct (between 75 and 125% of the true value), and overestimated (more than 125% of the true value).

In a second step, we use path models to examine the role of expected earnings for explaining socially stratified aspirations and attainments. Specifically, we apply serial mediation, which enables us to separate (1) the direct associations between parental SES and aspirations as well as attainment, (2) the indirect associations between parental SES and aspirations or attainment through expected earnings, and (3) the indirect associations between parental SES and attainment through expected earnings and aspirations in serial. Since vocational aspirations should be based on the expected earnings in different occupations relative to each other, we use the difference in expected earnings between the occupation with the lowest earnings (hairdressers) and the occupation with the highest earnings (doctors) in the mediation analysis.

All analyses were conducted using Mplus version 8.1 (Muthén and Muthén 2017) and a Full Information Maximum Likelihood (FIML) estimation method to deal with missing values. We calculated the indirect associations by the product

of coefficients method; the standard errors were obtained via bias-corrected bootstrap (10,000 replications), as this procedure does not require assumptions about the sampling distribution of estimated effects (MacKinnon, 2008). We use a Huber-White sandwich estimator to obtain cluster-robust standard errors in order to account for the clustering of observations within schools.

## Results

### *Is knowledge about earning in different occupations socially stratified?*

On average, students' expected earnings in the different occupations are quite close to the actual median earnings but were underestimated in every case (see Table 2). Underestimation is least pronounced for low-income occupations compared to middle- and high-income occupations (except for doctors). While students underestimate the median expected earnings of hairdressers by only 5%, they more strongly underestimate teachers' (19%) and nurses' (28%) earnings.

However, these average values of all students mask the substantial variation in expected earnings by parents' social class. Table 3 shows the mean errors in Euros and the proportion of students who underestimated (<75% of the true value), were fairly correct (75–125% of the true value), and overestimated earnings (>125% of the true value) for all students and for students in the lowest and highest SES sextiles. Most importantly, compared to high SES students, low SES students expect much lower earnings for the three highest-paid jobs, i.e. banker, teacher and doctor. This pattern is most pronounced for doctors: On average, low SES students underestimate the true median earnings of doctors by 490 EUR, while high SES students overestimate the earnings of doctors by about 460 EUR. These results are supported by the differently large shares of students who strongly under or overestimate earnings in these occupations. For example, low SES students are 8 percentage points more likely than high SES students to strongly underestimate earnings of doctors.

Moreover, high SES students also expect higher earnings for the three lower-paying occupations (hairdresser, auto mechanic and nurse) than low SES students, but the SES differences are smaller for these occupations. For example, low SES students underestimate the earnings of hairdressers on average by more than 200 EUR, while high SES students are, on average, about right. Again, this is also reflected in the share of students who underestimate earnings: Low SES students are 5 percentage points more likely than high SES students to strongly underestimate earnings of hairdressers.

**Table 3.** Errors in expected earnings of jobs by parental ISEI.

	All	Lowest SES Sixtile	Highest SES Sixtile
<b>Hairdresser</b>			
Mean error (EUR)	-137	-213	1
Share <75% of true value	0.382	0.403	0.358
Share 75–125% of true value	0.407	0.404	0.383
Share >125% of true value	0.212	0.194	0.259
<b>Auto mechanic</b>			
Mean error (EUR)	-457	-490	-334
Share <75% of true value	0.504	0.521	0.480
Share 75–125% of true value	0.334	0.328	0.339
Share >125% of true value	0.161	0.150	0.182
<b>Nurse</b>			
Mean error (EUR)	-548	-620	-438
Share <75% of true value	0.506	0.521	0.474
Share 75–125% of true value	0.328	0.332	0.332
Share >125% of true value	0.165	0.146	0.193
<b>Banker</b>			
Mean error (EUR)	-99	-193	237
Share <75% of true value	0.396	0.421	0.353
Share 75–125% of true value	0.380	0.367	0.386
Share >125% of true value	0.223	0.212	0.261
<b>Teacher</b>			
Mean error (EUR)	-672	-752	-446
Share <75% of true value	0.491	0.503	0.452
Share 75–125% of true value	0.349	0.343	0.359
Share >125% of true value	0.160	0.154	0.189
<b>Doctor</b>			
Mean error (EUR)	-171	-490	459
Share <75% of true value	0.423	0.465	0.386
Share 75–125% of true value	0.311	0.294	0.286
Share >125% of true value	0.266	0.241	0.327

