

RESEARCH

Open Access



# To what extent do secondary effects shape migrants' educational trajectories after lower-secondary education?

Robin Busse<sup>1\*</sup> , Christian Michaelis<sup>2</sup> and Richard Nennstiel<sup>3</sup>

\*Correspondence:  
robin.busse@tu-darmstadt.de

<sup>1</sup> FB3, Institute of General and Vocational Education, Vocational Education in the Context of Global Changes, Technical University of Darmstadt, Alexanderstr. 6, 64283 Darmstadt, Germany

<sup>2</sup> Georg-August University of Göttingen, Göttingen, Germany

<sup>3</sup> University of Bern, Bern, Switzerland

## Abstract

Research shows a heterogeneous picture of migration-related disparities regarding adolescents' educational trajectories at the end of lower-secondary education. Among other disparities, migrants face large disadvantages with regard to the transition to vocational education and training (VET). They are, however, also more likely to change to upper-secondary school tracks at the end of lower-secondary education. Using longitudinal data drawn from the German National Educational Panel Study (NEPS, Starting Cohort 4), this study empirically captures patterns in school-leavers' transition trajectories after lower-secondary education and empirically tests theoretical mechanisms of migration-related educational inequalities. Building on the concept of secondary effects of migrant origin, this study asks to what extent self-selection explains migration-related disparities in the educational trajectories at the end of lower-secondary education. Particular attention is devoted to the extent to which migration-related inequalities in adolescents' transitions can be explained by differences in (1) rational choice factors and (2) the educational expectations and demands of parents and friends. The results show that rational choice factors and the educational expectations of social groups largely contribute to migration-related educational inequalities. The results provide important starting points for educational policy discussions on strategies and measures to address migration-related inequalities in the transition to VET.

**Keywords:** Migration-related inequality, Vocational education and training (VET), Educational pathways, Secondary effects, Effect decomposition

## Introduction

In many countries, at the end of lower-secondary education adolescents must decide whether to pursue an academic school track to achieve a better general educational qualification or leave the general educational system and switch to vocational education and training (VET).<sup>1</sup> In many European countries, VET provides attractive educational opportunities after leaving lower-secondary education. Especially for adolescents with low educational attainment, VET is a viable pathway to skilled employment (Kogan

<sup>1</sup> Throughout the article, we use the term 'VET' for both company-based training programs in the dual system and for school-based training programs in the school-based sector (Protsch and Solga 2016).

2019; Quintini and Manfredi 2009). Therefore, VET is seen as an important channel for supporting the integration processes of adolescents with a migration background (Jeon 2019) as studies show that migrants and natives benefit equally from VET qualifications in terms of a stable and viable occupational career (Burkert and Seibert 2007). However, a consistent finding in research is that migrants are less likely to successfully enter VET than natives and have to consider alternatives like prevocational programs (e.g. Beicht and Walden 2019; European Commission 2014).

Different mechanisms are proposed to explain migration-related disparities in VET access (Tjaden 2017). Migration-related disadvantages in school performance and competencies (i.e. primary effects of a migrant background) are expected to be one main mechanism responsible for migrants' lower likelihood of successfully entering VET (e.g. Beicht and Walden 2019). However, previous research has consistently demonstrated that migration-related disparities remain after accounting for migrants' prior achievement and social background (Beicht and Walden 2017; Tjaden 2017). One body of research underlines that disparities in VET access have to be discussed in the light of ethnic discrimination in companies' selection processes (e.g. Immdorf 2017; Zschirnt and Ruedin 2016). Another growing body of research highlights that secondary effects of a migrant background (i.e. migration-specific educational choices) shape migration-related differentials in VET access (Busse 2020; Busse and Scharenberg 2022; Glauser 2015; Tjaden 2017; Tjaden and Hunkler 2017; Tjaden and Scharenberg 2017). Several studies across European countries revealed that migrants are more likely to choose academic school tracks over VET at the upper-secondary level when controlling for social origin and prior achievement (Germany: Tjaden and Hunkler 2017; Finland: Kilpi-Jakonen 2011; France: Brinbaum and Cebolla-Boado 2007; Netherlands: van de Werfhorst and van Tubergen 2007; Sweden: Jonsson and Rudolphi 2011; Switzerland: Tjaden and Scharenberg 2017).

The scientific debate on secondary effects has focused primarily on two theories that may explain the formation of educational choices. Rational choice theory (e.g. Esser 1999) suggests that differences in educational choices are explained by rational calculus, whereas the Wisconsin model of status attainment (Sewell et al. 1969) focuses on social influence processes. Both theories have received considerable empirical support (e.g. Gabay-Egozi et al. 2015; Zimmermann 2019). In addition, rational considerations and social influence processes largely determine young adults' transitions to VET (Becker and Glauser 2018; Glauser 2015), and both factors vary substantially between migrants and natives (Glick and White 2004; Salikutluk 2016; Tjaden and Hunkler 2017).

Building on this argumentation, this study's objectives are twofold. Using longitudinal data drawn from the German National Panel Study (NEPS) with a high representativeness for transitions from school to VET, this study first examines patterns in transition trajectories of a nationwide sample of school-leavers. For this purpose, sequence analysis and cluster analysis are conducted, which go beyond common studies on VET access by providing detailed insights into educational trajectories without blurring underlying heterogeneity. Second, the Karlson-Holm-Breen (KHB) method (Karlson and Holm 2011), which has been proven to be useful and robust for the decomposition of educational inequalities (e.g. Scharf et al. 2020; Tjaden and Scharenberg 2017), is applied to empirically test the theoretical mechanisms leading to migration-related inequalities in educational

transitions. More specifically, this method is used to quantify the relative importance of secondary effects (rational considerations and social influences), to explain migration-related inequalities in educational transitions. In sum, this study provides insights into the transition trajectories of students leaving general school education after grade 9 or 10 and the mechanisms driving migration-related inequalities.

### **Transition alternatives at the end of lower-secondary education in Germany**

When leaving school at the end of lower-secondary education (in grade 9 or 10), young adults in Germany face various transition alternatives (Michaelis et al. 2022). In Germany, there are three major post-secondary education systems: (1) VET (658,323 beginners in 2020), (2) prevocational programs (234,600 beginners 2020) and (3) upper-secondary school tracks at upper-secondary level (485,883 beginners in 2020; Federal Statistical Office 2021, own calculations). However, due to admission requirements and specific selection procedures, most options for upper-secondary level trajectories after leaving general education are structured by school-leaving certificates. The following description outlines the transition alternatives of school-leavers at the end of lower-secondary education.

1. VET is divided into dual (company-based VET) and school-based VET system (Cedefop 2020). Both company- and school-based VET lead to a vocational qualification (at ISCED level 3 and 4 or EQF level 3 and 4, Cedefop 2020), representing a crucial prerequisite for skilled and stable employment at the intermediate level (Brzinsky-Fay and Solga 2016; Protsch and Solga 2016). While access to company-based VET largely depends on the selection criteria of companies (Michaelis and Busse 2021), there are formal entry requirements for school-based VET programs. For most school-based VET programs, an intermediate secondary school certificate is required, whereas some school-based VET programs require only a lower-secondary school certificate (Michaelis 2017).
2. School-leavers can also participate in prevocational programs (at ISCED level 2 or EQF level 2). Despite diverging priorities between German federal states, the main purpose of prevocational programs is to improve adolescents' opportunities to access VET (Cedefop 2020; Holtmann et al. 2021).
3. At the end of lower-secondary education, adolescents who selected a non-academic school track after primary education are also able to change to upper-secondary school tracks at the upper-secondary level (e.g. a *Gymnasium* or upper-secondary vocational schools) and obtain an upper-secondary degree (e.g. a university entrance qualification) if they fulfil certain performance requirements (for details, see Standing Conference of the Ministers of Education and Cultural Affairs of the Länder of the Federal Republic of Germany 2019). For school-leavers of non-academic school tracks, vocational schools at upper-secondary level (e.g. *Fachoberschule* or *Berufliches Gymnasium*) are of particular importance (Dollmann and Weißmann 2020). These full-time vocational schools comprise 2- to 3-year vocationally oriented general education courses and require an intermediate school certificate (Standing Conference of the Ministers of Education and Cultural Affairs of the Länder of the Federal Republic of Germany 2019).

## **The role of primary and secondary effects in explaining migration-related inequalities**

Migration-related inequalities in educational transitions can be seen as a result of primary and secondary effects of a migrant background, among other factors (for an overview, see Tjaden 2017). While the primary effects of a migrant background relate to educational achievement differences between migrants and natives, secondary effects relate to migration-specific educational choices. This section describes how both mechanisms lead to migration-related inequalities in educational transitions at the end of lower-secondary education, particularly in transitions to VET.

### **Primary effects**

School performance and competencies are key predictors of educational transitions. However, there is consistent empirical evidence for migration-specific disadvantages in school performance (Algan et al. 2010) and competencies (Borgna and Contini 2014; Schnepf 2007). Therefore, a natural starting point for explaining migration-related disparities in educational transitions is migration-specific differences in school performance and competencies.

Regarding access to company-based VET, applicants' school performance and competencies represent important productivity signals for VET employers. Following the job competition model (Thurow 1979) and signaling theory (Spence 1973), it can be assumed that VET employers rank applicants by their expected productivity. To estimate the suitability of applicants, companies use in particular information on applicants' school performance as selection criteria (Protsch and Solga 2015). Studies in Germany show that the higher the applicant's level of education (Holtmann et al. 2017) and the better the grades and competencies (Beicht and Walden 2017), the more likely it is that they will obtain a training contract (Nennstiel 2021). Given the lower school performance levels of migrants (e.g. Algan et al. 2010), it may be assumed that they are more likely to be ranked at lower positions in the application queue by companies than natives and, thus, have a lower likelihood of entering VET. In sum, companies' selection practices may contribute to explaining migration-related inequalities. Furthermore, school certificates are relevant for entry to school-based VET and upper-secondary schools (see "[Transition alternatives at the end of lower-secondary education in Germany](#)" section). Despite the importance of performance indicators for successful educational transitions, there is strong empirical evidence that migration-related differentials in VET access are only partly driven by primary effects of a migrant background (e.g. Beicht and Walden 2017; Busse 2020; Busse and Scharenberg 2022; Tjaden 2017; Nennstiel 2022). Research also shows that migration-related disparities in access to VET do not reduce even when there is a low competition for training places (Michaelis and Busse 2021). In this context, it has also to be considered that many studies showed that there is discrimination against migrants in companies' selection processes (e.g. Imdorf 2017; Kaas and Manger 2012; Zschirnt and Ruedin 2016; Zschirnt 2020).

### **Secondary effects**

The research indicates that secondary effects of a migrant background largely shape migration-related differentials in educational transitions (e.g. Tjaden 2017). The

immigrant optimism hypothesis (Kao and Tienda 1995) provides a useful theoretical framework for understanding the underlying processes of secondary effects of a migrant background and has received both the most attention and empirical support in existing research (Fernández-Reino 2016; Salikutluk 2016; Tjaden and Hunkler 2017). Alternative theoretical explanations such as information deficits with regard to the German educational system or anticipated discrimination in the training market (Heath and Brinbaum 2007; Heath et al. 2008; Salikutluk 2016; Tjaden and Hunkler 2017) have received little or no support (Tjaden and Hunkler 2017).

