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How immigrant optimism shapes educational transitions over the educational life course–Empirical evidence from Germany

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Compared to natives, young adults with an immigrant background are more likely to choose academic education over vocational education and training (VET). Our study investigates ethnic choice effects at different stages of the educational system. Based on longitudinal data from the German National Educational Panel Study (NEPS), we found that immigrant youths–when controlling for achievement and social background–were more likely to attend academic tracks in Grade 9, have higher participation rates in academic tracks at the upper-secondary level, are less likely to choose VET after lower-secondary education as well as after upper-secondary education, and switch more often to higher education after achieving an upper-secondary degree. Mediation analyses confirmed that these effects were largely shaped by differences in educational and occupational aspirations. Our study provides detailed insights into the transition pathways at different educational stages and the relevant mechanisms driving migration-specific choice effects. As ethnic choice effects are empirically well documented in international research, our investigation may contribute to a deeper understanding of educational inequalities in other European countries.

KEYWORDS

ethnic choice effects, secondary ethnic effects, immigrant optimism, educational transitions, vocational education and training (VET), academic education

Introduction

Research across Europe consistently shows that there are large ethnic[1] educational inequalities in youths' educational attainment. For example, it is well-documented that immigrant youths are less likely to attend academic tracks in lower- and upper-secondary education than their native peers (e.g., Dollmann and Weißmann, 2020). Across Europe it is, however, also a well-established finding in sociological research that immigrant youths make different educational choices at different educational stages than natives. Once accounting for prior achievement[2] and social background, immigrant youths switch more often to higher demanding educational tracks than natives (Jackson et al., 2012; Dollmann, 2021). For example, several studies across European countries revealed that immigrant youths are more likely to choose academic tracks over vocational alternatives at the upper-secondary level when controlling for social background and achievement (Germany: Dollmann and Weißmann, 2020; Finland: Kilpi-Jakonen, 2011; Netherlands: van de Werfhorst and van Tubergen, 2007; Sweden: Jonsson and Rudolphi, 2011; Switzerland: Tjaden and Scharenberg, 2017). These choice effects have scholars let to speak of an "immigrant optimism" (e.g., Kao and Tienda, 1995; Fernández-Reino, 2016) as pointed out by Nygård (2017, p. 5).

A growing body of empirical research highlights that migration-specific educational choices (also referred to as *positive secondary effects of ethnic origin* or *ethnic choice effects*; Dollmann and Weißmann, 2020; Dollmann, 2021) largely shape these differential educational transitions (e.g., Tjaden and Scharenberg, 2017). Even if an increasing number of empirical research attributes these choice effects particularly to immigrants' usually higher educational and occupational aspirations (Tjaden and Hunkler, 2017; Tjaden and Scharenberg, 2017; Hadjar and Scharf, 2019; Dollmann, 2021), there are still open questions. First, so far, only a few empirical studies quantified the extent to which ethnic choice effects can be explained by measures of immigrant optimism (Tjaden and Scharenberg, 2017). Second, so far existing studies focused largely at single educational stages when analyzing ethnic choice effects (transition to lower-secondary education: e.g., Walper and Gniewosz, 2019; transition to upper-secondary education: e.g., Salikutluk, 2016; Dollmann, 2021; transition to higher education: e.g., Murdoch et al., 2016). To our knowledge, no study has yet distinguished and quantified the effects of educational and occupational aspirations on the relationship between immigrant background and transitions at different educational stages simultaneously.

Given that "education in modern societies has become a lifelong process" (Blossfeld and von Maurice, 2011, p. 19), investigating ethnic choice effects at various educational stages seems promising to improve the understanding of immigrants' educational attainment. Following the idea of the life-course perspective (for the principles of life-course research see Elder Johnson and Crosnoe, 2003), the present paper thus addresses this issue and examines to what extent immigrants and their descendants are more likely to choose academic tracks over vocational education and training (VET)[3] with eventual differences being attributable to higher educational and occupational aspirations. Taking Germany as the case of study and drawing on longitudinal data from the German National Educational Panel Study (NEPS), our objectives are twofold: First, we examine whether ethnic choice effects occur at different stages of the German educational system (at the end of lower- as well as at the end of upper-secondary education). Second, we empirically quantify relevant mechanisms related to ethnic choice effects. Particular attention is devoted to the extent to which ethnic choice effects can be explained by differences in educational and occupational aspirations.

The German educational system

In Germany, after completing primary education, students usually transfer to three different secondary school tracks[4]: lower, intermediate or academic tracks at lower-secondary level. Compared to students without immigrant background, immigrant youths are more likely to switch to lower or intermediate school tracks after primary school and are less likely to access academic tracks (Kristen and Granato, 2007; Segeritz et al., 2010; Olczyk, 2018), which mainly lead to higher education at general universities or universities of applied sciences.

After completing lower-secondary education (Grade 9 or 10), students face different alternatives (Solga et al., 2014). One of the dominant pathways is entering VET in the dual system (company-based VET) or school-based VET at full-time vocational schools. At the end, both company- and school-based VET trainees can achieve a vocational

1 There is a large body of literature on the concept of *ethnicity* (e.g., Zagefka, 2009). Following Jacobs et al. (2009), we refer to the definition of the Conference of European Statisticians for the United Nations Economic Commission for Europe [UNECE] (2006) as a reference point for ethnicity: "Ethnicity is based on a shared understanding of the history and territorial origins (regional, national) of an ethnic group or community as well as on particular cultural characteristics: language and/or religion and/or specific customs and ways of life" (United Nations Economic Commission for Europe [UNECE], 2006, p. 95). In the current paper, the criterion of differentiation is mainly oriented on the country of birth of immigrant populations.

2 In line with the literature, in this paper, the term "achievement" refers to individuals' academic competence levels and school grades (Lettau, 2021).

3 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 (details: Protsch and Solga, 2016).

4 In some federal states, schools combining multiple tracks or comprehensive schools (*Gesamtschule*) were introduced as an alternative to the traditional three-tiered secondary education system.

