20 Years of TREE, Transitions from Education to Employment: Exploring Life Courses in Their Making / Erforschung von Lebensläufen in ihrem Entstehungsprozess / Explorer les parcours de vie dans leur devenir

Edited by Sandra Hupka-Brunner, Ben Jann, and Thomas Meyer

Seismo

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Introduction to the Special Issue: Exploring Life Courses in Their Making

Einführung zum Sonderheft: Erforschung von Lebensläufen in ihrem Entstehungsprozess

Introduction au numéro spécial: Explorer les parcours de vie dans leur devenir

Sandra Hupka-Brunner*, Ben Jann*, and Thomas Meyer*

1   General Context

> [T]he opportunity should not be missed to equip Switzerland with a longitudinal survey of transitions at national level […]. Transition pathways to employment are becoming increasingly complex. To understand young people's decisions and options, and to take them into account in policy decisions, appropriate analytical instruments are needed. (OECD 1999, 53)

At the end of the 1990s, more than two decades ago, the OECD made the cited recommendation in the context of an extended review of how member countries then managed their youth's transitions from education to work. It may be seen as one of the legitimatory cornerstones fostering the launch of the TREE study (Transitions from Education to Employment) at the turn of the millennium (TREE 2016a; 2016b; Gomensoro and Meyer 2017; Hupka-Brunner et al. 2021; TREE 2021). Up to this point, the scientific and political representation of the Swiss education and transition system's functioning and underlying mechanisms had been at best fragmentary, largely relying on patchy, mostly cross-sectional data that hardly lent themselves to even adequately describe the system as a whole – let alone providing explanations as to the how and why of its functioning.

The launch of TREE was not the only initiative marking a shift of paradigm in the Swiss social sciences at the time. Throughout the 1990s and the 2000s, Switzerland gradually caught up on substantial gaps with regard to the development of the social sciences in general, including their empirical bases and their infrastructures (Farago

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2018). The respective initiatives led, among other things, to the implementation of the Research Priority Program "Switzerland: Towards the Future" (funded by the Swiss National Science Foundation SNF), the launch of the Swiss Household Panel and, later on, to the founding of the Swiss Centre of Expertise in the Social Sciences (FORS; Farago 2018.). In line with these developments, TREE gradually expanded into a life-course data infrastructure, now including two cohorts of school leavers (one from 2000 and one from 2016) whose pathways are followed over time.

2021 marked the twentieth anniversary of the TREE study (see www.tree. unibe.ch). On the occasion, TREE hosted an international anniversary conference.[1] Parallel to the conference, a call for papers was launched for the present special issue of the Swiss Journal of Sociology (SJS), inviting to submit contributions with the following foci: a) Medium- and long-term effects of earlier transitions on subsequent educational and labour market pathways, especially with respect to the cumulation of multiple social inequalities (cumulative [dis-]advantages); b) Interdependencies and spill-over effects between various life domains (e.g., education, work, family, health, social integration, self); c) Impact of institutional opportunity structures on individual outcomes of education and labour market outcomes; d) Historical, cross-national or cross-regional comparisons; and e) Methodological issues with regard to (multi-cohort) panel data. The call further specified that, given the occasion of the special issue, contributions drawing on TREE data would be particularly welcome.

2   Contributions to the Special Issue

The present special issue comprises seven contributions drawing on a wide range of theoretical, analytical and methodological approaches and covering most of the major foci defined in the call for papers. With respect to the empirical basis for their analyses, four contributions draw on TREE data (of one or both cohorts), one (Gayle/Connelly) on data from two British birth cohort studies, one (Zimmermann/Prein) on data of the German youth panel survey AID:A[2] and one (Achatz/Schels) on administrative data from the German Federal Employment Agency. The large majority of the selected contributions address the institutional mechanisms at work in the strongly tracked, VET-dominated education and transition systems of Germany and Switzerland, particularly and persistently bearing witness to the marked path-dependencies and the striking social inequalities that these systems give rise to. Furthermore, three contributions (Achatz/Schels, Gayle/Connelly and Scharenberg/Rollett) highlight the analytic (added) value of cohort comparisons.

1   4th International TREE Conference: Life Course in the Making, held on 11/12 November 2021 in Bern. See www.tree.unibe.ch/events for details.
2   Aufwachsen in Deutschland (Growing up in Germany).

To start with, the paper of *Gayle and Connelly* contributes to the sociological understanding of social inequalities with regard to test scores achieved in primary education. Comparing test data of two British birth cohorts born thirty years apart (1970 and 2000), they find similar negative relationships between social class and test scores for both cohorts. They conclude that these findings are consequential because "these children enter secondary school with restricted capabilities in logical thinking, concept formation and abstract reasoning". According to the authors, this finding also gives rise to some (political) concern, "given that there are 30 years of educational sociological debates and educational policy efforts between the two cohorts that have apparently been unable to change this relationship".

In another cohort-comparative analysis drawing on the two TREE cohorts from 2000 and 2016, *Scharenberg and Rollett* look at schools as differential learning environments for students' development and at how they influence students' transition from lower- to upper-secondary education. For both cohorts, they find that lower-secondary tracking leads to differential developmental environments resulting in educational inequalities. According to the authors, both social and academic school composition predicted successful transitions over and above individual student characteristics. Compositional effects were in part differentially predictive depending on students' track affiliation, thus underlining the mechanisms of social segregation associated with early tracking. In line with other analyses comparing the two TREE cohorts (see e. g., Gomensoro and Meyer 2021), the results suggest that despite substantial reforms in the education system, the basic mechanisms of inequality at work in Swiss secondary education seem to persist.

In the third cohort-comparative paper, *Achatz and Schels,* drawing on German labour market register data, analyse changes of patterns among three cohorts of German students making the transition from lower- to upper-secondary education between 2009 and 2013. The results show overall improved odds of a smooth transition across the three cohorts – in parallel to a gradual improvement of general labour market conditions throughout the observed period. However, the odds stably and strongly depend on the track that students have previously attended at lower-secondary level: Despite the overall general improvement, the (considerable) difference with regards to the odds of a smooth transition between low-track (*Hauptschule*) and intermediate-track (*Realschule*) students persisted. Similar to the paper of Scharenberg and Rollett, this contribution underlines the extent to which lower-secondary tracking influences the subsequent stages of educational pathways.

The two following papers, both based on data of the second TREE-cohort (TREE2), examine students' and parental educational aspirations. *Ackermann and Benz* investigate the development and adjustment of students' educational aspirations in the first years of post-compulsory education at upper-secondary level. They show that these are highly responsive to the attended track in lower- as well as in upper-secondary education. While students in general education programmes at upper-

secondary level tend to stick to their aspirations, their counterparts in vocational programmes exhibit considerable adjustments – both upwards and downwards – of their educational aspirations.

Kamm, Gomensoro, Heers and Hupka-Brunner, on their part, analyse the role parents play with respect to the educational success of their children. They do so by drawing on a mixed-methods study combining quantitative data from the TREE2 main survey and qualitative data collected among a TREE2 subsample in the context of the TREE add-on study PICE (Parental investment in children's education).[3] The authors investigate how parental investment – defined as parental aspirations, family resources and parental strategies – contributes to educational success. The analysis shows that migrant families prefer academic to vocational education and training (VET), while native families seem to place higher trust in the VET system. Moreover, the contribution develops a typology of strategies that parents with limited resources adopt to foster their children's educational success.

Contrary to the contributions outlined thus far, *Zimmermann and Prein* focus on (first) cohabitation with a partner as an outcome of transition to adulthood. Drawing on data from the German youth Survey AID:A[4], the authors find that young men do not undertake this step until they reach a certain level of economic security. Among male respondents of the study, moving in together is usually preceded by entering permanent employment, while there is no similar correlation among young women. In their conclusions, the authors address the persistent gender-based division of labour: Despite rising female labour market participation, it still seems to be the (main) responsibility of men to ensure a breadwinning status for economically dependent family members.

We conclude this special issue with an innovative methodological contribution. *Unterlerchner, Studer and Gomensoro* develop and compare two methods to study the link between educational pathways and later income on the labour market. While sequence analysis (SA) provides a comprehensive view on trajectories, it might fail to identify key trajectory characteristics to explain income. In order to overcome this methodological shortcoming of SA, the authors suggest feature extraction and selection (FES) as a new validation method. The authors claim that FES, contrary to SA, is able to directly identify relevant key characteristics, but concede that the number of selected features may be overwhelming.

3   A Brief Conclusion and Outlook

Among other things, the present special issue illustrates the substantial expansion of longitudinal data sources throughout the past two decades – and the equally

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3   See www.pice.unibe.ch for detail.
4   Aufwachsen in Deutschland (Growing up in Germany).

substantial analytical gain to be drawn from them. Apart from the British Birth Cohort Survey (BCS) that the contribution of Gayle and Connelly draws on, none of the panel datasets analysed in this issue would have been available twenty years ago. As Burton-Jeangros and Widmer (2009) put it in the first special issue on life course that the Swiss Journal of Sociology published:

> *Although inequality research was mostly synchronic for a long time, interest in processes that occur in time and space and the consequential development of longitudinal methods […] paved the way to a reconsideration of the main tenets of social stratification and social mobility research by including individual and collective time in the equation. The life-course paradigm insists upon the import of events, transitions, stages, and trajectories in the study of the structuring of individual lives.* (Burton-Jeangros and Widmer 2009, 184)

As things stand today, we do not only have more longitudinal data, but also more multi-cohort panel data. No less than three contributions in this issue draw on data following up several cohorts based on comparable survey designs (Gayle and Connelly drawing on British birth cohort surveys, Scharenberg and Rollett drawing on TREE as well as Achatz and Schels drawing on German Federal Employment Agency data of three subsequent school leavers' cohorts). In addition to being able to analyse processes and developments rather than states, multi-cohort data allow us to better understand and identify the role of macro-context factors in individuals' (and cohorts') life courses, thus contributing to disentangle the age-period-cohort problem inherent to longitudinal and life course research (see e. g., Bell and Jones 2015).