According to the immigrant optimism hypothesis, the central motive of migration, the striving for a better life, results in strong efforts to attain upward social mobility (Dollmann and Weißmann 2020; Hadjar and Scharf 2019; Heath and Brinbaum 2007). This upward mobility motive comes with high educational aspirations because educational degrees are regarded as the main key for upward mobility (Hadjar and Scharf 2019; Heath and Brinbaum 2007; Salikutluk 2016). Even if the first generation does not attain upward mobility, migrants' parents pass this goal on to the following generations (Heath et al. 2008). The implications of the concept of immigrant optimism for decision-making processes regarding educational transitions of school-leavers from lower-secondary education are discussed in the following sections from the perspectives of the rational choice theory and Wisconsin model.

#### ***Migration-specific rational considerations***

Educational decisions are commonly examined using the assumptions of the rational choice theory (Jackson 2013). From the perspective of the rational choice theory, individuals are expected to rationally decide for or against educational options based on the subjective expected utility (SEU) of available educational options (Breen and Goldthorpe 1997; Erikson and Jonsson 1996; Esser 1999).

The following remarks regarding the rational choice theory refer to the SEU model developed by Esser (1999). On the one hand, Esser (1999) developed his model of educational decision-making based on earlier theoretical frameworks from Erikson and Jonsson (1996), Breen and Goldthorpe (1997) and Becker (2017). On the other hand, the model from Esser (1999) provides a powerful analytical framework for explaining educational inequalities at the transition to VET (Becker and Glauser 2018; Glauser 2015).

From the perspective of Esser's SEU theory (1999), individuals' decisions regarding a certain educational alternative are influenced by the *educational motivation (EM)* for this alternative and its *investment risks (IR)*. The educational motivation (*EM*) of a certain educational option *i* is proposed to be equal to  $EM_i = B_i + c_i * SM$ , where  $B_i$  refers to the expected benefit of the educational option *i* (i.e. income, job security), *SM* refers to the importance of status maintenance, and  $c_i$  refers to individuals' beliefs of the extent to which the educational option *i* helps them to maintain the status of their parents. However, to investigate migration-specific rational considerations, some modifications of the model parameters are necessary. Esser's model was developed to explain social educational inequalities, which are assumed to be largely the result of differences in the importance of status maintenance. In contrast, migration-related differences in educational attainment and aspiration are assumed to be mainly driven through the striving for upward mobility and rather less due to the motive of status maintenance.

Therefore, this study assumes the educational motivation for a certain option to be equal to  $EM_i = B_i + c_i * UM$ , where  $UM$  refers to the importance of upward mobility and  $c_i$  to individuals' beliefs of the extent to which the educational option  $i$  helps them attain upward mobility. The perceived  $IR$  of a certain educational option  $i$  equals  $IR_i = C_i/p_i$ , where  $C_i$  refers to the subjective expected costs of educational option  $i$ , and  $p_i$  to the subjective probability that the educational option  $i$  can be successfully completed.

Following SEU theory, educational inequalities are assumed to result from group differences in educational motivation and investment risks for certain educational options. In accordance with previous studies (Glauser 2015; Tjaden 2016), migration-related differences in educational motivation and perceived investment risk are expected, among other factors, for the following reasons. First, immigrant optimism may influence the educational motivation of immigrant parents and their children. Overall, young people with a migrant background are expected to rate the importance of upward mobility ( $UM$ ) higher than young natives, as proposed by the immigrant optimism hypothesis. Since general motives of upward mobility ( $UM$ ) are included in the multiplicative term of educational motivation, regardless of certain educational options, immigrants could exhibit a higher educational motivation for both upper-secondary schools and VET. However, migrants might rate the benefits ( $B$ ) of upper-secondary schools and the probability of upward mobility through upper-secondary schools higher than natives, as upper-secondary school tracks provide viable channels for implementing upward mobility. Based on these assumptions, migrants may have a higher educational motivation to attend upper-secondary schools than natives. If these assumptions hold, migrants will probably put more effort into switching to upper-secondary schools (Tjaden and Hunkler 2017). Second, immigrant optimism is likely to influence the perceived investment risk of VET and upper-secondary schools. Due to the high motivation for upward mobility in migrant families, it can be assumed that immigrants and their children downweigh the investment risks of taking up upper-secondary schools. There is empirical evidence that migrant groups have a significantly higher educational motivation to attend upper-secondary schools, assess the associated investment risks as significantly lower, and are more likely to take up upper-secondary education even when the investment risks are high (Busse 2020). In sum, based on the rational choice theory and previous research, it is assumed that the influence of a migrant background on educational transitions is mediated by subjective rational considerations.

*H1* Differences in educational transitions between natives and students with a migration background can be explained by differences in educational motivations and perceptions of investment risks.

#### ***Migration-specific social influences***

In research, Boudon's (1974) analytical distinction between primary and secondary effects, and hence the consideration of the rational choice theory, has been proven to be useful for explaining inequalities during educational transitions (Dumont et al. 2019). However, several studies point out that rational choices cannot completely explain inequalities during educational transitions and that other mechanisms may also cause



observed educational inequalities (Dumont et al. 2019; Glauser 2015; Stocké 2010; Zimmermann 2019). In this regard, social influence processes, central to the Wisconsin model, are expected to shape the processes underlying secondary effects (Zimmermann 2019).

According to the Wisconsin model, students' educational choices result primarily from the desire to conform with the educational expectations and demands of their social environment. Through pressure towards conformity, adolescents may adopt the educational aspirations and performance expectations of parents and imitate educational aspirations and plans of friends and classmates (Cohen 1987; Lorenz et al. 2020; Woelfel and Haller 1971; Zimmermann 2019).

From the perspective of the Wisconsin model, educational inequalities are, therefore, the result of group differences in social influence processes. There is consistent evidence that social influence processes vary largely between individuals with and without a migrant background. The educational aspirations and expectations of adolescents with a migrant background and of their parents are substantially higher than those of natives (Germany: Acar 2018; Kristen and Dollmann 2010; Salikutluk 2016; Tjaden and Hunkler 2017; other European countries: Abrassart et al. 2020; Brinbaum and Cebolla-Boado 2007; Glick and White 2004; Jonsson and Rudolphi 2011; Nygård 2021; Rosenbaum and Rochford 2008; Teney et al. 2013; Werfhorst and Tubergen 2007). Additionally, migrants' friends show higher educational aspirations than natives' friends (Salikutluk 2016).

The effect of the comparatively high educational expectations and demands of immigrants' parents and friends may be of two kinds. The desire for upward mobility adapted and internalized by migrant children through family socialization is likely to be a decisive factor for migrants when they decide on an educational option. At the same time, parents' and friends' educational expectations and aspirations are also likely to directly determine young people's educational decisions at the point of educational transitions. Therefore, it can be assumed that the high educational expectations and aspirations in immigrants' social environment, particularly in migrants' families, lead migrants to choose more demanding educational options than natives. In sum, based on the assumptions of the Wisconsin model, it is assumed that the influence of a migrant background on educational transitions is mediated by social influence processes such as the educational expectations and demands of parents and friends.

*H2* Differences in educational transitions between natives and students with a migration background can be explained by differences in educational expectations and educational aspirations of peers (e.g. parents and friends).

## **Data and methods**

### **Data**

Starting Cohort 4 of the German National Educational Panel (NEPS; NEPS Network 2021; Blossfeld and Roßbach 2019) is used for the empirical analyses, as this substudy

of the NEPS multicohort sequence design allows to assess which educational and vocational pathways young adults choose after completing grade 9 of general education.<sup>2</sup>

Consistent with standard practice in studies of post-compulsory education, we restrict our analytical sample (Nennstiel 2021; Lindemann and Gangl 2019). We study students without special needs who left the general education system (i.e. *Hauptschule*, *Realschule*, *Gymnasium*, *Gesamtschule*, etc.) after the end of lower-secondary education (grade 9 or 10) or transferred to another school track (i.e. *Gymnasium* or upper-secondary vocational schools at upper-secondary level). As mentioned above, we focus on the post-compulsory educational pathways of students with low or intermediate educational attainment. Therefore, we excluded students who attended an academic school track at lower-secondary level and continued schooling in academic school tracks at upper-secondary level (see also Lindemann and Gangl 2019).<sup>3</sup>

In our study, school exit after grade 9 or 10 was determined as follows: If respondents left a regular school between 2011 and 2013 with an intermediate secondary school certificate or less, they were considered school-leavers ( $n = 7257$ ). Respondents for whom no information on their activity was available for more than 6 months (out of the first 24 months after leaving school) were excluded from the dataset ( $n = 1,373$ ). Furthermore, respondents for whom no information on migrant background, school-leaving certificate, or place of residence was available were also excluded ( $n = 447$ ). These sample restrictions left a subsample of  $n = 5,437$  ninth- and tenth-grade school-leavers born between 1990 and 1997.

#### **Operationalization of mechanisms of migration-related inequalities and control variables.**

The following section provides information on the independent and control variables of our analyses. Table 1 shows the operationalization of the main variables of interest regarding rational choice and social influence, and Additional file 1: Table A1 reports the operationalization of all variables used. Distributions and descriptive statistics of the independent and control variables are presented in Table 2.

#### ***Migrant background***

In this paper, respondents' migrant background is defined as follows. Young people who have immigrated themselves (first-generation migrants) or who have at least one parent born abroad (second-generation migrants) are considered to have a migrant background. The division of minority students into migrant generations is frequently used in empirical research on majority-minority gaps (e.g. Dollmann 2017). A total of 74.3% of respondents had no migrant background, whereas, in 19.1% of the cases, one or both parent(s) were born abroad. Only 6.6% of respondents have immigrated themselves. Overall, the composition of the group with a migrant background is comparable to German migration patterns (Olczyk et al. 2016). Data on respondents' migrant background were surveyed in the autumn of 2010 (wave 1).

<sup>2</sup> This paper uses data from the National Educational Panel Study (NEPS; see Blossfeld and Roßbach 2019): Starting Cohort 4, Grade 9, <https://doi.org/10.5157/NEPS:SC4:12.0.0>. From 2008 to 2013, NEPS data was collected as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). As of 2014, NEPS has been carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network.

<sup>3</sup> In Germany, students in academic tracks are not usually faced with the decision of staying in or leaving general education as they regularly attend upper-secondary level at their school.



**Table 1** Operationalization of the main variables of interest

Variable	Operationalization	Time of measurement
<i>Rational choice factors</i>		
Educational motivation: university entrance qualification (B + c * UM)	<i>Benefit (B)</i> : 'How favourable would you judge your prospects of getting a good job if you did the <i>Abitur</i> ?', 1 (very bad) → 5 (very good) <i>Importance of upward mobility (UM)</i> : Item 1 'How important is it to you that you have a similar or better school-leaving qualification than your parents', Item 2: 'How important is it to you to later have a similarly good or better job than your parents', 1 (very unimportant) → 5 (very important) <i>Probability (c) of upward mobility</i> : 'What would be the prospects for a similarly good or better vocation than that of your parents if you did the <i>Abitur</i> ?', 1 (very bad) → 5 (very good)	Wave 2 (if missing wave 3)
Investment risk: university entrance qualification (C/p)	<i>Costs (C)</i> : 'As long as you go to school, you can hardly make your own money. Most of the things you need are paid for by your parents (e.g. school things, clothing). How hard would it be for your parents to pay these costs if you did the <i>Abitur</i> ?', 1 (very easy) → 5 (very difficult) <i>Expected probability (p)</i> : 'Regardless of the kinds of qualifications you can earn at your current school, how likely is it that you could pass the <i>Abitur</i> ?', 1 (very unlikely) → 5 (very likely)	Wave 2 (if missing wave 3)
<i>Social influence factors</i>		
Parental educational expectations as perceived by adolescents (% university)	Item: 'And what kind of education would your parents like you to get after you have left school? My parents would like me to', 1 = study, 0 = else (to do a vocational training, to do no vocational training at all, my parents have no opinion)	9th grade, wave 1
Share of friends with aspirations for university entrance qualification	Item: 'How many people from your circle of friends intend to obtain the <i>Abitur</i> ?', 1 = none, 2 = almost none, 3 = less than half, 4 = about half, 5 = more than half, 6 = almost all, 7 = all	9th grade, wave 1 (if missing, wave 3)

Additional file 1: Table A1 reports the operationalization of all the variables used

**Social origin and prior achievement**

In order to investigate the secondary effects of migrant background, it is necessary to account for respondents' prior achievement and social origin (Dollmann and Weißmann 2020; Tjaden and Scharenberg 2017) which we operationalized as follows.

