Research in Higher Education (2020) 61:117–141
https://doi.org/10.1007/s11162-019-09553-z

Non-completion, Transfer, and Dropout of Traditional and Non-traditional Students in Germany

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Received: 30 March 2018 / Published online: 4 April 2019

Abstract
A considerable proportion of students in Germany has graduated from vocational training before entering higher education. With this paper we examined how these students progress through higher education. We argue that successful graduation is the result of a sequence of decisions and decompose the trajectories through higher education to distinguish non-completion, transfer and dropout. We used the German Educational Panel Study (NEPS-SC6), a retrospective life course study, and applied logistic regression models. Our results suggest that students with vocational qualifications are slightly more likely to graduate from the initially chosen program than traditional students, but this advantage diminishes after controlling individual and institutional characteristics. After non-completion of the initially chosen program, the traditional students are more likely to remain in higher education and transfer to another program, whereas students with vocational certificates rather choose to leave higher education. Taking the entire trajectory together, our bivariate analyses reveal a slightly higher risk of leaving higher education without graduation among the students with pre-tertiary vocational training. Again, this association disappears in models that control for individual and institutional characteristics.

Keywords Dropout · Non-completion · Non-traditional students · Vocational training · Germany

Introduction

In the German educational system, the "standard" pathway into higher education is entering the *Gymnasium* (academic track in secondary education) after primary school, graduating with *Abitur* (full entrance qualification for all types of higher education) and directly entering higher education. However, the German educational system also offers a number of alternative pathways into higher education and a considerable proportion of students enters university after periods of vocational training, labor force participation or via second cycle qualifications (Jacob 2004; Heine et al. 2008; Jacob and Weiss 2008; Schindler and Reimer 2010). More than 25% of all first-year students have obtained a vocational qualification before entering

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higher education (Willich et al. 2011; Autorengruppe Bildungsberichterstattung 2014). Moreover, a growing proportion of students did not obtain their higher education entrance certificates (*Abitur*) following the standard pathway but through detours or alternative routes (Orr and Hovdhaugen 2014; Schindler 2014). This has the advantage that access to higher education still is possible in later stages of the educational career, for example after a period of vocational training or labor market participation.

Despite the considerable number of students who did not enter higher education via the standard pathway, we know only little about the progression of these students through higher education and findings of the scarce empirical research are inconsistent: A number of researchers have reported that pre-tertiary vocational training is associated with higher rates of non-completion (Kolland 2002; Heublein et al. 2010; Müller and Schneider 2013; Dahm and Kerst 2016). Other researchers have concluded that students with pre-tertiary vocational qualifications are not (or not per se) less successful than traditional students (Meulemann 1991; Erdel 2010; Burchert and Müller 2012; Rager and Rottmann 2015). These diverging conclusions certainly come about through different samples or periods, and through the investigation of specific types of institutions, or fields of study, or even selected programs within selected institutions. We nevertheless want to point out that the concept of higher education dropout as such is not clearly defined—neither in German nor in international research. Terms such as dropout, non-completion, attrition and retention have been used more or less indiscriminately (Hovdhaugen 2009), while it is of paramount importance for the evaluation of student success to maintain a clear distinction between "institutional departure" and "system departure" (Tinto 1993; Herzog 2005; Ishitani and Flood 2018; Shapiro et al. 2018).

We draw on this distinction and argue that dropping out from higher education involves two decisions: the first decision is to quit the initially chosen program, the second is the decision between quitting higher education altogether and transferring to an alternative program within higher education. These two decisions probably are made under consideration of specific conditions and constraints. We assume that for the decision to quit the initial program the actual institutional conditions play a dominant role (Berger and Braxton 1998), whereas for the choice between transfer and dropout, the conditions and opportunity structures outside higher education gain importance.

There are reasons to assume that vocational training as such may not be harmful for success in higher education. However, at the same time, vocational training creates a specific individual opportunity structure which affects the stay-or-leave decision after non-completion. We therefore aim to answer the research questions if vocational training is associated with non-completion of the initial program and—in case of non-completion—if vocational training is associated with the decision between dropout and transfer. With this approach, we contribute to existing research by considering the sequential structure of the pathway into and through higher education and by integrating specific opportunity structures into theoretical considerations about dropout mechanisms. The remainder of this paper first gives an overview of the educational system and the relevant structural conditions in Germany. We then link our considerations to existing research and theoretical approaches to derive hypotheses which were tested using a large retrospective life-course survey.

Vocational Training and Higher Education in Germany

The German system of post-secondary education is divided into higher (tertiary) education and (post-secondary, non-tertiary) vocational training. The following section gives an overview of the structure and admission practices of vocational training and higher education.

Vocational training usually takes 3 years and consists of a large range of programs, which qualify for the skilled labor market. The vocational training system is divided into "school-based" and "dual" programs. School-based vocational training takes place as a full time training in vocational schools with practical units in the third year. The dual training mainly takes place on the job in companies with weekly one-day-units in vocational schools (Müller et al. 1998; Walden and Troltsch 2011). Both types of vocational training are highly standardized and follow curricula which are determined jointly by chambers of industry and commerce, labor unions and the ministry of education. The commitment of the training companies is considerable, as they pay a remuneration (which in most cases is sufficient to cover modest living expenses), and they have to employ licensed trainers who ensure compliance with the training regulations. In general, vocational training is a safe route into skilled employment, which makes it an attractive alternative to higher education.

Both training types theoretically can be entered after graduation from lower secondary education. However, the allocation of trainees in the dual system largely follows market principles, as companies select their own trainees and have an interest in recruiting talents for later employment. Admission to very attractive dual training programs thus is competitive, so that companies often require an upper secondary leaving certificate (which also would qualify for higher education).

German higher education consists of traditional universities and universities of applied sciences.[1] The universities of applied sciences were established in the 1970s to replace the 'schools of engineering'. Meanwhile they have considerably expanded and offer a wide range of programs—including, for example, business administration, social sciences, design, education and media-studies. Both types of higher education usually offer full (3–5 year) degree programs, which result in B.A., M.A. or equivalent qualifications. Since the end of the 1990s, the higher education system was gradually reformed to comply with the Bologna declaration.