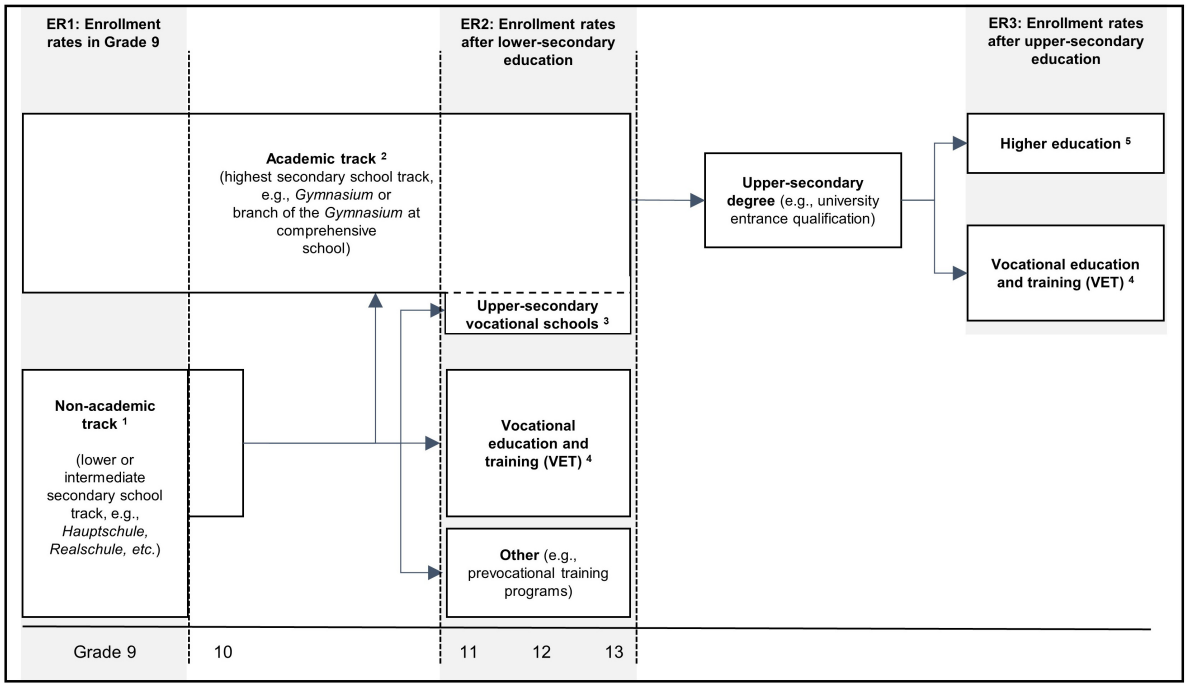

FIGURE 1
Analysis plan. [1]School tracks (e.g., *Hauptschule*, *Realschule*, and other kinds of combined schools) not leading to an upper-secondary degree. [2]School tracks (e.g., *Gymnasium* or a branch of a *Gymnasium* at a comprehensive school) leading to an upper-secondary degree (e.g., entrance qualification for universities or a universities of applied sciences). [3]Full-time vocational schools at upper-secondary level (e.g., *Fachoberschule*, *Berufliches Gymnasium*, etc.) requiring an intermediate-school leaving certificate and offering 2- to 3-year vocationally oriented general education courses. [4]Company- or school-based vocational education and training (VET) leading to nationally recognized, occupation-specific certificates. [5]Higher education at universities or universities of applied sciences.

qualification (at ISCED level 3; Cedefop, 2020). While access to company-based VET largely depends on the companies' selection criteria, 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 only require a lower-secondary school certificate (Seeber et al., 2019). After lower-secondary education, school leavers with an immigrant background are, however, substantially less likely to enter company-based VET than their peers without immigrant background (Beicht and Walden, 2019). School-leavers can also participate in prevocational training programs (at ISCED level 2), which mainly aim to improve youths' opportunities to access company- or school-based VET (Cedefop, 2020). In addition, school leavers from lower-secondary education are able to switch to general academic tracks at upper-secondary level and achieve a university entrance qualification if they fulfill certain performance requirements. There are also full-time vocational schools at upper-secondary level (e.g., *Fachoberschule* or *Berufliches Gymnasium*)[5] which require an intermediate-school leaving certificate and offer 2- or 3-year vocationally oriented general education courses (for details: Standing Conference of the Ministers of Education and Cultural Affairs of the Länder of the Federal Republic of Germany, 2019).

After completing upper-secondary education (after Grade 12 or 13), students who previously obtained a university entrance qualification largely transfer to higher education. Only a small share of upper-secondary school leavers (approximately 24%) enter company- or school-based VET programs (Federal Statistical Office, 2020; own calculations).

Figure 1 provides a simplified overview of the German educational system in order to illustrate our analytical strategy: Following the analytical setup by Dollmann and Weißmann (2020), we analyzed ethnic disparities in the probability of being enrolled in an academic track in Grade 9 (Enrollment Rate 1–ER1). Second, we investigated the predicted probability of enrollment in academic tracks, in VET, or in other educational options after lower-secondary education (ER2). Finally, we examined ethnic disparities in entering VET vs. higher education conditional on achieving an upper-secondary degree in an academic track (ER3). This approach allowed us to examine ethnic choice effects from the end of lower-secondary

5 Throughout the article, we use the term "upper-secondary vocational schools" to refer to such vocational schools at upper-secondary level.

education until the transition at the end of upper-secondary education.

Ethnic choice effects and their explanations

Ethnic disadvantages are well-documented for many educational outcomes (such as achievement or participation in secondary education). Immigrants' usually lower social background was found to be largely responsible for such ethnic educational disadvantages (for a summary, see Heath et al., 2008). However, "their *educational choices* paint a positive picture of immigrants' structural integration" (Dollmann and Weißmann, 2020, p. 33). In contrast to the invariably reported ethnic penalties, research also indicates that once controlling for prior achievement and social background, immigrant youths are more likely to choose higher-demanding educational tracks than their native peers (e.g., Dollmann, 2021).

In existing research, different explanations are proposed to explain ethnic disparities in educational transitions. Among many other factors, immigrants' advantages and disadvantages in educational attainment are largely seen as a result of primary and secondary effects of ethnic origin (Kristen and Dollmann, 2010; Tjaden, 2017; Hadjar and Scharf, 2019; Busse, 2020; Becker and Klein, 2021). The distinction between primary and secondary effects was originally introduced by Boudon (1974) to explain social inequalities in educational attainment. While primary effects of social origin relate to the effect of individual and family characteristics on educational achievement, secondary effects refer to group-specific educational decisions based on cost-benefit considerations (Dollmann, 2021, p. 976). Primary and secondary ethnic effects "go beyond the effects of social origin" (Hadjar and Scharf, 2019, p. 713) even when controlling for social background. While primary ethnic effects relate to achievement differences between immigrants and natives, secondary ethnic effects (or ethnic choice effects) relate to immigrant-specific educational choices.

Although the present paper focuses on secondary ethnic effects, it has to be considered that educational transitions are largely shaped by institutional selection criteria, processes and constraints. While there are formal admission restrictions for some educational pathways (e.g., certain performance requirements need to be fulfilled to switch to academic tracks or upper-secondary vocational schools after lower-secondary education, see Section "The German educational system"), there are no formal entry requirements for company-based VET programs (Seeber et al., 2019). Following job competition (Thurow, 1979) and signaling theories (Spence, 1973), companies, however, use information on applicants' school performance and competencies to estimate the suitability of applicants in the selection process (Hunkler, 2014; Forsblom et al., 2016). Immigrants' disadvantages in school performance and competencies (i.e., primary ethnic effects) are thus often considered as one main mechanism responsible for immigrants' lower likelihood of successfully entering VET (e.g., Beicht and Walden, 2019).

