Paper 19: Characteristics of double qualifying students – The transition of high school graduates into higher education after vocational training using the NEPS

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Abstract
Educational choices reproduce social inequalities. The proportion of those in a birth cohort who obtain the „Abitur"(A-Level) is constantly rising. At the same time, a larger proportion of them opts for vocational training and some also subsequently for university studies (additive double qualification). Although there is already research investigating the reasons for completing a double qualification, there are limitations: To counter geographical constraints, the presented replication study uses data from the National Educational Panel Study (NEPS) to investigate the transition into university education after completing VET with similar constructs (N = 310). Significant differences are found regarding age, gender, migration background, and cultural proximity. Supplementary analyses, using logistic regression models and FAMD, indicate the influence of cultural affection, even when controlling for socio-demographic factors.

1 Introduction

Numerous studies have shown that, in addition to parental educational attainment (Ditton et al., 2005; Wissenschaftlicher Beirat für Familienfragen, 2002), other sociodemographic factors, above all migration experience and family composition, have a relevant influence on individual educational success (Bremer, 2021; Solga & Dombrowski, 2009). Even though individual decisions are based on diverse rationales and path dependencies, one general trend can be identified: Academization (Elsholz et al., 2018; Weiß, 2019). It is important to note that academization in Germany is a special case in global comparison (Wiekert & Sackmann, 2010) because just above half of a birth cohort finishes secondary education with their A-Level, and the proportion of those who do not take up a course of study within 4 years after graduation is relatively high (14%), in global comparison (Statistisches Bundesamt (Destatis), 2018). The dual vocational training system is a special feature of the German education system and an attractive alternative to a study program.

Some of those who have completed dual training do not subsequently end their educational path but afterward take up a course of study, which is also referred to as additive double qualification (Becker & Hecken, 2008; Edeling, 2016; Spangenberg et al., 2017). In this context, where traditional educational pathways are shaken, remaining in these "institutions of education" that stand between general education and work are set in two ways: Their position in an individual's life course as well as the order and opportunities that are generally chosen, what makes them path-dependent (Hillmert, 2014; Kutscha, 1991; Mertens, 1976). Especially the latter applies in the case of additive double qualification. An investigation of this departure from non-traditional paths in

educational decisions can be relevant here in order to make these opportunities more flexible in terms of educational policy, to make them possible, and to establish solutions for companies and trainees to pursue them together. This is the focus of the present study, which aims to identify sociodemographic factors influencing the intention to complete such a path in the final step which means the transition from VET towards university. Our study hereby fulfills three purposes: Firstly, it serves to verify previous findings on sociodemographic characteristics (cf. Pilz et al., 2020); secondly, it enriches the state of research by expanding the spatial focus countrywide on Germany and does not preselect occupations and thirdly, it includes causal analytical models for a deeper examination.

Therefore, the article is structured as follows: First we provide an overview of dual qualifications from an educational research point of view. Then we focus on previous research findings, paying particular attention to aspects of social inequality and relevant educational factors. Subsequently, replication studies are focused on. Afterward, the data and methods are laid out and critically classified. Thereupon, the results are presented. The article concludes with its discussion, an implied conclusion, and finally points out its limitations.

2 State of research and theoretical framing

The number of students leaving general education with a higher education entrance certificate has been rising for years. Currently, 40 % of a birth cohort acquire this certificate by the age of 21 (Datenportal BMBF, 2021). Vocational training also appears to be becoming increasingly attractive for those with a higher education entrance certificate, as the proportion of those who already have this qualification before starting their training has been increasing for years and was one quarter (24%) for the first time in 2012 (Edeling 2016); the current share among those starting a dual training is 29.3% (BIBB, 2021). In recent years, more and more training graduates have taken up a subsequent course of study. This educational path will gain importance in the coming years. Already in 2012, the share of so-called double-qualifiers among first-year students was 22% (Datenportal BMBF, 2014b).