In line with the current academic debate on the measurement of social origin (Blossfeld 2019; Bukodi and Goldthorpe 2013), different indicators were used to capture important facets of this multidimensional construct. Parents' highest International Socio-Economic Index of Occupational Status (ISEI-08) (Ganzeboom 2010) is included to account for respondents' socioeconomic background ( $M = 46.5$ ). In addition, the highest education level of parents is included using the CASMIN educational schema. Following the procedure from Blossfeld (2019), the nine ordered categories on the CASMIN classification provided by the NEPS were then collapsed into three main educational levels (Additional file 1: Table A1).

We used different indicators for individuals' prior achievement at the time of the educational decision of interest to account for primary effects. Individuals' educational certificates are used, and three educational qualification categories are differentiated. In vertical order, respondents with no or a regular lower-secondary school certificate (*Hauptschulabschluss*, 20.2%), extended lower-secondary school certificate

**Table 2** Descriptive statistics

	Total	No migrant background	Second-generation migrants	First-generation migrants
<i>Prior achievement</i>				
School-leaving certificate (%)				
No or lower-secondary certificate	20.2%	18.7%	23.2%	28.4%
Extended lower-secondary certificate	13.2%	11.6%	16.6%	21.5%
Intermediate-secondary certificate	66.6%	69.7%	60.2%	50.1%
GPA school-leaving certificate (1 = very good → 6 = insufficient)	2.6	2.6	2.7	2.8
Language abilities and skills: Receptive vocabulary	54.2	56.2	49.3	47.0
<i>Rational choice (university entrance qualification)</i>				
Benefit (B)	4.8	4.8	4.8	4.8
Expected probability (p)	2.8	2.8	2.8	2.7
Importance of upward mobility (UM)	3.8	3.7	3.9	4.0
Probability of upward mobility (c)	4.7	4.7	4.7	4.7
Costs (C)	1.9	1.9	1.8	2.0
Expected probability (p)	2.8	2.8	2.8	2.7
Educational motivation (B + c * UM)	8.6	8.5	8.8	8.8
Investment risk (C/p)	0.9	0.9	0.8	1.0
<i>Social influence</i>				
Parental educational expectations as perceived by adolescents (% university)	23.3%	17.9%	38.1%	40.5%
Share of friends with aspirations for university entrance qualification (1 = none, 2 = almost none, 3 = less than half, 4 = about half, 5 = more than half, 6 = almost all, 7 = all)	3.3	3.3	3.4	3.2
<i>Social origin</i>				
Parents' highest socioeconomic status (ISEI)	46.5	49.0	40.1	36.9
<i>Parents' highest education (CASMIN) (%)</i>				
Low	9.1%	2.8%	25.3%	33.4%
Intermediate	81.4%	86.3%	69.2%	61.2%
High	9.5%	10.9%	5.5%	5.4%
<i>Other control variables</i>				
Gender (% female)	46.9%	45.9%	51.4%	45.1%
N sample	5,437	4,041	1,037	359
Row percentages	100.0%	74.3%	19.1%	6.6%

Coefficients for federal state are not shown due to data sensitivity issues. Data: NEPS SC4 SUF 12.0.0, column percentages or means of imputed data ( $m = 30$ ), own calculations

(*Qualifizierender Hauptschulabschluss*, 13.2%), or intermediate secondary school certificate (*Mittlerer Schulabschluss*, 66.6%) are distinguished (Table 2). In addition, students' self-reported grade point average (GPA) is used to obtain additional information concerning the quality of respondents' school certificates. In Germany, grades are coded from 1 (very good) to 6 (insufficient). Linguistic competencies tested in the first wave were used because they are an important predictor of migration-related educational inequalities (Esser 2006). Here, linguistic competencies in Germany are measured by respondents' receptive vocabulary, which is an internationally compatible indicator of the acquired linguistic skills and abilities of young people (LifBi 2011). The test of

receptive vocabulary is based on a modified version of the Peabody Picture Vocabulary Test (Dunn and Dunn 2004).

### **Secondary effects**

The processes underlying secondary effects of a migrant background were measured using a variety of predictors for the rational choice theory and Wisconsin model.

The rational choice theory was operationalized using parameters of the subjective value-expectancy model from Esser (1999). The rational choice theory indicators used in this study relate to students' rational considerations regarding the acquisition of a university entrance qualification (*Abitur*). Data on indicators of the rational choice theory for other post-compulsory educational pathways (e.g. VET or prevocational programs) were not collected in the NEPS. The operationalization for rational considerations included respondents' perception of the *benefits (B)*, *costs (C)*, *probability of success (p)*, *importance of upward mobility (UM)* and the corresponding *expectancy of upward mobility (c)* with regard to the acquisition of a university entrance qualification (for details, see Table 1). These indicators are used as proxies to measure respondents' subjectively expected utility regarding upper-secondary schools at upper-secondary level. It is assumed that the indicators for the acquisition of a university entrance qualification can be transferred to the attendance of upper-secondary schools in general. The *perceived costs of a university entrance qualification (C)* refer to the financial costs or financial burden of acquiring a university entrance qualification, whereas the *probability of success (p)* is determined by asking the students how likely they think it is that they will obtain a university entrance qualification. The *importance of upward mobility (UM)* is measured by two items related to students' perceived importance of obtaining a similar or better job and education than their parents. Scale reliability for both items is high ( $\alpha = 0.7$ ). The corresponding *probability (c) of upward mobility* is assessed by including students' beliefs about the extent to which a university entrance qualification could help them achieve a similar or better job than their parents. The *benefits (B)* of a university entrance qualification are estimated by including students' expected prospects of getting a good job if they did achieve a university entrance qualification. Answer categories on all these indicators ranged from 1 (very low) to 5 (very high). To directly test the SEU model from Esser (1999) and to follow existing research (Becker and Glauser 2018; Glauser 2015), data on these indicators are converted into the two multiplicative terms *educational motivation (EM = B + c \* UM)* and *investment risk (IR = C/p)*.

Social influence was operationalized using two indicators for the social influence of parents and friends (for details, see Table 1). The first indicator measures *parental university expectations* as perceived by the young adults. This indicator elicits information about whether respondents believe that their parents expect them to access higher education (coded as 1 'yes', 0 'no'). The second indicator measures the proportion of friends who planned to obtain a university entrance qualification (answer categories ranged from 0 'none' to 7 'all'). Both indicators were measured in wave 1 (autumn 2010). If data on friends' aspirations were not available in wave 1, information from wave 3 (2011/2012) was used instead.

### **Other control variables**

The analyses of the transition processes at the end of lower-secondary education must be placed in the overall context of important factors influencing secondary effects of migrant background in the transition to VET. First, research shows that gender needs to be controlled when investigating secondary effects of migrant background (Glaser and Becker 2023). Second, the regional context has been proven to be an important factor that may affect adolescents' educational options and chances for a training place (Busse 2020; Michaelis and Busse 2021) as well as educational plans (Dollmann and Weißmann 2022). Thus, all models were additionally controlled for respondents' gender and federal state of residency. The contextual characteristic 'federal state' is used as it is considered to be a general proxy for different regional opportunity and supply structures with regard to the entry into training (Zimmermann and Skrobanek 2015, p. 358).

### **Descriptive statistics**

Bivariate analyses indicate that respondents with a migrant background are more likely to have parents with lower education and lower socioeconomic status than natives. For a detailed interpretation, we calculated different effect sizes for mean differences (Cohen's  $d$ ) and proportion differences (Cohen's  $h$ ; Cohen 1988) between natives and second-generation migrants as well as between natives and first-generation migrants (see Table 3). Following Cohen's convention, effect sizes (for both Cohen's  $d$  and Cohen's  $h$ ) with an absolute value of 0.2 can be interpreted as small, with an absolute value of 0.5 as medium, and with an absolute value of 0.8 as strong group differences. Compared to natives, second-generation migrants ( $h=0.9$ ) and first-generation migrants ( $h=0.7$ ) have a substantially higher proportion of parents with a low educational level. First-generation migrants' parents have a 12.1 lower mean ISEI score ( $d=-0.7$ ), and second-generation migrants' parents an 8.9 lower mean ISEI score ( $d=-0.5$ ) compared to natives' parents. Bivariate analyses also confirm the existence of achievement gaps between natives and migrants: compared to natives, migrants have left school with substantially lower school-leaving qualifications. For example, second-generation ( $h=-0.2$ ) and first-generation migrants ( $h=-0.4$ ) are less likely to leave school with an intermediate-secondary school certificate than natives. In addition, compared to natives, both migrant groups have left school with poorer GPAs (second-generation migrants:  $d=0.2$ ; first-generation migrants:  $d=0.3$ ) and lower receptive vocabularies (second-generation migrants:  $d=-0.7$ ; first-generation migrants:  $d=-1.0$ ) (Tables 2, 3).

Bivariate analyses also confirm the existence of gaps in rational considerations and social influence between natives and migrants. Compared to natives, both migrant groups report a higher educational motivation for acquiring a university entrance qualification. The effect size for both migrant groups was 0.2. There are only small gaps in the perceived investment risks of a university entrance qualification between natives and migrants (Tables 2, 3). Regarding the indicators of social influence, the bivariate analyses clearly underline the existence of different educational aspirations between adolescents with and without a migrant background. Compared to adolescents without a migrant background, second-generation migrants (40.5% vs. 17.9%) as well as first-generation migrants (38.1% vs. 17.9%) are twice as likely to assume that

**Table 3** Gaps in achievement, rational choice, social influence, and social origin between natives and second-generation migrants and between natives and first-generation migrants (Cohen's *d* and Cohen's *h*)

	Second-generation migrants		First-generation migrants	
	Diff. <sup>1</sup>	Cohen's <i>d</i> or <i>h</i>	Diff. <sup>1</sup>	Cohen's <i>d</i> or <i>h</i>
<i>Prior achievement</i>				
School-leaving certificate <sup>2</sup>				
No or lower-secondary certificate	4.5***	0.1	9.7***	0.2
Extended lower-secondary certificate	5.0***	0.1	9.9***	0.3
Intermediate-secondary certificate	- 9.5***	- 0.2	- 19.6***	- 0.4
GPA on school-leaving certificate (1 = very good → 6 = insufficient)	0.1***	0.2	0.2***	0.3
Language abilities and skills: Receptive vocabulary	- 6.8***	- 0.7	- 9.0***	- 1.0
<i>Rational choice</i>				
Educational motivation: university entrance qualification (B + c * UM)	0.3***	0.2	0.3***	0.2
Investment risk: university entrance qualification (C/p)	- 0.1**	- 0.1	0.1	0.1
<i>Social influence</i>				
Parental educational expectations as perceived by adolescents (university) <sup>2</sup>	20.2***	0.5	22.6***	0.6
Share of friends with aspirations for university entrance qualification	0.1*	0.1	- 0.1	- 0.1
<i>Social origin</i>				
Parents' highest socioeconomic status (ISEI)	- 8.9***	- 0.5	- 12.1***	- 0.7
Parents' highest education (CASMIN) <sup>2</sup>				
Low	22.5***	0.7	30.6***	0.9
Intermediate	17.1***	- 0.4	25.1***	- 0.6
High	- 5.4***	- 0.2	- 5.4***	- 0.2

<sup>1</sup> Estimated difference of means or proportions (percentage points) based on a *t*-test

<sup>2</sup> For categorical variables Cohen's *h* was estimated. Average estimates pooled over 30 imputed data sets. Reference category for all tests were native respondents. Level of significance: \*\*\**p* < 0.001; \*\**p* < 0.01; \**p* < 0.05. Data: NEPS SC4 SUF 12.0.0, own calculations

their parents want them to go to university (Table 2). The effect sizes for both migrant groups range between 0.5 and 0.6 (Table 3).