Despite the relevance of performance indicators for the access to company-based VET, there is strong empirical evidence that ethnic disparities in VET access are only partly driven by primary ethnic effects (Beicht and Walden, 2017; Tjaden, 2017; Beicht and Walden, 2019; Seeber et al., 2019). On the one hand, there is empirical evidence of ethnic discrimination in companies' selection processes (e.g., Imdorf, 2011; Kaas and Manger, 2012; Zschirnt and Ruedin, 2016; Zschirnt, 2020). On the other hand, research findings indicate that secondary ethnic effects largely shape immigrants' lower transition rates to VET (e.g., Tjaden and Scharenberg, 2017) as well as their higher transition rates to academic tracks (Dollmann and Weißmann, 2020; Dollmann, 2021) and higher education (e.g., Murdoch et al., 2016). Most research on secondary ethnic effects highlights three factors as possible explanations for ethnic choice effects among immigrants and their descendants (e.g., Dollmann, 2021): information deficits, anticipated discrimination, and differences in aspirations. In the following, we focus on differences in aspirations, as this explanation received most empirical support in existing research (Fernández-Reino, 2016; Salikutluk, 2016; Tjaden and Hunkler, 2017; Busse, 2020). Alternative theoretical explanations such as information deficits with regard to the 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 no or only little empirical support (Tjaden and Hunkler, 2017; Busse, 2020; Dollmann, 2021). However, this may also be due to an insufficient operationalization of these alternative explanations.

The immigrant optimism hypothesis (Kao and Tienda, 1995) provides a useful theoretical framework for understanding the underlying processes of differences in aspirations between immigrants and natives. According to the immigrant optimism hypothesis, the central motive of migration, the striving for a "better life," results in strong efforts to reach upward social mobility (Heath and Brinbaum, 2007; Hadjar and Scharf, 2019; Dollmann and Weißmann, 2020). Upward social mobility can be described as an improvement in socio-economic status. The motive of upward social mobility comes along with high educational aspirations because educational degrees are regarded as the key to reach upward social mobility (Heath and Brinbaum, 2007; Salikutluk, 2016; Hadjar and Scharf, 2019). The immigrant optimism hypothesis includes the idea that the goal of economic improvement, and therefore also the high value of education, may be transferred from parents to their children (Hadjar and Scharf, 2019, p. 715). Even if first-generation immigrants did not reach upward mobility, parents may transfer their educational aspirations to the next generations (Heath et al., 2008; Fuligni, 2012;

Kirui and Kao, 2018). Through pressure toward conformity, adolescents may adopt their parents' educational aspirations and performance expectations (Woelfel and Haller, 1971; Zimmermann, 2019). Different educational choices between immigrants and natives may therefore result from immigrant-specific educational expectations and demands. A multitude of studies consistently showed that educational aspirations and expectations of youths with an immigrant background and their parents are substantially higher than those of natives (Germany: e.g., Salikutluk, 2016; findings from other European countries: Glick and White, 2004; Brinbaum and Cebolla-Boado, 2007; Teney et al., 2013).

Research questions and hypotheses

Drawing on the aforementioned theoretical considerations as well as the review of previous research, we derived the following research questions (RQ) and hypotheses (H):

RQ1: Do ethnic choice effects occur (a) in Grade 9 with regard to students' enrollment in academic tracks, (b) at the end of lower-secondary education when students have to decide between academic tracks, upper-secondary vocational schools, VET and other options, (c) at the end of upper-secondary education when students have to decide between higher education, VET and other options?

RQ2: To what extent are ethnic choice effects at the different decision-making stages driven by immigrant optimism?

Based on the outlined assumptions of the immigrant optimism hypothesis (Kao and Tienda, 1995) and previous research, we expected immigrant youths to favor educational options leading to university education "as this is perceived as the hallmark of educational success, future occupational status and prestige" (Tjaden and Scharenberg, 2017, p. 313). Therefore, we assumed that immigrant youths are more likely to be enrolled in academic tracks in Grade 9 (H1, relating to RQ1a), to choose (i.e., continuing) academic tracks over VET and other options at the end of lower-secondary education (H2, relating to RQ1b) and to favor higher education over VET and other options at the end of upper-secondary education (H3, relating to RQ1c), once controlling for prior achievement and social background.

Against this theoretical background and consistent with previous research, we assumed that the influence of the comparatively high educational and occupational aspirations of young immigrants and their parents could be twofold: First, the desire for upward social mobility which is adapted and internalized by immigrant children through family socialization may be important for immigrant youths when they have to choose between different educational options. At the same time, parents' educational and occupational expectations and aspirations are also likely to directly determine young people's educational decisions at the point of educational transitions. More precisely, we assumed that the high educational and occupational expectations and aspirations largely lead immigrant youths to enroll in more demanding educational tracks (e.g., academic tracks and higher education) than native youths. In sum, we expected ethnic choice effects to be largely explained by the educational and occupational aspirations of immigrant youths and the educational expectations of their parents (H4, relating to RQ2).

Data and methods

Data and sample

The German NEPS set up a multicohort sequence design at different educational stages to examine, among other research topics, key educational processes and trajectories across the entire life span (Blossfeld et al., 2011). The Starting Cohort 4 (Grade 9) of the German NEPS (Blossfeld and Roßbach, 2019; NEPS Network, 2021) was especially suitable for our empirical analyses as this sub-study allowed to assess which educational and vocational pathways youths choose after completing Grade 9 (toward the end of compulsory education) of general education. The first panel wave was conducted in fall 2010 with 9th Graders of the German general school system. After the first panel wave, participants were surveyed once or twice a year. The total initial sample comprised 16,425 Grade 9 students at regular or special schools. Our analyses examined the enrollment and transitions of these respondents at different stages. Respondents for whom no information on their educational or vocational activity was available for more than 12 months were excluded for analyses. In addition, respondents for whom no information on immigrant background, gender, school-leaving certificate, and place of residence was available were also excluded.[6] These restrictions left a base sample of n = 11,536 young adults born between 1990 and 1997.

Analytical strategy

To investigate the influence of immigrant background on educational transitions and to empirically test the assumed theoretical mechanisms of ethnic choice effects described above, two empirical approaches were used.

First, to estimate the extent to which immigrant groups face difficulties in their educational transitions at the different stages of the educational system, we conducted bivariate analyses of enrollment rates without controls. More precisely, as outlined in **Figure 1**, we investigated immigrants' enrollment in academic and non-academic tracks in lower-secondary

6 This step was necessary due to perfect prediction issues in the multiple imputation models.

education (ER1), after lower-secondary education (ER2) and after upper-secondary education (ER3). To investigate ethnic choice effects, we applied multivariate regression analyses controlling for respondents' prior achievement and social background. Average marginal effects (*AME*) are reported to display the average effect of immigrant background on individuals' probability of transition given that all covariates are held constant at their values. Using *AMEs*, allows a simple interpretation and, in addition, *AMEs* are robust against scaling and superior to other coefficients in many respects (Best and Wolf, 2015).

Second, in order to investigate to what degree effects of immigrant background on educational transitions are mediated by measures of immigrant optimism, mediation analyses were performed by using the KHB method for non-linear nested models (Kohler et al., 2011; Karlson et al., 2012; Breen et al., 2013). This decomposition method is robust against issues when comparing the coefficients of non-linear models (Best and Wolf, 2015) and allows to assess the net contribution of factors for explaining differences in the dependent variable. Since empirical observations may be clustered within classes or schools, clustered standard errors at school level were applied to all multivariate regression models. Continuous variables were *z*-standardized for all multivariate analyses.