Social differentiation and educational transitions

Educational transitions are a central component of the life course and individuals' education. They set the course for individual learning experiences at relevant decision points, which in turn result in life realities (Bosse & Kempf, 2013). Just as in the German education system as a whole, structures of social inequality are reproduced intergenerationally, especially at the interfaces and transitions, whether at the transition into primary, between primary and secondary school (where parental action has been identified as a relevant factor) or after the acquisition of the first general education degree (Becker & Hecken, 2008; Becker & Schubert, 2006; Ditton et al., 2005; Schindler, 2015; Solga & Dombrowski, 2009; Wissenschaftlicher Beirat für Familienfragen, 2002). Especially the internationally comparative PISA study views the German educational system among those where individual educational success depends the most on familiar decadence (Klemm, 2014; van Ackeren & Klemm, 2019). In this context, educational transitions are not arbitrary, are difficult to revise, and usually cannot be shifted in time (or only to an extremely limited extent), which makes them highly relevant for individuals at a specific point in time (Kutscha, 1991). According to Mertens (1976), the so-called "site of education" stands between general education and working life. While this is an institutionalized term for him, it is not to be understood as an exact realization. It is therefore not clear whether this means one or several

different training institutions for the individual. In its institutionalized form, this can have various meanings: dual training, school-based training, university or university of applied sciences are among the best known. Following Edeling (2016), the non-examination of these educational institutions must be tackled here, since circularities and "internal transitions" (within the educational path between secondary school and the workplace) do also count in the context of double qualification. In order to reach this internal transition, it is first necessary to follow the specific educational path from high school graduation to training, which is being followed by more and more young people.

Double qualification as a specific educational pathway

In the following, the internal transition of the additive double qualification, which describes the two qualification phases of (in-company) vocational training and (specialized) university studies separated from each other in terms of time and content, will be discussed in more detail. Of particular interest, here is the time-stretched form of additive dual qualification, which is characterized above all by the fact that it not only combines two qualifications (e.g., vocational training and entrance qualification for a university of applied sciences). It supplements a curriculum in terms of content, but not in terms of time, in order to combine two degrees (e.g., dual study program). In the form considered here, both degrees are acquired one after the other and (usually) institutionally independently of each other (Buchmann, 2021; Edeling, 2016; Jacob et al., 2013).

Focussing on research on occupational choice, we can identify various reasons for the additive double qualification, following different connecting factors: Explanatory approaches range from training as a self-insuring, risk-minimizing "downward protection" in the case that students might not pass their studies (insurance strategy), to training as a way to earn money directly and more easily finance subsequent studies (economic aspects). As education is generally free in Germany, state universities do not charge tuition fees. Therefore, the costs of education might be relatively low, especially compared to North-American countries. Nevertheless, many students must finance their living themselves, especially if they are not eligible for state funding (BAFöG). A third possible reason for an additive double qualification is the (expected) easier career entry after graduation compared to graduates without previous vocational training. Social determinants, which include the parental home, the social environment, but also individual class affiliation, also play an important role here (Bellmann et al., 2008; Büchel & Helberger, 1995; Edeling, 2016; Jacob et al., 2013; Lewin et al., 1996).

The first thing to note here is that academic performance appears to be a significant predictor. Since a course of study can only be considered successful if it is completed, future students must have the confidence to master it. Previous formal performance, i.e., school performance or final grades, are often used as an indicator of this likelihood (Spangenberg et al., 2017). A lower level of parental education makes it less likely that students will take up their studies after completing their education. A possible explanation is the lack of a role model and the self-perceived lack of soft skills to master university (Becker & Hecken, 2008). One aspect that can serve as a bridge toward university, particularly in the context of additive double qualification, is a possible proximity of the content of studies and the completed training (Bellmann et al., 2008). Halbig's (1990) findings point in a similar direction, showing striking differences between individual occupations regarding the decision of their graduates in favor of a double qualification. A study

by the German Centre for Higher Education Research and Science among first-year students also revealed comparable results (Datenportal BMBF, 2014b). Edeling (2016) shows that the desire to study at a (technical) university after completing training is less pronounced among skilled trades occupations than among businesspeople. In addition, gender-related differences can be found, but there is no consensus on possible causes (Halbig, 1990; Jacob, 2004; Jacob et al., 2013).