   Against this background, TREE's launch of a second school leavers' cohort in 2016 (and thus its extension to a multi-cohort design) has been a significant step towards improved data sources for life course research in Switzerland. Even though the implementation of the second cohort is relatively recent, we should keep in mind that the longitudinal observation of both TREE cohorts is ongoing. By the mid-2020s, the first cohort (TREE1) will have reached an average age of approximately 40 and will have responded to a total of 11 survey waves. With the advent of biographical middle-age and a cumulative panel observation span of 25 years, the TREE1 data will increasingly lend themselves to the analysis of various phases of the life course such as the progress of family formation or the development of further stages of respondents' professional career, including lifelong education. Initially conceived and designed as a panel survey capturing school-to-work transitions in Switzerland, TREE1 is thus gradually developing into full-blown life course study.

   As to the second TREE cohort (TREE2), born around the turn of the millennium, the data will cover an observation span of about ten years by the mid-2020s. In step with each additional panel wave, the potential of the TREE data multiplies. Owing to the multi-cohort design of the study, the data lend themselves for cohort

comparison not only at a descriptive level, but also in view of research questions pertaining to how changing macro-contexts affect the observed trajectories and the dynamics between structure and agency in which they unfold. In view of the reforms and changes in the education system, the labour market and society as a whole, it also seems immensely promising to have a cohort-comparative look, e. g., at the issue of reconciliation of family and work – and gendering of life courses in general. The observation of the two TREE cohorts over a (prospective) span of several decades are furthermore promising for analyses of life courses across several biographical phases and transitions, thus allowing, e. g., to investigate path-dependencies and the development of cumulative (dis)advantages in more depth and detail.

The present Special Issue of SJS may serve as a stepping stone for further life-course research based on longitudinal cohort data such as TREE. The contributions in this issue tap into the analytic potential of such data and provide methodological guidance, yet they only scratch the surface. The significance of life-course data infrastructures grows with each wave of data collection and a wealth of future insights along the lines discussed above is to be expected.

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Social Class Inequalities in Children's Cognitive Test Scores: Comparing Similarities Test Scores in Two British Birth Cohort Studies

Vernon Gayle* and Roxanne Connelly*

Abstract: This paper contributes to the sociological understanding of social class inequalities in childhood similarities test scores. We undertake a comparative analysis of two cohorts of British children born 30 years apart. There is a similar negative relationship in both cohorts. Children born in families in the less advantaged social classes have lower childhood similarities test scores. This is consequential because these children enter secondary school with restricted capabilities in logical thinking, concept formation and abstract reasoning.

Keywords: Social Class, Cognitive Test Scores, Inequality, United Kingdom

Soziale Klassenunterschiede bei kognitiven Testergebnissen von Kindern: Vergleich verbaler Analogien in zwei britischen Geburtskohortenstudien

Zusammenfassung: Dieser Beitrag trägt zum soziologischen Verständnis von sozialen Klassen-ungleichheiten bei Vergleichbarkeit von Testergebnissen in der Kindheit bei. Wir führen eine vergleichende Analyse zweier Kohorten britischer Kinder durch, die im Abstand von 30 Jahren geboren wurden. In beiden Kohorten besteht ein ähnlicher negativer Zusammenhang. Kinder, die in Familien aus weniger begünstigten sozialen Schichten geboren wurden, erzielen auf Primarstufe niedrigere Testergebnisse. Das hat weitreichende Folgen, weil diese Kinder mit eingeschränkten Fähigkeiten in logischem Denken, Konzeptbildung und abstraktem Denken in die weiterführende Schule kommen.

Schlüsselwörter: Soziale Klasse, Kognitive Testergebnisse, Ungleichheit, Vereinigtes Königreich

Inégalités sociales dans les résultats de tests cognitifs pendant l'enfance : une comparaison des résultats de tests de similarité dans deux études de cohorte de naissance britanniques

Résumé : Cet article contribue à la compréhension sociologique des inégalités de classe sociale dans les résultats des tests de similarités pendant l'enfance. Nous procédons à une analyse comparative de deux cohortes d'enfants britanniques né·e·s à 30 ans d'intervalle. Il existe une relation négative similaire dans les deux cohortes. Les enfants né·e·s dans des familles appartenant aux classes sociales les moins favorisées ont des scores aux tests plus faibles. Par conséquent, ces enfants entrent à l'école secondaire avec des capacités limitées en matière de pensée logique, de formation de concepts et de raisonnement abstrait.

Mots-clés : Classe sociale, résultats aux tests cognitifs, inégalité, Royaume-Uni

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1   Introduction

Cognitive tests assess a person's ability to learn and remember information, to recognise concepts and their relations, and to apply this information (Neisser et al. 1996). Cognitive ability in childhood has a long history of being examined within psychology (for a review see Rutter 1985). By stark contrast, it is not a mainstream activity in sociology, even though it is associated with educational attainment, labour market outcomes, health and wellbeing across the lifecourse (see Nettle 2003; Deary et al. 2007; Vanhanen 2011). The absence of detailed sociological studies of general cognitive ability is especially surprising since general cognitive ability in childhood is known to be socially stratified from a very young age (see for example Duncan et al. 1998; Feinstein 2003; Gottfried et al. 2003; Cunha and Heckman 2009; Sullivan et al. 2013; Skopek and Passaretta 2021).

   An important development in understanding general cognitive ability in childhood is the "Flynn effect". The "Flynn effect" describes a widespread set of empirical observations that there were substantial increases in population average intelligence test scores throughout the twentieth century (Neisser 1998; Flynn 2012). The "Flynn effect" is the initial theoretical catalyst for our investigation of the relative social class inequalities in cognitive test scores for children in two British birth cohorts born thirty years apart.

   A characteristic of the "Flynn effect" is that average performance on different elements, or subtests, have changed at different rates (Wicherts et al. 2004). Over the course of the twentieth century there were large and often rapid improvements in population average performance on some subtests, whereas average performance on other subtests changed very little. Two subtests that showed the greatest gains were Raven's Progressive Matrices and the Similarities Test (Flynn 2012). Flynn theorises that these gains could be attributed to changing "habits of mind" of societies over time. This refers to the way in which people are required, or encouraged, to look at the world around them (Flynn 2012).

   The Similarities Test is the focus of this article. In this test children are presented with a series of words, or concepts, and are required to identify what they have in common. For example when presented with the words "cupboard", "table" and "bed" it would be correct to state that these are all furniture.[1] This answer assumes that the child has been conditioned to look at the world scientifically, or conceptually (Flynn 2012). If a child was presented with the words "cupboard", "table" and "bed" and gave the answer that "these are all things you use", "these are things in the home" or "you can bump into them all", this would display that they had an inability to conceptually group these words. This inability would suggest that they

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[1]   This is an example of a simple test item. The test also includes more difficult items such as "Signature, Fingerprint, Face" where "proof of identity" would be an acceptable answer but "police use them" or "can be forged" would be incorrect responses.

have not mastered abstract conceptualisation, or that they have a more utilitarian outlook on the world. Flynn (2012) theorises that in contemporary societies we have moved beyond a reliance on "concrete thinking", and have effectively put on "scientific spectacles" which refocus how we view the world and interact within it.

Flynn's explanation for population average increases in Similarities Test scores strongly resonate with work in the sociology of education developed by Basil Bernstein. Bernstein (1971) theorised that working class children engaged in particularistic rather than universalistic orientation to meaning (see also Hasan 2002). More recently, Nash (2016) argues that these different linguistic patterns are ultimately social class based differences in the skills which allow the processing of symbolic information. Taken together, Flynn's theory which seeks to explain population average increases in similarities test scores and Bernstein's complementary theories which explain social class based inequalities in abstract conceptualisation present an empirical puzzle which this paper aims to address. If more recent cohorts of children are better equipped to handle abstract conceptualisation on average, how have relative social class inequalities in this skill changed? Understanding inequalities in this skill is important, as Nash (2001) notes that children who have become sensitised by differential linguistic and cognitive socialisation are going to have differential ability to respond to the demands of formal education.

The substantive focus of this article is to examine the relationship between parental social class and children's scores on similarities tests. The association between parental social class and children's cognitive test performance has been consistently documented, and a wealth of empirical evidence demonstrates that children from more advantaged families generally have better cognitive test scores (for example McCulloch and Joshi 2001; Feinstein 2003; Blanden et al. 2007; Goodman and Gregg 2010; Schoon et al. 2010; Schoon et al. 2011; Sullivan et al. 2013; Dickerson and Popli 2016). It is theoretically plausible that more socio-economically advantaged families have strategies at their disposal, which they are better able to deploy to maintain their children's advantage (Devine 2004). Sullivan et al. (2013) discuss possible explanations for the influence of socio-economic factors on children's cognitive test scores, these include parental cultural and cognitive resources, parenting styles and parenting activities (see also Bourdieu and Passeron 1977; Vincent and Ball 2007; Ermisch 2008; Kiernan and Mensah 2011; Lareau 2011; Washbrook 2011).

There is very limited previous research on the changing nature of relative socio-economic inequalities in cognitive test scores between cohorts. One exception is Kagitcibasi and Biricik (2011) who studied performance on the Draw-a-Person test in 1977 and 2010 in the same area of Turkey. This study found clear socio-economic differences in the 1977 cohort, and these effects were only slightly reduced in the 2010 cohort. Connelly and Gayle (2017) investigated social class inequalities in general cognitive ability test scores over time using British birth cohort data from 1958 and 1970. They reported notable social class divisions in general cognitive

ability when children were still at primary school, and that similar patterns were observed in each cohort.

This article makes a distinctive contribution in this area and reports the results of an original investigation of the changing nature of the effects of parental social class on children's similarities test scores in two nationally representative British birth cohorts, born in 1970 and 2000/2. Against the backdrop of substantial increases in population average cognitive test scores over this period, we theorise that one of three broad changes in relative social class inequalities is most likely to be observed.

› The first theoretical scenario is that the similarities test scores for children in all social classes have improved, and therefore relative class inequalities will remain stable.
› The second theoretical scenario is that the similarities test scores for children in the most advantaged social classes have improved and this contributed to the population average increases. In this scenario relative class inequalities increase and there will be a wider gap between children in the most advantaged social classes and their counterparts in less advantaged social classes.
› The third theoretical scenario is that the similarities test scores for children in the least advantaged social classes have improved and this contributed to the population average increases. In this third scenario, the relative social class inequalities decrease, and the gap between children from the least advantaged social classes and the most advantaged social classes will become narrower.