**Empirical strategy**

Four empirical approaches were used to investigate patterns in school-leavers' transition trajectories and empirically test theoretical mechanisms of migration-related educational inequalities.

1. To investigate the complexity and diversity of transition processes, sequence analysis (Macindoe and Abbott 2006) and cluster analysis (Everitt et al. 2011) were conducted. This approach allows us to identify different transition patterns in the data without blurring underlying heterogeneity. An optimal matching algorithm was used to generate a similarity measure by comparing each sequence with the others. Based on this similarity measure, the ward algorithm was then applied to create groups such that within-group differences were minimized (Brzinsky-Fay and Solga 2016). For the sequence analysis, we used status information on the first 24 months after

respondents left school. Here, eight types of activities are distinguished: (1) company-based VET, (2) school-based VET,<sup>4</sup> (3) upper-secondary schools (e.g. *Gymnasium* or upper-secondary vocational schools), (4) prevocational program, (5) employment, (6) unemployment, (7) other activities (e.g. voluntary military service), and (8) gaps (e.g. missing information or panel mortality).<sup>5</sup>

2. To estimate the extent to which migrant groups face difficulties in their educational transitions after leaving school, multinomial regression analyses were used. Average marginal effects (AME) are reported to display the average effect of a migrant background on the probability of belonging to a certain transition cluster, given that all covariates are held constant at their values. AMEs have the advantage of allowing a simple interpretation and, in addition, are robust against scaling and superior to other coefficients in many respects (Best and Wolf 2015).
3. To estimate to what degree the effects of a migrant background on the educational transition are explained by rational choices and social influences, a decomposition analysis was performed using the KHB method for nonlinear nested models (Karlson and Holm 2011). This decomposition method is robust against issues for comparing the coefficients of nonlinear models (Best and Wolf 2015) and allows us to assess the net contribution of factors for explaining differentials in the dependent variable. Since observations may be clustered within classes or schools, clustered standard errors at the school level were applied to all multivariate models. Continuous variables were z-standardized for all multivariate analyses.
4. To test the sensitivity of the results of the decomposition method, three robustness checks were conducted. In the *first robustness check*, additional control variables were included in the analyses to test the stability of the results. Respondents' beliefs about discrimination of migrants in the labour market (see Additional file 1: Table A1 for operationalization) were included to account for the effects of anticipated discrimination, a mechanism also frequently discussed concerning secondary effects of a migrant background (e.g. Tjaden and Hunkler 2017). For the *second robustness check*, additional measures for rational considerations were included to test whether the net contribution of rational choices and secondary effects changes. For this purpose, the multiplicative terms of students' educational motivation and investment risk regarding the achievement of a lower- and intermediate-secondary school certificate (see Additional file 1: Table A1 for operationalization) were included to capture a wider range of students' rational considerations. A *third robustness check* comprises the estimation of a logistic regression to disentangle the effect of a migrant background on the probability of accessing company-based VET directly (Cluster 1) versus the transition to upper-secondary schools (Cluster 4).

Missing information on independent variables was estimated through multivariate imputation by chained equations in Stata. In line with the recommendations of simulation

<sup>4</sup> Given the variety of possible states involved and the methodological challenges for sequence and cluster analyses, we decided against a differentiation of the occupational status of the training place (see also Busse 2020).

<sup>5</sup> Some respondents had issues classifying episodes that incorporated school activities because VET, prevocational programs, and upper-secondary schools all comprise school elements (Menze et al. 2016). In such cases, the information provided by the respondents had to be modified.



and validation studies (von Hippel 2007), both the dependent and independent variables were included in the imputation model. In addition, auxiliary variables (including the educational aspirations of adolescents in grade 9) were added to the imputation model but not used in the empirical analyses. To increase the robustness of the imputations, 30 imputation datasets were generated.

## Results

### Transition patterns at the end of lower-secondary education

Sequence and cluster analyses identified six distinct transition patterns for ninth- and tenth-grade school-leavers.<sup>6</sup> While Fig. 1 shows the monthly proportion plots of the six clusters, Table 4 reports the clusters' main characteristics.

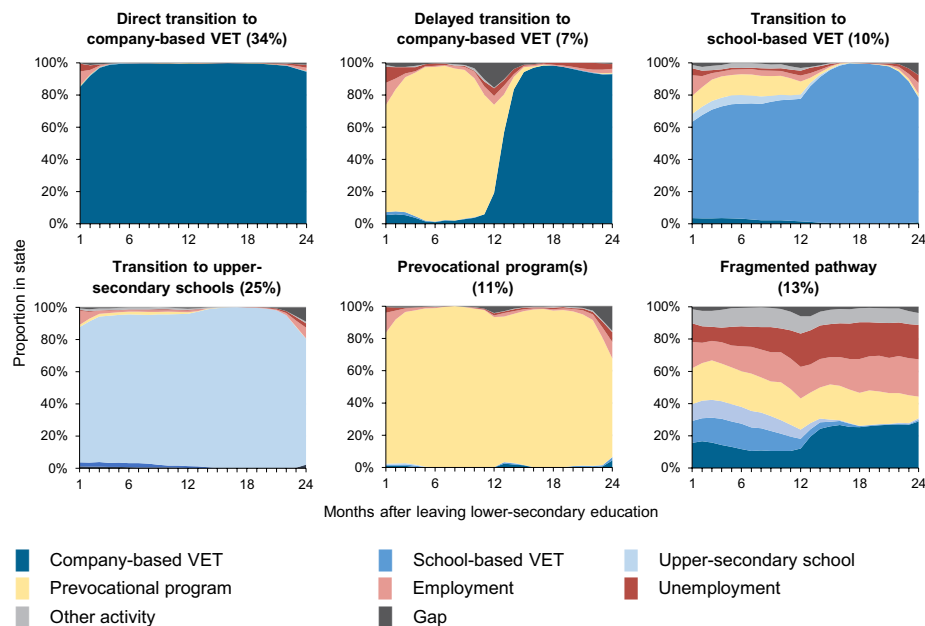
Three of the six clusters represent VET pathways at the upper-secondary level (Fig. 1). Cluster 1, '*Direct transition to company-based VET*', comprises approximately 34% of the total sample. Cluster members passed smoothly to company-based VET after leaving school. The average accumulated length of the apprenticeship period (23.5 months) also demonstrates a high continuity (Table 3). Cluster 2, '*Delayed transition to company-based VET*', represents approximately 7% of the total sample and most commonly started with a prevocational program (duration 10.4 months on average) before cluster members entered company-based VET. There are also respondents with short periods of unskilled employment or unemployment (both 0.6 months on average, Table 3). After entering company-based VET, cluster members had a low dropout risk: only 9% of the adolescents with delayed transitions to company-based VET left the apprenticeship. Members of Cluster 3 '*Transition to school-based VET*' (10% of the total sample) passed to school-based VET (Fig. 1). However, the transition to school-based VET ran less smoothly compared to Cluster 1, as there were short periods of participation in prevocational programs (1.6 months on average), unskilled employment (0.7 months on average), and unemployment (0.4 months on average) before cluster members entered school-based VET. However, periods of school-based VET largely lasted until the end of the observation period, which is also indicated by the average accumulated length of the apprenticeship period (19.6 months, Table 3).

Cluster 4, '*Transition to upper-secondary schools*', describes for 25% of the total sample transitions to upper-secondary schools. At the end of the observation period, 29% of the cluster members had already achieved an entrance qualification for applied sciences universities (Table 3). However, due to the limited observation period of 24 months, the subsequent educational achievement and pathways of these young adults remained unclear (Fig. 1).

For a quarter of the school-leavers, the transition processes are characterized by high uncertainty and risk (Fig. 1). Long-lasting periods of participation in prevocational

---

<sup>6</sup> The identification of the number of relevant transition patterns "is an explorative approach, which draws on researchers' knowledge of the research issue studied" (Brzinsky-Fay and Solga 2016). In line with previous research (e.g. Brzinsky-Fay and Solga 2016), we examined many cluster solutions for determining the optimal number of transitions patterns. The examined cluster solutions ranged from 3 transition patterns to 12 transition patterns. Eventually, we opted for the 6-cluster solution as it provided a sufficiently high case number in all clusters and delivered distinct sequence types. While a higher cluster solution added transition patterns of only limited distinctiveness, lower cluster solutions blurred the heterogeneity of the educational pathways.



**Fig. 1** Monthly proportion plots for adolescents' transition processes at the end of lower-secondary education. *Notes:* NEPS SC4 SUF 12.0.0, own calculations. Reading note: The monthly proportion plots need to be read vertically. The distribution of the status of all cluster members for each month is shown. For transition pattern 1, the monthly proportion plot shows that more than 80% of the cluster members were in company-based VET in the first month after leaving lower-secondary education. In month six, almost all cluster members participated in company-based VET

programs shape the educational trajectories of adolescents affiliated with the fifth cluster, 'Prevocational program(s)' (11% of the total sample). Eighty-two per cent of the cluster members participated in one prevocational program (mainly in *zweijährigen Berufsfachschulen*). In comparison, 18% of the cluster members participated in more than one prevocational program, indicating entry boundaries to VET. The last cluster, 'Fragmented pathway' (13% of the total sample), clearly shows the most problematic transition processes. Adolescents affiliated with this cluster showed frequent changes in activities at a level that is above average ( $M=3.5$ ) and their VET episodes were largely unstable (39% dropout of company- and school-based VET). Moreover, adolescents affiliated with the sixth cluster showed sustained accumulated periods of unskilled employment and unemployment (4 months on average compared to the sample mean of 1 month) (Table 3). As a result, at the end of the observation period, 69% of the cluster members were neither in fully qualifying VET nor upper-secondary schools (Fig. 1).