Replication studies in educational research

In general, replication studies serve to question and verify the verifiability that scientific knowledge strives for in its most direct way (Fecher et al., 2017; Perry et al., 2022; Rost & Bienefeld, 2019). They are not new to educational research either; for example, the past decade has been called the "decade of replication research" (Perry et al., 2022). Serving different purposes, replication studies fall into three categories: direct, approximate, and conceptual, with a decreasing orientation alongside the initial study toward the latter (Erdfelder & Ulrich, 2018; Perry et al., 2022). The study presented here can be classified as approximate/conceptual, as it combines characteristics of both types.

Following a study by Pilz et al. (2020), this article explores the question of why apprentices with a high school diploma continue to study after the end of their dual training. The authors use data collected for this purpose from four training occupations in North Rhine-Westphalia (cf. also Edeling 2016) to investigate which factors are decisive in the decision to take up a course of study after completing an apprenticeship. Limitations of this study are the restriction to one federal state and to only four training occupations. To address these major limitations, educational data from the National Educational Panel Study (NEPS-Netzwerk, 2021) is used in this replication study.

3 Data and Methods

For the present study, data of the starting cohort 4 (grade 9) of the NEPS is used; the first survey wave took place in 2010 (Blossfeld & Roßbach, 2019). The following variables were chosen, analogous to (Pilz et al., 2020): Age (calculated from birthday and time of survey wave), intended (feasible) degree, application to a university, attendance to high cultural events (divided into Museum / Art Exhibition, Opera / Ballet / Classical Concert or Theatre in the last year), gender, number of siblings, migration background, highest educational attainment of the respondent's parent and his:her:their partner (hereafter both referred to as "parents"), and grade in education.

The main reason for the replication with the given dataset is to overcome two of the main shortcomings, which Pilz et al. (2020) point out themselves: Their study took place in only one German state (North Rhine-Westphalia) and only among trainees of four specific apprenticeship occupations (optician, bank clerk, office clerk, and mechatronics technician). Congruent with the literature already pointed out, these occupations might be specific regarding visiting university after completing VET (BIBB, 2021), and since there is, for example, an already established educational pathway for trained bank clerks and office clerks in higher education in the form of business studies, which might facilitate their decision towards studying at a university (Bellmann et al., 2008). Both points of criticism of the initial study are addressed in the present study by working with a data set that is representative of Germany, the NEPS. Here, a two-stage sample of all 9th grade general education students in Germany was drawn in 2010 (Blossfeld & Roßbach, 2019). Accordingly, both data collections took place at comparable points in time.

In order to consider possible competing effects, the following section supplements the replicated

analyses using nested logistic regression models with the variables identified as significant ($p < 0.1$) in the bivariate analyses (t or Chi^2 tests) (regressors) and the university application (regressand). Logistic regression is a multivariate analysis procedure used when the dependent variable is dichotomous, i.e., can take two possible values. Usually, it is used when binary decisions (Best & Wolf, 2010; Wooldridge, 2014), in this case applying to a university, are investigated. Based on numerous pieces of literature (Becker & Schubert, 2006; Ditton et al., 2005; Kutscha, 1991; Schindler, 2015; Solga & Dombrowski, 2009; Wiekert & Sackmann, 2010; Wissenschaftlicher Beirat für Familienfragen, 2002) suggesting this, both parental educational qualifications, although only one being significant ($p < 0.1$) in the chi-square test were included, via the selection of their highest graduation.

Two variables were dichotomized before the logistic regression analysis: migration background was dichotomized (no migration background vs. migration background) and the different measures of participation in high cultural events (see above). All these category groupings were necessary to meaningfully estimate effects due to the limited number of cases in each expression in the variables under consideration.

The analysis is conducted stepwise: First, we restrict ourselves to the control variables (model 1), before adding the degree sought (educational aspiration) (model 2). The full model (model 3) then incorporates the three measures of high culture (Museum / Art Exhibition, Opera / Ballet / Classical Concert, or Theatre attendance in the last year). All three models are described individually and finally compared. Additionally, to the logistic regression, a further step is taken toward the in-depth analysis of the relationship between individual characteristics and application at a university after completion of a VET. This step is a factor analysis of mixed data (FAMD), which facilitates the analysis of a dataset in which the variables are of different levels, and allows to plot their proximity, regarding, in this case, two dimensions (Husson et al., 2010; Pagès, 2004).