2   Data

In this article we use data from two British birth cohort studies which follow the lives of babies born 30 years apart. The 1970 British Cohort Study (BCS) follows babies born in England, Scotland and Wales from the 5th to the 11th of April 1970 (Elliott and Shepherd 2006; University of London 2013; University of London 2016a; University of London 2016b). The Millennium Cohort Study (MCS) tracks a sample of babies born between the 1st of September 2000 and the 31st of August 2001 in England and Wales, and between the 24th of November 2000 and the 11th of January 2002 in Scotland (Plewis 2007a; University of London 2012a; University of London 2012b; University of London 2012c; Connelly and Platt 2014; University of London 2015a; University of London 2015b).

The BCS provides a suitable benchmark against which to compare data collected on the children in the MCS. We used measures from the first three sweeps of data collection in the BCS (i.e., at birth, age 5 and age 10). We used MCS data from the first five sweeps of data (i.e., at age 9 months, age 3, age 5, age 7 and age 11). There would be obvious analytical benefits to including additional birth cohort data within these analyses. This is not possible however as the previous

large-scale nationally representative British birth cohort studies (i. e., the studies following children born in 1946 and 1958) do not contain the required cognitive test data for this investigation.

2.1 Similarities Test Scores

The similarities test was undertaken at age 10 in the BCS and at age 11 in the MCS. Both tests involved the child being presented with a series of words, and then being required to identify why these words go together. For example the child would be read the words "sad, worried, happy" and the correct answer would be "emotions" (see Hansen 2014; Parsons 2014). In the BCS the Word Similarities subscale of the British Ability Scales (First Edition) was used, and in the MCS the Verbal Similarities subscale of the British Ability Scales Second Edition was used (Elliott et al. 1997).

In the BCS, children were asked to name the group of items, but also to give an example of a further congruent word. For example, for the list "sad, worried, happy", the correct answer would be "emotions" and a further congruent word might be "excited". In the original BCS scoring system, children were given a point for each item if they answered both elements of the test correctly. This test was administered slightly differently in the MCS, and the protocol did not ask the child to provide a further word example. In order to ensure that the measures in the two cohort datasets are appropriately comparable we concentrate our analyses on the "naming" items from the BCS test.

The MCS version of the test included a routing methodology. The children were given items of varying difficulty based on the number of mistakes they made on previous items (Elliott et al. 1996). The MCS test scores were adjusted to take the difficulty of the items the child had completed into account, and the test scores were adjusted for the child's age when the test was administered. The BCS test scores were not adjusted for age at the time of the test but this is inconsequential because all of the children are born within a single week.

The analyses presented below do not seek to replicate the "Flynn effect" which has been investigated numerous times (Neisser 1998; Wicherts et al. 2004; Flynn 2012; Dutton et al. 2016; Bratsberg and Rogeberg 2018). The focus of this article is an examination of the nature of relative parental social class influences on their children's scores on similarities tests. The Word Similarities subscale of the British Ability Scales (First Edition) which was used in the BCS differs slightly from the Verbal Similarities subscale of the British Ability Scales (Second Edition) used in the MCS, as described above. For many analyses these two tests will be functionally equivalent. In the analyses below the similarities test scores from the BCS and the MCS are arithmetically standardised as a Z score with a mean of 0 and a standard deviation of 1 to make them comparable.[2] Therefore these scores should

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2   This follows the practice adopted by Schoon et al. (2010).

be understood as relative measures, where the comparison is with peers within the same birth cohort.

2.2 Parental Social Class

In this paper we have operationalised an occupation-based measure of socio-economic position for the analyses of parental social class effects. Our theoretical justification follows a conventional line of sociological argument, namely that occupation-based socio-economic measures are reliable and parsimonious indicators of social class positions (Rose and Pevalin 2002). In the present analysis we use the UK National Statistics Socio-Economic Classification (NS-SEC) which is the official UK Government classification, and is widely used in social research (Rose and Pevalin 2003; Office for National Statistics 2010).

Parental NS-SEC was computed using standardised occupational codes and employment status information for mothers and fathers collected in the age 10 sweep of the BCS survey, and the age 11 sweep of the MCS survey. Using the occupational coding of the BCS developed by Gregg (2012) our measure of parental class is based on contemporary standardised occupational codes for both cohorts ensuring the appropriate comparability of the two parental social class measures. A measure of

Table 1   Distribution of the Covariates

Variable	BCS %	MCS %
Sex		
Male	51	51
Female	49	49
Parent's Highest Education		
0 None	33	6
1 GCSE Below Grade C	20	5
2 GCSE Grade A-C	20	22
3 A-Levels	9	16
4 University Degree or Above	18	51
Parental Social Class (NS-SEC)		
1.1 Large employers and higher managerial and administrative occupations	3	6
1.2 Higher professional occupations	6	11
2. Lower managerial, administrative and professional occupations	22	30
3. Intermediate occupations	14	14
4. Small employers and own account workers	11	11
5. Lower supervisory and technical occupations	16	7
6. Semi-routine occupations	14	14
7. Routine occupations	15	7
Unweighted n	10 008	11 457

Note: British Cohort Study (BCS) values are weighted for non-response, Millennium Cohort Study (MCS) values are adjusted for survey design and weighted for non-response.

family social class was created using the highest NS-SEC category of the mother or father, which can appropriately be considered as a semi-dominance measure (see Erikson 1984). The distribution of parental NS-SEC in the two cohorts is shown in Table 1. It is clear that the social class distribution changes between these two cohorts. For example, in the BCS 15 % of parents were in the routine occupations category (NS-SEC 7) compared to 7 % of parents in the MCS, and the percent of parents in the higher professional occupations category (NS-SEC 1.2) increased from 6 % in the BCS to 11 % in the MCS.

2.3   Parental Education

The intergenerational effects of parental education have often been highlighted in sociological studies (Blau and Duncan 1967; Sewell and Hauser 1975; Jencks 1979; Halsey et al. 1980). Social class effects are the main focus of this paper, but in countries like Britain education is entangled with social class. There are observable educational differences between classes in Britain, but also some variability in education levels within classes. There is usually a moderate correlation between an adult's level of education and their social class. In the BCS the correlation is Cramer's $V = 0.33$, and in the MCS it is Cramer's $V = 0.30$.

We have created a measure of parental education based on the National Vocational Qualification (NVQ) levels. The MCS parents' qualifications, measured in the age 11 survey, were organised into NVQ levels in the deposited datasets. We have allocated the BCS parents' qualifications, measured in the age 10 survey, into the most comparable NVQ level. In order to maximise comparability NVQ level 4 (e. g., undergraduate degree) and NVQ level 5 (e. g., postgraduate degree) have been grouped in the MCS as we are unable to differentiate between these two groups in the BCS. In the analyses we use the highest educational level of the cohort member's parents. The distribution of parental education in the two cohorts is shown in Table 1.

2.4   Sex

Savage-McGlynn (2012) states that sex differences in intelligence continue to captivate psychologists and the general public alike, and no other concept in psychology has generated more debate. For example, Lynn (1999) challenged the view that there are no sex differences in general intellectual ability, but Colom et al. (2000) suggest that there are negligible sex differences. Sociologists include measures of sex in a broad array of empirical analyses, and sex and gender measures are widely understood as being key variables. We contend that sex is too central to the structure and organisation of contemporary societies for it to be excluded in the present analyses.

2.5   Study Designs and Missing Data

The MCS has a complex survey design which is stratified to increase the probability of selection for children in disadvantaged areas, and areas with large populations of minority ethnic families (Plewis 2007b; Ketende and Jones 2011). Stata software was used for data enabling and data analysis, and the survey facility (svy) was used to analyse data from the complex survey design of the MCS (StataCorp 2017). The BCS was a systematic sample of all babies that were born in a single week (Elliott and Shepherd 2006). Therefore the BCS does not have a complex design and selection strategy.

Observational studies typically have missing data and this has the potential to distort results (Hawkes and Plewis 2006; Mostafa and Wiggins 2014; Mostafa and Wiggins 2015). In the current analyses the original sample sizes are reduced due to attrition (i. e., drop out), wave non-response (i. e., not being present in one or more sweeps of the surveys), and item non-response (i. e., not providing a response to a survey question). The patterns of unit and item missingness for the two cohorts are shown in the supplementary materials. Non-response weights are deposited with the MCS data. We have constructed a set of inverse probability weights for the BCS that are similar to the MCS weights.[3] These weights are used in a principled attempt to reduce potential distortion due to missing data in the complete records analysis (Höfler et al. 2005; Carpenter and Kenward 2012).

3   Results

Descriptive statistics are reported in Table 2. There were small observable differences between the mean similarities test scores for males and females in both the BCS and the MCS. There were observable parental educational differences in the mean similarities scores. Children with better qualified parents had higher mean scores in both cohorts. There were also observable parental social class differences. Children from more advantaged NS-SEC classes had higher scores in both the BCS and the MCS.

Similarities test scores are modelled using ordinary least squares regression. The most appropriate model for the MCS and BCS data was a main effects model of sex, parental education and parental social class (see online supplement tables S7 and S8). The modelling results are shown in Table 3. The regression coefficients for the NS-SEC variable are plotted in Figure 1 alongside 95 % quasi-variance comparison intervals (see Gayle and Lambert 2007). The estimation of quasi-variances allows comparisons to be made between categories of NS-SEC and between the two birth cohorts.

The striking finding is that although the second cohort were born thirty years after the children in the BCS, the effects of sex, parental education and parental

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3   See online supplementary materials for more details.

Table 2   Social Inequalities in Similarities Test Scores 1970 Birth Cohort Study (BCS) and Millennium Cohort Study (MCS)

	BCS 1970		MCS 2000-2	
	Mean Similarities Score (SD)		Mean Similarities Score (SD)	
Sex				
Male	0.11	(1.01)	0.01	(1.00)
Female	−0.06	(0.95)	−0.08	(0.94)
Parental Education				
0 None	−0.31	(0.97)	−0.68	(1.08)
1 GCSE Below Grade C	−0.12	(0.95)	−0.44	(1.01)
2 GCSE Grade A-C	0.13	(0.92)	−0.24	(0.97)
3 A-Levels	0.25	(0.88)	−0.06	(0.91)
4 University Degree or Above	0.57	(0.89)	0.18	(0.91)
Parental Social Class (NS-SEC)				
1.1 Large employers and higher managerial and administrative occupations	0.34	(0.91)	0.38	(0.84)
1.2 Higher professional occupations	0.55	(0.87)	0.38	(0.86)
2. Lower managerial, administrative and professional occupations	0.33	(0.92)	0.09	(0.89)
3. Intermediate occupations	0.16	(0.91)	−0.03	(0.91)
4. Small employers and own account workers	0.01	(0.93)	−0.20	(0.97)
5. Lower supervisory and technical occupations	−0.15	(0.98)	−0.25	(0.96)
6. Semi-routine occupations	−0.25	(0.97)	−0.38	(1.07)
7. Routine occupations	−0.38	(0.97)	−0.43	(1.04)

Note: British Cohort Study (BCS) values are weighted for non-response, Millennium Cohort Study (MCS) values are adjusted for survey design and weighted for non-response.

social class are incredibly similar. There is an observable negative social class gradient net of sex and parental education. Children from the more advantaged NS-SEC categories have, on average, higher relative test scores in the similarities test. Children from families with parents in higher managerial administrative and professional occupations (NS-SEC 1.1, 1.2 and 2) have higher relative test scores than children with parents in intermediate occupations (NS-SEC 3, 4 and 5) and children with parents in routine and manual occupations (NS-SEC 6 and 7).

