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Destinations after higher education non-completion: the role of social background and pre-tertiary vocational qualifications

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Abstract

Prior research has shown that students from lower socio-economic backgrounds are less likely to graduate. We examine if this can be explained by background-specific pathways into higher education. Many students in Germany enter higher education with a vocational qualification and prior vocational qualifications occur more often among students from lower socio-economic backgrounds. We argue that vocational qualifications shift opportunity structures and opportunity costs of students who have to decide between continuing higher education and alternative options. We therefore examine if parental background and vocational qualifications are associated with the destinations after non-completion. We distinguish the destinations “re-entering higher education”, “vocational training” and “skilled employment”. Using the German Educational Panel Study (NEPS starting cohort 6), we apply competing risks models. Our results show that non-completers from higher socio-economic backgrounds are more likely to re-enter higher education than non-completers from lower socio-economic backgrounds. The higher rates of transfer to skilled employment among non-completers from lower backgrounds are mainly due to the fact that they more often hold a vocational qualification and have good chances to enter the skilled labour market without additional educational investments. Our results hence shed some new light on the question how vocational training “diverts” lower background students from higher education.

Keywords: Non-completion, Dropout, Transitions, Inequality, Vocational training, Diversion

Introduction

Research on inequalities in educational attainment typically reveals that students from lower socio-economic backgrounds are less likely to reach a higher education degree. This is mainly because these students are less likely to fulfil the entry requirements for higher education, but they are also less likely to enter higher education, given they have obtained eligibility to enter (Boliver 2011; Finger 2016; Hillmert and Jacob 2003; Jerrim et al. 2015; Müller and Pollak 2010; Müller et al. 2011; Schindler and Reimer 2011). On top of the social selectivity that occurs already during the pathway leading to higher education, we know from prior research that students from

lower socio-economic backgrounds less often graduate successfully, given they have entered higher education (Aina 2013; Checchi 2000; Contini et al. 2018; DesJardins et al. 2002; Johnes and McNabb 2004; Müller and Schneider 2013; Roksa and Velez 2012). There have been numerous attempts to explain these inequalities in degree completion. Studies mention lower levels of academic preparation, higher levels of employment hours and part-time enrolment as well as lower levels of interaction with peers and faculty among the “first generation” college students (Bean and Metzner 1985; Ishitani 2003, 2006; Pascarella et al. 2004; Spiegler and Bednarek 2013; Terenzini et al. 1996). We argue for the case of Germany that especially pathways leading to higher education and the resulting specific opportunity structures may contribute to explain why students from lower socio-economic backgrounds are less likely to graduate. Students from lower socio-economic backgrounds are more likely to enter higher education via vocational training and hence with a formal qualification for the skilled labour market (Buchholz and Pratter 2017; Tieben and Rohrbach-Schmidt 2014, 2021). These may result in a paradoxical “double-buffer” as vocational skills and work experience can be beneficial in higher education, but the vocational credential also can be used as a return ticket into the labour market (Scholten and Tieben 2017; Tieben 2020a).

This contribution extends this approach by examining the destinations of higher education non-completers. Our approach draws on Tinto’s (1993) distinction of “institutional departure” (leaving the program) and “system departure” (leaving higher education altogether) and takes into account that students may re-enter higher education after non-completion, but also can choose alternatives outside higher education. Following this distinction, we use the term “non-completion” for any program in higher education that was not completed with a degree. Non-completers hence may choose an alternative program in higher education or leave higher education and enter employment or non-tertiary training. The term “dropout” refers to students who leave higher education after non-completion. Note that previous research does not always make this distinction or use this terminology consistently. We propose that differences in pathways prior to higher education mediate the association between socio-economic background and the choice of a destination after non-completion.

The research questions that will be addressed in this paper are as follows:

1. To what extent is parental background associated with the choice of a subsequent destination after non-completion of the initially chosen program?
2. To what extent does prior vocational training mediate the association between parental background and the choice of a subsequent destination after non-completion of the initially chosen program?

In the remainder of this paper, we will first give an overview of the educational system in Germany with a special focus on detours to higher education. We then summarize the literature that examines the relationship between socio-economic background, detours to higher education and dropout. We derive a set of hypotheses, which will be tested using a large-scale retrospective life course study of the German population (NEPS SC6).

Traditional and alternative pathways to higher education in Germany

The tracked structure of the German post-secondary education system assumes two typical pathways, namely the “vocational” track, comprising lower secondary education, followed by vocational training, and the “academic” track, comprising upper secondary education, followed by higher education.

The strict separation between the vocational and academic sector has dissolved in recent decades and an increasing proportion of graduates from upper secondary school enter vocational training although they are eligible for higher education. Among these students, a certain proportion strives to enter higher education after vocational training, which is discussed as “double qualification” in German literature (Edeling and Pilz 2017; Pilz 2009). Moreover, initiatives to increase permeability between vocational and higher education ensured that vocational schools can award upper secondary certificates that qualify for higher education. As a result, more than 20% of all first-year students in Germany had graduated from vocational training before entering higher education (Middendorff et al. 2017; Tieben 2020b). While in many other countries, vocational education primarily addresses the lower performing school leavers and may come with low prestige, income and occupational perspectives, the German vocational training system includes selective programs with attractive conditions and future perspectives. Vocational training can take place in full-time-vocational schools or in the so-called dual system. Dual training is organized as in-firm-training in private-sector companies with regular attendance in vocational schools. Most of the school-based training programs qualify for employment in public sector occupations (e.g. in the health and care sector) and also comprise practical units. For access to some vocational training programs, competition is high, so that vocational schools and employers are selective on prior achievement and non-cognitive traits. All vocational training programs are standardized. Companies have to employ licensed instructors. Vocational schools are usually part of the public school system. Private sector vocational schools exist but they have to comply with all governmental training regulations. Quality assurance processes and the development of the curricula are organized jointly by the national ministry of education, the federal institute for vocational education and training (BIBB) as responsible governance agent, labour unions and chambers of commerce (Bundesinstitut für Berufsbildung 2022). Hence, the quality of the training programs usually is high and prior vocational qualifications may not necessarily indicate a risk factor in higher education, but rather a resource.