4 Results

Univariate Results

This section presents the characteristics of the variables under consideration univariately to provide a first overview regarding the used metric data basis.

Table 1: Univariate analysis – metric variables (own representation)

Variable	Number	Mean	Std. Dev.	Minimum	25 %	75 %	Maximum
Number of siblings	142	2.634	1.707	1	2	3	10
Grade in training	237	2.001	0.541	1	1.7	2.3	3
Age	307	20.336	1.097	19	20	21	25

The above table (Table 1) presents the univariate metric measures of the dataset processed for the bivariate comparisons.

Table 2 illustrates the univariate analysis of dichotomous and categorical variables used for the regression models. 222 respondents applied to a university at the time of the survey, which is just

under 72% of the sample. According to their parents, 128 of the respondents (58.4%) are boys, and 91 (41.6%) are girls. Accordingly, boys are disproportionately well represented in the partial data set examined here.

Bivariate Results

In the following, the bivariate correlations are discussed in more detail. First, the metric variables of the data set were examined by employing t-tests for their correlation with the trainees' decision toward tertiary education. Here, regarding age, the applicants applying are somewhat younger than those who did not apply to a university (20.19 and 20.69 years, respectively). The difference is highly statistically significant ($p < 0.05$) and of medium magnitude. The t-test examining the association of university application with grade in education shows that the effect is very small, negative, and not statistically significant (grade point average 2.00 and 2.01, respectively, $p > 0.05$). Looking at the number of siblings, those who apply to university after having completed their vocational training have fewer siblings on average than those who do not (1.57 and 1.81, respectively). This result is not statistically significant ($p > 0.05$), and the effect is small.

For the non-metric variables, chi^2-tests have been conducted, to investigate the relationship with the dependent variable. The relationship of application at a university with migration background is only significant at the $p<0.01$-level. Not significant or only just significant at the $p<0.1$ level is the correlation of applying to a university and the parental education or that of their partner (m/f/d) (Figures 1.6 and 1.7). The field of training is also not significant regarding the application at a university, according to our chi^2-tests. All other variables are significant ($p<0.01$) regarding the application to a university

Comparison of the results of both studies

After the presentation of the univariate and bivariate analyses in the prior sections, we will compare our own results with those of Pilz et al. (2020) in the following. An overview of this comparison can be found in table 4. Regarding the comparison of the studies, different concordances emerge for the individual variables. Specifically, the age effect points in the same direction, and there is at least partly a small or no group difference concerning the number of siblings. The grade of education, which is not significant in the NEPS survey, is highly significant in the study conducted by Pilz et al. (2020). Consequently, the two studies differ in this aspect. The same applies to participation in high culture, although it should be kept in mind that different items were answered here in the two different surveys. The group difference for gender was shown to be highly significant in both studies, whereas the migration background did not or hardly lead to group differences between both studies. Regarding parental educational attainment, Pilz et al. (2020) found a significant ($p<0.01$) difference for both parents, but the present study found none or a very small one ($p<0.1$). This could be due to the finer subdivision in the present study or the gender specificity in their survey, which is not given in the NEPS due to the survey design (mother or father in Pilz et al. (2020), interviewed parent and partner in the NEPS). Looking at the group difference in terms of the degree pursued the results of both studies tend to lead in the same direction.

Table 2: Comparison of the present study and the study by Pilz et al. (2020). Levels of significance: n. sig.: non significant on a p<0.1-level; + p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001 (own representation)

	Results of the present study	Results by Pilz et al. (2020)	Concordances between analysis
Age	t = -3.57 ***	t = 5.0 ***	Yes
Number of siblings	t = -0.66 n. sig.	t = 1.8 +	(Yes)
Grade in training	t = -0,18 n. sig.	t = -3,2 **	No
Participation high cultural events	14.6 ** (M/AE) 7.25 * (O/B/CC) 24.4 *** (T)	-1.5 n. sig.	No
Gender	11.6 ***	42.5 ***	Yes
Migrant background	8.36 +	1.3 n. sig.	Yes
Graduation parent	5,72 n. sig.	3.3 +	(No)
Graduation other parent	6.28 +	10.6 **	(Yes)
Educational aspiration	41,1 ***	-3.2 **	Yes

Analysis using logistic regression and FAMD

Three logistic regression models with a dependent dichotomous variable (university application) were estimated to estimate the parameters, which are reported as odds ratios (OR) in Table 5 below. In addition, we index the confidence interval (CI) and p-value (p).