### Migration-related inequalities in educational transitions

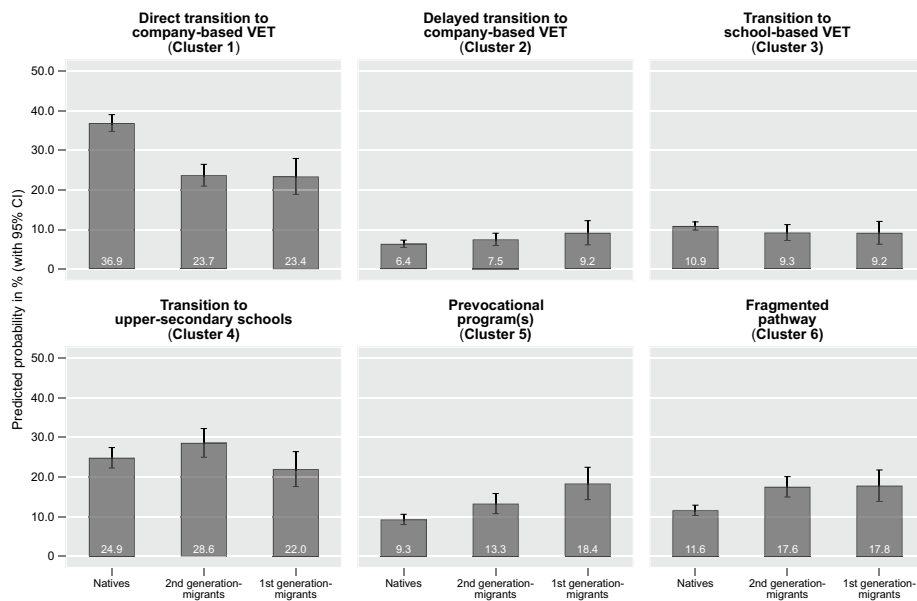
Figure 2 presents descriptive findings of the distribution of migrants and natives regarding the identified transition patterns. Model 0 (M0) of Fig. 3 shows the gaps in the distribution of migrants and natives. Overall, the transition patterns differed substantially between adolescents with and without a migrant background. Figures 2 and 3 (M0) indicate that after leaving lower-secondary education, first-generation and second-generation migrants were 12–13 percentage points less likely to directly enter company-based VET (Cluster 1) compared to natives. Disadvantages in direct access to company-based

**Table 4** Characteristics of the transition patterns

	(Cluster 1) Direct transition to company-based VET	(Cluster 2) Delayed transition to company-based VET	(Cluster 3) Transition to school-based VET	(Cluster 4) Transition to upper-secondary schools	(Cluster 5) Pre-vocational program(s)	(Cluster 6) Fragmented pathway
In % (row percentages)	34%	7%	10%	25%	11%	13%
<i>Average duration in month</i>						
Company-based VET	23.5	11.5	0.4	0.1	0.1	4.6
School-based VET	0.0	0.1	19.6	0.3	0.1	1.8
Upper-secondary school	0.0	0.0	0.6	22.5	0.0	1.3
Prevocational program	0.0	10.4	1.6	0.2	22.2	5.0
Employment	0.2	0.6	0.7	0.4	0.6	4.3
Unemployment	0.1	0.6	0.4	0.1	0.3	4.1
Other activity	0.0	0.1	0.3	0.2	0.1	2.4
Gap	0.1	0.7	0.4	0.3	0.6	0.6
<i>Changes between activities (means)</i>						
Average number of changes	1.3	3.2	2.0	1.6	2.1	3.6
<i>Number of episodes of prevocational programs (column percentages)</i>						
Participated in one prevocational program	1.3%	94.6%	15.3%	2.6%	82.4%	41.9%
Participated in more than one prevocational program	0.1%	5.4%	1.4%	0.0%	17.6%	8.2%
<i>Obtain higher school certificates (column percentages)</i>						
Share of students who improved their school certificate	– <sup>1</sup>	–	–	29.3%	16.9%	–

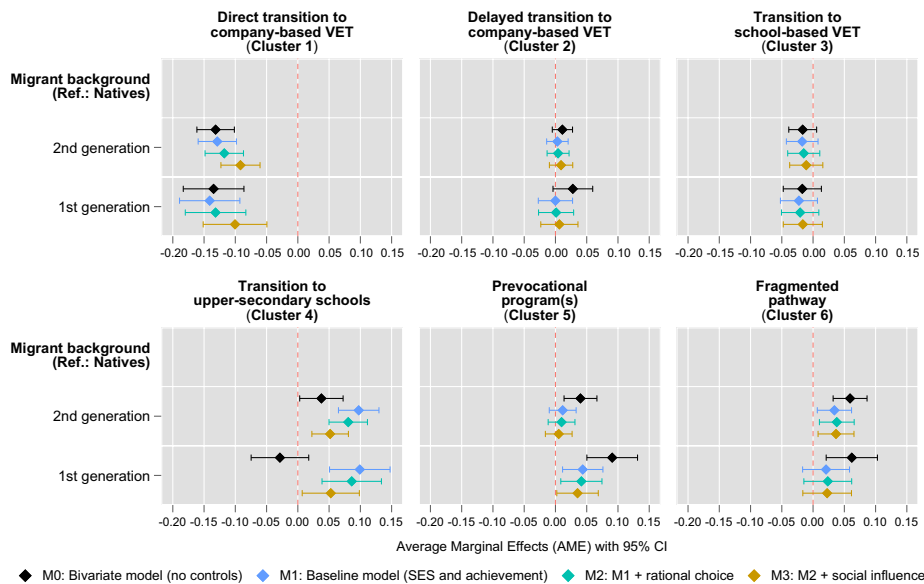
<sup>1</sup> Column percentages lower than 5% are not reported. Data: NEPS SC4 SUF 12.0.0, percentages or means of imputed data (m = 30), own calculations

VET were especially pronounced for migrants of Turkish and Polish origin (Additional file 1: Fig. A1). Migrants, particularly those who immigrated themselves, were also substantially more likely to enter prevocational programs (Cluster 5) and to have an insecure and highly fragmented pathway (Cluster 6) than their native peers. However, Figs. 2 and 3 (M0) also show advantages for second-generation migrants regarding the attendance of upper-secondary schools. The differentiation of migrants' country of origin reveals that migrants of Polish origin had the highest probability to switch to upper-secondary schools after lower-secondary education even compared to natives (Additional file 1: Fig. A1).



**Fig. 2** Affiliation with transition patterns by migrant background. *Notes:* Predicted probabilities (with 95% CI). Estimates based on a bivariate multinomial logistic regression model (see Additional file 1: Table A2). Each group (natives, second-generation migrants, first-generation migrants) results in 100%. Data: NEPS SC4 SUF 12.0.0, own calculations

The descriptive picture regarding the gaps between natives and migrants (M0, Fig. 3) changed markedly once controlling for social origin (parents’ HISEI and CASMIN),



**Fig. 3** Influence of migrant background on affiliation with transition patterns. *Notes:* Estimates (with 95% CI) based on multinomial regression analyses, average marginal effects. Reference category for all significance tests are native respondents. Robust standard errors on school level. Full estimation results are displayed in Additional file 1: Table A2 (model 0: bivariate model), Additional file 1: Table A3 (model 1: baseline model), Additional file 1: Table A4 (model 2), Additional file 1: Table A5 (model 3), and Additional file 1: Table A6 (model 4/full model). Data: NEPS SC4 SUF 12.0.0, own calculations

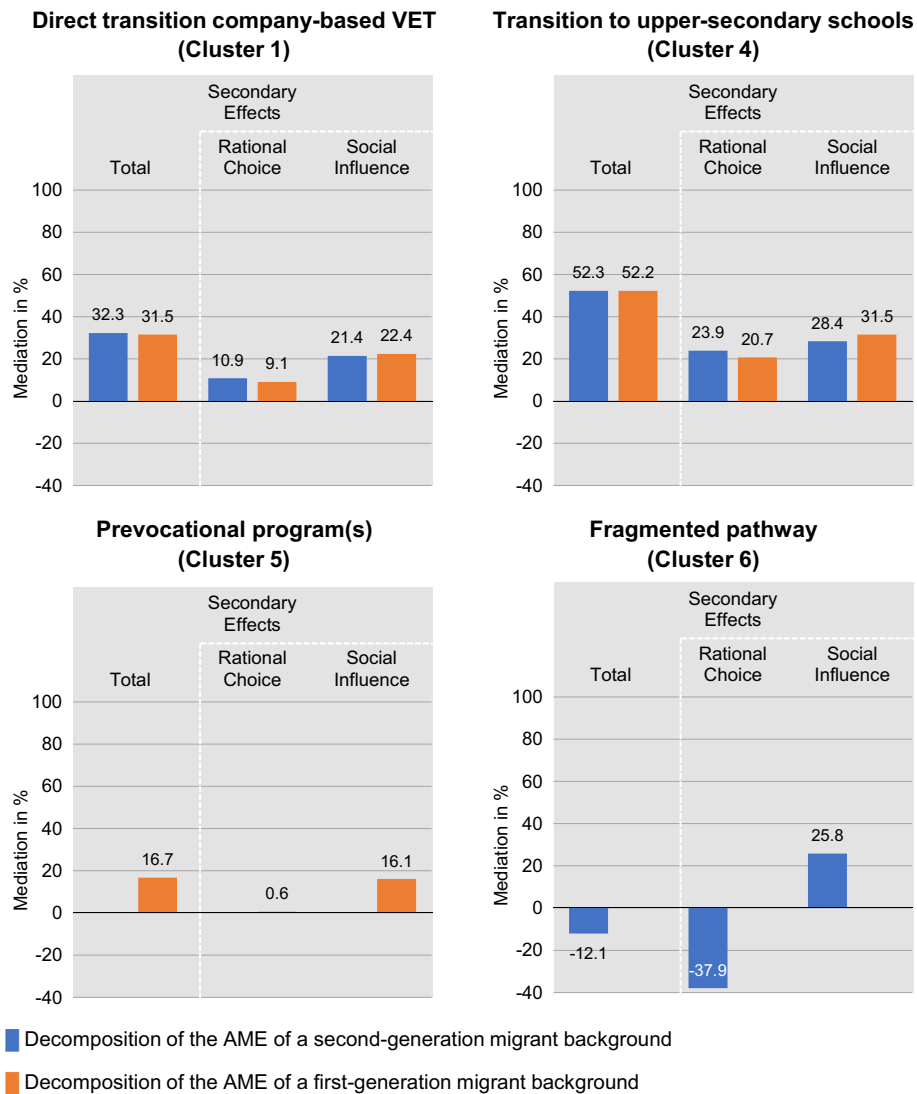
prior achievement (school certificate, school grades, and receptive vocabulary), and other controls (sex and federal state of residence; see baseline model (M1) in Fig. 3). At given levels of achievement and with a given social origin, migrants were even more likely to switch to upper-secondary schools (Cluster 4) than natives once controlling for social origin and prior achievement. However, migrants' higher probability to attend prevocational programs (Cluster 5) and to have a fragmented pathway (Cluster 6) reduced. These remarkable shifts in the transition patterns after controlling for achievement and social origin occurred regardless of migrants' generational status (Fig. 3) or country of origin (Additional file 1: Fig. A2). However, regarding the direct transition to company-based VET (Cluster 1), the gap between migrants and natives changed only slightly once controlling for achievement and social origin. In other words, even at given levels of achievement and with a given social origin, migrants were less likely to directly switch to company-based VET than natives.

In summary, the baseline model (M1, Fig. 3) made evident that once controlling for social origin and achievement (1) migrants' disadvantages in access to prevocational programs and fragmented pathways reduced and (2) immigrants' disadvantages regarding access to company-based VET changed only slightly, whereas (3) migrants' advantages in access to upper-secondary schools increased. The baseline model (Fig. 3) also showed that net of achievement and social origin there are still significant average marginal effects of a migrant background on the affiliation with Cluster 1 (direct transition to company-based VET), Cluster 4 (upper-secondary schools), Cluster 5 (prevocational programs), and Cluster 6 (fragmented pathway). The next section investigates the extent to which secondary effects can explain these significant effects of a migrant background.