Conceptional framework

Socio-economic background, delayed entry and success in higher education

When it comes to associations between socio-economic background and dropout, many studies find that students from lower socio-economic backgrounds are more likely to leave higher education without a degree (Aina 2013; Checchi 2000; Goldrick-Rab 2006; Heublein et al. 2017, 2003; Hillmert and Jacob 2010; Kolland 2002; Müller and Schneider 2013; Roksa 2012; Roksa and Velez 2012; Schindler 2006; Triventi and Trivellato 2009). Milesi (2010) shows for an American sample that the association between socio-economic background and dropout decreases to non-significance when pre-tertiary

trajectories (e.g. GED¹ or delayed entry) are controlled. She concludes “that a substantive part of the disadvantage experienced by students whose parents have low levels of education is due to the alternative trajectories low SES students follow” (p. 42). It is tempting to derive from this finding that a detour as such comes with disadvantages. In many other contributions, the lower success rates of delayed entries indeed are attributed to lower high-school grade-point-averages and lower academic ability (Attewell et al. 2012; Bozick and DeLuca 2005; Faulkner et al. 2016; Goldrick-Rab and Han 2011; Hearn 1992; Milesi 2010; Niu and Tienda 2013; Parker et al. 2015; Roksa and Velez 2012). It nevertheless may be a premature conclusion that a high dropout prevalence among the delayed entries can be causally attributed to performance deficits resulting from poor academic preparation. Studies showed that students from vocational pathways enter higher education with lower levels of academic readiness (Köller et al. 2004; Tieben 2020b). However, there is also empirical evidence that a delay between secondary school and higher education may serve students to gain experiences and develop a clearer vocational orientation (Arnett 2004; Crawford and Cribb 2012; Schneider and Stevenson 1999). Others report that delays are associated with higher motivation, higher goal commitment and better performance in college (Birch and Miller 2007; Cantwell et al. 2001; Heath 2007; Martin 2010; McKenzie and Gow 2004; Parker et al. 2015). These are motivational resources that potentially compensate deficits in academic readiness. These positive effects of delays may be particularly pronounced in Germany, where delays are typically caused by participation in structured vocational training programs. Several German studies indeed report higher or equal achievement levels among students who did not enter higher education directly after upper secondary education (Burchert and Müller 2012; Dahm and Kerst 2016; Erdel 2010; Jürgens and Zinn 2012). But very similar to Anglo-American studies, there is evidence that this group is less likely to graduate than traditional students (Dahm and Kerst 2016; Heublein et al. 2017; Tieben 2020a).

Vocational training as safety-net

It is striking that socio-economic background and delays both seem to be associated with higher dropout rates, whereas—in the case of Germany—there is no clear evidence for performance deficits of these groups. This casts some doubt on the assumption that higher dropout rates of students from lower socio-economic backgrounds can be attributed to performance deficits that are related to their detours into higher education. Milesi’s (2010) observation that the association between socio-economic background and dropout is mediated by the pathway into higher education may nevertheless be plausible. Shavit and Müller (2000) discuss the safety-net function of vocational training from a comparative perspective. They show that especially in countries like Germany, where vocational training is highly specialized and closely linked to the organization of the labour market, vocational training provides a reliable route into stable qualified employment. Under these conditions, especially lower background secondary school leavers are likely to be “diverted” to vocational training instead of entering higher education. They perceive a higher risk

¹ GED (general educational development test) is a test for school-leavers without a high school diploma to prove equivalent competences.

of failure in higher education than in vocational training (Barone et al. 2018; Lörz 2012) and also seem to have less confidence in their skills (Schlücker and Schindler 2019). In a similar fashion, Büchel and Helberger (1995) assume an ‘insurance strategy’ of double qualifiers in the German educational system: Double qualifiers leave upper secondary education with a higher education entrance certificate but choose to obtain a vocational training certificate before entering higher education. Given that vocational training lasts at least 2 years, this is quite an additional investment. These students hope to benefit from their vocational skills during higher education as well as later in the labour market, once they have graduated. Scholten and Tieben (2017) examined the labour market transitions of higher education dropouts and show that those with a vocational training certificate indeed enter the labour market quicker than dropouts without a vocational training certificate but that the certificate does not result in advantages regarding the occupational status.

Destinations after non-completion

We argue that vocational qualifications may work as a paradoxical “double buffer”. The vocational skills and experiences that are beneficial during higher education, also are beneficial in the labour market. After non-completion of the initially chosen program, students have to decide about the subsequent destination. They can enter employment, vocational training or re-enter higher education. Tieben (2016, 2020a) showed that students with vocational qualifications are less likely to resume higher education after non-completion and Heublein (2017) reported that among dropouts with prior vocational training 64% enter the labour market, whereas only 20% of the dropouts without vocational qualifications do so. However, although these studies show a group-specific inclination to remain in higher education after non-completion, they do not reveal the destinations of students who prefer to leave higher education. It appears plausible to assume that students with a formal vocational certificate have lower incentives to remain in higher education because they can enter the labour market with the qualifications they already hold. Moreover, for students who have entered a program that draws on prior vocational experiences, remaining in higher education but changing the field of study would mean that the benefits of these prior experiences decrease and the risk of failure increases. This has consequences for the equalizing function of vocational detours: Even if there is no reason to assume that lower-background students are less successful in the initially chosen program, they are subject to attractive labour market opportunities outside higher education more often. This is because lower-background students use the vocational detour to a higher rate and hence more of them already have a vocational qualification when they enter higher education. If vocational qualifications work as a pull-factor into the labour market, lower-background students hence are more likely to be affected. We therefore propose that non-completers from lower socio-economic backgrounds are less likely to re-enter higher education (H1) or to enter vocational training (H2) after non-completion and more likely to enter the labour market (H3) than non-completers from higher socio-economic backgrounds. These associations between socio-economic background and destination are explained by prior vocational training (H4).