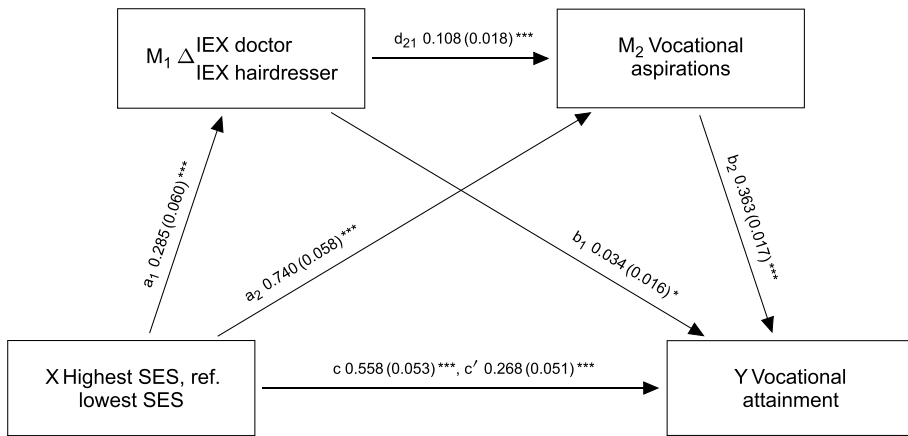
Notes: Predicted values for children without migration background living in West Germany based on logistic regression models (shares) and linear regression (mean error) with and without accounting for ISEI, FIML estimations, school cluster robust S.E., 10,000 reps., 5,646 students, 533 schools.

***Do differences in expected earnings by SES contribute to differences in vocational aspirations and attainment by SES?***

Figure 2 shows the results of our serial mediation model. We present analyses only for the group of students with the highest SES compared to the group of students with the lowest SES in our sample, as these results are most informative. The full standardised and unstandardised regression results, including the associations examined for the other SES groups and the control variables used, are provided in Table A1 in the online supplementary materials.

***Do low-SES students expect smaller differences in earnings of high-paying and low-paying jobs than high-SES students (Hypothesis 1)?***

Consistent with our expectation from hypothesis 1 and the results of our exploratory analyses, high-SES students expect a 0.285 standard-deviation higher (SD, equivalent to 706 EUR) income gap between doctors and hairdressers compared with their low-SES counterparts (Figure 2, path a<sub>1</sub>, S.E. 0.060).



**Figure 2.** Path analyses of the associations between SES, expected income gap, vocational aspirations and attainments. Results are for the highest compared to the lowest SES group. Notes: Indirect effect of X on Y through M<sub>1</sub> only =  $a_1 b_1$ ; Indirect effect of X on Y through M<sub>1</sub> and M<sub>2</sub> in serial =  $a_1 d_{21} b_2$ ; Direct effect of X on Y =  $c'$ ; Total effect of X on Y =  $c$ ; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ; Continuous variables z-standardised; Control variables are gender, migration background and federal state; FIML, bootstrap and school cluster robust S.E., 10,000 reps., 5,646 students, 533 schools.

*Are students, who underestimate the difference in earnings between low-paying and high-paying jobs, more likely to have lower vocational aspirations (Hypothesis 2) and attainment (Hypothesis 3)?*

Supporting hypothesis 2, we find that the greater the gap between the expected incomes of doctors and hairdressers is, the higher students' vocational aspirations tend to be. A one SD change in the gap in expected income is associated with a 0.108 SD (equivalent to 0.8 ISEI points) increase in vocational aspirations (path  $d_{21}$ , S.E. 0.018). The correlation between the expected income gap and vocational attainment is small but statistically significant at the 5% level (path  $b_1$ ,  $\beta$  0.034, S.E. 0.016). Thus, we find weak support for hypothesis 3.