### **Decomposition of migration-related inequalities**

To answer the main question regarding the relative importance of the outlined mechanisms in explaining the effects of a migrant background, the decomposition analysis adds the key explanatory variables to the equation of the baseline model (i.e. the measures for secondary effects, full model: Additional file 1: Tables A5 and A6). This approach allowed to test to what degree significant effects of a migrant background on transition probabilities (found in the baseline model in Fig. 3) are explained by migration-specific differences in rational choice factors and social influences. Overall, the underlying multinomial regression model yielded an acceptable model fit. The Pseudo  $R^2$  (McFadden) was 0.179, which is line with previous research on educational transitions (Busse 2020, p. 184).

Figure 4 shows that secondary effects accounted for up to 32.3% of migrants' lower probability of a direct transition to company-based VET (Cluster 1)—depending on the migrant group studied. Secondary effects measured by predictors of rational choice and social influence accounted for 32.3% of the second-generation and 31.5% of the first-generation effect. Figure 4 further allowed us to distinguish the relative importance of predictors of rational choice and social influence. The most important mechanism for migrants' lower probability of accessing company-based VET were differences in social influences. The comparatively high educational expectations of migrants' parents as perceived by the adolescents and the high aspirations of migrants' friends explained up to 22.4% of why migrants were less likely to directly enter company-based VET. This is also



**Fig. 4** Decomposition of migration-related effects on affiliation with transition patterns. *Notes:* KHB method, average estimates pooled over 30 imputed datasets. Controlled for GPA, school-leaving certificate, receptive vocabulary, gender, highest parental CASMIN and ISEI, and federal state of residence. Data: NEPS SC4 SUF 12.0.0, own calculations. See Additional file 1: Table A3 for details

in line with the observable changes in the effect sizes displayed in Fig. 3, which indicate that the inclusion of the predictors of social influence (M3) in the regression model decreased the gap between natives and migrants to a larger extent than the inclusion of predictors of rational choice factors (M2). Taken together, migration-related differentials regarding a direct and stable transition to company-based VET are largely shaped through secondary effects, in particular, through social influence processes.

Regarding the transition to upper-secondary schools, the mechanisms explained approximately 52% of the differences between migrants and natives (Fig. 4). Concerning the relative importance of the indicators of rational choice and social influence, Fig. 4 shows that social influence processes weight more than rational considerations. A total of 31.5% of the differential between first-generation migrants and natives and 28.4% of



the differential between second-generation migrants and natives can be ascribed to differences in the educational aspirations of parents and friends. The rational choice mechanism explained 20.7% of the first-generation effect and 23.9% of the second-generation effect. The findings are also in accordance with the results of Fig. 3, which indicate that migrants' higher probability to enter upper-secondary schools decreased to a larger degree by adding factors of social influence (M3) than by including factors of rational choice (M2) to the regression model. In sum, secondary effects explained approximately half of why second-generation and first-generation migrants were more likely to enter upper-secondary schools than their native peers given they have the same achievement levels and social origin.

In contrast, secondary effects hardly explained why migrant groups were more likely to attend prevocational programs (Cluster 5) or were more likely to have an insecure and fragmented pathway (Cluster 6) than natives. Secondary effects only accounted for 16.7% of the first-generation migrants' higher probability to attend prevocational programs and they did not explain second-generation migrants' higher probability to have a fragmented pathway.<sup>7</sup> Therefore, migrants' higher probability of insecure and unstable educational pathways is determined by unobserved mechanisms (Fig. 4).

### Robustness checks

To test the sensitivity of the results of the decomposition method, three robustness checks were applied (see empirical strategy in the methods section for details). The *first robustness check* comprised the inclusion of respondents' beliefs about discrimination of migrants in the labour market (results in Additional file 1: Table A7). For the *second robustness check*, additional measures for rational considerations were included (Additional file 1: Table A8). A *third robustness check* comprised the estimation of a logistic regression to disentangle the effect of a migrant background on the probability of accessing company-based VET directly (Cluster 1) versus the transition to upper-secondary schools (Cluster 4) (Additional file 1: Table A9). However, the relative importance of secondary effects and the net contribution of rational choice factors and social influence processes remained robust against all tests.

### Discussion and conclusion

The present study aimed to empirically examine patterns in transition trajectories of ninth- and tenth-grade school-leavers with low and intermediate educational attainment and investigate explanations for migration-related educational inequalities. Regarding the first goal, the findings of sequence analysis revealed heterogeneous transition patterns ranging from predominantly smooth and stable transitions to company- and school-based VET, through transitions to upper-secondary schools and prevocational

<sup>7</sup> Technically, rational choice and social influence mediated – 12.1% of second-generation migrants' higher probability to have a fragmented pathway (when controlling for all other covariates). This confounding percentage was negative because adding rational choice indicators to the baseline model increased the gap between second-generation migrants and natives by – 37.9%, while adding the indicators of social influence to the baseline model reduced the gap by 25.8%. Thus, in total, secondary effects widened the gap between second-generation migrants and natives by 12.1%, as we can also see in Fig. 4.

programs, to problematic and unstable transition processes characterized by large obstacles to enrolment in company- or school-based VET.

The results of a multinomial regression further showed that there are migration-related inequalities in educational transitions at the end of lower-secondary education. Migrant groups are not only substantially and significantly less likely to directly enter company-based VET after leaving lower-secondary education but also more likely to have an insecure and unstable pathway, net of controls. However, in line with recent research (Dollmann and Weißmann 2020; Tjaden and Scharenberg 2017), the present study's findings further confirm that migrant groups are also more likely to attend upper-secondary schools.

Extending previous research, the present study simultaneously examined and quantified the extent to which migration-related inequalities are explained by differences in rational choice and social influences. This approach yielded detailed insights into the mechanisms driving migration-related educational inequalities. The results showed that the factors used to frame secondary effects can explain 32–52% of why migrant groups are less likely to enter company-based VET and are more likely to switch to upper-secondary schools, thereby yielding support for *H1* and *H2*. In agreement with previous studies (Gabay-Egozi et al. 2015; Zimmermann 2019), the empirical quantification of the relative importance of rational choices and social influence processes revealed that both mechanisms contribute to explaining migration-related differentials in educational transitions.

Although migration-related differences in educational transitions – once controlled for educational attainment and social origin – were largely explained by the predictors of secondary effects, substantially and statistically significant differentials remained unexplained after accounting for rational choice factors and social influence processes. In particular, migrants' higher probability to enter unstable and insecure pathways could hardly be ascribed to the measures of secondary effects. The reason that secondary effects show low explanatory power for transition patterns 5 (prevocational programs) and 6 (insecure and highly fragmented pathway) might be because the affiliation to these patterns is not only based on the students' decisions. For example, it is known from previous studies that selection practices of companies and differences in the way employers value school-leaving certificates contribute to inequalities in access to VET (e.g. Imdorf 2017; Zschirnt and Ruedin 2016; Nennstiel 2021). Additionally, little is known about the use of career counselling services by immigrants and their influence on immigrants' educational decisions, particularly in interaction with secondary effects. Hence, the mechanisms and processes underlying migration-related inequalities at the transition point from lower-secondary education are likely to be more complex than those presented in this study. Unfortunately, similar to many other datasets of life course research, the NEPS did not provide information on the recruitment processes of companies. Therefore, we could not assess the extent to which employers' selection processes and eventual discrimination processes affect migrants' educational pathways.

Furthermore, remaining residuals of a migrant background also have to be discussed concerning the current study's important limitations. First, the operationalization of the indicators of rational choice has been limited and, thus, is most likely not sufficient to fully capture young adults' rational considerations. For instance, the NEPS dataset did

not provide information on young adults' perceptions of the costs and benefits of company- and school-based VET. Additionally, there were no indicators available on young adults' rational considerations in relation to prevocational programs. Second, although the immigrant optimism hypothesis has received much attention in research, the operationalization of immigrant optimism varies largely between existing studies. One reason for this may be that the motivation of previous research has been predominantly to document the phenomenon rather than exploring the underlying mechanisms (Cebolla-Boado et al. 2020). Third, Moreover, it is still unclear whether immigrant optimism narrows the educational attainment gaps of migrant groups in the long run. There is strong evidence suggesting that migrants have a higher risk of dropping out from upper-secondary schools (Birkelund 2020; Dollmann and Weißmann 2020) as well as from VET (Busse and Scharenberg 2022; Michaelis and Richter 2022). Thus, the long-term effects of migrants' educational decisions should be focused on in further research.

Notwithstanding these limitations, the current study has three important theoretical and empirical contributions to research on educational transitions and migration-related disparities. First, the results go beyond common studies by drawing a more detailed picture of school-leavers' transition processes from lower-secondary education. Second, beyond the German case, the results shed light on the mechanisms driving migration-related inequalities in educational transition processes, especially regarding the transition to company-based VET and upper-secondary schools. More specifically, the results underline the relative weight of secondary effects of a migrant background for explaining differing transition processes. The investigation of migrants' rational considerations and social influences may also foster the understanding of educational inequalities in other countries, as migration-specific choice effects are also well documented in other European countries (e.g. Tjaden and Scharenberg 2017).

Currently, the German labour market is influenced by a socio-demographic change, which already causes shortages of skilled workers in many domains and affects the training market. As a result, there is a reduced competition for training positions (Autor\*innengruppe Bildungsberichterstattung 2022). Regional comparisons already indicate that migrants and natives benefit equally from the lower competition in the training market (Michaelis and Busse 2021). However, it is unclear how the socio-demographic change influences secondary effects on migrants' educational trajectories after lower-secondary education. In addition, occupation- and industry-specific analyses would be of interest to examine whether our results are valid for the entire training market.

Implications can also be drawn concerning policy discussions, as the results provide important starting points for reducing migration-related inequalities in VET access. Secondary effects have been proven to be an important mechanism partly responsible for the phenomenon that migrant groups are more likely to switch to upper-secondary schools and are less likely to enter company-based VET. Given the empirical relevance of social groups' educational aspirations and expectations, parents should be actively involved in professional career counselling services. As adolescents with a migrant background are twice as likely to assume that their parents want them to go to university (see Table 2), it is likely to expect that educational expectations for academic routes are substantially higher in families with a migrant background. Therefore, parents' awareness of

advantages of VET can be seen as a key driver during the process of finding out whether vocational routes may suit migrants' plans better for their occupational career than academic routes.

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s40461-023-00142-0>.

**Additional file 1: Table A1.** Variables used. **Table A2.** Bivariate multinomial logistic regression on the affiliation with the transition patterns. **Table A3.** Multinomial logistic regression on the affiliation with the transition patterns. Model coefficients from the baseline model (M1). **Table A4.** Multinomial logistic regression on the affiliation with the transition patterns. Model coefficients from model 2 (M2). **Table A5.** Full list of model coefficients from Full Model (M3). **Table A6.** Decomposition of migration-related effects on affiliation with transition patterns. **Table A7.** Robustness test 1: Adding anticipated discrimination to the full model. **Table A8.** Robustness test 2: Adding students' educational motivation and perceived investment risks regarding a lower- and intermediate-secondary school certificate to the full model. **Figure A1.** Affiliation with transition patterns by migrants' country of origin. **Figure A2.** Influence of migrants' country of origin on affiliation with transition patterns.

## Acknowledgements

This paper uses data from the National Educational Panel Study (NEPS; see Blossfeld and Roßbach 2019). The NEPS is carried out by the Leibniz Institute for Educational Trajectories (LifBi, Germany) in cooperation with a nationwide network.

## Author contributions

RB conceived the aim of the study and coordinated the study. RB, CM and RN were responsible for generating theory, hypothesis, methodology and discussion of the results. RB prepared the data, performed the statistical analysis and visualized the figures and tables. RB, CM and RN wrote, reviewed and edited the manuscript in several rounds. All authors read and approved the final manuscript.