Missing information on independent variables were estimated in Stata 15 using Multivariate Imputation by Chained Equations (MICE) (Azur et al., 2011). In line with the recommendations of simulation and validation studies (von Hippel, 2007), both the dependent and independent variables were included in the imputation model. To increase the robustness of imputations, 25 imputation data sets were generated.[7] To account for the NEPS sampling design and further issues resulting from panel attrition, we used design weights for descriptive findings, but not for multivariate analyses (Steinhauer and Zinn, 2016).

Dependent variables

Our first dependent variable (ER1) differentiated between students' enrollment in academic (i.e., the *Gymnasium* or a *Gymnasium* branch at a comprehensive school) and non-academic tracks (i.e., lower- and intermediate secondary school tracks such as the *Hauptschule* or *Realschule*) in Grade 9. The second dependent variable (ER2) represented students' enrollment rates after lower-secondary education. We distinguished between students who attended upper-secondary schools until Grade 12 (or Grade 13 in some federal states)[8] and those who switched to company- or school-based VET, upper-secondary vocational schools, or pursued other activities (e.g., prevocational training programs) in the first year after leaving general school at lower-secondary level. For those students who achieved an upper-secondary degree (entrance qualification for general universities or universities of applied sciences) in an academic track, the third dependent variable (ER3) reported students' enrollment rates in higher education, VET and other alternatives 1 year after they had left the academic track.

Independent variables

We defined immigrant background using information on the generational status[9]: Respondents who immigrated themselves (first-generation immigrants; 5.2% of the total sample in Grade 9) or had at least one foreign-born parent (second-generation immigrants; 18.3% of the sample in Grade 9) were considered to have an immigrant background (i.e., up to the second generation). 76.5% of respondents had no immigrant background in Grade 9. Overall, the composition of the group with an immigrant background corresponded to migration patterns that are typical of Germany (see Olczyk et al., 2016): Immigrants of Turkish origin (21.0% in Grade 9) and those whose families are from the former Soviet Union (FSU: 18.1% in Grade 9) represent the largest share among the immigrant population in the NEPS sample. Those from guest worker countries other than Turkey (11.3%) and from Poland (10.3% in Grade 9) followed respectively. Data on respondents' immigrant background was surveyed in Grade 9 (wave 1, fall 2010).

In order to investigate ethnic choice effects, it is necessary to account for respondents' prior achievement and social background (Tjaden and Scharenberg, 2017; Dollmann and Weißmann, 2020) which we handled as follows:

- Respondents' achievement was measured with different indicators. For the analyses of enrollment rates in Grade 9 (ER1), we used respondents' competence test scores

7 We used the Stata command *How Many Imputations* (von Hippel, 2020) to determine the adequate number of imputed datasets.

8 Due to educational reforms (G12) in Germany, many federal states changed the curriculum so students can achieve the *Abitur* (general qualification for university entrance) after the end of the Grade 12 at upper-secondary school (*Gymnasium*). However, some federal states still require school attendance until the end of Grade 13 (see Büttner and Thomsen, 2015).

9 Consistent with the literature (e.g., Becker, 2011; Kristen et al., 2016), the term *generational status* in this paper refers to the country of birth of the respondents and of their parents and grandparents. First-generation immigrants are born in a foreign country and immigrated themselves. Second-generation immigrants are born in the receiving country (Germany), but have at least one foreign-born parent. Third-generation immigrants and their parents are born in Germany, but have at least two grandparents who were born outside of Germany.

(measured in Grade 9) in Maths, German reading comprehension, and ICT-literacy. In addition, we included the average of students' grades in Maths and German of the annual report card in Grade 9.[10] Regarding enrollment after the end of lower-secondary education (ER2), we again used the competence test scores measured in Grade 9 and included students' grade point average (GPA) on the school-leaving certificate if they left the general school system after lower-secondary education. For those who continued attending school, we used the average of students' grades in Maths and German of the annual report card in Grade 10. Regarding the educational transitions after upper-secondary education (ER3), we used the competence test scores in Maths, German reading comprehension, and ICT-literacy measured in Grade 12 and students' GPA on the upper-secondary school leaving certificate.

- In line with current scientific debates on the measurement of social background (Bukodi and Goldthorpe, 2013; Blossfeld, 2019), 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) was included to account for respondents' socio-economic background. In addition, parents' highest education level was included using the International Standard Classification of Education (ISCED 2011; UNESCO, 2012). Due to the partly small case numbers within each category of the ISCED scale, we distinguished three main education levels (ISCED 0–2, ISCED 3–4, and ISCED 5–6) (see **Supplementary Table 1**).

In empirical research, occupational and educational aspirations are commonly used to explain immigrant optimism (Tjaden and Scharenberg, 2017; Dollmann, 2021). In our analyses, the processes underlying immigrant optimism were measured by using two indicators of respondents' educational and occupational aspirations and one indicator of parents' educational aspirations as perceived by the students.[11,12] For the analyses of ethnic choice effects in Grade 9 (ER1) and after lower-secondary education (ER2), the indicator of students' educational aspirations captured what students preferred to do after Grade 9 if it were up to them. Answers were coded as 1 = attend company- or school-based VET, 2 = continue school, 0 = do something different (e.g., work for a while). To analyze ethnic choice effects after upper-secondary education (ER3), the indicator of educational aspirations captured what students thought they would probably do after finishing school. Here, respondents' answers were coded as 1 = attend company- or school-based VET, 2 = study at a university, 0 = do something different (e.g., work for a while). In addition, for the analyses of the enrollment rates during and after lower-secondary education (ER1 and ER2), we included students' occupational aspirations by using the ISEI score (Ganzeboom, 2010) of the desired occupation measured in Grade 9. For the investigation of the enrollment rates after upper-secondary education (ER3), we used the ISEI scores of the desired occupation measured in Grade 12 or 13 as a measure of students' occupational aspirations.

The indicator of parental educational aspirations provided information on whether respondents believed that their parents expected them to pursue higher education, to enter VET or whether their parents had no opinion on this. To predict enrollment rates during Grade 9 (ER1) and after lower secondary education (ER2), information from Grade 9 was used, whereas for the prediction of enrollment after upper-secondary education (ER3), information from Grade 11 was used.

Regarding the distribution of independent and control variables, descriptive analyses showed that students with an immigrant background had a lower social background, achieved lower school grades, and scored lower on the competence tests. However, they had higher occupational and educational aspirations and their parents had higher educational expectations (**Supplementary Tables 2, 3**). In this context, the largest differences between immigrants and natives were observed with regard to parents' educational expectations as perceived by students. These differences were particularly large in the group of students of parents with a low HISEI score and ISCED level (**Supplementary Figure 1**).

Controls

The analyses of the transition processes must be placed in the overall context of important factors influencing respondents' educational enrollment. Thus, all regression and mediation models were additionally controlled for respondents' gender, and federal state of residency. In addition, type of school track in Grade 9 was controlled for the analyses of students'

10 In Germany, grades are coded from 1 (*very good*) to 6 (*insufficient*).

11 In the interview of parents, NEPS asked parents regarding their educational aspirations for their child/children. However, parents' idealistic educational aspirations for their child/children were first surveyed approximately in Grade 11 (in the years 2012 and 2013). In addition, information on parents' idealistic educational aspirations was available only for 27.4% of the total sample (n = 11,536). Therefore, we did not use the information provided by the interview with students' parents.