The first model includes age, gender, and migration background, which are also considered our control variables. For the second model, the degree sought is included. The third model adds the presented measures of high cultural participation. Age, Gender, and migration background have a significant effect in models 1 and 3, but the inclusion of the degree comprises their significance in the second model. In contrast, the highest parental educational attainment does not seem to have a significant effect.

Regarding the attendance of high culture in the past year, which was included in the third model, the effect of the cultural activities museum or art exhibition is statistically significant and negative; as well as attending theatre. On the other hand, the effect of the high cultural activity opera, ballet, or classical concert is statistically significant and positive.

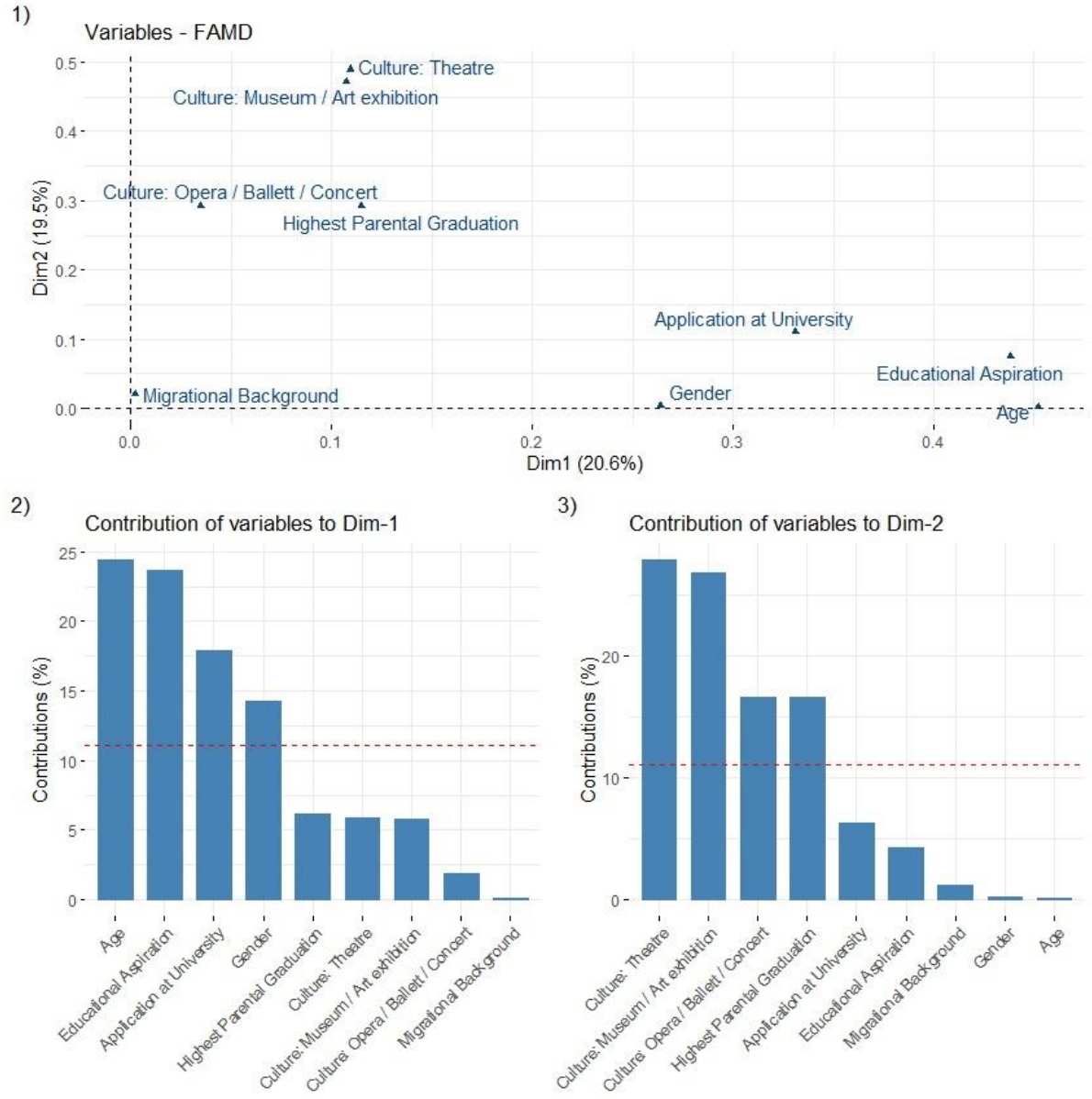
Table 3: Results of stepwise logistic regression model building. OR = Odds Ratios, CI = Confidence Interval, p = level of significance, [bold] statistically significant at a p>0.1-level (own representation)