This lends no general support to the theoretical proposition that the relationship between parent's social class and their children's scores on similarities tests may display marked differences between these two British birth cohorts. The changes in the occupational composition of the UK, and the emergence of an increasingly technological and knowledge-based economy seems to have done little to change the relative social class inequalities in children's similarities test scores. The general finding was overall stability in relative social class inequalities between the two cohorts, despite the children being born thirty years apart.

Table 3   Main effects models for the British Cohort Study (BCS) and
                 Millennium Cohort Study (MCS)

	(1) BCS		(2) MCS	
	Coef.	S.E.	Coef.	S.E.
Sex				
Female	0.00		0.00	
Male	0.18***	(0.02)	0.08***	(0.02)
Parent's Highest Education				
0 None	0.00		0.00	
1 GCSE Below Grade C	0.12***	(0.03)	0.21*	(0.08)
2 GCSE Grade A-C	0.3***	(0.03)	0.36***	(0.07)
3 A-Levels	0.40***	(0.04)	0.49***	(0.07)
4 University Degree or Above	0.66***	(0.03)	0.60***	(0.07)
Parental Social Class (NS-SEC)				
1.1 Large Employers and Higher Managerial	−0.07	(0.06)	0.01	(0.05)
1.2 Higher Professional	0.00		0.00	
2 Lower Managerial and Professional	−0.03	(0.04)	−0.25***	(0.03)
3 Intermediate	−0.07	(0.05)	−0.31***	(0.04)
4 Small Employers and Own Account Workers	−0.17***	(0.05)	−0.42***	(0.04)
5 Lower Supervisory and Technical	−0.29***	(0.05)	−0.46***	(0.06)
6 Semi-Routine	−0.33***	(0.05)	−0.53***	(0.05)
7 Routine	−0.44***	(0.05)	−0.51***	(0.06)
Constant	−0.12*	(0.05)	−0.24**	(0.08)
N	10 008		11 457	
Adjusted R^2	0.13		0.09	
BIC	26 817		31 293	

Note: BCS model is weighted for non-response, MCS model is adjusted for survey design and weighted for non-response. Adjusted R^2 and BIC are estimates calculated from non-adjusted models for the MCS analysis. To avoid confusion, in this table and throughout the paper, we report the BIC calculated by the Stata command -est stat-. We are aware that alternative formulations are available (see Treiman 2009; StataCorp 2017).

The more nuanced result is that there are very subtle differences in the overall patterns of relative social class inequalities in the more recent birth cohort that might potentially be sociologically illuminating. Children born at the turn of the millennium with parents in NS-SEC categories 2 (lower managerial, administrative and professional), 3 (intermediate occupations), 4 (small employers and own account workers), 5 (lower supervisory and technical occupations) and 6 (semi-routine occupations) have lower relative test scores than their counterparts born in 1970. This may be due to changes in the composition of these social class groups, and the employment conditions of these parents. However, notably there is no difference between the test scores of children with parents in the most-disadvantaged social

Figure 1   OLS Regression Coefficients and 95 % Quasi-Variance Comparison
                  Intervals for the Association between Parental Social Class and
                  Similarities Test Scores in each Cohort
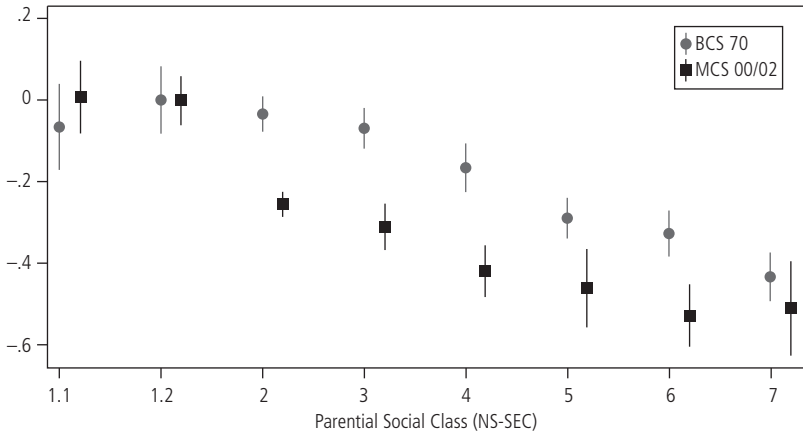
Data: British Cohort Study (n = 10 008). Millenium Cohort Study (n = 11 457). Outcome Similarities Test Score (age 10 / 11), standardised within cohort. Note: Model also contains Sex and Parents' Education, adjusted for survey design and weighted for non-response.

class (NS-SEC 7). This is a more complex pattern of relative social class inequalities than the three scenarios we theorised *a priori.*

Whilst similarities test scores in the BCS were structured into two distinctive social class groupings (NS-SEC 1.1, 1.2, 2 and 3, and NS-SEC 5, 6 and 7) a detailed examination of the MCS data reveals a third division. The first group in the BCS (NS-SEC 1.1, 1.2, 2, and NS-SEC 3) appears to have bifurcated and formed two distinctive groups in the MCS (NS-SEC 1.1 and 1.2, and NS-SEC 2 and 3).

In both the BCS and MCS the quasi-variance based 95 % comparison intervals for NS-SEC 1.1 and 1.2 substantially overlap. This convinces us that these two social classes form a single division. The occupations in this division are characterised by high levels of cognitive demand and routinely require logical thinking, concept formation and abstract reasoning.

The second MCS division comprises children with parents in NS-SEC 2 and NS-SEC 3. These two classes include both lower managerial and lower professional occupations, and intermediate occupations (which include clerical and administrative occupations, sales and services, and some technical and engineering occupations). These parents have occupations that are of a semi-professional nature, and historically might have been described as being 'white collar'. The occupations in this division make fewer cognitive demands on workers than the more professional and managerial occupations in NS-SEC 1.1 and 1.2.

Social stratification research on changing structures and social class mobility in modern Britain provides insights into these more subtle social class inequalities. The expansion of the professional social classes has led to increasing numbers of individuals now being located in more advantaged social classes (Goldthorpe 2016). There has been a growing demand for professional and managerial personnel across the British economy. This expansion has facilitated social ascent. We envisage that some MCS parents in NS-SEC 1.1 and 1.2 would have been in less advantaged social classes in earlier times. This may partially explain why the children of MCS parents who now comprise NS-SEC 2, 3 and 4 have lower test scores than their counterparts in the BCS.

An obvious limitation of this study is that only two cohorts have been compared. There would be great benefits to replicating this analysis with further cohorts, and in different national contexts where suitable data are available. This study has focussed on only one test, the similarities test, there would also be benefits to examining changes in social class inequalities in other elements of cognitive ability between cohorts.

4   Conclusions

This study answers Flynn's (2012) appeal for researchers to consider sociological contexts in order to develop a more comprehensive understanding of the role of social influences on cognitive inequalities. We posed the theoretically informed question of whether relative social class inequalities in similarities test scores had changed between two cohorts of British children born 30 years apart.

Flynn's (2012) theory of societal movement away from 'concrete thinking' strongly chimes with Bernstein's (1971) theories of class-based linguistic and cognitive socialization which are an important but often neglected canon within the sociology of education. Our overall finding that social class divisions in similarities test scores have remained largely stable over a period of 30 years indicate that despite wider social change, including possible changes in 'habits of mind' at the societal level (see Flynn 2012), social class inequalities in this particular skill have been maintained. Although we do observe some more nuanced changes in the social class divisions than the general scenarios that we theorised *a priori*.

The fact that social class inequalities in this skill can be observed whilst children are age 10/11 is important because children from less advantaged social classes will arrive at secondary school with a distinctive handicap. The logical thinking, concept formation and abstract reasoning skills that children from the less advantaged social classes display are unlikely to help them to effectively compete in education and the labour market (see Nash 2005; Nash 2016). In Britain there are on-going concerns about social inequality in education and there have been numerous policy changes

and new initiatives designed to combat inequality. However, arguably the policies enacted are not of sufficient ambition to tackle engrained social inequalities that might emanate from linguistic and cognitive socialisation from birth.

We observe clear social class gradients in both cohorts. Plausibly, the assets that parents in more advantaged social classes have, and the material rewards that flow from their occupations have the potential to provide family environments that are conducive to positive development. This finding has previously been reported by Parcel and Menaghan (1994) who noted that social class differences are likely to reflect differences in the characteristics and complexity of the parents' jobs. The class differences may also reflect the instability, and the economic and social strain that results from being located in a more disadvantaged social class (Conger and Elder 1994; Conger and Conger 2002; Layte 2017). Sullivan et al. (2013) conclude that parental social class and parental education were directly linked to inequalities in children's cognitive test scores, but they emphasise that these differences could not be explained even though they modelled a wide range of measures of both family social resources and parental behaviours. Psychologists have pointed to the heritability of general cognitive ability (Deary et al. 2006; Tucker-Drob et al. 2013; Hill et al. 2014; Harden 2021), this might be another potentially plausible dimension of the persistent negative social class gradient.

Having reported a negative social class gradient we are careful to avoid slipping into a mechanistic deficit theory of social class inequalities. By contrast we emphasise that parental education, parental skills, parental work and market situation, and the cognitive requirements of their occupations could combine to make parent's efforts differentially effective in promoting the abstract reasoning skills of their children, and that the entrenched nature of these inequalities contribute to the ongoing reproduction of inequalities in cognitive socialisation.