Data and analytic approach

Data and sample

We use the starting cohort 6 of the German National Educational Panel Study (NEPS SC6—Data release 14-0-0). The design combines a prospective panel with a yearly follow-up and a “retrospective module” as part of the first wave. In the retrospective module, respondents gave information about their past life course (education, occupation, partnership and family formation, etc.). Although the data of the retrospective module was collected in the first wave and therefore bears characteristics of a cross-sectional design, the information is recorded in longitudinal format, containing the start and end dates of each episode, so that a chronological structure of different life course transitions can be obtained (Blossfeld et al. 2011; Tieben 2023). For our analyses, we used spell-type data on a monthly basis.

The sample of NEPS SC6 comprises 11,932 respondents born in Germany between 1944 and 1986. We exclude 6783 respondents who were never enrolled in higher education before the time of the interview. Furthermore, students from universities of cooperative education (*Berufsakademie*), business academies (*Wirtschaftsakademie*) and academies of public administration (*Verwaltungsakademie*) are excluded from the sample ($N=582$). These institutions offer “dual programmes” which combine the higher education program with in-firm vocational training, so that these programs cannot be clearly defined as full-time higher education. To ensure comparability of individual educational careers, we exclude all students who studied abroad ($N=390$) or who have obtained their higher education entrance certificate in the German Democratic Republic² ($N=610$). We selected respondents who have entered higher education for the first time at the age of 17–30 years. Our initial analytic sample comprises 3567 cases.³ Approximately one quarter ($N=922$) of these individuals did not complete their initially chosen program in higher education. This group is the sample for the analysis of the destination after non-completion. As we are using retrospective life course data from the wave-1 interviews, we do not have to handle issues that occur due to panel attrition. The target population for wave 1 was stratified along federal state, administrative districts, and a classification of urbanization. Given that this sampling strategy resembles a simple random sampling approach, no design weights are applicable for the full sample of wave 1 (Hammon et al. 2016). For the cases that were selected from the original sample and for the selected non-completers, no reliable cross-cohort calibration base is available from official student register data. We may, however, safely assume that the analytic sample is reasonably representative as we primarily select by education level.

Analytic approach

In a first step, we will give a descriptive overview of the full sample and the sub-sample of non-completers of the initial program in higher education. Bivariate analyses

² The higher education system of the GDR followed planned economy principles in admission and graduation of students. Especially the selection of students was based on academic merits, but also on compliance with the socialist government values, which led to a highly selected student population and low dropout rates. We do, however, include Eastern German citizens who entered higher education after the reunion.

³ Note that the sharp drop from the original sample is primarily due to the selection of respondents who have entered higher education at least once in their life course.

will show the destinations of non-completers from higher and lower educated family backgrounds and of non-completers with and without a vocational training certificate. We examined the destination after the first higher education non-completion, using an approach that exploits the longitudinal data structure and the categorical nature of the dependent variable. After higher education non-completion, three mutually exclusive absorbing states are possible: higher education, vocational training and skilled employment. Re-entering higher education, vocational training and entering skilled employment are likely to occur after periods of inactivity (“bridging episodes”). The transition may be postponed by shorter or longer periods, or not take place at all during the observation period covered by the data. For this reason, we applied competing risks regressions, as proposed by Fine and Gray (1999). This model is an extension of Cox’s semiparametric proportional hazards model, which allows subdistributions of competing risks (in other words: event-history analysis with non-binary categorical dependent variables). The model hence takes into account that individuals choose between multiple (mutually exclusive) destinations. It does not assume a specific functional form but proportional subhazards. We tested for proportionality of the subhazards and confirmed that the assumption is not violated.

Fine and Gray’s (1999) definition of the subhazard function is

$$\bar{h}_i(t|x) = \lim_{\Delta t \rightarrow 0} \frac{1}{\Delta t} Pr\{t \leq T \leq t + \Delta t, i = 1 | T \geq t \cup (T \leq t \cap i \neq 1), x\}$$

where T is the event time, i the cause of event occurrence (i.e. transition to one of the absorbing states) and x a time-independent covariate vector. The subhazard for a given cause is the instantaneous probability of event occurrence from the cause at time t , given that no event occurred before t or due to another cause. For our purpose, we estimate separate subhazard functions for higher education (with the competing risks vocational training and skilled employment), vocational training (with the competing risks of higher education and skilled employment) and skilled employment (with the competing risks of higher education and vocational training):

$$\bar{h}_{hed}(t|x) = \bar{h}_{hed,o}(t)\exp(x\beta)$$

$$\bar{h}_{voc}(t|x) = \bar{h}_{voc,o}(t)\exp(x\beta)$$

$$\bar{h}_{skemp}(t|x) = \bar{h}_{skemp,o}(t)\exp(x\beta)$$

We fitted the models using the stata command `stcrreg` (Cleves et al. 2010). We specified models that remove cases from the risk set upon occurrence of either the transition of interest or a competing event. Where multiple transitions occur, we applied priority principles (see Sect. “[Dependent Variable](#)” for details). Although for some of the subjects in the data a period of up to 25 years after non-completion was covered, we restricted the observation to 60 months. The reasons for this are straightforward: The majority of the subjects made a transition within 5 years after non-completion, so that by cutting off the observation only 57 subjects are censored artificially. The cut-off reduced the computing time considerably and made the estimation more

efficient. We carefully compared the results from the full and the reduced observation period and verified that the cut-off did not lead to any changes regarding results or conclusions.