Entrance certificates for higher education typically are obtained by graduation from general upper secondary education. Besides the full general upper secondary certificate (*Abitur*) students can also obtain a restricted upper secondary certificate, which allows access to selected programs in higher education (*fachgebundenes Abitur* and *Fachabitur*). These are assigned to students who graduate from upper secondary schools with a vocational profile.[2] Besides this traditional route into higher education, there are several alternative pathways. Especially vocational training can also result in entrance qualifications for higher education (Schindler 2014). The rules for obtaining a higher education entrance certificate via vocational training are very heterogeneous across federal states, but in general

[1] Next to these two main types of higher education, the German system also comprises a number of specialized types of institutions, such as, for example, Dual Academies (*Duale Hochschulen*), Academies of Public Administration and Management (*Verwaltungsfachochschulen*) and Universities of the Armed Forces (*Hochschule der Bundeswehr*). These programs usually combine an apprenticeship or employment with higher education and hence cannot unambiguously be treated as higher education.

[2] Note that these schools are, unlike the vocational schools described earlier, upper secondary schools which maintain the curriculum of general upper secondary schools with an additional focus on business, engineering/technology, health/care or agriculture/nutrition.

students can choose to take extra lessons and exams in math and languages to obtain a full or restricted entrance certificate. In addition to the 'traditional' and 'vocational' route to a higher education entrance certificate, it is possible to enter adult and evening education, which also results in a full or restricted entrance certificate. In exceptional cases, higher education can be entered without a formal entrance certificate—but this applies to a small group of approximately 3% of all students[3] (Dahm and Kerst 2013).

The Role of Vocational Training in Higher Education Trajectories

The German vocational training system is characterized by a relatively high degree of standardization and occupational specificity, which—in general—is associated with structured and smooth education-to-work-transitions (Allmendinger 1989; Shavit and Müller 2000). Vocational training in Germany therefore is highly attractive as a vocational qualification usually results in good employment opportunities in the skilled labor market as well as high chances of a direct entry into a stable position within the training company (Soskice 1994; Kerckhoff 2000; Wolbers 2007; Bol and Weeden 2015). For this reason an increasing proportion of general upper secondary education graduates, who already fulfil the entry requirements for higher education, choose vocational training instead of higher education (Büchel and Helberger 1995; Jacob 2004; Edeling and Pilz 2017). Moreover, an increasing number of vocational training graduates uses the opportunity to obtain higher education entrance certificates during or after vocational training (Schindler 2014; Buchholz and Pratter 2017). Currently, a quarter of all higher-education students have graduated from vocational training before entering higher education (Autorengruppe Bildungsberichterstattung 2014).

The heterogeneity of pathways into higher education and the resulting heterogeneity of the student population raised questions regarding the study progress and success of these non-traditional students. These questions have been addressed likewise in international and German research. We therefore give an overview in the subsequent sections.

Delays, Detours and Success in Higher Education

Anglo-American research generally refers to "non-traditional students", "mature students" or "delayed entries", meaning students who enter higher education after periods of labor market participation or inactivity. Some research suggests that a delay between secondary school and higher education may serve students to gain experiences and develop a clearer vocational orientation (Schneider and Stevenson 1999; Arnett 2004; Crawford and Cribb 2012). Others have found that delays are associated with higher motivation, higher goal commitment and better performance in college (Cantwell et al. 2001; McKenzie and Gow 2004; Birch and Miller 2007; Heath 2007; Martin 2010; Parker et al. 2015). Despite these positive outcomes, delayed entry is associated with an increased risk of leaving higher education without a degree (Hearn 1992; Bozick and DeLuca 2005; Milesi 2010;

[3] Admission of these "non-traditional" students in fact usually is based on vocational qualifications as well. Often a vocational training certificate plus work experience or specialists training is required and admission usually is restricted to related fields.

Goldrick-Rab and Han 2011; Attewell et al. 2012; Roksa and Velez 2012; Niu and Tienda 2013; Parker et al. 2015; Faulkner et al. 2016). Research using German samples is scarce, but most of the available studies[4] indeed indicate that delayed entrants show competence and performance levels that are comparable to those of traditional students, or even slightly better (Erdel 2010; Burchert and Müller 2012; Jürgens and Zinn 2012). Yet, when it comes to graduation rates, results suggest that dropout occurs more often among students with prior vocational training (Müller and Schneider 2013; Dahm and Kerst 2016; Heublein et al. 2017).

Comparing these results, it is striking that any type of delay seems to be associated with higher dropout rates, whereas there is no clear evidence that performance levels of delayed entries are below that of traditional students. This contradictory pattern in fact is similar in Germany and other countries and the following sections are dedicated to possible explanations of this observation.

Graduation as a Result of a Sequential Decision Process

As indicated in the introduction of this paper, previous research has examined study success from different perspectives and has used different definitions of dropout. Tinto (1975) proposed a distinction between system departure and institutional departure: the former denotes dropping out of higher education altogether without a degree, whereas the latter denotes quitting the initially chosen program, but remaining in higher education after transfer to another program. We draw on this distinction, but extend the underlying assumptions in a way that may be helpful to explain how students with vocational qualifications make decisions about continuing higher education. In a first step they would decide about whether or not to continue the initially chosen program. Many students who do not complete a course with a degree change the type of institution or choose another major, but remain in higher education. Transfers to alternative programs within higher education therefore occur frequently and lead to graduation with a certain likelihood (Brint and Karabel 1989; Dougherty and Kienzl 2006; Goldrick-Rab and Pfeffer 2009; Hovdhaugen 2009; Kalogrides and Grodsky 2011; Ishitani and Flood 2018). The actual rates of graduation or dropout hence are result of a sequential decision process, which may involve one (or even several) incomplete episodes of higher education.

The distinction between non-completion and dropout may be particularly relevant when we want to examine non-traditional students. The decision between re-enrolment and dropout probably is based on different considerations than the decision to quit the initial program (non-completion). Opportunity structures outside the higher education system may play a more important role here and students with prior vocational qualifications might have (or perceive) attractive occupational opportunities that draw them out of higher education. The following sections outline the underlying assumptions and implications.

Non-completion of the Initial Program

A vast number of studies has examined reasons and predictors of non-completion and dropout in higher education. It is beyond the scope of this paper to incorporate all approaches.

[4] Brändle and Lengfeld (2015, 2017) show contradicting results on a cohort of students (B.A. social economics) at the University of Hamburg.

We therefore focus on those that seem to be most helpful to explain differences between students with and without vocational qualifications.

Delayed entry often is associated with poor academic preparation and low high school GPA (Bozick and DeLuca 2005; Heather 2007; Roksa and Velez 2012). Moreover, these students often stem from lower socio-economic backgrounds and have to juggle education, family obligations and part time work at the same time (Roksa and Velez 2012). These are conditions which are very likely to hamper progression through higher education. Still, students in higher education have some flexibility in their schedule that allows them to study at their own pace (Triventi 2014). This can buffer the additional strain of family and work obligations. Moreover, students choose the type of institution and their major in higher education following their interests and preferences. We argue that especially students with vocational qualifications may be able to compensate adverse predispositions through their vocational experiences and a careful choice of their study program.