5   Supplementary Materials

Supplementary materials and data analysis code are available here: https://osf.io/ ug5pz/.

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Devenir travailleuse domestique
Perspectives philippines

**Collection
Questions de genre**

Comment les femmes en provenance des Philippines entrent-elles dans l'économie mondialisée du travail domestique ? À partir de cette question, le présent ouvrage interroge les rouages des domesticités globalisées afin de comprendre comment les engagements migratoires et professionnels se construisent et s'alimentent dans le temps et l'espace. Pour ce faire, l'enquête analyse les trajectoires biographiques de travailleuses domestiques philippines. Sur la base d'entretiens avec des femmes ayant exercé et/ou se préparant à le faire en Asie, au Moyen-Orient, en Europe ou en Amérique du Nord, cette recherche décrit comment elles en viennent à partir, comment elles endossent le métier d'employée de maison, et comment elles négocient les relations de pouvoir avec leurs employeur·euse·s. L'analyse des carrières migratoires permet ainsi de pointer – aux niveaux micro, méso et macro sociologique – les dynamiques sous-jacentes à la culture de la migration qui mènent ces actrices à quitter l'archipel philippin et devenir employée de maison à l'étranger.

L'originalité de cet ouvrage réside dans le fait d'appréhender de façon processuelle, non-linéaire et plurielle les carrières migratoires en décrivant comment les femmes interrogées s'approprient ou mettent à distance le métier d'employée de maison au fil des circulations et des expériences professionnelles. À partir d'une perspective de genre, il souligne ainsi comment le rapport à la qualification se construit au gré des migrations transnationales dans de multiples espaces et temporalités.

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Schools as Differential Environments for Students' Development: How Tracking and School Composition Affect Students' Transition After the End of Compulsory Education

Katja Scharenberg* and Wolfram Rollett**

Abstract: Tracking leads to differential developmental environments resulting in educational inequalities. We investigated whether tracking and school composition affect students' transition to post-compulsory education. Based on data of two Swiss school-leavers' cohorts (2000/2016), multilevel analyses show that the social and achievement-related school composition and track affiliation predict transitions beyond students' individual characteristics. Compositional effects were in part differentially predictive depending on students' track affiliation.

Keywords: Transition, tracking, school composition, differential environments for students' development

Schulen als differenzielle Entwicklungsmilieus: Wie schulische Bildungsgänge und Schulkomposition den Übergang nach Ende der Pflichtschulzeit beeinflussen

Zusammenfassung: Schulformen mit unterschiedlichen Anforderungsniveaus sind differenzielle Entwicklungsmilieus, die zu Bildungsungleichheiten führen. Der Beitrag untersucht Effekte der Schulformzugehörigkeit und Schulzusammensetzung auf den Übergang nach der Pflichtschulzeit. Mehrebenenanalysen basierend auf Daten zweier Schweizer Schulabgängerkohorten (2000/2016) zeigen, dass die soziale und leistungsbezogene Schulzusammensetzung und der besuchte Bildungsgang über Individualmerkmale hinaus bedeutsam sind. Kompositionseffekte waren z. T. bildungsgangspezifisch.

Schlüsselwörter: Übergang, Schulform, Schulformgliederung, Komposition, differenzielle Entwicklungsmilieus

Les écoles en tant que milieux de développement différenciés : comment les types d'école et la composition des écoles influencent la transition après la fin de la scolarité obligatoire

Résumé : Les types d'école sont des milieux de développement différenciés qui entraînent des inégalités scolaires. Nous étudions l'impact des types et de la composition des écoles sur la transition après la scolarité obligatoire. Basées sur les données de deux cohortes de jeunes suisses en fin de scolarité (2000/2016), les analyses multi-niveaux montrent que la composition sociale, les performances scolaires et les types d'école étaient significatifs au-delà des traits individuels. Les effets de composition étaient en partie spécifiques au type d'école.

Mots-clés : Transition, types d'école, composition des écoles, milieux de développement différenciés

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1   Introduction: School Contexts as Differential Environments for Students' Learning and Development[1]

Sociology of education (e. g., Coleman 1986; Mayer 1990; Becker and Schulze 2013) holds that individuals are embedded in different social contexts defined as the material, institutional, or cultural environments which inevitably and continuously shape individuals' development throughout their lives. In childhood and adolescence, the education system is considered as the major environmental context apart from the family (e. g., Bornstein 2015), as it constitutes the relevant institutional context for students' development, which not only sets the course for lifelong learning, but also structures their opportunities for transitions into other social contexts such as employment or higher education (e. g., Müller and Jacob 2008; Blossfeld and von Maurice 2011).

Empirical findings repeatedly show that the structure of the formal education system and the respective institutional school context can have an independent, but also cumulative effect on, e. g., students' school performance and educational attainment beyond the effects of the home learning environment, and can thus contribute to social and migration-related inequalities, especially at the transition points within the education system (e. g., Kristen and Dollmann 2010; Neugebauer and Schindler 2012). Such findings contradict not only the meritocratic principle, but also show that institutional contexts are likely to contribute to unequal chances of educational outcomes.

From an international perspective, many OECD countries apply between-school tracking in secondary education (OECD 2022). In (lower) secondary education systems, the aim of tracking is to create homogenous learning environments in terms of students' academic achievement (e. g., Oakes 1985; Slavin 1990; Rosenbaum 2000) and prepare them for different educational and vocational pathways after compulsory education. Tracking intends to create comparable learning conditions with regard to teaching and learning efficiency: It is held that learning contents and formats in tracked settings can be geared more specifically to students' needs and abilities so that they can be optimally supported according to their individual learning requirements (Oakes 1985; Slavin 1990; Rosenbaum 2000).

At the individual level, however, academic achievement is persistently and closely related to students' social origin (Weis et al. 2019). As a consequence, the intended achievement-related homogenization of the student body due to external differentiation and track placement after primary education (Becker et al. 2012) leads to social stratification in secondary education (Baumert et al. 2006). If we consider students' sociocultural background (e. g., percentage of students with immigrant

background), performance-related characteristics (e. g., average school achievement or cognitive ability level) and their educational biography (e. g., percentage of students with discontinuous educational pathways) as indicators of the student body composition – and hence as factors that influence a school's learning environment –, a combination of several of these compositional characteristics may lead to cumulative advantages or disadvantages in certain schools (Baumert et al. 2006, 97). Especially lower-track schools are often characterized by a socially less privileged student body composition and lower availability of educational resources (Trautwein et al. 2007). Accordingly, tracks represent socio-ecologically largely different school environments (Baumert et al. 2006, 98). Their compositional profiles also reflect the residential social segregation of a school's catchment area (Ditton and Krüsken 2006b, 154).

2   Theoretical Framework Model and Empirical Evidence

School environments, especially with respect to differences between school tracks, are assumed to constitute *differential environments for learning and development*: Students are offered different, track-specific developmental opportunities independent of and in addition to their individual sociocultural, economic, and intellectual resources (Baumert et al. 2006, 99).

According to the theoretical framework model on mediation processes of contextual effects of the school learning environment as proposed by Baumert et al. (2006, 126), achievement gaps are mainly due to

   a) students' *differential individual achievement trajectories* depending on their prior knowledge and on the availability of resources provided by parents and peers;
   b) *institutional effects*, i. e., track-specific differences in institutionalized learning opportunities regarding educational programs, curricula, teaching and learning culture as well as track-specific traditions of teacher education;
   c) *compositional effects* with respect to track-specific differences regarding the achievement-related and sociocultural student body composition.

Whereas predictors of trajectories such as students' social origin and their prior knowledge relate to the individual level, institutional and compositional effects arise due to differences in school-level characteristics. Tracking alone, however, does not necessarily evoke pronounced differences in students' learning and achievement (Hattie 2002). As has been frequently discussed in research on ability grouping (e. g., Gamoran 1992; Ireson and Hallam 2001), tracking effects are, according to Baumert et al. (2006, 126), mediated by various processes relating to

   a) pedagogical responses to student groups of different achievement or ability levels (e. g., instructional organization and teacher expectations, curricular standards, differences in didactics and instructional quality),

b) differences in parents' normative values (e. g., parental expectations regarding achievement and behavior),

c) differences in the normative values of the peer group (e. g., norms for achievement and success),

d) social comparison processes at student level.

Based on the model of Baumert et al. (2006), an extended theoretical framework model of mediation processes of school-contextual effects was presented by Scharenberg (2019), who proposed

1. to consider not only achievement-related outputs as criterion, but also to take into account multi-criterial goals of school and instruction,

2. to include further aspects of students' heterogeneity (e. g., gender, cognitive skills) and

3. to consider longer-term outcomes such as educational pathways, transitions into other educational or vocational contexts and educational attainment, that is, to extend the temporal dimension of the mediation model beyond compulsory schooling.

2.1 Previous Research

Against the background of the theoretical model on mediation processes of institutional effects as proposed by Baumert et al. (2006), empirical studies repeatedly showed that differential environments have an impact on students' academic achievement. For Germany, there is empirical evidence that school composition and track affiliation are associated with math and reading achievement gaps that widen throughout secondary education between basic tracks (*Hauptschule*) and academic tracks (*Gymnasium*). The evidence also highlights advantages for students in schools with a more privileged composition, even when controlling for prior knowledge (Baumert et al. 2006; Gröhlich et al. 2010).

Becker et al. (2012) found that students attending the academic track had significantly larger increases in psychometric intelligence between grades 7 and 10, compared to a matched sample of students in non-academic tracks and controlling for relevant psychological and social background variables. Similar results were provided by Guill et al. (2017) based on a larger and more heterogeneous sample. Scharenberg et al. (2014) investigated the domain-specificity of track-specific developments at the beginning of secondary school (grades 5 and 6) and compared students' development in subject-related skills (reading, mathematics) and reasoning skills: They reported significant advantages after two years in secondary school for students in academic tracks and those with higher-performing schoolmates. Yet, although there were unique effects of school composition and tracking, they were highly confounded.

2.2   The Swiss Context and Research Interest

The Swiss education system at lower-secondary level is characterized by achievement-based grouping into tracks with different academic requirements (Swiss Education Server 2021). Tracking at lower-secondary level starts in grade 7, when students are aged approximately 12-13. Depending on cantonal and communal regulations, lower-secondary education is organized in different structural models: The streamed model (two to four tracks in separate schools with different educational requirements in all subjects) is the most common structural model in Switzerland, but it offers little permeability (EURYDICE 2021). However, in some cantons, students with different track affiliations are taught in "mixed-track" classes in all or some school subjects. In other cantons, students are entirely separated by track (for further information see the website of the Swiss Conference of Cantonal Ministers of Education [EDK], www.edk.ch).