12 NEPS also provided other measures such as respondents' self-reported importance to achieve a similar or better job and certificate than their parents. However, these measures have some shortcomings. First, it is unclear whether these measures capture motives of upward status mobility (achieve a [. . .] better job and certificate) or motives of status maintenance (achieve a similar [. . .] job and certificate). Second, our mediation analyses with these variables showed that the measures did only explain 2–6% of ethnic choice effects that emerged at the different educational stages.

enrollment after lower-secondary education (ER2) and after upper-secondary education (ER3).

Results

Regarding the enrollment rates in Grade 9 (see **Figure 2**), we found that 64% of all students attended non-academic tracks and 36% of the students were enrolled in academic tracks. After lower-secondary education, 45% of the total sample attended academic tracks until Grade 12 or 13. 55% of the students left the general school system at the lower-secondary level and either switched to VET (29%), upper-secondary vocational schools (10%), or other educational options such as prevocational training programs (16%) in the first year after leaving school. In the first year after upper-secondary education, 48% of those who achieved an upper-secondary degree (entrance qualification for universities or universities of applied sciences) entered higher education, 16% switched to VET, and 36% chose a different path (e.g., work for a while or go abroad).

Influence of immigrant background on educational transitions

With regard to our first research question (RQ1), **Figure 3** presents the findings from our regression models to predict the dependent variables relating to the three different kinds of enrollment rates: students' enrollment in academic tracks in Grade 9 (ER1), students' enrollment in academic tracks, VET and other options after lower-secondary education (ER2), and students' enrollment in higher education, VET and other options after upper-secondary education (ER3).

First, the bivariate models in **Figure 3** report the effect of immigrant background on the respective dependent variables without controlling for other variables. The estimation of raw enrollment rates without adjusting for students' background characteristics showed multiple disadvantages at different phases of the German educational system for students with an immigrant background. In Grade 9, immigrant youths were 9.8 percentage points less likely to attend academic tracks than natives (28.6% vs. 38.4%; $p < 0.001$). Moreover, at the end of lower-secondary education (25.9% vs. 29.7%; $p < 0.001$) as well as at the end of upper-secondary education (14.0% vs. 16.8%; $p = 0.054$), students with an immigrant background entered VET less often compared to native youths. However, at the end of lower-secondary education, immigrant youths were 3.8 percentage points more likely to switch to upper-secondary vocational schools providing options to achieve an upper-secondary degree (13.1% vs. 9.3%; $p < 0.001$). In addition, conditional on achieving an upper-secondary degree in an academic track, immigrant youths were 5.6 percentage points more likely to attend higher education than natives (52.4% vs. 46.8%; $p < 0.001$). These patterns in enrollment rates can be found in both immigrant groups, first- and second-generation immigrants. Yet, disadvantages in access to academic tracks in Grade 9 and in VET access after lower- and upper-secondary education were especially pronounced for first-generation immigrants (**Supplementary Figure 2**). Regarding immigrants' ethnic origin, the results showed that immigrants of Turkish origin had the lowest probability to attend an academic track (both in Grade 9 and in Grade 12 or 13) and to switch to VET after lower- and upper-secondary education. However, conditional on achieving an upper-secondary degree in an academic track, Turkish immigrant students had the highest probability to switch to higher education, even compared to natives (**Supplementary Figure 3**).

In contrast to these descriptive findings, the picture changed markedly once controlling for prior achievement (competence scores and school grades) and social background (see baseline model in **Figure 3**) in order to investigate ethnic choice effects (RQ1a–RQ1c). At given achievement levels and with a given social background, immigrant youths were more likely to attend academic tracks in Grade 9, had higher enrollment rates in academic tracks and upper-secondary vocational schools after lower-secondary education, and switched more often to higher education after achieving an upper-secondary degree compared to those students without an immigrant background. In addition, once controlling for prior achievement and social background, youths with an immigrant background were even less likely to take up VET after lower-secondary education (ER2) as well as after upper-secondary education (ER3). These remarkable shifts in the enrollment patterns after controlling for prior achievement and social background were found both in the group of first- and second-generation immigrants (**Supplementary Figure 2**) and were especially large for the group of immigrants of Turkish origin (**Supplementary Figure 4**).

In summary, the results with regard to RQ1a–RQ1c showed that disadvantages in immigrants' educational attainment were mainly due to the disadvantages that immigrant groups have regarding their social background and prior achievement compared to native youths. Once controlling for social background and achievement, however, it became evident that (1) immigrants' disadvantages in access to academic tracks during and after lower-secondary education completely disappear, (2) immigrants' advantages in access to higher education increase, whereas (3) immigrants' disadvantages regarding access to company- and school-based VET increase.

Decomposition of ethnic choice effects

To answer RQ2 regarding the importance of the outlined mechanisms in mediating the effects of immigrant background,

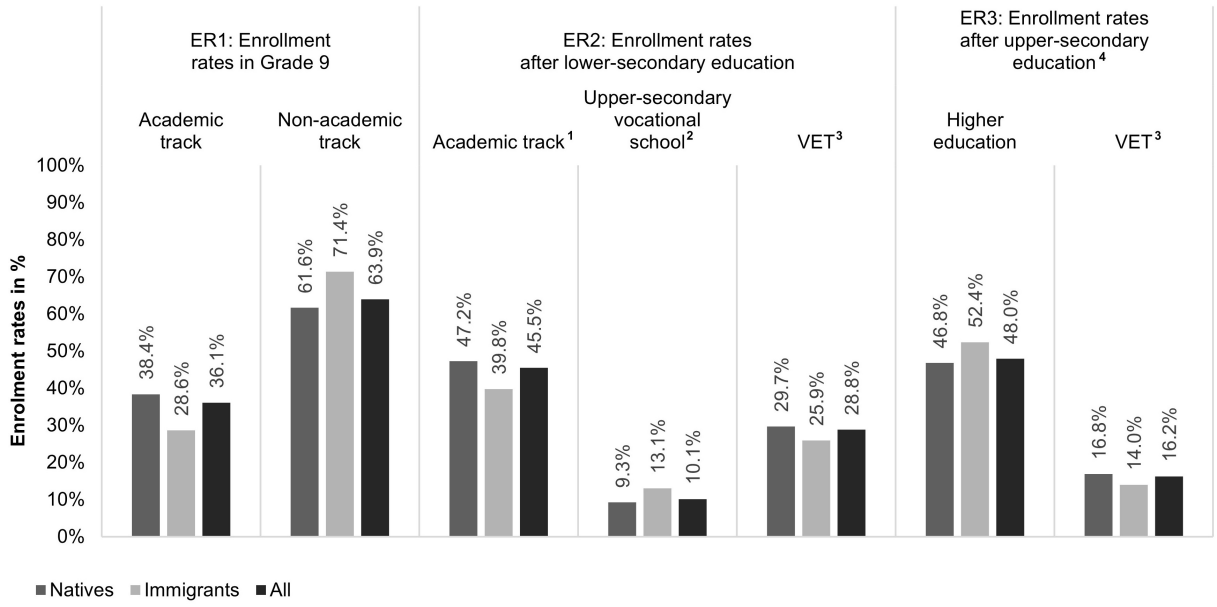

FIGURE 2
Descriptive findings on students' enrollment rates in different educational stages. [1]Attending upper-secondary school of the general school system until Grade 12 or 13. [2]Attending full-time vocational schools at upper-secondary level (e.g., *Fachoberschule*, *Berufliches Gymnasium*, etc.). [3]Entering company- or school-based vocational education and training (VET). [4]Includes only respondents who achieved an upper-secondary degree in an academic track. Imputed data (m = 25).