Indecision or goal uncertainty have been mentioned frequently as main drivers for non-completion (Pascarella and Terenzini 1991; Astin 1993; Tinto 1993; Hovdhaugen 2009; Gordon and Steele 2015). We assume that traditional students are more likely than those with vocational training to enter higher education without a clear vocational orientation or occupational goals. Super (1980) described the development of vocational (career) orientation as a continuous, explorative and sometimes iterative process, involving the collection of information, (re-)evaluation of the current plan as well as possible alternatives (see also Manski 1989). During this process, students clarify their vocational goals. For some students this process can be completed already at the end of high school, whereas for others the decision-making process lasts much longer. Against this background, transfer from vocational training to higher education may look like a radical change of career plans, which implies that the initial vocational choice was erratic. Prior research (Jacob 2004; Hammen 2011) on the contrary suggests that those who transfer to higher education after vocational training usually strive to gain deeper insight into their initial vocation and improve their career opportunities. This is supported by the observation that they often choose a closely related field of study (Jacob 2017). We therefore assume that students with vocational qualifications enter higher education with lower levels of goal uncertainty and indecision. Having a clearer goal should also result in a higher motivation to succeed (Eccles and Wigfield 2002). Especially, when the decision to enter higher education was taken with a perspective to be promoted to a degree-level job after graduation, the incentive to graduate probably is high.

In sum, students with vocational qualifications hence deal with restrictions that hamper progress and success in higher education, such as poorer academic preparation, family obligations and work. There are nevertheless reasons to expect that they are able to compensate these disadvantages to some degree through higher motivation, clearer goal orientation and vocational experience. We therefore expect that non-completion of the initially chosen program (institutional departure) does not occur more often among students with pre-tertiary vocational training than among traditional students (*H1*).

Decision After Initial Non-completion

Tinto (1975) points out that "a person will tend to withdraw from college when he perceives that an alternative form of investment of time, energies, and resources will yield greater benefits, relative to costs, over time than staying in college" (pp. 97–98).

In the above section, we derived that there is only little reason to assume that students with and without vocational qualifications differ in their decision to quit the initial program. However, a student who decides to quit the initial program has to choose between transfer and leaving higher education. In general, for students with pre-tertiary vocational qualifications, the incentives for re-enrolling to obtain another formal qualification should be lower than for students without such credentials, because they can enter the skilled labor market with the qualification they already hold. These students thus can achieve higher benefits in the labor market than students without vocational qualifications and face higher opportunity costs in case of re-enrolment. Students who have no formal qualification for the skilled labor market on the contrary, have a high risk of remaining unemployed, entering low- or un-skilled occupations, or instable career paths when they drop out (Scholten and Tieben 2017). For these students, the incentive to obtain a formal qualification and to remain in the educational system thus should be higher than for those who already hold a formal qualification. Moreover, the clearer vocational orientation discussed above leads us to the assumption that they generally are less inclined to change their major. Especially for students who have entered a program that draws on prior experiences, a change would mean that the benefits of these prior experiences decrease and the risk of failure increases. Students with vocational training therefore should be more likely to drop out rather than entering an alternative program after non-completion of the initially chosen program (*H2*).

Total Graduation Rate

Graduation from higher education hence is the result of a sequence of decisions and can involve multiple transfers within the higher education system. In a first step a student will decide—based on information gains after enrolment—whether to remain in the initial program and graduate. Yet, a student who does not graduate from the initial program has to choose between re-enrolment in another program or dropout. The (final) graduation rate therefore comprises direct graduations and graduations after transfer or re-enrolment. If the rate of re-enrolment is lower for students with vocational qualifications, we thus may observe a lower final graduation rate among these students, even when the rate of (initial) non-completion is not lower. By sequencing the decisions, we therefore can identify whether differences in the actual dropout rates can be explained by differences in the initial non-completion or by differences in re-enrolment. From the above considerations we cannot clearly derive an hypothesis regarding the final outcome of the decision sequence, as the final graduation is a result of two potentially counteracting mechanisms. We nevertheless propose that—taking the entire pathway through higher education together—students with vocational qualifications should be more likely to leave higher education without a degree than traditional students (*H3*).

Data and Methods

Data

Our analysis is based on data from the National Educational Panel Study (NEPS SC6, https://doi.org/10.5157/neps:sc6:7.0.0) (Blossfeld et al. 2011a). The data set provides detailed retrospective life history data with comprehensive information on the education and employment biography of each respondent as well as panel data on several subjects.

The main purpose of the data collection is to link individual educational trajectories with later life course outcomes, such as occupational careers, family transitions and life satisfaction. The design combined 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 was recorded in longitudinal format, containing the start and end dates of each episode, so that a chronological structure of different life course transitions could be obtained (Blossfeld et al. 2011b). The advantage of the retrospective life history data is that we obtain information about the complete educational careers of a large national sample. The survey hence covers a long observation period without the inevitable panel attrition which typically occurs in long-running prospective panels. The advantages for examining higher education dropout is that we can use information about destinations after non-completion and that we are able to identify transfers to different institutions or re-entries several years after non-completion (e.g. after episodes of family formation or labor market participation). A possible problem often mentioned with regard to retrospective data is recall bias, but in case of objectifiable facts, such as educational and occupational life courses, the bias proved to be negligible (Dex 1995).

The sample of NEPS SC6 comprises 11,932 respondents born in Germany between 1944 and 1986. Our final sample was restricted to students who were enrolled in higher education at least once in their life-course, which caused a sharp drop in sample size as only approximately one-third of all respondents have ever enrolled in higher education. Students from universities of cooperative education (*Berufsakademie*), business academies (*Wirtschaftsakademien*) and academies of public administration (*Verwaltungsakademien*) were excluded from the sample. These institutions offer "dual programs" which combine the higher education program with in-firm vocational training, so that these programs could not be clearly defined as full-time higher education. To ensure comparability of individual educational careers, we excluded all students who have studied abroad or who have obtained their higher education entrance certificate in the German Democratic Republic[5] (former East Germany). We also excluded respondents who were younger than 17 (N = 48) at the time of their first enrolment in higher education. The typical minimum age of obtaining a higher education entrance certificate is 19, so we could safely assume that the reporting (by respondents) or the recording (by interviewer) of this information was not reliable. Our final dataset contained 3751 cases.