At the transition from lower- to upper-secondary education, adolescents in Switzerland have to make a decision between general education and vocational education and training (VET) (e. g., Jüttler et al. 2021). This transition is often described as a "bottleneck" which young adults have to pass on their way to post-compulsory certification. In fact, a significant proportion of students fails to make this transition without any delay: For example, analyses of the TREE study show that after the first year following the end of compulsory education, about 20 percent of adolescents have not yet successfully managed the transition into a certifying general education or VET program at upper-secondary level (Keller et al. 2010; Scharenberg et al. 2016; Gomensoro and Meyer 2021). Such discontinuities at the entry into post-compulsory education may also represent a risk factor for further discontinuities in the educational pathway and for the acquisition of a post-compulsory certificate (e. g., Scharenberg et al. 2016). Thus, managing this transition is a central phase in young adults' lives and an important developmental task in (young) adulthood (Havighurst 1972).

With regard to previous research evidence for the Switzerland, Felouzis and Charmillot (2013) compared school tracking effects on educational inequality in 12 cantons. Drawing on data from the Swiss PISA 2003 sample, they found that the official structure of tracks is less important for explaining educational inequality than the way how tracking is actually implemented in schools (e. g., in terms of the degree of segregation). According to their analyses, some cantonal tracks are more unequal than others, with significant variation of the factors predicting inequality. Educational inequality was especially pronounced in tracks with basic requirements. Finally, multi-level analyses showed that tracking effects are closely linked to compositional effects of the student population within tracks.

Angelone (2019) analyzed track-specific achievement gains for students in the canton of Zurich from the end of primary education (grade 6) to the end of lower-secondary education (grade 9). In Zurich's three-track lower secondary system,

Angelone observed increasing track-related disparities of achievement (net of skills and individual social background) in German, with significant advantages for students in tracks with high requirements (*Gymnasium*) compared to a matched sample of students in tracks with extended (i. e., medium) requirements. Moreover, students in tracks with extended requirements achieved higher in German and mathematics than those attending tracks with basic requirements. Effect sizes for the differences between the three tracks were small, but meaningful ($d = 0.21–0.34$).

Neumann et al. (2007) found for a student sample in the German-speaking parts of the cantons of Valais and Fribourg that students' achievement development in French as a foreign language within one school year (grade 8) was significantly higher in tracks with extended academic requirements than in basic tracks, even when controlling for intake characteristics (including prior knowledge) at individual level. The study also provided evidence of advantages for students' achievement development due to a higher performing and socially more privileged school composition. However, these effects were confounded with institutional tracking effects.

When interpreting these research findings, we have to bear in mind that track-specific differences in students' development accumulate throughout the entire school career and across different school contexts and may continue to affect students' development even if they have already left a certain learning environment (Goldstein and Sammons 1997; Ditton 2013).

The above-mentioned findings notwithstanding, tracking effects on students' development have not yet been investigated as extensively for the Swiss context as for Germany (Angelone 2019). In fact, the focus of the existing studies in this field available to date is mostly on school performance. A deeper understanding of the interaction of tracking and school composition as well as their effects on other outputs or on *longer-term outcomes* therefore remains a substantial research gap. The present contribution therefore examines for Switzerland how differences in school contexts due to tracking as well as school composition affect students' transition after the end of compulsory education and may contribute to unequal educational opportunities in this crucial phase of adolescence.

3   Research Questions

Following the theoretical approach of Baumert et al. (2006) as outlined above, we conceptualize school contexts as differential institutional environments for students' development that – presumably – influence not only students' learning and achievement development at school, but also set the course for transitions into post-compulsory education, the labor market and the workplace (as suggested in the extended mediation model of school-contextual effects by Scharenberg 2019). Based on the aforementioned theoretical considerations and the review of research

literature, the aim of the present paper is to extend previous research by investigating effects of tracking and student body composition. As most of the above-mentioned research focused on achievement outputs, the present study addresses a research gap by examining the transition from lower- to upper-secondary education (and in the Swiss case: from compulsory to post-compulsory education) as an indicator of educational outcomes. With reference to the theoretical framework model (Baumert et al. 2006; Scharenberg 2019), our analytical focus is at the level of the institutional school context, where we strive to assess how school-level characteristics, i. e., differences in school composition resulting from tracking measures, affect students' individual post-compulsory pathways as educational outcome. We address the following three research questions (RQ):

1. Does students' lower-secondary track affiliation affect their probability of successful transition to post-compulsory education – over and beyond the effects of other student characteristics at individual level?
2. Are differences in lower-secondary school composition related to students' probability of successful transition to post-compulsory education?
3. Are there interaction effects between school composition in lower-secondary education and students' track affiliation?

4 Data and Methods

4.1 Data and Sample

We use data from the Swiss TREE panel survey (Transitions from Education to Employment). TREE is a multi-disciplinary large-scale panel survey in Switzerland that follows up on educational and occupational pathways of youths from the end of compulsory school (at an approximate age of 15 to 16) to young and middle adulthood, with panel waves at yearly intervals up to the age of 22–23 years, and at longer intervals thereafter (Hupka-Brunner et al. 2021).

TREE is a multi-cohort study with two cohorts: The first cohort (TREE1; TREE 2016b) draws on a baseline sample of $n = 6,343$ students who participated in PISA (Programme for International Student Assessment) 2000 and left compulsory education in the same year (TREE 2016a). In 2016, a second, comparable cohort study (TREE2; TREE 2021) was launched with a sample of students ($n = 9,762$) who had left compulsory education in 2016 (Hupka-Brunner et al. 2021). As its baseline survey, TREE2 draws on the Assessment of the Attainment of Educational Standards conducted in 2016 (AES 2016; for the complex survey structure see Verner and Helbling 2019). Both cohorts are nationally and regionally representative of almost 80,000 school-leavers in their last year of compulsory education (Hupka-Brunner et al. 2021).

With regard to our analysis sample, we first excluded students who had not participated in the first follow-up survey (cohort 1: year 2001, cohort 2: year 2017). Second, since our research questions relate, among other things, to the importance of lower-secondary tracking for the transition after compulsory education, we excluded students who had attended lower-secondary schools with no formal tracking. Third, we excluded schools with less than 10 participating students, as lower sample sizes at aggregate level are expected to lower reliability of the schools' average-based institutional variables. Applying these selection criteria resulted in an analysis sample of $n = 4,707$ students in 208 schools (cohort 1) and $n = 5,239$ students in 316 schools (cohort 2).

For both cohorts, analyses were based on weighted data (Sacchi 2013; forthcoming) to compensate for biases resulting from students' unequal selection probabilities due to disproportional baseline sampling and selective sample attrition, which is a common source of missing data in longitudinal studies (Little and Rubin 2020).

4.2 Measurements

Our *dependent variable* is students' successful (coded as 1) or unsuccessful transition (coded as 0) into certifying upper-secondary general education or VET programs within the first year after the end of compulsory education. In line with previous analyses based on TREE1 data (e.g., Keller et al. 2010), we considered transitions as successful if students experienced no delays or interruptions of any kind in their educational pathways between lower- and upper-secondary education (e.g., gap years, other "intermediate solutions" or the absence of any educational activity whatsoever; on the issue of delayed transitions see also Sacchi and Meyer 2016).

In our analyses, we follow an explanatory approach based on between-school differences, taking into account characteristics of the school context resulting from the sociocultural segregation between schools. When analyzing compositional aggregates, we accounted for the nested data structure (Hox et al. 2018). The respective individual characteristics that were used to generate these aggregates were also included in the estimation models as recommended by Harker and Tymms (2004).

Educational disadvantages due to different socialization and learning processes in the family and neighborhood context depending on the availability of economic, social, and cultural resources are well known (e.g., Ditton and Krüsken 2006a; Kristen and Dollmann 2010; Becker 2011; Angelone and Ramseier 2012). For the present study, we therefore relied on various student characteristics that are also elements of the theoretical framework model for the mediation of institutional effects (Baumert et al. 2006; Scharenberg 2019 – see Section 2).

As *predictor variables at individual level*, we included the following variables: Gender was used as a dummy-coded variable (reference: *male*). Students' cultural background was operationalized as the correspondence of the teaching language at school and the language mainly spoken at home (reference: *the teaching language*

Table 1 Description of Analysis Samples

	Cohort 1[a]		Cohort 2[b]	
	M	(SD)	M	(SD)
SES[c]	49.57	(16.09)	51.81	(16.38)
Math test score[d]	536.97	(94.12)	0.17	(1.39)
Gender (Girls)	50.7 %		49.2 %	
Teaching language mainly spoken at home	79.9 %		75.9 %	
Not in upper-secondary certifying education or training[e] in first post-compulsory year	22.9 %		19.1 %	
Track affiliation: extended requirements[f]	74.0 %		74.1 %	

Note. Descriptive statistics based on imputed ($m = 5$) and weighted data.
[a]School-leavers in 2000 (students: $n = 4{,}707$; schools: $n = 208$).
[b]School-leavers in 2016 (students: $n = 5{,}239$; schools: $n = 316$).
[c]Highest International Socioeconomic Index of Occupational Status (ISEI-88; Ganzeboom et al. 1992).
[d]Standardized achievement test in mathematics. Cohort 1: Mathematical literacy in PISA 2000. Cohort 2: Assessment of the Attainment of Educational Standards (AES) 2016 in mathematics, Weighted Likelihood Estimates (WLE).
[e]Percentage of youths not being in a certifying upper-secondary educational program, i.e., programs leading to a degree at ISCED level 3 (e. g., not pursuing any education or training at all or being in interim solutions such as internships, additional 10th year of schooling etc.).
[f]Attending lower-secondary tracks with high or advanced requirements at the end of compulsory school (grade 9).

does not match the language mostly spoken at home). This was used as an indicator of students' cultural proximity or distance to the cantonal education system, their opportunities for participation and involvement in school lessons as well as for personal exchange and communication with teachers and schoolmates. Social background was operationalized by means of the Highest International Socio-Economic Index of Occupational Status (HISEI; Ganzeboom et al. 1992). For reasons of comparability of both cohorts, we used the ISEI-88 classification, ranging from 16 (e. g., cleaner, unskilled farmworker) to 90 (e. g., courtroom judge).