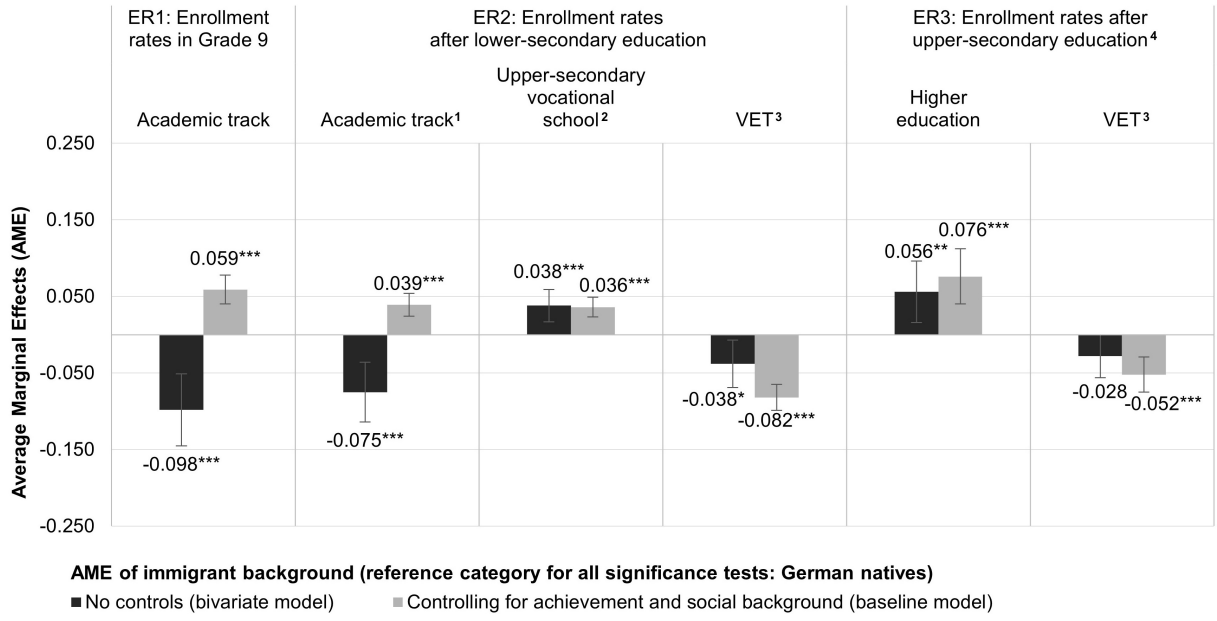

FIGURE 3
Average marginal effects of immigrant background on the enrollment rates in Grade 9 (ER1), after lower-secondary education (ER2) and after upper-secondary education (ER3). [1]Attending upper-secondary school of the general school system until Grade 12 or 13. [2]Attending full-time vocational schools at upper-secondary level (e.g., *Fachoberschule*, *Berufliches Gymnasium*, etc.). [3]Entering company- or school-based vocational education and training (VET). [4]Includes only respondents who achieved an upper-secondary degree in an academic track. Baseline model adjusted for gender, school track in Grade 9 (not used for ER1), federal state of residency, school grades, competence score in Maths, Reading, and ICT-Literacy, highest parental socio-economic status, and educational level. KHB corrected estimates. Reference category for all significance tests are German natives. Robust standard errors on school level. Level of significance: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$. Imputed data (m = 25).

the mediation analysis added the key explanatory variables to the equation of the baseline model (i.e., the measures for educational and occupational aspirations; full model: **Supplementary Table 4**). This approach allowed us to test to what degree significant effects of an immigrant background on enrollment rates in lower-secondary education, after lower-secondary education and after upper-secondary education are mediated by migration-specific aspirations. Adding respondents' and their parents' aspirations to the baseline model, significantly improved the model fit of all regression models (likelihood ratio tests each with $p < 0.001$).

Regarding enrollment during lower-secondary education (ER1), immigrant students were 5.9 percentage points more likely to be enrolled in a general academic track compared to natives, net of social background and achievement. Differences in aspirations accounted for 100.0%[13] of this effect of immigrant background, indicating that respondents' and parents' aspirations fully explained why–when controlling for achievement and social background–immigrants were more likely to be enrolled in academic tracks than natives (**Table 1**).

After lower-secondary education (ER2), students with an immigrant background were approximately 4 percentage points more likely to be enrolled in academic tracks or upper-secondary vocational schools and 8.2 percentage points less likely to enter VET compared to natives when controlling for social background and achievement. Immigrant optimism explained 69.2% of immigrants' higher probability of enrollment in academic tracks, 19.4% of immigrants' higher probability of enrollment in upper-secondary vocational schools, and 39.0% of immigrants' lower probability of entering VET after leaving lower-secondary education (**Table 1**).

After achieving an upper-secondary degree in an academic track (ER3), immigrant youths were 7.6 percentage points more likely to switch to higher education, but 5.2 percentage points less likely to enter VET net of achievement and social background. The measures for educational and occupational aspirations accounted for 35.5% of immigrants' higher probability to enroll in higher education and for 28.8% of immigrants' lower probability to enter VET. Taken together, the results confirm that immigrants' educational choices at the different stages in the educational system were largely shaped by differences in aspirations. However, substantial and statistically significant differences remained regarding enrollment rates after lower- and after upper-secondary education (**Table 1**).

Robustness checks

To test the sensitivity and validity of the results, we conducted various robustness checks. One robustness check comprised the estimation of the models with additional and varying indicators of respondents' social background. On the one hand, we included the household possession scale (HOMEPOS; e.g., Ehmke and Siegle, 2005) as an additional indicator of students' social background (robustness check 1a). On the other hand, we replaced parents' ISEI score by their EGP class (Erikson et al., 1979), which is also often used to measure social background (e.g., Bukodi and Goldthorpe, 2013) (robustness check 1b). Also, we measured parents' educational level with the CASMIN educational classification (Müller et al., 1989) instead of using the ISCED classification (robustness check 1c, see **Supplementary Table 1** for operationalization). As previous research suggested that

13 Note that the sum of the proportion mediated can exceed 100% (Vanderweele, 2015, pp. 121–22) when in the baseline model the *AME* is >0 and in the full model the *AME* is <0.

TABLE 1 Mediation of immigrants' differences in enrollment rates.