Dependent Variables

In order to test our three hypotheses, we defined three dependent variables.

(1) A binary variable "successful graduation from initial program". This variable was coded 1 if the respondent reported a graduation from the first episode in higher education and 0 if the episode was terminated without graduation.

[5] 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 lead to a highly selected student population and low dropout rates. We do, however, include Eastern German citizens who entered higher education after the reunion.

(2) A binary variable "transfer to an alternative program". This variable was coded 1 if a second higher education episode was started after non-completion. These transfers comprise transfers to another field of study, type of institution[6] or type of degree.[7] The variable was coded 0 if the student decided to leave higher education. The sample used for these models comprised only the 961 individuals who did not graduate from the initial program.
(3) A binary variable for the "final graduation". Unlike the first dependent variable, this took the entire pathway through higher education into account. If the respondent reported a graduation from the first higher education episode or any later higher education episode, this variable was coded 1, it was coded 0 if the respondent did not reach graduation during the observation period.

Independent Variable

Our independent variable was "graduation from vocational training before higher education". This variable was coded 1 if a full qualification for the skilled labor market had been obtained before entering higher education, and 0 if not.

Control Variables

We controlled for a number of variables which are associated with the probability of entering higher education after vocational training. As it became increasingly popular across cohorts to enter higher education after vocational training (Tieben and Rohrbach-Schmidt 2014), we controlled birth cohorts as a categorical variable, each comprising 10 years. We controlled sex because men are somewhat more likely to enter higher education with a vocational training certificate (Stegmann and Kraft 1983). We controlled region of origin (West/East Germany and Non-German) as this is highly associated with labor market opportunities (Haas 2002; Kogan 2011) and hence with educational decisions. Students from highly educated family backgrounds are less likely to enter higher education via vocational training (Tieben and Rohrbach-Schmidt 2014), we therefore controlled education of the parents. The dummy variable was coded 1 when at least one parent has obtained higher education.

We tested if more fine-grained specifications of parental education delivered more information in the models—as they did not, we preferred this parsimonious solution. Age at entry into higher education is very highly correlated with pre-tertiary vocational training. In fact, vocational training inevitably increases the transition age by at least 2 years.[8] For this reason, we conducted careful checks of multicollinearity and robustness of all models that included age as a control variable. Variance inflation factors did not indicate that age should be excluded from the models and robustness checks suggested that our general

[6] Transfers of type of institution are all transfers between universities and universities of applied sciences.

[7] A transfer of type of degree without a change of field of study most typically occurs when students decide to enter teacher training in their field or when they started a teacher training and decide to transfer to a program that does not result in a teaching license.

[8] Note that the typical age of obtaining a traditional general Abitur is 19 for the birth cohorts in our sample. The typical age of obtaining a lower secondary leaving certificate is 16 years, whereas the typical duration of a vocational training course is 3 years. This is to illustrate that the group with pre-tertiary vocational training is not by definition older. The average transition age however, is approximately 4 years higher (without vocational training: 20.6; with vocational training: 24.7).

conclusion is reasonably robust against inclusion/exclusion of age. As different types of higher education entrance certificates are likely to reflect lower academic achievement (Köller and Trautwein 2003; Watermann et al. 2003; Trautwein and Lüdtke 2004), we controlled for full and restricted entrance certificates (restricted entrance certificates either allow only entering universities of applied sciences or only a specific field of study) and non-traditional entry pathways (which usually involve vocational training and labor market experience or an advanced vocational certificate). We also controlled for type of institution (universities and universities of applied sciences) and initial field of study. Table 1 shows an overview of the distributions. For Table 1, we also cross-tabulated the variables with each of the dependent variables to give an overview of the sub-samples used in each of the multivariate analyses. The bottom row of the table shows that in total 961 respondents did not graduate from the first higher education episode. Of these non-completers, 498 entered a second episode, whereas 463 dropped out after the first non-completion. Of the 498 re-entries, 396 reached graduation in the second (or later) episode. At the "end of the loop", 565 have not reached graduation, which means that in total 102 of the re-entries have failed to graduate in later episodes. Whereas the rate of first non-completion is around 26%, the final dropout rate is only 15%.

Analytic Approach

To test our hypotheses, we applied binary logistic regressions on the three dependent variables. In order to capture the sequential decision process, we started with the full sample (N = 3751) and modeled the probability of the initial program. We then conditioned on non-completion (N = 961) and modeled the choice between dropout and transfer. We considered alternative modeling strategies, such as multinomial logit and nested logit on graduation, transfer and dropout. The drawback of multinomial logit is that it treats non-completion as one of three alternatives, whereas non-completion strictly reduces the set of opportunities to two alternatives. Nested logit would in fact deliver comparable results as it indeed assumes a hierarchical decision tree. Nested logit has one advantage over our "sequential binary" strategy, namely that it is possible to include alternative-specific variables (e.g. if the cost or labor market benefits of each of the alternatives would be identified in the data). The data do not contain this type of information and suitable data which could be matched to our data are unavailable. Due to these data restrictions, we were not able to exploit the full advantages of nested logit models and hence decided to use the more parsimonious binary logit models.

On top of detailed information about the choices in each of the decision steps, we also were interested in the final outcome. We therefore examined, based on the full sample (N = 3751), if the student has ever graduated from higher education (in contrast to the first model which shows if the student has graduated from the initial program). As a certain proportion of the non-completers who re-entered, graduated in the later course of higher education, these had to be treated as graduates in this step. A comparison between the first and the third model thus can give insights if difference in graduation probabilities are due to differences in non-completion or due to differences in transfer.