As indicators of students' achievement and schools' differential intake selectivity, we controlled for students' PISA 2000 literacy test scores in the case of TREE1 (Adams and Wu 2002) and AES 2016 test scores in the case of TREE2 (Angelone and Keller 2019), respectively. We focused on students' test scores in mathematics, as this domain was assessed in both cohorts and allows comparability of the results obtained.

Regarding students' lower-secondary track affiliation at individual level, we distinguished between students attending tracks with basic (coded as 0) vs. extended requirements (i. e., high or advanced requirements, jointly coded as 1). Students attending schools with no formal tracking were excluded from our analyses. We handled students' track affiliation as an individual-level variable, as some cantons do not only apply between-school tracking, but also separate students by track within the same school (see Section 2). Descriptive information on key variables of both cohorts can be found in Table 1.

Table 2   Correlations of Analysis Variables

	(1)	(2)	(3)	(4)	(5)	(6)
Student level						
(1) Successful transition[a]	–	−0.06***	0.13***	0.13***	0.31***	0.32***
(2) Gender[b]	−0.13***	–	0.01†	0.00	−0.07***	0.05***
(3) Language[c]	0.14***	0.00	–	0.25***	0.22***	0.16***
(4) SES[d]	0.20***	0.01	0.19***	–	0.29***	0.29***
(5) Math test score[e]	0.32***	−0.12***	0.26***	0.29***	–	0.55***
(6) Track affiliation[f]	0.23***	0.08***	0.13***	0.27***	0.46***	–

	(7)	(8)	(9)	(10)	(11)
School level					
(7) Successful transition[g]	–	−0.02	0.36***	0.30***	0.52***
(8) Gender[h]	−0.07	–	0.05	0.04	0.08
(9) Laguage[i]	0.12†	0.23**	–	0.28***	0.41***
(10) SES[j]	0.56***	0.14*	0.30***	–	0.49***
(11) Math test score[j]	0.49***	0.09	0.55***	0.66***	–

Note. Correlations for cohort 1 (below diagonals) and cohort 2 (above diagonals). Correlations based on imputed ($m = 5$) and weighted data (school level: aggregation of weighted data).
[a] Successful transitions to upper-secondary education.
[b] Reference: male.
[c] Teaching language mainly spoken at home. Reference: foreign language.
[d] HISEI, z-standardized at student level.
[e] Standardized achievement test in mathematics, z-standardized at student level. Cohort 1: PISA 2000, cohort 2: AES 2016.
[f] Reference: basic academic requirements.
[g] Percentage of students at school level with successful transitions to upper-secondary education.
[h] Percentage of girls.
[i] Percentage of students mainly speaking the teaching language at home.
[j] Averages of standardized achievement test in mathematics. Cohort 1: PISA 2000, cohort 2: AES 2016.
***$p < .001$; **$p < .01$; *$p < .05$; †$p < .10$.

As *predictors at aggregate level*, we controlled for the schools' average social and achievement-related student body composition (aggregated by the school mean of math achievement and SES) as well as for ethnic school composition (percentage of students mainly speaking the teaching language at home). Before aggregating for multilevel analyses, HISEI and Math test scores were z-standardized ($M = 0$, $SD = 1$) to the grand mean of the respective cohort.

The intercorrelations of predictors on individual and aggregate level (see Table 2) were of an acceptable magnitude (see, e. g., Shieh and Fouladi 2003), so that the risk of multicollinearity is negligible.

4.3   Methodological Approach of Multilevel Analyses

Multilevel logistic regression analyses were performed with the software HLM (Raudenbush et al. 2019a; version 8.2.2.1) and specified at individual and aggregate level. Results are presented as odds ratios (OR). We chose a stepwise model specifi-

cation approach (Hox et al. 2018): First, in an unconditional model, we examined the variance decomposition of the dependent variable to estimate how much of the variance in students' probability of a successful transition to post-compulsory level was attributable to differences between students and between schools. Second, we simultaneously added student characteristics and their lower-secondary track affiliation as predictors at individual level (Model 1 relating to RQ1). Third, we estimated a fully specified model at aggregate level with all school composition characteristics (Model 2 relating to RQ2). Finally, we ran three different models with cross-level interactions between school-level variables and students' individual track affiliation to examine whether school composition effects were equally evident for students from tracks with basic and extended requirements or whether there were differential effects (Models 3–5 relating to RQ3). We do not report a fully specified model that simultaneously integrates all three interaction effects because the results did not lead to a meaningful interpretation. Comparisons of differently specified models were conducted by likelihood ratio (LR) tests implemented in HLM (Raudenbush et al. 2019a).

4.4 Missing Data

Regarding the independent variables gender and track affiliation, answers were complete for all students in the analysis sample in both cohorts. Single missing values regarding other student characteristics were estimated with a multiple imputation approach in SPSS 28 ($m = 5$ imputations). School composition characteristics were then calculated for each imputed data set after imputation. In the imputation model, we used all student characteristics that were later included as predictors in the outcome model. In addition, we used students' test scores in reading literacy as a predictor for imputation of cohort 1 data as – by design in the PISA 2000 baseline survey – math test scores were available for about only half of the cohort (55.6%) because the focus of PISA 2000 was on reading achievement. For other student characteristics, the proportions of missing data in cohort 1 were comparatively small (teaching language mainly spoken at home: 0.3%) and somewhat higher for SES (7.5%). In cohort 2, the proportions of missing values were generally low (between 0.1 and 1.8%). Estimates from the 5 data sets resulting from multiple imputation were appropriately combined in HLM when conducting multilevel analyses.

5 Results

5.1 Transition Rates, Students' Social Background and Achievement

Analyses of transition rates (data weighted and imputed) show that 22.9% of the cohort 1 school-leavers in our analysis sample failed to directly enter certifying upper-secondary education. Young women (71.9%) were significantly less likely to

successfully manage this transition than men (82.4 %; $\chi^2 = 66.46$, $df = 1$, $p < .001$). Students mainly speaking the teaching language at home showed significantly higher transition rates (79.9 %) than those mainly speaking another language at home (65.8 %; $\chi^2 = 77.57$, $df = 1$, $p < .001$). Students who made a direct transition to upper-secondary level are substantially more privileged in terms of social background ($M = 51.29$ for parental HISEI, $SD = 16.17$) than those who failed to do so ($M = 43.76$, $SD = 14.42$; $t(1379) = 13.50$, $p < .001$). Regarding achievement indicators, students with successful transitions achieved significantly higher math test scores ($M = 553.15$, $SD = 89.07$) than their unsuccessful counterparts ($M = 482.49$, $SD = 90.13$; $t(4237) = -11.82$, $p < .001$). Markedly unequal transition patterns were also observed depending on students' lower-secondary track affiliation: 39.4 % of basic-track students failed to directly enter certifying education programs at upper-secondary level, while this share is less than half as high (17.1 %) among those from tracks with extended requirements ($\chi^2 = 228.92$, $df = 1$, $p < .001$).

As regards cohort 2 leaving compulsory school in 2016, 80.9 % succeeded in directly entering a certifying upper-secondary level program, whereas 19.1 % failed to do so. The percentage of unsuccessful transitions was significantly higher among young women (21.6 %) than among men (16.6 %; $\chi^2 = 169.69$, $df = 1$, $p < .001$). Students mainly speaking the teaching language at home were significantly more successful (83.7 %) at this transition point than those mainly speaking other languages (72.0 %; $\chi^2 = 654.53$, $df = 1$, $p < .001$). As in cohort 1, the average parental socioeconomic index among those making a successful transition is significantly higher ($M = 52.84$, $SD = 16.37$) than among those failing to do so ($M = 47.43$, $SD = 15.70$; $t(51) = -22.67$, $p < .001$). Regarding school achievement indicators, students with successful transitions had significantly higher math test scores ($M = 0.38$, $SD = 1.34$) than those with unsuccessful transitions ($M = -0.71$, $SD = 1.27$; $t(248) = -63.58$, $p < .001$). With regard to the track attended at lower-secondary level and compared to cohort 1, the disparities proved to be even more accentuated: While 40.6 % of basic-track students failed to directly enter certifying education programs at upper-secondary level, the respective share among students from tracks with extended requirements was almost four times lower (11.5 %; $\chi^2 = 4{,}376.47$, $df = 1$, $p < .001$).

5.2 Decomposition of Variance

The variance decomposition of the dependent variable revealed significant variance components for both the first ($\tau_{00} = 0.91$) and the second cohort ($\tau_{00} = 0.48$). Accordingly, the intraclass correlations (ICC; for the ICC calculation for dichotomous variables, see Snijders and Bosker 2012) were $\rho = 0.217$ (cohort 1) and $\rho = 0.128$ (cohort 2), respectively (each $p < .001$). Thus, students' probability of successful transition significantly varied between schools. ICCs of this magnitude indicate the need for multilevel analyses. Therefore, it seemed justified to account for the

hierarchically nested data structure and to predict transition probabilities by both individual and aggregate-level characteristics.

5.3 Multilevel Analyses

The results of the multilevel analyses described below focus on the effects that relate to our aforementioned research questions. For both cohort 1 (Table 3) and cohort 2 (Table 4), our models confirm individual-level effects of socio-demographic and achievement-related characteristics that had been reported in previous research: At student level and controlling for the other individual characteristics in Model 1, we observe significantly lower transition rates for girls (cohort 1: OR = 0.59, $p < .001$; cohort 2: OR = 0.60, $p < .001$). As regards social origin, cohort 1 students with a higher SES were more likely to make a successful transition (OR = 1.25, $p < .001$), while the effect of (mainly) speaking the teaching language at home was insignificant. Interestingly, the opposite is true for cohort 2 (teaching language: OR = 1.22, $p = .022$; SES: OR = 1.00, n. s., respectively). With regard to math skills and lower-secondary track attendance – and for both cohorts –, the odds of a successful transition are significantly higher among students with higher math test scores (cohort 1: OR = 1.64, $p < .001$; cohort 2: OR = 1.61, $p < .001$) and for those having attended tracks with extended requirements (OR = 1.87, $p < .001$; OR = 2.96, $p < .001$). Including individual characteristics at student level significantly improved the goodness of fit compared to the unconditional model.