The competing risks analyses follow a hierarchical strategy: Model 1 introduces education of the parents as socio-economic predictor of the destination after non-completion. Model 2 adds pre-tertiary vocational training as central mediator of the relationship and Model 3 adds a set of variables that control for differences in socio-demographic properties, individual pathways prior to higher education and institutional context conditions. The coding of all variables is described in the following section.

Variables

Dependent variable

We used a categorical variable of the destination after non-completion with four categories. The variable was coded 1, when the respondent re-entered higher education during the observation period. When the respondent entered a vocational training, which fully qualifies for the skilled labour market, the destination was coded 2 (vocational training). When the respondent entered a job which typically requires a formal qualification, the destination was coded 3 (skilled employment). A fourth category was coded 0 and comprises destinations that are “not in education, employment or training (NEET)”, including unemployment, but also internships, military or voluntary service, sick leave and parental leave, sabbaticals/vacation as well as low- or unskilled labour. We include low- or unskilled labour ($N = 36$) in this category, because skilled employment is the target destination for non-completers. Non-completers hold a general or vocational upper secondary leaving certificate and hence would strive for a position in the skilled labour market. Inspection of the data showed that un- or low-skilled employment does occur among non-completers, but in general is used as bridging episode, for example to fill the months between non-completion and vocational training or higher education. Cases that did not enter one of the three destinations, but remain in the “zero state” throughout the observation period, are treated as censored at the end of the observation period. For cases with multiple transitions into different destinations, we applied priority principles: Re-entering higher education has priority over vocational training and skilled employment; vocational training has priority over skilled employment. The lower part of Table 3 in Appendix gives an overview of the distribution of the destinations after non-completion.

Independent variables

Our main independent variable is socio-economic background, which was measured as education of the parents. We used a dummy variable, indicating if at least one of the parents had obtained higher education ($= 1$). Sensitivity analyses showed that this threshold has the highest discriminatory power, compared to alternative measurements (e.g. ISEI, EGP or other codings of parental education). We applied listwise deletion where education of the parents was not reported ($N = 10$, (1.1%)).

Pre-tertiary vocational training is a dummy variable that was coded 1 if the respondent had graduated from a full non-tertiary vocational training (2–3,5-year programs, that qualify for skilled occupations) before entering higher education. These comprise

company-based dual training (with part-time attendance in vocational schools) and school-based vocational training. Vocational training episodes that were started before higher education, but not finished with a certificate, were assigned to the reference category (no vocational training = 0).

Controls

We introduced three sets of control variables: The socio-demographic controls comprise sex, age, place of birth (West Germany, East Germany, abroad), place of birth both parents in Germany (yes/no), children under age 6 when respondent entered higher education for the first time (yes/no), childbirth during first episode in higher education (yes/no). Age was measured as age at non-completion. Linearity tests indicated that a metric measurement of age was justified.

The second set of controls (individual pathways to higher education), was captured by the type of the entrance certificate, vocational qualifications and work experience. We distinguished “full entrance certificate” (allows access to all types of institutions and programs), “restricted entrance certificate” (restricts access to either particular types of institutions or particular fields of study), and “alternative pathways” (students who do not hold a formal entrance certificate but gained eligibility through vocational training and work experience). For analyses of the sub-sample of non-completers, we collapsed the “restricted” and “alternative” categories in order to maintain a sufficient number of cases. Work experience in a skilled job was coded as categorical variable (no skilled work experience = 0, less than a year = 1, more than a year = 2).

A third set of controls aims to capture the institutional context conditions. We controlled type of institution (university of applied sciences = 0, university = 1) and field of study (education, arts/humanities, social/behavioural sciences, business/public administration/services/law, natural sciences/mathematics/ICT, engineering/manufacture/construction and life sciences). Field of study was missing for 90 (2.5%) cases, but instead of dropping the cases we used a “missing-value”-dummy in our analyses. The starting date of the first higher education episode was controlled by a categorical variable comprising 10-year intervals from 1960 to 2009. Model 3 also includes a categorical measure of the duration of the first higher education episode. For starting date and duration of the first higher education episode, the categorical solution was justified by the non-linear association with the dependent variable. Table 1 gives an overview of all variables used in the competing risks analyses for the full sample and the sub-sample of non-completers.

Results

Descriptive analyses

Table 1 shows the frequency-distributions of all variables for the full sample and the selection of non-completers. It may be surprising that the majority of respondents has parents without a higher education degree. However, we have to keep in mind that the data comprise the birth cohorts 1944–1985. Through the expansion of the higher education participation, the share of students from highly educated backgrounds kept increasing across cohorts. But especially during the 1970s and 1980s the majority of students was “first generation educated”. In 1991, for example, only 43% of all German students had parents with an upper secondary education certificate