Each of the three sets of models included the same independent and control variables and the same stepwise strategy: in a first step, we included only a dummy for pre-tertiary vocational training to gain an insight into the general patterns of the graduation and transfer patterns of students with vocational training certificates. The calculation of average marginal effects allowed us to express the logit coefficients as the difference between

Table 1 Distributions of variables

	Graduated from first higher education episode				Entered 2nd higher education episode after non-completion				Graduated from 2nd episode		Ever graduated from higher education				Total
	Yes		No		Yes		No		Yes		Yes		No		
	N	%[a]	N	%[a]	N	%[b]	N	%[b]	N	%[c]	N	%[a]	N	%[a]	N
Graduation from vocational training before HE															
No	1911	73.3	697	26.7	417	59.8	280	40.2	332	79.6	2243	86.0	365	14.0	2608
Yes	879	76.9	264	23.1	81	30.7	183	69.3	64	79.0	943	82.5	200	17.5	1143
Birth cohort															
1944–1954	555	81.6	125	18.4	64	51.2	61	48.8	50	78.1	605	89.0	75	11.0	680
1955–1964	855	72.3	327	27.7	150	45.9	177	54.1	114	76.0	969	82.0	213	18.0	1182
1965–1974	749	75.1	249	24.9	136	54.6	113	45.4	96	70.6	845	85.4	144	14.6	998
1975–1984	631	70.8	260	29.2	148	56.9	112	43.1	127	85.8	758	85.1	133	14.9	891
Sex															
Male	1587	74.3	548	25.7	291	53.1	257	46.9	229	78.7	1816	85.1	319	14.9	2135
Female	1203	74.4	413	25.6	207	50.1	206	49.9	167	80.7	1370	84.8	246	15.2	1616
Region of origin															
Western Germany	2502	74.7	848	25.3	436	51.4	412	48.6	348	79.8	2850	85.1	500	14.9	3350
Eastern Germany	179	71.0	73	29.0	39	53.4	34	46.6	32	82.1	211	83.7	41	16.3	252
Non-German	109	73.2	40	26.8	23	57.5	17	42.5	16	69.6	125	83.9	24	16.1	149
Education parents															
No parent HE	1829	74.9	613	25.1	280	45.7	333	54.3	220	78.6	2049	83.9	393	16.1	2442
At least one parent HE-graduate	961	73.4	348	26.6	218	62.6	130	37.4	176	80.7	1137	86.9	172	13.1	1309
Age at HE entrance															
17–20	1141	75.7	367	24.3	228	62.1	139	37.9	188	82.5	1329	88.1	179	11.9	1508
21–25	1416	73.9	501	26.1	248	49.5	253	50.5	198	79.8	1614	84.2	303	15.8	1917
26–30	154	70.0	66	30.0	16	24.2	50	75.8	8	50.0	162	73.6	58	26.4	220
31–35	39	70.9	16	29.1	6	37.5	10	62.5	2	33.3	41	74.5	14	25.5	55
36–40	23	74.2	8	25.8	0	0.0	8	100.0	-	-	23	74.2	8	25.8	31
40+	17	85.0	3	15.0	0	0.0	3	100.0	-	-	17	85.0	3	15.0	20

Table 1 (continued)

	Graduated from first higher education episode				Entered 2nd higher education episode after non-completion				Graduated from 2nd episode		Ever graduated from higher education				Total
	Yes		No		Yes		No		Yes		Yes		No		
	N	%[a]	N	%[a]	N	%[b]	N	%[b]	N	%[c]	N	%[a]	N	%[a]	N
Type of HE entrance certificate															
Full general entrance certificate	2099	72.9	780	27.1	441	56.5	339	43.5	355	80.5	2454	85.2	425	14.8	2879
Restricted entrance certificate	363	76.3	113	23.7	38	33.6	75	66.4	25	65.8	388	81.5	88	18.5	476
Non-traditional	328	82.8	68	17.2	19	27.9	49	72.1	16	84.2	344	86.9	52	13.1	396
Type of institution															
University of applied sciences	1043	82.7	218	17.3	70	32.1	148	67.9	52	74.3	1095	86.8	166	13.2	1261
University	1747	70.2	743	29.8	428	57.6	315	42.4	344	80.4	2091	84.0	399	16.0	2490
Field of study															
Education	478	79.7	122	20.3	66	54.1	56	45.9	55	83.3	533	88.8	67	11.2	600
Arts/Humanities	250	66.8	124	33.2	70	56.5	54	43.5	57	81.4	307	82.1	67	17.9	374
Social/Behav. Sc.	181	58.8	127	41.2	66	52.0	61	48.0	55	83.3	236	76.6	72	23.4	308
Business/Admin./Serv./Law	526	76.1	165	23.9	67	40.6	98	59.4	51	76.1	577	83.5	114	16.5	691
Nat. Sc./Maths/ICT	315	66.5	159	33.5	100	62.9	59	37.1	77	77.0	392	82.7	82	17.3	474
Engin./Manuf./Const.	675	77.1	201	22.9	98	48.8	103	51.2	77	78.6	752	85.8	124	14.2	876
Life Sc.	364	85.2	63	14.8	31	49.2	32	50.8	25	80.6	389	90.9	39	9.1	428
Total	2790	74.4	961	25.6	498	51.8	463	48.2	396	79.5	3186	84.9	565	15.1	3751

Data: NEPS, Starting cohort 6, data release 7-0-0, own calculations

[a]Based on full sample (N = 3751)

[b]Based on subsample of non-completers (N = 961)

[c]Based on subsample of re-entrants (N = 498)

the groups as a difference in percentage points, compared to the reference category, and ensured the comparability of coefficients (Mood 2010; Williams 2012). In a second step we added socio-demographic variables to the models in order to eliminate spurious effects that are related to birth cohort, sex, age, region of origin and age at entry to higher education. In a third step, we added characteristics of the educational pathway (type of higher education entrance certificate) and the chosen program (type of institution and field of study) in order to reduce spurious effects due to self-selection into specific programs.

Results

Composition of the Student Populations

Table 2 shows the distributions of all variables, including a comparison between students with and without vocational qualifications. We did not find significant group differences regarding date and region of birth, but the group differences for all other variables are large and significant. Students with vocational qualifications are more likely to be male and to have parents who have no higher education degree. It is not surprising that they are older, because obtaining a vocational qualification naturally takes 2–3 years in the vocational training system and many decide to enter higher education after additional periods of employment. As vocational training in many cases does not result in a full entrance certificate for higher education, they are also less likely to hold a full general entrance certificate. Because universities of applied sciences historically were designed to accommodate students from vocational training, the group differences regarding the type of institution are particularly large—whereas research universities also accommodate a considerable proportion of the students with vocational qualifications. Regarding the field of study, we observed that students with vocational qualifications are more likely to enter business studies and engineering in contrast to education studies. This probably is due to the fact that business and technically oriented vocational training provides good opportunities and high incentives for graduates to move to a higher education entrance certificate and into higher education.