*Do differences in expected earnings of low-paying and high-paying jobs partially mediate SES differences in vocational aspirations (Hypothesis 4) and attainment (Hypothesis 5)?*

In the following, we focus on the indirect associations between SES and vocational aspirations as well as SES and vocational attainment. The results of the total, direct and indirect associations between SES and vocational aspirations and the corresponding S.E.s are shown in Table A2, and those between vocational attainment and SES in Table A3 in the online supplementary materials.

Regarding hypothesis 4, our results show that the indirect relationship between SES and vocational aspirations mediated by the gap in expected incomes is less pronounced, especially compared to the direct relationship between SES and vocational aspirations. The direct association between SES and vocational aspirations for the highest SES group compared to the lowest amounts to 0.740 SD (path  $a_2$ , S.E. 0.058) and the indirect association is only 0.031 SD (paths  $a_1 \times d_{21}$ , S.E. 0.008, see Table A2 for the point estimate of the indirect association).

Not surprisingly, concerning hypothesis 5, the indirect association between SES and vocational attainment via the gap in expected incomes and career aspirations is even smaller in the serial mediation, albeit statistically different from zero. For the group of students with the highest SES compared to the one with the lowest SES, the serial indirect association is 0.011 SD (paths  $a_1 \times d_{21} \times b_2$ , S.E. 0.003, see Table A3 for the point estimate of the indirect association).

In the ratio of the indirect and total associations, differences in the gap in expected incomes mediate 4.0% ( $0.031/0.771$ ; see Table A2) of the differences in vocational aspirations between students with the highest SES compared to students with the lowest SES. In the case of vocational attainment, the differences in expected incomes mediate 2.0% ( $0.011/0.558$ ; see Table A3) of the observed differences in vocational attainment between the group of students with the highest SES and those with the lowest SES.

## Discussion

Our paper explores the role of a largely neglected factor for explaining social stratification in aspirations and attainments of students who entered VET in Germany: misconceptions about earnings, which is an important component of labour market literacy. We use recent longitudinal data on adolescents' transitions from general schooling to VET in Germany and cross-sectional data on their income expectations of different occupations and vocational aspirations at the end of ninth grade to examine the path dependence of socially stratified income expectations, vocational aspirations and attainments.

First, we investigate students' expected earnings and misconceptions about earnings of hairdressers, auto mechanics, nurses, bankers, teachers and doctors, thus covering the entire spectrum of low to high-income occupations. The recent and representative NEPS sample of a cohort of students in Germany validates the findings in the existing literature that students in certain regions and schools are, on average, well informed about earnings in different occupations. Moreover, our study suggests that the results obtained for students in the final years on the academic track and students who attend university (Ehlert et al. 2017; Klößner and Pfeifer 2019) also hold for younger students and those who will be ineligible to attend university. However, students in our sample

underestimate earnings of medium and high-income occupations, such as bankers, teachers and, especially, nurses. A partial explanation for this may be that students have initial earnings in mind when making their assessments rather than earnings later in the career. Thus, the underestimation of a banker's earnings may be due to their steeper earnings trajectories over their careers and the greater variance in their earnings. This argument does not hold for nurses and teachers, however; underestimation of their earnings may contribute to the current labour shortage in these occupations.

However, knowledge about earnings is socially stratified. Low SES students not only think that *their* future earnings and returns on further education are lower (e.g. Smith and Powell 1990; Webbink and Hartog 2004), but underestimate earnings *in general*. The social class differences in knowledge about earnings vary depending on which occupations are considered. This may partly account for the inconsistency in the literature regarding social class differences in the accuracy of earning predictions. Low SES students particularly underestimate the earnings in the more prestigious occupations. This may be the result of socially homogeneous networks, i.e. high SES students may have more contact with friends or relatives in higher-paying occupations in general and may generalise their knowledge about those occupations to lower-paying occupations. Moreover, if students from high SES families are in contact with persons in jobs that are on average low-paying, those persons may be more likely to earn more than average in that occupation (e.g. the owner, rather than the staff, of a hair salon).