Table 1 Absolute and relative frequencies of variables

	All students		Only non-completers	
	N	% (col.)	N	% (col.)
Completed first higher education episode				
No	922	25.8		
Yes	2645	74.2		
Education parents				
No HE degree	2308	64.7	585	63.5
HE degree	1259	35.3	337	36.5
Pre-tertiary vocational certificate				
No	2562	71.8	690	74.8
Yes	1005	28.2	232	25.2
Sex				
Male	2040	57.2	530	57.5
Female	1527	42.8	392	42.5
Age at entry first episode				
17–20	563	15.9	126	13.7
20–22	2218	62.2	582	63.1
23–25	590	16.5	149	16.2
26–30	196	5.5	65	7.1
Place of birth				
West Germany	3210	90.0	814	88.3
East Germany	221	6.2	68	7.4
Abroad	136	3.8	40	4.3
Both parents born in Germany				
No	3173	89.0	811	88.0
Yes	394	11.0	111	12.0
Children under 6 at entry first episode				
No	3469	97.4	894	97.0
Yes	98	2.7	28	3.0
Childbirth during first episode				
No	3309	92.8	867	94.0
Yes	258	7.2	55	6.0
Type of entrance certificate				
Full entrance certificate	2779	77.8	760	82.4
Restricted entrance certificate	454	12.8	106	11.5
Alternative	334	9.4	55	6.1
Work experience				
No skilled work exp	2883	80.9	785	85.1
Less than 1 year skilled	320	9.0	70	7.6
More than 1 year skilled	364	10.1	67	7.3
Type of institution				
Univ. of applied sciences	1189	33.3	206	22.3
Research university	2378	66.7	716	77.7
Field of first HE episode				
Education	562	15.9	113	12.3
Arts/humanities	347	9.7	116	12.6
Social/behav. sc	271	7.5	117	12.7
Business/admin./service	637	17.8	158	17.1
Natsc./maths/ict	449	12.6	154	16.7
Engin./manuf./const	824	23.2	196	21.3

Table 1 (continued)

	All students		Only non-completers	
	N	% (col.)	N	% (col.)
Life sc	388	<i>10.9</i>	54	<i>5.9</i>
Information unavailable	89	<i>2.5</i>	14	<i>1.5</i>
Transition cohort first episode				
1960–1969	249	<i>7.0</i>	33	<i>3.58</i>
1970–1979	838	<i>23.6</i>	182	<i>19.7</i>
1980–1989	1115	<i>31.2</i>	301	<i>32.7</i>
1990–1999	898	<i>25.3</i>	252	<i>27.3</i>
2000–2009	467	<i>13.0</i>	154	<i>16.7</i>
Duration of first higher education episode (mean = 29,4)				
Up to 1 year			323	35.0
1–2 years			244	26.5
2–3 years			122	13.2
3–4 years			81	8.8
More than 4 years			152	16.5
Total	3567		922	

Relative frequencies (column %) in italic

(Abitur) (Kroher et al. 2023). It may also be surprising that neither family background nor prior vocational training seem to predict non-completion of the initial program. The differences are not pronounced but they indicate that students from higher backgrounds as well as students with a vocational training certificate discontinue their initially chosen program slightly less often. This—at first glance—contradicts most of the existing literature in dropout research. Yet, as outlined above non-completion of the initially chosen program does not necessarily mean dropping out of higher education. Non-completers choose between leaving higher education (= dropout) and starting an alternative program in higher education. We argue that family background and vocational training predict this choice rather than the decision to discontinue the initial program (see Tieben (2020a) for a discussion). Figure 1 therefore shows the destinations after non-completion for non-completers from lower and higher socioeconomic backgrounds and non-completers with and without a vocational training certificate. Note that these figures do not show the immediate destination after non-completion but rather if a transition to one of the destinations was observed within 5 years after non-completion. More than half of the non-completers with highly educated parents decides to start an alternative program in higher education (55.3%). Non-completers from lower educated backgrounds are less likely to remain in higher education (40.3%). Whereas we observe only small differences between these two groups in the transition to vocational training (21.6% vs. 22.2%), the differences in the transition to skilled employment are considerable: a quarter of the non-completers from lower educated backgrounds enters skilled employment, but only 14.5% of the non-completers from higher educated backgrounds. The differences between non-completers with and without prior vocational qualifications are even more pronounced: more than half of the non-completers who have entered higher education with a vocational training certificate choose skilled employment (52,0%), whereas only

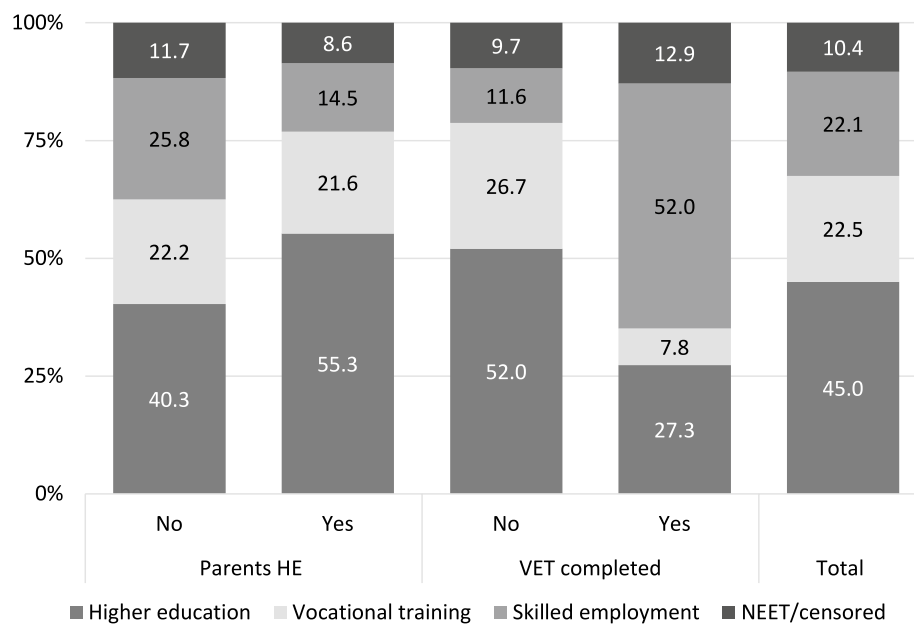


Fig. 1 Destination after non-completion by family background and prior vocational training

11,6% of the non-completers without vocational training enter skilled employment. These are more likely to remain in higher education (52,0%) than to enter vocational training (26,7%). These figures show impressively how strongly prior qualifications determine the destinations of non-completers. These figures also raise the question if students from lower socio-economic backgrounds dropout more often because they are more likely to have a qualification for skilled employment and therefore have less difficulties entering skilled employment than non-completers from higher socio-economic backgrounds. The following multivariate competing risks analyses will examine to what extent the lower rates of re-entering higher education are explained by higher rates of vocational detours among lower background students.