	ER1: Enrollment in Grade 9	ER2: Enrollment after lower-secondary education			ER3: Enrollment after upper-secondary education[4]	
	Academic track	Academic track[1]	Upper-secondary vocational school[2]	VET[3]	Higher education	VET[3]
AME in baseline model	0.059***	0.039***	0.036***	−0.082***	0.076***	−0.052***
AME in mediation model (+Aspirations)	0.000	0.012	0.029***	−0.050***	0.049**	−0.037**
Mediation in%	**100.0%**	**69.2%**	**19.4%**	**39.0%**	**35.5%**	**28.8%**

[1]Attending upper-secondary school of the general school system until Grade 12 or 13. [2]Attending full-time vocational schools at upper-secondary level (e.g., *Fachoberschule*, *Berufliches Gymnasium*, etc.). [3]Entering company- or school-based vocational education and training (VET). [4]Includes only respondents who achieved an upper-secondary degree in an academic track. The mediation model estimates the mediation of educational and occupational aspirations on the ethnic choice effects to examine the immigrant optimism hypothesis. Reference category for all significance tests are German natives. KHB corrected estimates. Robust standard errors on school level. Level of significance: ***$p < 0.001$; **$p < 0.01$. Imputed data ($m = 25$).

anticipated discrimination and information deficits may be mechanisms responsible for migration-specific choices (e.g., Salikutluk, 2016; Tjaden and Hunkler, 2017), we included proxy variables for both mechanisms to the models (robustness check 2, see **Supplementary Table 1** for operationalization). In addition, we changed the classification of immigrant background in that also those students who had at least two grandparents who were born outside of Germany were defined as having an immigrant background (i.e., up to the third generation; robustness check 3). Notwithstanding these robustness checks, the extent to which migration-specific choice effects emerged at the different educational stages as well as the relative importance of aspirations for explaining migration-specific choice effects remained robust against all those tests. All robustness checks are provided in the **Supplementary material** (**Supplementary Table 5**).

Discussion

One aim of the present study was to examine whether and to what extent ethnic choice effects occur at different stages of the German educational system, when prior achievement and social background are controlled (RQ1a–RQ1c). In order to examine ethnic choice effects, we first estimated raw enrollment rates and then adjusted immigrants' enrollment rates for prior achievement and social background. In line with previous research (Dollmann and Weißmann, 2020) and official statistics[14], the estimation of raw enrollment rates showed that immigrants had lower enrollment rates in academic tracks and in VET, but they showed higher enrollment rates in upper-secondary vocational schools and higher education than natives. Regarding RQ1a–RQ1c, the results confirmed that ethnic choice effects occur at different stages of the German educational system. When prior achievement and social background were held constant, immigrant youths were more likely than their peers without immigrant background to be enrolled in academic tracks in Grade 9, to choose academic tracks over vocational alternatives after lower-secondary education, and to choose higher education over vocational alternatives after upper-secondary education. The results were consistent with our hypotheses stating that ethnic choice effects occur in Grade 9 (H1), at the end of lower-secondary education (H2) and also at the end of upper-secondary education (H3) once controlling for achievement and social background. So far existing international studies largely documented ethnic choice effects at one single specific stage of the respective educational system (at the transition to lower-secondary education: e.g., Walper and Gniewosz, 2019; transition to upper-secondary education: e.g., Salikutluk, 2016; Dollmann, 2021; transition to higher education: e.g., Murdoch et al., 2016), but they hardly provided empirical evidence of ethnic choice effects at different stages of the post-compulsory educational system.

Extending on previous research, a second aim of the present study was to examine and quantify the degree to which ethnic choice effects are explained by differences in educational and occupational aspirations. This approach yielded detailed insights into the mechanisms driving migration-specific educational choices. Regarding RQ2 and H4, our results showed that migration-specific educational and occupational aspirations (i.e., the measures of immigrant optimism) can largely explain why–when controlling for achievement and social background–immigrants favor academic tracks and higher education over VET and other alternatives at the different stages in the educational system. Differences in aspirations fully explained why immigrants were more likely to be enrolled in academic tracks toward the end of compulsory school education than natives. This finding remained robust against all our robustness checks. Nonetheless, it needs to be considered that the decision to attend an academic track in lower-secondary education takes place after Grade 4 (or, in some federal states, after Grade 6). As we investigated students' enrollment in academic tracks in Grade 9, it remains unclear, whether differences in aspirations explain why immigrants were more likely to be enrolled in academic tracks net of achievement and social background or whether, for example, the attendance of a specific track influenced the formation of aspirations. After lower-secondary education, the indicators explained between 39.0 and 69.2% of why immigrants favored academic tracks over VET, but they only accounted for 19.4% of immigrants' higher probability to access upper-secondary vocational schools. After upper-secondary education, the measures explained between 28.0 and 35.5% of why immigrants favored higher education over VET. Thereby our results confirmed H4. In accordance with Boudon (1974), our results underline the importance to understand ethnic disparities as the result of both primary and secondary ethnic effects. While primary ethnic effects (achievement differences between students with and without immigrant background) are largely responsible for immigrants' disadvantages in educational transitions, secondary ethnic effects seem to affect immigrants' educational decision-making processes in that they divert them from vocational alternatives and attract them to academic tracks and higher education.

Optimistic educational choices need to be discussed against the background of their final outcomes, for example, whether immigrants are more likely to succeed in the higher demanding tracks than in vocational alternatives or if they have a higher risk of dropping out from more demanding tracks. In this

14 The distribution of lower-secondary school students over the different school tracks in 2010/2011 (the starting year of our NEPS sample) corresponds well with the actual distribution as shown in official statistics. Students attending academic tracks in upper-secondary education: 36.0% (NEPS)/34.4% (official statistics); students in lower- and intermediate secondary schools: 41.9/42.3%; students attending schools combining several tracks and comprehensive schools: 18.3/19.4%; free Waldorf schools: 0.5/0.7% (own calculations of data of official statistics, see Baumann et al., 2012, p. 13).