Second, we apply serial mediation models and reveal that expected differences between high-income and low-income occupations contribute to social stratification in vocational aspirations and attainments. In line with previous research on the role of benefit expectations on university enrolment and choice of field of study (e.g. Baker et al. 2018; Bleemer and Zafar 2018; Wiswall and Zafar 2015), differences in expected earnings partially explain the association between social class and vocational aspirations, and, to a lesser degree, vocational attainments. However, associations are small. The differences in expected earnings mediate only 4% of the SES gap in vocational aspirations and 2% of the SES gap in attained VET. However, why students who underestimate differences between high-income and low-income occupations have lower vocational aspirations may not only be rooted in differences in the expected monetary benefits of different occupations. Instead, expected earnings are likely one facet of their labour market literacy, which encompasses knowledge of a broader bundle of benefits of different occupations (Higgins, Nairn, and Sligo 2010).



### ***Limitations and future research***

Some limitations must be considered when interpreting these results. First, our study only explores the association between SES, knowledge about earnings, vocational aspirations and attainment; it cannot make any causal claims. Students who aspire to start VET may seek information about specific occupations, including earnings. Moreover, cognitive dissonance may lead students on lower school tracks to devalue earnings in occupations that are out of reach for them. For instance, becoming a teacher or doctor usually requires a university entrance certificate that can only be obtained from the highest school track. Thus, vocational aspirations may affect knowledge about earning rather than the other way around.

Second, we can only analyse the vocational attainment of those students who have started VET. Hence, we exclude students who either enrolled at university or did not find a full-qualifying VET position. However, knowledge about earnings likely influences whether students enter university or start VET and possibly become part of our sample (Barone et al. 2018). Addressing these issues would require an experiment with several years of follow-up.

Finally, our study cannot explain why (socially stratified) expected income gaps before entering VET are less associated with vocational aspirations and VET positions attained, which are themselves highly socially stratified. From the perspective of making vocational choices, social class-specific vocational attainments may be more driven by social class-specific preferences or vocational interests than by the expected income benefits of different occupations. In addition, before applying for an apprenticeship, students may seek more intensive information about earnings in different occupations and update their misconceptions about earnings (Heckhausen and Tomasik 2002). However, this may occur too late to meet the requirements for VET in higher-paying occupations (Morgan 2002). For instance, if a student in a lower school track initially aspires to become a hairdresser because of misinformation about earnings, it may be impossible to enter VET in a higher-paying occupation that would require a higher school leaving certificate.

### ***Conclusion and implications***

Our results suggest that labour market literacy in terms of expected earnings in different occupations vary substantially across SES. Low SES students underestimate earnings in all occupations to a larger extent than their high SES counterparts, particularly for high-paid occupations. Therefore, low SES students perceive smaller earnings differences between high-income and low-income occupations than high-SES students do. The expected gap in incomes also gives rise to further path dependencies concerning aspiration and attainment, but the correlations are small and dilute over time when it comes to

vocational choices. Despite these small associations, our study shows that researchers need to consider labour market literacy when studying group differences in vocational aspirations and attainment. The correlations are likely to be larger when labour market literacy is measured more comprehensively. Also, labour market literacy is likely relevant for factors beyond social class, such as differences in aspirations and attainments between immigrants and natives or the genders. Moreover, the smaller association between earning misconceptions and vocational attainment suggests that low SES students update their earnings misconceptions before entering VET, which may indicate that interventions taken by counsellors and schools also contribute to reducing social class disparities in vocational attainment. Further research is needed to test these hypotheses.

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No potential conflict of interest was reported by the author(s).

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