Competing risks analyses of destinations after non-completion

Table 2 shows the estimates for higher education, vocational training and skilled employment. In a first step (M1), we include only the education of the parents as predictor, in a second step (M2), we added the pre-tertiary vocational certificate and in a third step (M3), we added the full set of control variables. Table 2 shows only the coefficients for parent's education and pre-tertiary vocational training. The full set of coefficients from M3 is displayed in the appendix (Table 3). We report subhazard ratios, which are exponentiated subhazards and can be interpreted in a similar way as odds ratios (a subhazard ratio of 1 indicates that there is no association, negative subhazards result in a subhazard ratio below one, positive subhazards result in SHR larger than one). For ease of interpretation, Fig. 2 shows cumulative incidence curves for each of the destinations, separately for non-completers from high and low educated family backgrounds. The cumulative incidence function converts the subhazard ratio into the (conditional) probability of

Table 2 Subhazard ratios from competing risks models for higher education, vocational training and skilled employment

	Higher Education			Vocational Training			Skilled Employment		
	SHR M1	SHR M2	SHR M3	SHR M1	SHR M2	SHR M3	SHR M1	SHR M2	SHR M3
Education parents									
No parent has a HE degree (ref.)									
At least one parent has a HE degree	1.49***	1.34**	1.29**	0.98	0.83	0.84	0.53***	0.77	0.87
Pre-tertiary vocational certificate									
No (ref.)									
Yes		0.48***	0.79		0.25***	0.23***		5.56***	3.93***
N (observations)	1608			1608			1608		
N (subjects)	922			922			922		
N (entered target destination)	422			203			200		
N (entered competing destination)	403			622			625		
N (censored)	97			97			97		
Log Likelihood	- 2769.41	- 2753.42	-2675.15	- 1360.70	- 1338.00	- 13,307.60	- 1326.30	- 1258.60	- 1219.00
Wald Chi2	30.30	48.94	217.66	0.02	35.16	114.08	15.80	166.62	248.12

All M3 contain the full set of controls: sex, age at non-completion, region of birth, childbirth during enrolment, number of children under 6, type of institution, field of study, duration first HE enrolment, type of entrance certificate, work experience. Model details and coefficients are displayed in Table A2 (appendix)

SHR subhazard ratio

*p < 0.05; **p < 0.01; ***p < 0.001

entering the target destination within the first 60 months after non-completion.⁴ Comparing the graphs allows insights into the background-specific transition patterns to the three destinations across time. We present three graphs for each destination, which represent the three modelling steps from Table 2. The socio-economic gradient in the destination after non-completion is expressed by the distance between the dashed and the solid lines. The stronger the “effect” of socio-economic background, the larger the distance between the dashed and the solid line. The middle graph in the upper row for example illustrates that the two lines are perfectly congruent when the subhazard ratio equals or approaches 1. The mediating role of prior vocational training is expressed by the reduction of this distance in model 2, whereas the additional mediation through the control variables is expressed in model 3.

The three models for higher education show that the subhazard ratio of socio-economic background is large and remains significant when pre-tertiary vocational training is controlled. We nevertheless observe that the subhazard ratio collapses from 1.49 to 1.34 in model 2 which suggests that prior vocational training explains some of the association between socio-economic background and re-entering higher education after non-completion. For entering vocational education, we do not find any association with

⁴ As an example, for the interpretation of the graphs, the upper left panel of Fig. 2 displays the following information: non-completers whose parents have no higher education degree, have a probability of 0.2 of (re-)entering higher education in the first month after non-completion. Their probability accumulates to 0.4 after 60 months. The probability of non-completers whose parents hold a higher education degree is somewhat higher, at 0.3 in month 1 and at 0.55 in month 60.