Selection into Detours

We acknowledge that this overview provokes questions about selectivity issues. It is, however, not wise to tackle this selectivity with the available two-stage methods, such as propensity score matching or Heckman correction. Selection takes place at different stages of the educational career. First, students are channeled into secondary school tracks at the age of 10–12 years in Germany and some of these tracks prevent the (direct) acquisition of a higher education entrance certificate. The main selection criterion for the assignment of secondary school tracks is prior achievement, but students can deviate from the prescribed pathway later in life and possibly catch up during their detour (or the detour was taken because the student did catch up). Second, age at entry into higher education is a direct consequence of the training and employment episodes and is highly correlated with living conditions that are likely to have an influence on progress and success in higher education. Treating age as a criterion that causes self-selection into vocational training hence would be highly problematic, while ignoring age as a by-product of vocational training would result in an overestimation of treatment/training effects. Third, the vocational pathway to

Table 2 Student population and composition of groups

	Student has obtained a vocational qualification before HE				Total		Difference between groups	
	No		Yes					χ^2
	N	%(col)	N	%(col)	N	%(col)	dyx%	p (diff ≠0)*
Birth cohort								0.220
1944–1954	455	17.5	225	19.7	680	18.1	−2.2	
1955–1964	849	32.6	333	29.1	1182	31.5	3.4	
1965–1974	657	25.2	341	29.8	998	26.6	−4.6	
1975–1984	647	24.8	244	21.4	891	23.8	3.5	
Sex								0.000
Male	1411	54.1	724	63.3	2135	56.9	−9.2	
Female	1197	45.9	419	36.7	1616	43.1	9.2	
Region of birth								0.731
West Gemany	2333	89.5	1017	89.0	3350	89.3	0.5	
East Germany	172	6.6	80	7.0	252	6.7	−0.4	
Non-German	103	4.0	46	4.0	149	4.0	−0.1	
Education parents								0.000
No parent HE	1547	59.3	895	78.3	2442	65.1	−19.0	
At least one parent HE	1061	40.7	248	21.7	1309	34.9	19.0	
Age at HE entry								0.000
17–20	1412	54.1	96	8.4	1508	40.2	45.7	
21–25	1157	44.4	760	66.5	1917	51.1	−22.1	
26–30	28	1.1	192	16.8	220	5.9	−15.7	
31–35	5	0.2	50	4.4	55	1.5	−4.2	
35–40	2	0.1	29	2.5	31	0.8	−2.5	
40+	4	0.2	16	1.4	20	0.5	−1.3	
Type of HE entrance certificate								0.000
Full general entrance certificate	2407	92.3	472	41.3	2879	76.8	51.0	
Restricted entrance certificate	177	6.8	299	26.2	476	12.7	−19.4	
Non-traditional	24	0.9	372	32.6	396	10.6	−31.6	
Type of institution								0.000
University of applied sciences	540	20.7	721	63.1	1261	33.6	−42.4	
Research university	2068	79.3	422	36.9	2490	66.4	42.4	
Field of study								0.000
Education	519	19.9	81	7.1	600	16.0	12.8	
Arts/Humanities	323	12.4	51	4.5	374	10.0	7.9	
Social/Behav. Sc.	212	8.1	96	8.4	308	8.2	−0.3	
Business/Admin./Serv./Law	402	15.4	289	25.3	691	18.4	−9.9	
Nat. Sc./Maths/ICT	391	15.0	83	7.3	474	12.6	7.7	
Engin./Manuf./Const.	471	18.1	405	35.4	876	23.4	−17.4	
Life Sc.	290	11.1	138	12.1	428	11.4	−1.0	
Total (% row)	2608	(69.5)	1143	(30.5)	3751	(100.0)		

Data: NEPS, Starting cohort 6, data release 7-0-0, own calculations

*Bonferroni adjusted p-values

a higher education entrance certificate restricts options as well as preferences and channels most students into particular institutions and fields of study (e.g. an electrician probably would consider electrical engineering in a university of applied sciences, but not philosophy at a research university). The achievement-based selectivity hence is conceptually distinct from the resulting path-dependency. Moreover, we have to consider that the path-dependency leads to individual choices that are potentially compensating general ability deficits. A field of study that matches previously obtained vocational skills, would lead to a better fit between domain-specific individual skills and institutional requirements and by itself reduce the risk of failure. Propensity score matching would enable us to tackle the "selection into the treatment" (where vocational training is the treatment), but not solve the remaining problem that the treatment comes along with side-effects (e.g. aging and changing living conditions) and that the "treated" are subject to specific institutional environments that influence decisions and behaviors on their own. For these reasons we decided to remain on a more descriptive level and tried to capture these issues by controlling individual and institutional characteristics in a regression.

Non-completion of the Initial Program

Table 3 shows the results of the first logistic regression. The dependent variable is successful graduation of the initially chosen program. In model 1a, we inserted only a binary variable indicating if the student has graduated from a full vocational training program before entering higher education. The average marginal effect is positive and significant. This indicates that vocational training is associated with an increase of 3.6 percentage points in graduation probability. In order to rule out that this is driven by personal characteristics, we controlled for birth cohort, sex, region of origin, parental background and age at higher education entrance in model 1b. We observed that the association between vocational training and non-completion is somewhat more pronounced under control of these variables. Respondents who were born in a younger birth cohort or have entered at a higher age have an increased risk of non-completion, whereas sex, region of origin and family background do not seem to be associated with the risk of non-completion. In model 1c we controlled for the type of the higher education entrance certificate, type of institution and field of study. The coefficient for pre-tertiary vocational training in model 1c is small and not significant. This indicates that the lower risk of non-completion for this group, as observed in model 1a, is primarily driven by favorable educational choices (in terms of type of institution and field of study).

Decision After Initial Non-completion

In a second step, we ran the same set of models on those 961 respondents who did not complete their initially chosen program and examined their probability of transfering to another program (instead of dropping out). In model 2a, we observed that non-completers with a pre-tertiary vocational credential have a by 29 percentage points reduced transfer probability (Table 4). Again, we tested to which extent this can be attributed to socio-demographic characteristics and prior educational choices. Our results indicate that the association between pre-tertiary vocational training and transfer is partly, but not entirely mediated by individual characteristics (model 2b). However, in model 2c we still found a considerable reduction of the transfer probability (to 12 percentage points) for students who have a pre-tertiary vocational certificate. The coefficients of the controls show that

Table 3 Logistic regression. Dependent variable: successful graduation from initial program (Yes = 1). Average marginal effects