	Control model			**Incorporation "degree"**			**Incorporation "high culture"**		
DV: Application at university after VET	*OR*	*CI*	*P*	*OR*	*CI*	*P*	*OR*	*CI*	*P*
Intercept	0.00	0.00-	**0.004**	0.01	0.00-	0.147	0.00	0.00-	**0.004**

		0.05			5.29			0.01	
Age	1.52	1.15-2.06	**0.004**	1.28	0.95-1.75	0.113	1.90	1.28-2.96	**0.003**
Gender [Girl]	2.55	1.26-5.26	**0.010**	2.44	1.18-5.13	**0.017**	3.72	1.63-8.86	**0.002**
Highest parental Gradation	0.83	0.57-1.21	0.339	0.88	0.60-1.30	0.531	0.94	0.60-1.48	0.798
Migration Background [Yes]	0.35	0.12-0.89	**0.039**	0.44	0.14-1.17	0.117	0.37	0.11-1.08	**0.081**
Educational Aspiration [High school diploma]				0.32	0.15-0.69	**0.004**	0.48	0.21-1.10	**0.080**
Culture: Museum / Art exhibition [often]							0.39	0.15-1.00	**0.056**
Culture: Theatre [often]							0.17	0.03-0.71	**0.021**
Culture: Opera / Ballet / Concert [often]							5.34	1.64-18.47	**0.006**
Observations	191			191			191		
R^2 Tjur	0.115			0.159			0.234		
AIC	218.489			212.100			203.248		
Log-Likelihood	-104.245			-100.050			-92.624		

Across the three models we can observe, that when the additional explanatory constructs of educational aspiration and high culture are added stepwise, the influences of the control variables remain significant and unidirectional, while the explanatory power increases successively across the individual models. It is particularly striking that within these high culture activities there seem to be different effect directions.

Figure 1: Factor analysis of the variables' correlations (own representation)



As a further step of in-depth analysis of the correlation between application at a university after VET and the individual characteristics considered a Factor Analysis of Mixed Data was conducted, which results are shown in Figure 3. In the first subfigure, it is observable that the two high cultural activities Theatre and Museum / Art Exhibition are plotted proximate which illustrates their high co-occurrence in the sample. The visit of Opera / Ballet / Classical Concert is close to the highest parental education, which emphasizes the supposition from earlier that these activities of high culture are more common among those emerging from the educated middle class. As in the logistic regression, we see a closeness of age and educational aspiration here as well. The application at university is relatively the same distance from there as individuals' gender. Apart from all of the variables and therefore in this special case inconclusive is the migration background, as it already has been supposed in the interpretation of the regression analysis. Subfigures 2 and 3 show the

contribution of the variables to the formation of the two dimensions. To the first dimension (x-axis) the variables, that are contributing the most (descendent order) are age, educational aspiration, application to university, and gender. All these variables contribute more to the formation of this dimension than they would if all variables contributed equally (dotted line). For the y-axis (second dimension), the variables strongly contributing are the three different measures of culture and the highest parental education.