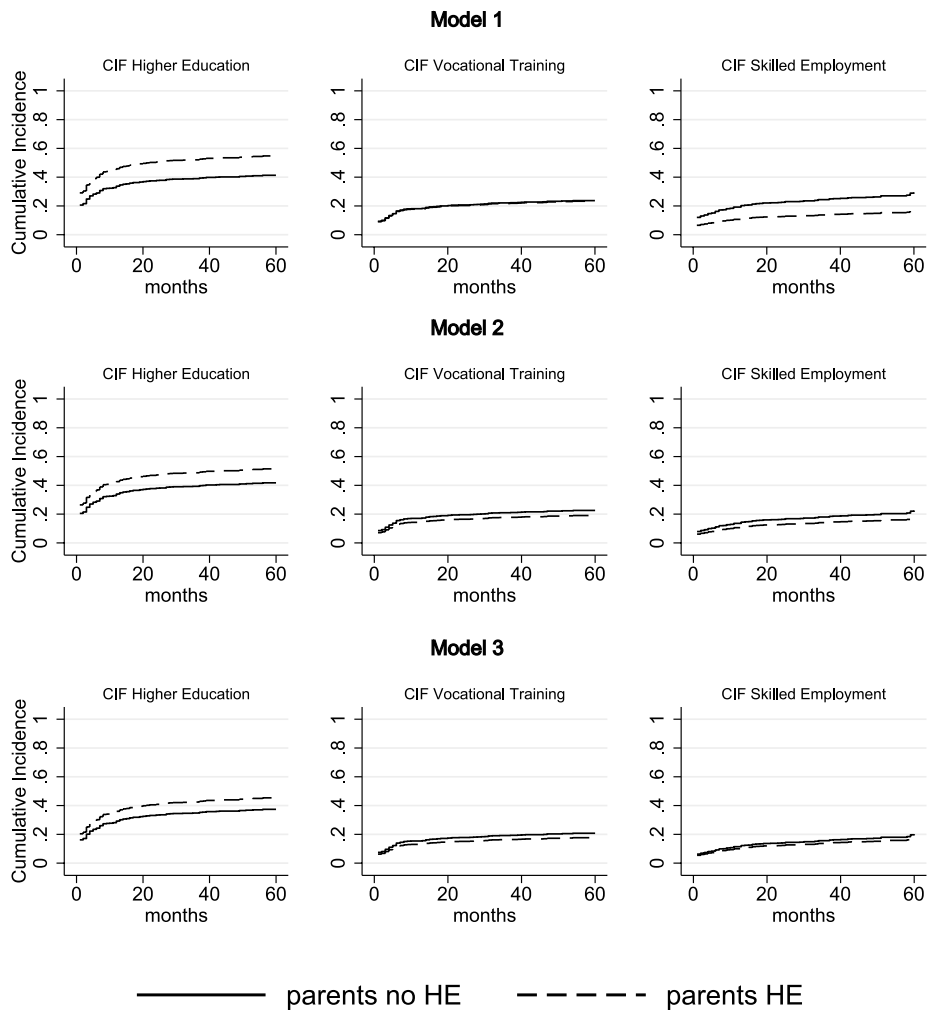


Fig. 2 Cumulative incidence curves for re-entering higher education, vocational training, and skilled employment, based on competing risks models in Table 2

socio-economic background. The coefficients suggest that there is a slight suppressor⁵ effect under control of prior vocational certificates, but the association is non-significant in all models. For entering skilled employment, we observe a pronounced mediation effect in model 2: controlling prior vocational certificates reduces the subhazard ratio of socio-economic background from 0.53 to 0.77. The association is non-significant in models 2 and 3. It is important to note that prior vocational certificates have a very strong negative effect on the decision to enter vocational training after non-completion. This is plausible as the incentive to obtain a second vocational certificate is low. The effect of prior vocational certificates also is very strong but positive for entering skilled employment. The subhazard ratio of 5.56 indicates a more than fivefold increased chance to enter skilled employment for those who hold a formal qualification. This indicates that prior vocational qualifications

⁵ Counterintuitively, a subhazard ratio that changes from 1 to 0.85 actually gets larger, due to the multiplicative nature of the coefficients.

hamper success in higher education, not because they are a risk factor, but because they are a pull-factor that draws non-completers towards the labour market. This coefficient remains highly significant in model 3, albeit slightly decreases to 3.93.

Conclusions

The aim of this paper was to examine if pre-tertiary vocational certificates can explain that students from lower socio-economic backgrounds are less likely to graduate from higher education. Our approach takes into account that students from lower socio-economic backgrounds are more likely to enter via vocational detours and that vocational skills and certificates may work as a paradoxical double-buffer in higher education. They may be helpful resources during study, but at the same time they provide an easy return ticket into the skilled labour market (Tieben 2020a). We examined the destinations after non-completion and aimed to answer the following research questions:

1. To what extent is parental background associated with the choice of a subsequent destination after non-completion of the initially chosen program?
2. To what extent does prior vocational training mediate the association between parental background and the choice of a subsequent destination after non-completion of the initially chosen program?

We examined the destination after non-completion and picked up the prior discussion around vocational training as safety net or diversion (Arum et al. 2007; Scholten and Tieben 2017; Shavit and Müller 2000). We proposed that non-completers from lower socio-economic backgrounds are less likely to re-enter higher education (H1) or vocational training (H2) after non-completion and that they are more likely to enter the labour market (H3) than non-completers from higher socio-economic backgrounds. We also proposed that these associations between socio-economic background and destination are explained by prior vocational training (H4).

In models that do not control prior vocational qualifications, we observe that non-completers from lower socio-economic backgrounds are almost twice as likely to enter skilled employment than non-completers from higher backgrounds. They also are considerably less likely to re-enter higher education which lends support to H1 and H3. Hypothesis 2 is not supported by the results of the competing risks analyses as we do not find associations between socio-economic background and entering vocational training. Hypothesis 4 can only be partly confirmed. Prior vocational certificates are a relevant predictor for the destinations after non-completion and mediate the relationship between socio-economic background and destination to a considerable degree. Nonetheless, especially for re-entering higher education, a strong effect of the socio-economic background remains in the full model and the effect of prior vocational training itself is mediated by certain control variables, such as age at non-completion, gender, duration of the non-completed study, type of institution and field of study.

The remaining effect of socio-economic background on re-entering higher education hence deserves further scrutiny, as this finding suggests that mechanisms beyond the mere opportunity structure are in place here. It is likely that performance deficits play a role. The data do not contain performance indicators but we know from previous

research that lower background students and certain groups of non-traditional students report lower grades, lower levels of academic self-concepts and academic preparation (Schlücker and Schindler 2019; Tieben and Knauf 2019). We nevertheless have to consider that weak performance does not necessarily prompt dropout. Where low grades meet high levels of goal orientation or a higher motivation to graduate, students are likely to stay in higher education. Where low grades meet attractive exit options, students are likely to leave. Regarding motivations to graduate, we may think of status maintenance motives among students from higher socio-economic backgrounds (Erikson and Jansson 1996). For students who have to rely on loans, the allocation rules for means-tested study loans and grants for lower income students may at least partly drive the decision to leave: these are awarded conditional on timely proofs of study progress and students who decide to transfer to another program, may lose eligibility to receive funding. The financial risk of re-entering hence may be higher for non-completers from lower socio-economic backgrounds. This is highlighted by the observation that the duration of the non-completed study also seems to play a relevant role in the decision to re-enter. For entering skilled employment, the findings show more clearly that prior vocational training is a strong predictor for the transition to skilled employment, but also the dominant mediator of the association between socio-economic background and destination. The association identified in model 1 is literally ‘mediated away’ under control of prior vocational training.