## Authors' information

Prof. Dr. Robin Busse is a professor at the Institute of General and Vocational Education at the Technical University of Darmstadt. His research interests focus on disparities in access to Vocational Education and Training (VET), monitoring in VET as well as the influence of VET on political and democratic competences.

Dr. Christian Michaelis is an assistant professor at the Chair of Business Education and Human Resource Development at the Georg-August University of Göttingen. His research focus lies on monitoring in Vocational Education and Training (VET), competence diagnostics in VET as well as vocational education for a sustainable development.

Dr. Richard Nennstiel is a research associate at the Department of Sociology of Education at the University of Bern. His research interests focus on ethnic inequalities in access to Vocational Education and Training (VET), social mobility, and longitudinal competence development.

## Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Availability of data and materials

The data that support the findings of this study are available from the Leibniz Institute for Educational Trajectories (LifBi) but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available.

## Declarations

### Competing interests

The author declares that he has no competing interests.

Received: 27 October 2022 Accepted: 11 May 2023

Published online: 25 May 2023

## References

- Abrassart A, Busemeyer MR, Cattaneo MA, Wolter SC (2020) Do adult foreign residents prefer academic to vocational education? Evidence from a survey of public opinion in Switzerland. *J Ethn Migr Stud* 46:3314–3334. <https://doi.org/10.1080/1369183X.2018.1517595>
- Acar T (2018) The variation in educational aspirations among immigrant students in Germany. In: Park H, Kao G (eds) *Research in the Sociol Educ*, vol 20. Emerald Publishing Limited, Germany, pp 5–40
- Algan Y, Dustmann C, Glitz A, Manning A (2010) The economic situation of first and second-generation immigrants in France, Germany and the United Kingdom. *Econ J* 120:4–30. <https://doi.org/10.1111/j.1468-0297.2009.02338.x>
- Autor:innengruppe Bildungsberichterstattung (2022) *Bildung in Deutschland 2022: Ein indikatorengestützter Bericht mit einer Analyse zum Bildungspersonal*. Wbv, Bielefeld
- Becker R (2017) Entstehung und Reproduktion dauerhafter Bildungsungleichheiten. In: Becker R (ed) *Lehrbuch der Bildungssoziologie*. Springer Fachmedien, Wiesbaden, pp 89–150

- Becker R, Glauser D (2018) Vocational education and training, vocational baccalaureate or academic high school? An empirical analysis of social selective transitions to upper secondary education in the German-speaking part of Switzerland. *Swiss J Sociol* 44:9–33. <https://doi.org/10.1515/sjs-2018-0002>
- Beicht U, Walden G (2017) Transitions of young migrants to initial vocational education and training in Germany: the significance of social origin and gender. *J Vocat Educ* 69:424–449. <https://doi.org/10.1080/13636820.2016.1275032>
- Beicht U, Walden G (2019) Transition to company-based vocational training in Germany by young people from a migrant background – the influence of region of origin and generation status. *Int J Res Vocat Educ Train* 6:20–45
- Best H, Wolf C (2015) *The SAGE handbook of regression analysis and causal inference*. SAGE, Los Angeles Calif
- Birkelund JF (2020) Aiming high and missing the mark? Educational choice, dropout risk, and achievement in upper secondary education among children of immigrants in Denmark. *Eur Sociol Rev* 36:395–412. <https://doi.org/10.1093/esr/jcz064>
- Blossfeld PN (2019) A multidimensional measure of social origin: theoretical perspectives, operationalization and empirical application in the field of educational inequality research. *Qual Quant* 53:1347–1367. <https://doi.org/10.1007/s11135-018-0818-2>
- Blossfeld HP, Roßbach HG (eds) (2019) *Education as a lifelong process: the German national educational panel study (NEPS)*. Edition ZfE, 2nd edn. Springer VS, Wiesbaden
- Borgna C, Contini D (2014) Migrant achievement penalties in western Europe: do educational systems matter? *Eur Sociol Rev* 30:670–683. <https://doi.org/10.1093/esr/jcu067>
- Boudon R (1974) *Education, opportunity, and social inequality: changing prospects in western society*. Wiley, New York
- Breen R, Goldthorpe JH (1997) Explaining educational differentials. *Ration Soc* 9:275–305. <https://doi.org/10.1177/104346397009003002>
- Brinbaum Y, Cebolla-Boado H (2007) The school careers of ethnic minority youth in France. *Ethnicities* 7:445–474. <https://doi.org/10.1177/1468796807080237>
- Brzinsky-Fay C, Solga H (2016) Compressed, postponed, or disadvantaged? School-to-work-transition patterns and early occupational attainment in West Germany. *Res Soc Stratif Mobil* 46:21–36. <https://doi.org/10.1016/j.rssm.2016.01.004>
- Bukodi E, Goldthorpe JH (2013) Decomposing “social origins”: the effects of parents’ class, status, and education on the educational attainment of their children. *Eur Sociol Rev* 29:1024–1039. <https://doi.org/10.1093/esr/jcs079>
- Burkert C, Seibert H (2007) Labour market outcomes after vocational training in Germany Equal opportunities for migrants and natives? <https://www.econstor.eu/bitstream/10419/32679/1/608260703.pdf>. Accessed 25 Oct 2022
- Busse R (2020) Übergangsverläufe am Ende der Sekundarstufe I: Erklärungsansätze für soziale und migrationsbezogene Ungleichheiten. *wbv Media, Bielefeld*. <https://doi.org/10.3278/6004818w>
- Busse R, Scharenberg K (2022) How immigrant optimism shapes educational transitions over the educational life course—empirical evidence from Germany. *Front Edu* 7:894249. <https://doi.org/10.3389/educ.2022.894249>
- Cebolla-Boado H, González Ferrer A (2020) It is all about “Hope”: evidence on the immigrant optimism paradox. *Ethn Racial Stud* 44(2):252
- Cedefop (2020) *Vocational education and training in Germany: short description*. Publications Office of the European Union, Luxembourg
- Cohen J (1987) Parents as educational models and definers. *J Marriage Fam* 49:339–351. <https://doi.org/10.2307/352304>
- Cohen J (1988) *Statistical power analysis for the behavioral sciences*, 2nd edn. Lawrence Erlbaum Associates, Publishers, Hillsdale, NJ
- Comission E (2014) *Tackling early leaving from education and training in Europe: strategies, policies and measures*. Publications Office of the European Union, Luxembourg
- Dollmann J (2017) Positive choices for all? SES- and gender-specific premia of immigrants at educational transitions. *Res Soc Stratif Mobil* 49:20–31
- Dollmann J, Weißmann M (2020) The story after immigrants’ ambitious educational choices: real improvement or back to square one? *Eur Sociol Rev* 36:35–47. <https://doi.org/10.1093/esr/jcz042>
- Dollmann J, Weißmann M (2022) Ethnic choice effects\*: welche rolle spielt die räumliche Verfügbarkeit anspruchsvoller Bildungsalternativen? In: Kruse H, Teltemann J (eds) *Differenz im Raum*. Springer, Wiesbaden, pp 141–167
- Dumont H, Klinge D, Maaz K (2019) The many (subtle) ways parents game the system: mixed-method evidence on the transition into secondary-school tracks in Germany. *Sociol Educ* 92:199–228. <https://doi.org/10.1177/0038040719838223>
- Dunn L, Dunn LM (2004) *Peabody picture vocabulary test (PPVT-R) (deutsche version)*. Hogrefe, Göttingen
- Erikson R, Jonsson JO (1996) Introduction. explaining class inequality in education: the Swedish test case. In: Erikson R, Jonsson JO (eds) *Can education be equalized?* Westview Press, Boulder, pp 1–64
- Esser H (1999) *Soziologie: Spezielle Grundlagen. Band 1: Situationslogik und Handeln*. Campus Verlag, Frankfurt am Main
- Esser H (2006) *Migration, language and integration*. [https://wzb.eu/www2000/alt/aki/files/aki\\_research\\_review\\_4.pdf](https://wzb.eu/www2000/alt/aki/files/aki_research_review_4.pdf). Accessed 6 May 2020
- Everitt BS, Landau S, Leese M, Stahl D (2011) *Cluster analysis*, 5th edn. Wiley, Chichester
- Federal statistical office (2021). *Integrierte Ausbildungsberichterstattung 2020 [Integrated training report 2020]*. [https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bildung-Forschung-Kultur/Schulen/Publikationen/Downloads-Schulen/integrierte-ausbildungsberichterstattung-5211201207005.xlsx?\\_\\_blob=publicationFile](https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bildung-Forschung-Kultur/Schulen/Publikationen/Downloads-Schulen/integrierte-ausbildungsberichterstattung-5211201207005.xlsx?__blob=publicationFile). Accessed 4 Oct 2022
- Fernández-Reino M (2016) Immigrant optimism or anticipated discrimination? Explaining the first educational transition of ethnic minorities in England. *Res Soc Stratif Mobil* 46:141–156. <https://doi.org/10.1016/j.rssm.2016.08.007>
- Gabay-Egozi L, Shavit Y, Yaish M (2015) Gender differences in fields of study: the role of significant others and rational choice motivations. *Eur Sociol Rev* 31:284–297. <https://doi.org/10.1093/esr/jcu090>
- Ganzeboom HB (2010) *Occupational status measures for the new international standard classification of occupations ISCO-08*. paper presented at the annual conference of international social survey program