	Model 1a: only vocational training		Model 1b: 1a + individual characteristics		Model 1c: 1b + institutional characteristics	
	AME	SE	AME	SE	AME	SE
Graduation from vocational training before HE						
No (Ref.)						
Yes	0.036	0.015*	0.062	0.017***	0.011	0.021
Birth cohort						
1944–1954 (Ref.)						
1955–1964			−0.090	0.020***	−0.072	0.020***
1965–1974			−0.062	0.021**	−0.048	0.021*
1975–1984			−0.099	0.023***	−0.091	0.023***
Sex						
Male (Ref.)						
Female			0.003	0.015	−0.014	0.016
Region of origin						
Western Germany (Ref.)						
Eastern Germany			−0.020	0.031	−0.027	0.030
Non-German			−0.014	0.037	−0.001	0.036
Education parents						
No parent HE (Ref.)						
At least one parent HE-graduate			−0.003	0.016	0.010	0.015
Age at HE entrance						
17–20 (Ref.)						
21–25			−0.034	0.016*	−0.033	0.016
26–30			−0.114	0.038**	−0.119	0.038**
30+			−0.074	0.051	−0.081	0.052
Type of HE entrance certificate						
Full general entrance certificate (Ref.)						
Restricted entrance certificate					−0.056	0.028*
Non-traditional					0.030	0.029
Type of institution						
University of applied sciences (Ref.)						
University					−0.131	0.018***
Field of study						
Education (Ref.)						
Arts/Humanities					−0.114	0.028***
Social/Behavioural Sciences					−0.171	0.031***
Business/Administration/Services/Law					−0.059	0.023*
Natural Sciences/Maths/ICT					−0.127	0.027***
Engineering/Manufacturing/Construction					−0.075	0.025**
Life sciences					0.042	0.023
N	3751		3751		3751	
Log likelihood	−2132.44		−2111.61		−2034.74	
Chi^2	5.61		47.28		201.03	
AIC	4268.89		4251.22		4115.47	

Data: NEPS, starting cohort 6, data release 7-0-0, own calculations

* p > 0.05; **p > 0.01; ***p > 0.001

Table 4 Logistic regression. Dependent variable: entered second HE episode (Yes = 1), conditional on prior non-completion. Average marginal effects

	Model 2a: only vocational training		Model 2b: 2a + individual characteristics		Model 2c: 2b + institutional characteristics	
	AME	SE	AME	SE	AME	SE
Graduation from vocational training before HE						
No (Ref.)						
Yes	−0.291	0.034***	−0.203	0.041***	−0.113	0.047*
Birth cohort						
1944–1954 (Ref.)						
1955–1964			−0.068	0.051	−0.075	0.050
1965–1974			0.019	0.053	0.018	0.053
1975–1984			0.016	0.054	0.023	0.054
Sex						
Male (Ref.)						
Female			−0.076	0.032*	−0.078	0.034*
Region of origin						
Western Germany (Ref.)						
Eastern Germany			−0.102	0.061	−0.092	0.061
Non-German			0.066	0.075	0.063	0.075
Education parents						
No parent HE (Ref.)						
At least one parent HE-graduate			0.120	0.033***	0.106	0.033**
Age at HE entrance						
17–20 (Ref.)						
21–25			−0.093	0.037*	−0.095	0.037**
26–30			−0.224	0.076**	−0.245	0.074***
30+			−0.232	0.110	−0.265	0.107
Type of HE entrance certificate						
Full general entrance certificate (Ref.)						
Restricted entrance certificate					−0.013	0.060
Non-traditional					−0.044	0.076
Type of institution						
University of applied sciences (Ref.)						
University					0.212	0.049***
Field of study						
Education (Ref.)						
Arts/Humanities					−0.014	0.059
Social/Behavioural Sciences					−0.004	0.059
Business/Administration/Services/Law					−0.089	0.056
Natural Sciences/Maths/ICT					0.035	0.058
Engineering/Manufacturing/Construction					0.064	0.059
Life Sciences					0.043	0.073
N	961		961		961	
Log likelihood	−628.58		−611.29		−595.3	
Chi^2	59.07		93.66		125.63	
AIC	1261.17		1246.57		1232.61	

Data: NEPS, Starting cohort 6, data release 7-0-0, own calculations

*p > 0.05; **p > 0.01; ***p > 0.001

Table 5 Logistic regression. Dependent variable: ever graduated from higher education (Yes = 1). Average marginal effects

	Model 3a: only vocational training		Model 3b: 3a + individual characteristics		Model 3c: 3b + institutional characteristics	
	AME	SE	AME	SE	AME	SE
Graduation from vocational training before HE						
No (Ref.)						
Yes	−0.035	0.013**	0.009	0.014	−0.006	0.017
Birth cohort						
1944–1954 (Ref.)						
1955–1964			−0.068	0.017***	−0.058	0.017***
1965–1974			−0.030	0.017	−0.021	0.017
1975–1984			−0.035	0.018*	−0.029	0.019
Sex						
Male (Ref.)						
Female			−0.014	0.012	−0.023	0.013
Region of origin						
Western Germany (Ref.)						
Eastern Germany			−0.036	0.028	−0.039	0.028
Non-German			−0.014	0.031	−0.009	0.030
Education parents						
No parent HE (Ref.)						
At least one parent HE-graduate			0.023	0.013	0.026	0.013
Age at HE entrance						
17–20 (Ref.)			−0.045	0.013***	−0.044	0.013***
21–25			−0.151	0.035***	−0.160	0.035***
26–30			−0.120	0.045*	−0.135	0.048**
30+			−0.045	0.013***	−0.044	0.013***
Type of HE entrance certificate						
Full general entrance certificate (Ref.)						
Restricted entrance certificate					−0.056	0.024*
Non-traditional					0.021	0.022
Type of institution						
University of applied sciences (Ref.)						
University					−0.053	0.015***
Field of study						
Education (Ref.)						
Arts/Humanities					−0.065	0.023**
Social/Behavioural Sciences					−0.090	0.025***
Business/Administration/Services/Law					−0.055	0.020**
Natural Sciences/Maths/ICT					−0.068	0.022**
Engineering/Manufacturing/Construction					−0.039	0.020
Life Sciences					0.027	0.019
N	3751		3751		3751	
Log likelihood	−1583.92		−1556.57		−1526.75	
Chi^2	7.68		62.38		122.02	
AIC	3171.84		3141.14		3099.5	

Data: NEPS, Starting cohort 6, data release 7-0-0, own calculations

*p > 0.05; **p > 0.01; ***p > 0.001

men and students from highly educated family backgrounds have a higher probability of transfering than the respective reference groups. The transfer probability decreases with age at entry and is 21 percentage points higher for university non-completers than for non-completers from universities of applied sciences.