In general, we can conclude that prior vocational qualifications are a relevant but not the only mediator of the association between socio-economic background and destinations after non-completion. The skilled labour market in particular seems to be an attractive alternative to re-entering the educational system especially for non-completers with a vocational certificate. Hence, the mere fact that students from lower socio-economic backgrounds more often enter higher education with a formal qualification for the skilled labour market explains the difference between non-completers from lower and higher socio-economic backgrounds to a considerable extent. As discussed above, it is not necessarily a higher risk of failure in higher education among students with prior vocational training, but we have to take into account that a formal qualification for skilled employment comes with a different opportunity structure for. Students without this qualification may decide to discontinue their initially chosen course of higher education but in the highly credentialist German labour market they will need a formal qualification of any kind. Our results hence shed new light on the assumption that detours and delayed transition to higher education always are a risk factor. They are a safety-net, but rather than mitigating the actual risk of failure they also facilitate the decision to leave.

This study does not come without limitations. Our results are suggestive, but it would be worthwhile to replicate the analyses with more recent cohorts. The youngest participants in the data were almost 40 years old when this manuscript was drafted. This has the advantage that long observation periods capture mature starters and late returners to the education system. These analyses were possible due to the unique structure of the dataset. In Germany, centralized register data are not available so that it is not possible to determine trajectories through higher education and the transitions during the subsequent years. Prospective panel data, such as the NEPS starting cohort 5 (comprising students who started their 1st year in higher education in the winter term 2010/11) would

potentially be suitable, but this requires a long-running panel of at least 10–15 years in order to capture delayed graduation and gap-episodes. Given that panels of this kind suffer from (mostly selective) panel attrition in the long run, retrospective data collections seem to be the more promising pathway to unbiased results. The drawback of these data is that information about the actual reasons for non-completion and for the choice of the subsequent destination are not clear.

Appendix

See Table 3

Table 3 Full set of coefficients from M3

	Higher education SHR	Vocational training SHR	Skilled employment SHR
Education parents			
No parent has HE degree (ref.)			
At least one parent has HE degree	1.29**	0.84	0.87
Pre-tertiary vocational certificate			
No (ref.)			
Yes	0.79	0.23**	3.93***
Sex			
Male (ref.)			
Female	0.73**	1.52**	1.17
Age at non-completion first episode	0.91**	0.98	1.06*
Both parents born in Germany			
No (ref.)			
Yes	1.12	0.85	0.88
Place of birth			
West Germany (ref.)			
East Germany	1.02	0.67	1.69*
Abroad	1.08	1.40	0.40
Children			
Birth during first HE episode (Yes = 1)	1.08	0.67	0.80
Children under 6 before HE (Yes = 1)	0.57	1.43	0.71
Type of entrance certificate			
Full entrance certificate (ref.)			
Restricted entrance certificate	0.84	1.04	1.01
Work experience			
No skilled work experience (ref.)			
Less than 1 year	1.04	0.40	1.47
More than 1 year	1.11	0.81	1.44
Type of institution			
Univ. of applied sciences (ref.)			
Research university	2.19***	0.41***	0.73
Field of first HE episode			
Education (ref.)			
Arts/humanities	0.77	0.88	2.24*
Social/behavioural sciences	0.89	0.86	1.86
Business/admin./services	0.63**	0.95	2.45**

Table 3 (continued)

	Higher education	Vocational training	Skilled employment
	SHR	SHR	SHR
Natural sciences/mathematics/ict	0.96	0.69	1.90
Engineering/manufacture/construction	1.11	0.69	1.72
Life sciences	1.36	0.70	0.83
Information unavailable	1.18	0.54	3.29*
Transition cohort first episode			
1960–1969 (ref.)			
1970–1979	0.80	1.71	1.68
1980–1989	0.65*	2.79	1.27
1990–1999	0.73	3.75	0.89
2000–2009	0.73	3.23	1.01
Duration of first higher education episode			
Up to 1 year (ref.)			
1–2 years	0.78*	1.74**	1.21
2–3 years	0.84	1.64*	1.01
3–4 years	0.49**	1.59	2.13**
More than 4 years	0.32***	1.57	2.31**
N (observations)	1608	1608	1608
N (subjects)	922	922	922
N (entered target destination)	422	203	200
N (entered competing destination)	403	622	625
N (censored)	97	97	97
Log Likelihood	– 2675.20	– 13,307.60	– 1219.00
Chi2	217.66	114.08	248.12

SHR = subhazard ratio

Legend: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Author contributions

Not applicable (single authorship).

Funding

The work on this manuscript was generously supported by Deutsche Forschungsgemeinschaft (German Science Foundation, Grant No. TI 766/1-1).

Availability of data and materials

This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort Adults (<https://doi.org/https://doi.org/10.5157/NEPS:SC6:14.0.0>). 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 is carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network. The data that support the findings of this study are available from 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. Data are however available upon reasonable request and with permission of Leibniz Institute for Educational Trajectories (LIfBi): NEPS Network (2023). *National Educational Panel Study, Scientific Use File of Starting Cohort Adults*. Leibniz Institute for Educational Trajectories (LIfBi), Bamberg. <https://doi.org/https://doi.org/10.5157/NEPS:SC6:14.0.0>.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

I declare that that I have no competing interests or personal relationships that influence the work reported in this paper.

Received: 27 November 2023 Accepted: 23 April 2024

Published online: 01 June 2024

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Data

NEPS Network (2023) National educational panel study, scientific use file of starting cohort adults. Leibniz Institute for Educational Trajectories (LIfBi), Bamberg. <https://doi.org/10.5157/NEPS:SC6:14.0.0>

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