- Glauser D (2015) *Berufsausbildung oder allgemeinbildung*. Springer, Wiesbaden
- Glauser D, Becker R (2023) Gendered ethnic choice effects at the transition to upper secondary education in Switzerland. *Front Sociol* 8:1158071. <https://doi.org/10.3389/fsoc.2023.1158071>
- Glick JE, White MJ (2004) Post-secondary school participation of immigrant and native youth: the role of familial resources and educational expectations. *Soc Sci Res* 33:272–299. <https://doi.org/10.1016/j.ssresearch.2003.06.001>
- Hadjar A, Scharf J (2019) The value of education among immigrants and non-immigrants and how this translates into educational aspirations: a comparison of four European countries. *J Ethn Migr* 45:711–734. <https://doi.org/10.1080/1369183X.2018.1433025>
- Heath AF, Brinbaum Y (2007) Guest editorial. *Ethnicities* 7:291–304. <https://doi.org/10.1177/1468796807080230>
- Heath AF, Rothon C, Kilpi E (2008) The second generation in western Europe: education, unemployment, and occupational attainment. *Annu Rev Sociol* 34:211–235. <https://doi.org/10.1146/annurev.soc.34.040507.134728>
- Holtmann AC, Menze L, Solga H (2017) Persistent disadvantages or new opportunities? The role of agency and structural constraints for low-achieving adolescents' school-to-work transitions. *J Youth Adolesc* 46:2091–2113. <https://doi.org/10.1007/s10964-017-0719-z>
- Holtmann AC, Ehlert M, Menze L, Solga H (2021) Improving formal qualifications or firm linkages-what supports successful school-to-work transitions among low-achieving school leavers in Germany? *Eur Sociol Rev* 37:218–237. <https://doi.org/10.1093/esr/jcaa047>
- Imdorf C (2017) Understanding discrimination in hiring apprentices: how training companies use ethnicity to avoid organisational trouble. *J Vocat Educ* 69:405–423. <https://doi.org/10.1080/13636820.2016.1278397>
- Jackson M (2013) Introduction: how is inequality of educational opportunity generated? The case for primary and secondary effects. In: Jackson M (ed) *Determined to succeed?* Stanford University Press, Stanford, Performance Versus Choice in Educational Attainment, pp 1–33
- Jeon S (2019) *Unlocking the potential of migrants: cross-country analysis*. OECD Publishing, Paris, OECD Reviews of Vocational Education and Training
- Jonsson JO, Rudolphi F (2011) Weak performance - strong determination: school achievement and educational choice among children of immigrants in Sweden. *Sociol Educ* 27:487–508. <https://doi.org/10.1093/esr/jcq021>
- Kao G, Tienda M (1995) Optimism and achievement: the educational performance of immigrant Youth. *Soc Sci Q* 76:1–19
- Karlsson KB, Holm A (2011) Decomposing primary and secondary effects: a new decomposition method. *Res Soc Stratif Mobil* 29:221–237. <https://doi.org/10.1016/j.rssm.2010.12.005>
- Kaas L, Manger C (2012) Ethnic Discrimination in Germany's Labour Market: A Field Experiment. *Ger Econ Rev* 13:1–20. <https://doi.org/10.1111/j.1468-0475.2011.00538.x>
- Kilpi-Jakonen E (2011) Continuation to upper secondary education in Finland: children of immigrants and the majority compared. *Acta Sociol* 54:77–106. <https://doi.org/10.1177/0001699310392604>
- Kogan I (2019) Still a safety net? Revisiting the role of vocational education and training in school-to-work transitions in Europe. In: Becker R (ed) *Research handbook on the social educ*. Edward Elgar Publishing, USA, pp 329–346
- Kristen C, Dollmann J (2010) Sekundäre Effekte der ethnischen Herkunft: Kinder aus türkischen Familien am ersten Bildungsübergang. In: Becker B, Reimer D (eds) *Vom Kindergarten bis zur Hochschule*, vol 46. VS Verlag für Sozialwissenschaften, Wiesbaden, pp 117–144
- LifBi (2011) Information on competence testing: NEPS starting cohort 4—grade 9. [https://www.neps-data.de/Portals/0/NEPS/Datenzentrum/Forschungsdaten/SC4/1-0-0/NEPS\\_SC4\\_Competences\\_W1\\_en.pdf](https://www.neps-data.de/Portals/0/NEPS/Datenzentrum/Forschungsdaten/SC4/1-0-0/NEPS_SC4_Competences_W1_en.pdf). Accessed 29 Apr 2020
- Lindemann K, Gangl M (2019) Parental unemployment and the transition to vocational training in Germany: interaction of household and regional sources of disadvantage. *Eur Sociol Rev* 35:684–700
- Lorenz G, Boda Z, Salikutluk Z, Jansen M (2020) Social influence or selection? Peer effects on the development of adolescents' educational expectations in Germany. *Br J Sociol Educ* 41:643–669. <https://doi.org/10.1080/01425692.2020.1763163>
- Macindoe H, Abbott A (2006) Sequence analysis and optimal matching techniques for social science data. In: Hardy MA, Bryman A (eds) *Handbook of data analysis*. Sage, London, pp 386–406
- Menze L, Künster R, Ruland M (2016) Startkohorte 4: Klasse 9 (SC4) Welle 3 und 4: Edition von widersprochenen Schul-, Berufsvorbereitungs- und Ausbildungsepisoden (NEPS research data paper). [https://www.neps-data.de/Portals/0/NEPS/Datenzentrum/Forschungsdaten/SC4/6-0-0/SC4\\_6-0-0\\_Report-Edition\\_de.pdf](https://www.neps-data.de/Portals/0/NEPS/Datenzentrum/Forschungsdaten/SC4/6-0-0/SC4_6-0-0_Report-Edition_de.pdf). Accessed 8 Aug 2019
- Michaelis C (2017) Zur Steuerung und Entwicklung des Schulberufssystems unter Berücksichtigung rechtlicher sowie ausbildungsmarktabhängiger Einflüsse. *RdJB* 65:406–424. <https://doi.org/10.5771/0034-1312-2017-4-406>
- Michaelis C, Busse R (2021) Regional disparities in the training market: opportunities for adolescents to obtain a company-based training place depending on regional training market conditions. *Int J Res Vocat Educ Train* 8:87–114. <https://doi.org/10.13152/IJRVT.8.1.5>
- Michaelis C, Richter M (2022) Discontinuities in vocational education and training: the influence of early-risk factors and personality constructs on premature training termination and subsequent trajectories. *Empirical Res Voc Ed Train*. <https://doi.org/10.1186/s40461-022-00135-5>
- Michaelis C, Busse R, Seeber S, Eckelt M (2022) *Nachschulische Bildungsverläufe in Deutschland: Schulentlassene zwischen institutionalisierten Idealwegen und schwierigen Umwegen*. wbv Publication, Bielefeld
- Nennstiel R (2021) Do more demanding lower secondary school certificates for minority students pay off? A comparison of VET access between Germany and German-speaking Switzerland. *SozW* 72:313–342. <https://doi.org/10.5771/0038-6073-2021-3-313>
- Nennstiel R (2022) Explaining ethnic differences in access to VET in German-speaking Switzerland: the effects of application behavior and resources. *Z Soziol* 50:396–414. <https://doi.org/10.1515/zfsoz-2021-0024>
- NEPS Network (2021) *National educational panel study, scientific use file of starting cohort grade 9*. Leibniz Institute for Educational Trajectories (LifBi), Bamberg. <https://doi.org/10.5157/NEPS:SC4:12.0.0>
- Nygård O (2021) Pre-migration status, social capital, and the educational aspirations of children of immigrants in disadvantaged Swedish schools. *Scand J Educ Res* 66:580–593. <https://doi.org/10.1080/00313831.2021.1897878>



- Olczyk M, Seuring J, Will G, Zinn S (2016) Migranten und ihre Nachkommen im deutschen Bildungssystem: Ein aktueller Überblick. In: Diehl C, Hunkler C, Kristen C (eds) *Ethnische Ungleichheiten im Bildungsverlauf: Mechanismen, Befunde, Debatten*. Springer Fachmedien, Wiesbaden, pp 33–70
- Protsch P, Solga H (2015) How employers use signals of cognitive and noncognitive skills at labour market entry: insights from field experiments. *Eur Sociol Rev* 31(5):521–532
- Protsch P, Solga H (2016) The social stratification of the German VET system. *J Educ Work* 29:637–661. <https://doi.org/10.1080/13639080.2015.1024643>
- Quintini G, Manfredi T (2009) Going Separate Ways? School Work Tran US Eur. <https://doi.org/10.1787/221717700447>
- Rosenbaum E, Rochford JA (2008) Generational patterns in academic performance: the variable effects of attitudes and social capital. *Soc Sci Res* 37:350–372. <https://doi.org/10.1016/j.ssresearch.2007.03.003>
- Salikutluk Z (2016) Why Do immigrant students aim high? Explaining the aspiration-achievement paradox of immigrants in Germany. *Eur Sociol Rev* 32:581–592. <https://doi.org/10.1093/esr/jcw004>
- Schnepf SV (2007) Immigrants' educational disadvantage: an examination across ten countries and three surveys. *J Popul Econ* 20:527–545. <https://doi.org/10.1007/s00148-006-0102-y>
- Scharf J, Becker M, Stallasch SE, Neumann M, Maaz K (2020) Primäre und sekundäre Herkunftseffekte über den Verlauf der Sekundarstufe: Eine Dekomposition an drei Bildungsübergängen. *Z Erziehungswiss* 23:1251–1282. <https://doi.org/10.1007/s11618-020-00981-7>
- Sewell WH, Haller AO, Portes A (1969) The educational and early occupational attainment process. *Am Sociol Rev* 34:82–92. <https://doi.org/10.2307/2092789>
- Spence M (1973) Job market signaling. *Q J Econ* 87:355. <https://doi.org/10.2307/1882010>
- Standing conference of the ministers of education and cultural affairs of the Länder of the federal Republic of Germany (2019) The education system in the federal republic of Germany 2017/2018. [https://www.kmk.org/fileadmin/Dateien/pdf/Eurydice/Bildungswesen-engl-pdfs/dossier\\_en\\_ebook.pdf](https://www.kmk.org/fileadmin/Dateien/pdf/Eurydice/Bildungswesen-engl-pdfs/dossier_en_ebook.pdf). Accessed 9 Mar 2021
- Stocké V (2010) Adaptivität oder Konformität? Die Bedeutung der Bezugsgruppe und der Leistungsrealität der Kinder für die Entwicklung elterlicher Bildungsaspirationen am Ende der Grundschulzeit. In: Baumert J, Maaz K, Trautwein U (eds) *Bildungsentscheidungen*, 2009th edn. VS Verlag für Sozialwissenschaften, Wiesbaden, pp 257–281
- Teney C, Develshouwer P, Hanquinet L (2013) Educational aspirations among ethnic minority youth in Brussels: Does the perception of ethnic discrimination in the labour market matter? A mixed-method approach. *Ethnicities* 13:584–606. <https://doi.org/10.1177/1468796812472009>
- Thurow L (1979) A job competition model. In: Piore MJ (ed) *Unemployment and Inflation*. M. E. Sharpe, New York, pp 17–32
- Tjaden JD (2017) Migrant background and access to vocational education in Germany: Self-selection, discrimination, or both? *Z Soziol* 46:343. <https://doi.org/10.1515/zfsoz-2017-1007>
- Tjaden JD, Hunkler C (2017) The optimism trap: migrants' educational choices in stratified education systems. *Soc Sci Res* 67:213–228. <https://doi.org/10.1016/j.ssresearch.2017.04.004>
- Tjaden JD, Scharenberg K (2017) Ethnic choice effects at the transition into upper-secondary education in Switzerland. *Acta Sociol* 60:309–324. <https://doi.org/10.1177/0001699316679491>
- Tjaden JD (2016) *Migrants' educational choices-evidence from upper secondary education in Germany and Switzerland*. Dissertation, Otto-Friedrich-University Bamberg
- van de Werfhorst HG, van Tubergen F (2007) Ethnicity, schooling, and merit in the Netherlands. *Ethnicities* 7:416–444. <https://doi.org/10.1177/1468796807080236>
- von Hippel PT (2007) 4. Regression with missing Ys: an improved strategy for analyzing multiply imputed data. *Sociol Methodol* 37:83–117. <https://doi.org/10.1111/j.1467-9531.2007.00180.x>
- Woelfel J, Haller AO (1971) Significant others, the self-reflexive act and the attitude formation process. *Am Sociol Rev* 36:74–87. <https://doi.org/10.2307/2093508>
- Zimmermann T (2019) Social influence or rational choice? Two models and their contribution to explaining class differentials in student educational aspirations. *Eur Sociol Rev* 43:1–17. <https://doi.org/10.1093/esr/jcz054>
- Zimmermann E, Skrobanek J (2015) Glaube an dich, dann schaffst du es auch?!—Die Rolle der allgemeinen Selbstwirksamkeitsüberzeugung im Ausbildungsübergang. *Z Erziehungswiss* 18:351–374. <https://doi.org/10.1007/s11618-023-01147-x>
- Zschirnt E, Ruedin D (2016) Ethnic discrimination in hiring decisions: a meta-analysis of correspondence tests 1990–2015. *J Ethn Migr* 42:1115–1134. <https://doi.org/10.1080/1369183X.2015.1133279>
- Zschirnt E (2020) Evidence of Hiring Discrimination Against the Second Generation: Results from a Correspondence Test in the Swiss Labour Market. *J Int Migr Integr* 21:563–585. <https://doi.org/10.1007/s12134-019-00664-1>

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.