Total Graduation Rate

We repeated the procedure with the full sample and with final graduation as dependent variable (see Table 5 for results). Model 3a shows that students with pre-tertiary vocational training have a 3.5 percentage points lower probability of graduating (taking all higher education episodes into account). However, when we controlled for socio-demographic characteristics of the students (model 3b), this difference collapsed to 0.9 percentage points and insignificance. Controlling for type of entrance certificate, type of institution and field of study (model 3c) reduced the strength of the association further to a small non-significant negative value.

Discussion

In this paper we aimed to shed light on the relationship between pre-tertiary vocational qualifications and pathways through the higher education system in Germany. We decomposed the decision process into non-completion of the initial program and the subsequent decision between transfer and dropout. The core puzzle we aimed to solve with this strategy was that previous research often reported higher rates of dropout among students with pre-tertiary vocational training, but at the same time there were no clear indications of performance deficits within this group which might explain higher dropout rates. Moreover, unlike in the Anglo-American educational system, "delayed entries" in Germany are more likely to come along with vocational skills that can be beneficial in higher education. We suggested an alternative theoretical explanation, namely that students who decided to quit the initial program, are more likely to leave higher education altogether when they already have a full qualification for the skilled labor market (due to higher opportunity costs). Traditional students on the contrary, would face a high risk of unemployment or atypical employment when they enter the labor market without graduation. Vocational qualifications hence may come with a paradoxical "double buffer" effect: On the one hand, it decreases insecurities regarding occupational goals and risk of failure, which should be beneficial in higher education. On the other hand, in case of non-completion, it diverts students to alternatives outside higher education and increases the risk of dropout.

Non-completion of the Initial Program

We tested hypotheses 1 (non-completion of the initially chosen program does not occur more often among students with pre-tertiary vocational training than among traditional students) using logistic regressions. The first (empty) model revealed that students with pre-tertiary vocational training even have a slightly higher probability of graduating from the initial program. The full models, including all control variables, showed that this association is mainly driven by self-selection into particular programs. We therefore confirm

hypothesis 1. The results indicate that students with vocational qualifications prefer specific types of institutions and fields in higher education, but at this point it has to remain speculative if fields that are congruent with the prior vocation generate these advantages. Moreover, universities of applied sciences, which traditionally accommodate the bulk of the students with vocational qualifications, possibly bear organizational structures that support the academic and social integration of these students. The inclusion of organizational attributes, as proposed by Berger and Braxton (1998), thus may be a promising avenue for further research.

Decision after Non-completion

Hypotheses 2 (students with vocational training should be more likely to drop out rather than entering an alternative program after non-completion of the initially chosen program) was tested in a similar fashion. In these models a considerable association between pre-tertiary vocational training and transfer remained even after controlling socio-demographic and institutional characteristics. These results suggest that students with full qualifications for the skilled labor market have lower incentives to remain in higher education (when the initial program was not completed with a degree). We confirm hypotheses 2. Again, this result gives ample room for speculations about the actual reasons for this observation. While it is plausible at first glance to assume that non-completers with vocational qualifications return to their prior job, the question remains if they indeed do. Future research hence should be dedicated to examine the destinations of non-completers.

Total Graduation Rate

Regarding hypothesis 3 (students with vocational qualifications should be more likely to leave higher education without a degree than traditional students), we generally replicated the findings of other researchers in our empty model and showed that students with pre-tertiary vocational training indeed have a higher dropout-probability. Against the background of the bivariate models we hence confirm hypothesis 3. However, taking the individual and institutional characteristics into account, the difference decreases to a non-significant level. This result indicates that vocational qualifications are not the main driver for the higher dropout rates among this group, but rather attributes that are associated with vocational qualifications.

Strengths, Limitations and Future Research

Although we cannot derive any conclusions regarding causalities, the results show impressively that it may be misleading to focus exclusively on the final graduation rate in the attempt to identify correlates and predictors of higher education dropout, or even to explain higher education dropout. We outlined above that the decision to quit the initial program and the choice of a subsequent destination probably are driven by different mechanisms. Whereas the decision to quit the initial program seems to be primarily associated with institutional attributes, the decision to re-enter is more closely linked to socio-demographic characteristics and prior pathways. Against this background we suggest that dropout decisions should be treated as a sequence of decisions between available options—rather than a simple "stay-or-leave" decision. Our results also suggest that the dominant narrative of

delayed entries being a "risk group" may not hold universally. The higher dropout rates of these students do not necessarily indicate that they are less successful academically, but rather that they have more alternatives outside higher education and less reasons to change their major once the initial program turned out to be disappointing.

Further research is needed to shed more light on our results: at first glance, it may seem plausible that students with vocational qualifications have lower incentives to graduate as they easily can return to their previous job. It nevertheless seems worthwhile to have a closer look at the actual decision sequences, because that same group of students must have had a good reason to quit their previous job for higher education. As outlined above, Super (1980) and Manski (1989) regard educational decisions as rational choices under uncertainty, which would explain why many educational decisions are corrected later on. Especially in the German post-secondary education system, the options are multifaceted and variable, so that we indeed must assume a continuous rather than a one-time evaluation of costs (required effort), benefits and success probability throughout the individual educational career. We acknowledge that a lot more work is necessary to explore the actual processes: Our paper for example had to spare the question in which way students profit from their vocational skills and from a "general maturation" that comes along with a higher age at entering higher education. Although we do not find pronounced group-differences in initial non-completion, it is unclear if students with vocational certificates differ in their academic preparation and integration, their social integration or reasons for non-completion. Besides, it would be worthwhile to clarify the process behind the decision to drop out versus transfer. There is more than one theoretical framework to explain this: Rational choice theory would suggest that a vocational qualification changes the opportunity structure (as outlined in the theory section of this paper). An alternative explanation would be that vocational training leads to a more stable occupational orientation and occupational goals. This may hamper flexibility in a way that students with pre-tertiary vocational training are less prone to experiment with alternative majors when the initial program turns out to be disappointing.

Acknowledgements This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort 6—Adults (Adult Education and Lifelong Learning), https://doi.org/10.5157/neps:sc6:7.0.0. The NEPS data collection is part of the Framework Programme for the Promotion of Empirical Educational Research, funded by the German Federal Ministry of Education and Research and supported by the Federal States. The work on this paper has been generously funded by the German Science Foundation within the Priority Programme 1646 "Education as a lifelong process".

Funding The funding was provided by Deutsche Forschungsgemeinschaft (German Science Foundation, Grant No. TI 766/1-1).

Compliance with Ethical Standards

Competing interests The authors declare that they have no competing interests.

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