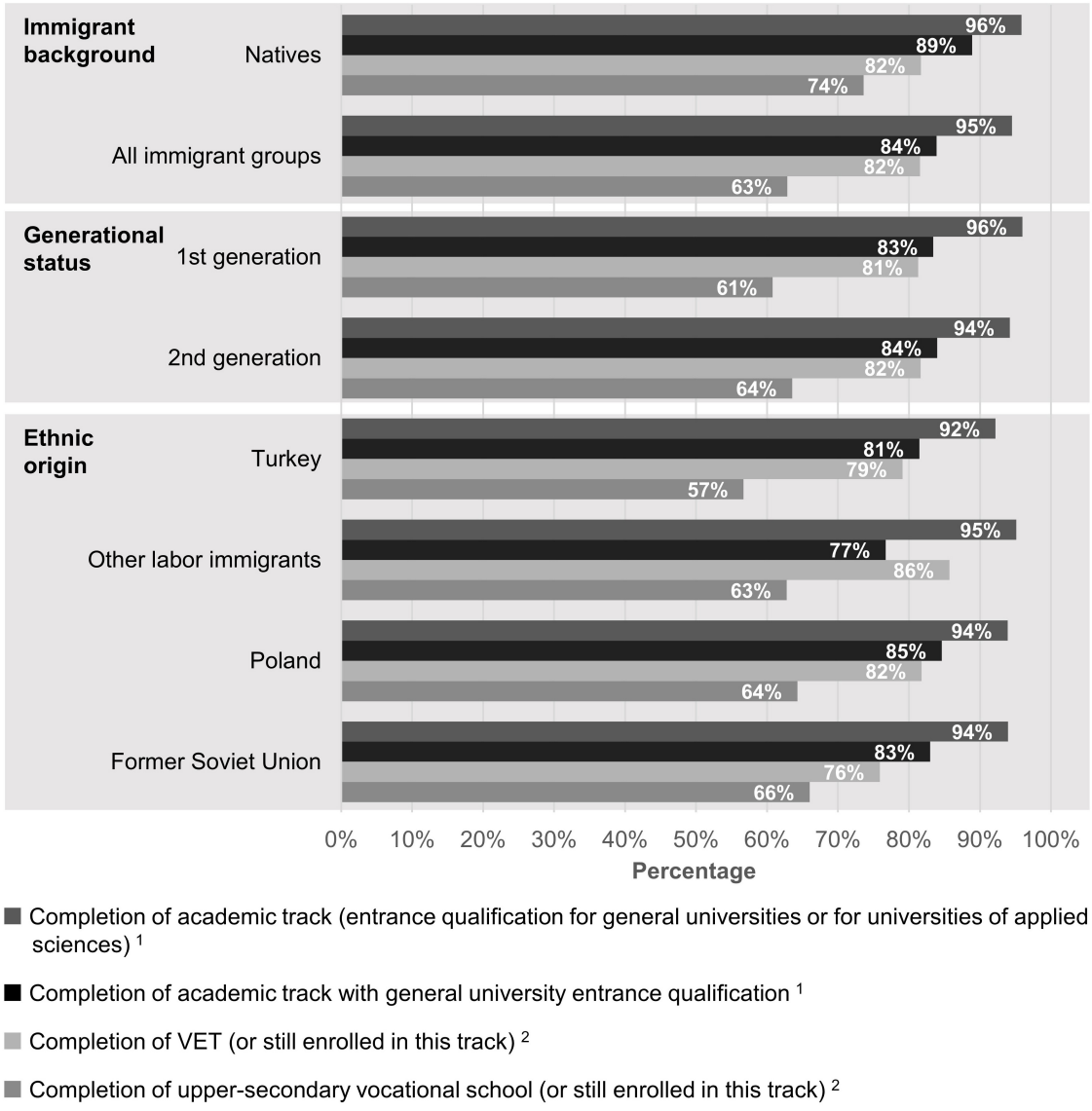

FIGURE 4
Completion rates of academic tracks, upper-secondary vocational schools and VET. [1]Given enrollment in an academic track until the final year (Grade 12 or 13). [2]Given enrollment in this track after Grade 9 or 10. Imputed data (m = 25).

respect, recent findings begin to provide valuable insights into the consequences of immigrant optimism. Recent studies found higher dropout rates at academic tracks (e.g., Birkelund, 2020; Dollmann and Weißmann, 2020), at VET (e.g., Rohrbach-Schmidt and Uhly, 2015; Seidel, 2019; Michaelis and Richter, 2022), but also at higher education (e.g., Müller, 2018; Lörz, 2019; Klein and Neugebauer, 2021) among immigrants.

With the current version of the NEPS Starting Cohort 4, it was so far only possible to shed light on the successful completion of academic tracks as well as on the completion of VET and upper-secondary vocational schools for those students who entered these tracks after Grade 9 or 10 (see **Figure 4**). With regard to the question whether immigrants who were enrolled in an academic track until the final year (Grade 12 or 13) were less successful than natives in completing this track with an upper-secondary degree, our findings showed the following: Immigrants who attended academic tracks until the final year (grade 12 or 13) had almost the same completion rates as native youths when considering the achievement of both entrance qualification for general universities and for universities of applied sciences. When focusing only on students who achieved a general university entrance qualification (*Abitur*) at an academic track, immigrants' completion rate was 5 percentage points lower compared to natives ($p < 0.001$). Especially immigrants of Turkish origin or from other guest worker countries

had difficulties to complete academic tracks with a general university entrance qualification. Disadvantages regarding track completion were, however, particularly pronounced among students who entered VET after Grade 9 or 10: 37% of immigrants enrolled in VET after Grade 9 or 10 dropped out and did not achieve a vocational qualification, while the dropout rate of natives (26%) was 11 percentage points lower ($p < 0.001$) (see also Michaelis and Richter, 2022). In contrast, immigrants and natives who switched to upper-secondary vocational schools after Grade 9 or 10 had the same probability to successfully complete these tracks with an upper-secondary degree (mainly with an entrance qualification for university of applied sciences) or to still be enrolled at the last interview available in NEPS. Nonetheless, the average completion rate at upper-secondary vocational schools was notably lower than at academic tracks (82% vs. 96%). Taken together, disadvantages occurred not only regarding the completion of academic tracks with a general university entrance qualification, they were also high among students entering VET after Grade 9 or 10. Future research should thus focus on the consequences of immigrant optimism and investigate whether immigrant optimism narrows educational attainment gaps in the long run.

Limitations

Although migration-related differences in educational transitions were largely mediated by the differences in educational and occupational aspirations, substantially and statistically significant differentials remained unexplained. One reason for the remaining residuals of an immigrant background may be that the mechanisms and processes underlying ethnic disparities are more complex and interwoven as well as more individual in nature than those that could be assessed in the present study. Similar to many other data sets, the NEPS data did not, for example, provide information on the recruitment processes of training companies. Selection practices of training companies, however, may contribute to immigrant youths' usually lower probability to access VET as there is empirical evidence of ethnic discrimination in companies' hiring decisions and practices (e.g., Kaas and Manger, 2012; Zschirnt and Ruedin, 2016; Imdorf, 2017).

Remaining residuals of an immigrant background also have to be discussed with regard to our study's limitations. First, although the immigrant optimism hypothesis has so far received large attention in empirical research, the operationalization of immigrant optimism varies between so far existing studies. One reason for this may be that the motivation of previous research predominantly was to document the phenomenon rather than exploring the underlying mechanisms (Cebolla-Boado et al., 2020). Second, although we controlled for anticipated discrimination and information deficits as alternative mechanisms responsible for migration specific choices, the measurement of both mechanisms was limited with NEPS data (see also Tjaden and Hunkler, 2017) and should be investigated in more depth in future studies. In this regard, other alternative explanations such as the influence of ethnic school segregation on the formation of ethnic choice effects should also be considered. Third, our analyses regarding the mediating role of aspirations was limited to a cross-sectional design. Future research on ethnic choice effects needs to consider the development of responsible mechanisms with longitudinal data.

Conclusion

Despite these limitations, the present study makes three important contributions to the research field. First, by examining educational transitions at different stages of the educational system, we extended previous research in that we drew a detailed picture of immigrants' enrollment processes over the educational life course from compulsory education up to young adulthood. Second, we confirmed the existence of ethnic choice effects over the educational life course from lower-secondary education until the transition to higher education. Third, beyond the German case, the results shed light on mechanisms largely driving ethnic choice effects at different stages of the educational system. More specifically, we showed that educational and occupational aspirations–both important indicators of immigrant optimism–largely explain ethnic choice effects.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found here: doi: 10.5157/NEPS:SC4:12.0.0, Leibniz Institute for Educational Trajectories (LIfBi).

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

RB and KS: conceptualization and design of the study, methodology, resources, writing–original draft preparation, and writing–review and editing. RB: software, validation, investigation, data curation, project administration, and funding acquisition. Both authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2022.894249/full#supplementary-material

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