5 Discussion of results

This study aimed to investigate the characteristics of apprentices who decide to study at a university after completing their vocational training and have already obtained their high school diploma beforehand, compared to those who do not. As pointed out, high school diplomas and vocational training are becoming less and less mutually exclusive. Pursuing a course of study following vocational training has already gained importance in recent years (BIBB, 2021). The comparison with the replicated study by Pilz et al. (2020) showed consistency between the two studies in terms of age differences between those who apply to university and those who remain in the workforce. This could be explained by the fact that older individuals are more likely not to apply to university directly following their vocational training due to the longer period of education they have already gone through, either through voluntary or involuntary detours.

Regarding gender, it was possible to link the bivariate results, both from our analysis and from the analysis by Pilz et al. (2020). However, the results of the regression contradict the findings of other studies shown above regarding the direction of the effect. A possible explanation could be the timeliness of the data (over 10 years compared to Jacob (2004) or over 20 after Halbig (1990)), in a period in which university attendance, especially among young women, has immensely grown and gender ratios, therefore, have shifted (Datenportal BMBF, 2014a). Compared to Pilz et al. (2020), a change due to their restriction to certain occupations, which in turn have specific gender ratios in studies and vocational training, could offer a possible explanation, as well. In their study, the authors found an influence of a parental university degree on the apprentices' study application behavior. We could not fully confirm this finding in our analyses. Possible explanations here might be the levels of degrees in our study versus their inclusion as a dichotomous variable in the baseline study. Likewise, a possible gender specificity (father's degree vs. mother's degree), which could not be replicated with NEPS directly, could be a possible explanation.

While Pilz et al. (2020) find no significant influence of migration background on university application, we find such an influence, both in the bivariate comparison and in the parsimonious, as well as in the full regression model, and the FAMD-analysis. While the exact collection of the variable is not presented in either dataset, similar proportions of respondents with an immigrant background are found in both surveys. One possible reason for the ambiguity of the migration background concerning the respondents' further educational plans could be the heterogeneity of both emerging groups: for example, neither all “migrants” nor all “non-migrants” can be understood as a homogeneous group, especially since the country of origin seems to be very relevant in the educational context (Bremer, 2021; Siegert, 2008). Both, the bivariate comparisons of the baseline study and ours suggest an influence of the degree sought. This can also be shown in the regression (models 2 and 3) and the factor analysis. It could be an indication that the young people surveyed are already able to assess their educational opportunities.
The aspect of cultural activities deserves special attention. While this had no significant influence

on the trainees' university applications in Pilz et al. (2020), it was identified as significant in both the bivariate and the regression analysis, measured over three items, in our analysis. The reasoning here could be that visits to events such as the theatre or museum often occur as part of guided group activities (e.g., school activity day, youth recreation). Visiting the opera, a classical concert, or a ballet, on the other hand, illustrates, especially at the age of the interviewees, a humanistic parental home in which holistic education and a university degree could be important (or at least more important), and in which parental willingness to pay for admission could also be higher.

6 Limitations and Conclusion

In the following, further limitations of the present study are pointed out. These are divided into two parts: While the limitations resulting from the survey design as a replication study will be pointed out first, those limitations of the study concerning the research field of dual qualification will be pointed out hereafter.

First, the variable selection of this study is pre-selected by Pilz et al. (2020). Further influencing factors that could be significant might be, for example, parental income, also to map whether studying after training would be parental financeable. Furthermore, as the lifelong learning approach suggests, it is not only possible to study directly after completing vocational training. Some training graduates may decide to pursue this option even later. Another major limitation of this study is that the variables grade in high school and occupational field of the vocational training could not be considered, although both the study by Pilz et al. (2020) and the analyzed literature postulate (significant) influences here.
Further research in the area of dual qualification is still necessary, especially regarding the internal development of this educational path (planned from the beginning or step by step), the motivation of those taking this path, as well as their expectations of a potential added value or productive interaction. To cover this desideratum holistically, a re-occurring qualitative survey would be a useful addition. Similarly, it remains unclear to date which motives for taking up a course of study are decisive for individuals with which characteristics.

Another relevant aspects are that the educational attainment of the biological parents might have an influence, and this was not fully captured by measuring the respondent parent's partner. In addition, the number of cases included in the present study is small due to the panel structure of the NEPS and the sampling having taken place in 9th grade. Possible reasons for this reduction of the sample size include dropout due to the length of time until dual qualification is relevant and the eligibility of other educational pathways that are chosen more often.

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