In the next step, the school composition effects were analyzed (Model 2) estimating the common effect of the school-level aggregates.

As regards cohort 1 (Table 3), Model 2 shows a surprising result: The odds of a successful transition are substantially lower in schools with a larger share of students who mainly speak the teaching language at home (OR = 0.12, $p = .001$). This result is by no means supported by the bivariate correlations conducted prior to the multi-level analyses (see Table 2). In-depth analyses revealed that the mentioned level-2 effect only occurred when math test scores and track affiliation were included as level-1 predictors in the model. The data at hand does not allow us to present a viable explanation for this level-2 effect, but it might be due to a subgroup of schools with both a high share of students speaking a language other than the teaching language at home and a high rate of successful transitions to post-compulsory education. A high proportion of students speaking other languages may also be an indicator of schools in urban areas, where the share of students entering VET is lower than in rural areas. When controlling for the other variables in the model (especially math test scores), it may be easier for students in urban areas to successfully manage this transition because general education programs are more readily available to them.[2]

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2   It should be noted that delayed entries into certifying upper-secondary education largely occur in the course of transitions to VET programs.

Table 3   Results from Multilevel Analyses Predicting Transition into Post-Compulsory Education by Student Background Characteristics, Track Affiliation and School Composition Variables (Cohort 1)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	CI[g]	OR	CI[g]	OR	CI[g]	OR	CI[g]	OR	CI[g]
Intercept	4.88***	(3.59, 6.62)	27.83***	(9.79, 79.06)	30.24***	(9.93, 92.03)	27.36***	(9.58, 78.11)	33.49***	(11.55, 97.06)
Student level										
Gender[a]	0.59***	(0.50, 0.69)	0.58***	(0.49, 0.69)	0.58***	(0.49, 0.69)	0.58***	(0.50, 0.69)	0.58***	(0.49, 0.69)
Language[b]	1.19	(0.96, 1.47)	1.29*	(1.04, 1.61)	1.30*	(1.04, 1.63)	1.30*	(1.04, 1.63)	1.30*	(1.04, 1.63)
SES	1.25***	(1.12, 1.39)	1.19**	(1.07, 1.33)	1.19**	(1.07, 1.32)	1.18**	(1.07, 1.32)	1.19**	(1.07, 1.32)
Math test score[c]	1.64***	(1.46, 1.84)	1.62***	(1.45, 1.82)	1.62***	(1.44, 1.82)	1.62***	(1.44, 1.82)	1.63***	(1.45, 1.83)
Track affiliation[d]	1.87***	(1.50, 2.34)	1.67***	(1.33, 2.10)	1.67	(0.49, 5.70)	1.80***	(1.36, 2.39)	1.58**	(1.19, 2.11)
School level										
% Students speaking the teaching language			0.12***	(0.04, 0.44)	0.11**	(0.03, 0.45)	0.12***	(0.03, 0.41)	0.11***	(0.03, 0.39)
SES (M)			3.21***	(1.85, 5.56)	3.07***	(1.79, 5.26)	2.53**	(1.29, 4.98)	3.08***	(1.79, 5.30)
Math test score (M)			1.20	(0.72, 1.99)	1.26	(0.76, 2.10)	1.24	(0.74, 2.07)	1.52	(0.80, 2.90)
Cross level interactions:										
track affiliation…										
… * % students speaking the teaching language					1.01	(0.23, 4.57)				
… * SES (M)							1.40	(0.67, 2.92)		
… * Math test score (M)									0.76	(0.39, 1.48)
Model comparison										
Deviance (-2LL)	12 448.92		12 407.94		12 403.55		12 401.62		12 402.84	
N parameters[e]	7		10		13		13		13	
Reference model	Empty model		Model 1		Model 2		Model 2		Model 2	
LR test (df)	309.44 (5)		40.98 (3)		4.39 (3)		6.32 (3)		5.10 (3)	
Significance[f]	<.001		<.001		.222		.150		.164	

Note: Estimation of odds ratios (OR). Continuous predictors on student level z-standardized. $n_{l1} = 4\,707$; $n_{l2} = 208$. Data weighted and imputed ($m = 5$).
[a]Reference: male. [b]Language: Teaching language mainly spoken at home. Reference: Other language mainly spoken at home. [c]Standardized achievement test in mathematics (Programme of International Student Assessment, PISA 2000). [d]Basic requirements.
[e]Number of estimated parameters.
[f]Significant improvement of model fit compared to reference model. Empty model: ICC = 0.217, $p < .001$; Deviance (-2LL): 12 758.37, $df = 2$.
[g]Confidence interval (lower bound, upper bound).
*** $p < .001$, ** $p < .01$, * $p < .05$. † $p < .10$.

A socially more privileged school composition proved to be advantageous for this transition in cohort 1: If the average HISEI at a school was above the average, there was a strong increase in students' likelihood of a successful transition (OR = 3.21, $p < .001$). The effect of attending schools with a higher-performing student body composition was insignificant (OR = 1.20, $p = .482$). Model 2 showed a higher goodness of fit compared to Model 1 ($p < .001$).

Finally, Models 3–5 examine, by means of the cross-level interactions, whether school composition effects on successful transitions vary by students' individual lower-secondary track affiliation. For cohort 1, for none of the examined school composition characteristics can we detect significant school-specific effects. Thus, the goodness of fit of each of these models is not improved compared to Model 2.

For cohort 2 (Table 4), we also observe segregation effects at school level: When taking into account all three compositional characteristics simultaneously (Model 2), only the achievement composition was a significant predictor (OR = 1.33, $p = .042$). However, the effects of the schools' sociocultural composition were insignificant in cohort 2 (percentage of students speaking the teaching language at home: OR = 1.58, $p = .294$; average SES: OR = 1.28, $p = .106$). Yet, this model led to a significant improvement of the goodness of fit compared to Model 1 ($p = .001$).

Finally, we examined differential school composition effects for students with different lower-secondary track affiliations. In contrast to the first cohort, Model 4 shows that the probability of successful transitions in schools with a higher average SES is higher for students from tracks with extended requirements than for those having attended tracks with basic requirements (OR = 2.11, $p = .001$), leading to a significantly higher overall goodness of fit than Model 2 (Δ-2LL = 9.31, $df = 3$, $p = .025$). In Model 5, significant track-specific effects emerge for the achievement-related school composition: The effect of having attended a higher-performing school was larger for students from tracks with extended requirements than for those from tracks with basic requirements (OR = 1.47, $p = .032$). Yet, this cross-level interaction effect between students' individual track affiliation and the achievement-related school composition did not yield a significant improvement of the model fit compared to Model 2 (Δ-2LL = 3.96, $df = 3$, $p = .266$), as the main achievement composition effect became insignificant (OR = 1.02, $p = .936$).

6   Discussion and Conclusion

A successful transition from lower- to upper-secondary education is one of the crucial milestones in setting the course for adolescents' future educational and professional biography (cf. Meyer 2003; Trautwein et al. 2008). A better understanding of individual and school-related factors fostering or hampering the success of this transition is an important element for the evaluation and improvement of

Table 4 Results from Multilevel Analyses Predicting Transition into Post-Compulsory Education by Student Background Characteristics, Track Affiliation and School Composition Variables (Cohort 2)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	CI[g]	OR	CI[g]	OR	CI[g]	OR	CI[g]	OR	CI[g]
Intercept	3.03***	(2.42, 3.79)	2.28*	(1.14, 4.56)	1.78	(0.82, 3.88)	1.99†	(1.00, 3.97)	1.98†	(0.98, 3.99)
Student level										
Gender[a]	0.60***	(0.52, 0.70)	0.59***	(0.51, 0.69)	0.95***	(0.51, 0.69)	0.60***	(0.51, 0.70)	0.59***	(0.41, 0.69)
Language[b]	1.00*	(1.03, 1.44)	1.17†	(0.98, 1.40)	1.17†	(0.98, 1.40)	1.17†	(0.98, 1.41)	1.17†	(0.98, 1.41)
SES	0.98	(0.92, 1.09)	0.98	(0.90, 1.07)	0.98	(0.89, 1.07)	0.98	(0.90, 1.07)	0.98	(0.90, 1.07)
Math test score[c]	1.61***	(1.46, 1.77)	1.52***	(1.36, 1.69)	1.52***	(1.36, 1.70)	1.51***	(1.35, 1.68)	1.51***	(1.35, 1.69)
Track affiliation[d]	2.96***	(2.50, 3.52)	2.91***	(2.44, 3.47)	4.71***	(2.32, 9.59)	3.22***	(2.67, 3.88)	3.18***	(2.62, 3.87)
School level										
% Students speaking the teaching language			0.12***	(0.67, 3.70)	2.19	(0.81, 5.93)	1.64	(0.70, 3.82)	1.68	(0.72, 3.91)
SES (M)			3.21***	(0.95, 1.73)	1.29†	(0.96, 1.74)	0.81	(0.52, 1.25)	1.25	(0.93, 1.69)
Math test score (M)			1.20	(1.01, 1.75)	1.33*	(1.01, 1.76)	1.28†	(0.98, 1.68)	1.02	(0.70, 1.48)
Cross level interactions:										
track affiliation...										
...* % students speaking the teaching language					0.53	(0.21, 1.34)				
...* SES (M)							2.11**	(1.35, 3.32)		
...* Math test score (M)									1.47*	(1.03, 2.10)
Model comparison										
Deviance (-2LL)	14069.34		14051.97		14050.69		14042.66		14048.01	
N parameters[e]	7		10		13		13		13	
Reference model	Empty model		Model 1		Model 2		Model 2		Model 2	
LR test (df)[f]	524.79 (5)		17.37 (3)		1.27 (3)		9.31 (3)		3.96 (3)	
Significance[f]	<.001		.001		.735		.025		.266	

Note: Estimation of odds ratios (OR), Continuous predictors on student level z-standardized. $n_{L1} = 5239$; $n_{L2} = 316$. Data weighted and imputed ($m = 5$). [a]Reference: male. [b]Language: Teaching language mainly spoken at home. Reference: Other language mainly spoken at home. [c]Standardized achievement test in mathematics (Assessment of the Attainment of Educational Standards, AES 2016). [d]Basic requirements.
[e]Number of estimated parameters.
[f]Significant improvement of model fit compared to reference model. Empty model: ICC = 0.128, $p < .001$; Deviance (-2LL): 14594.13, $df = 2$.
[g]Confidence interval (lower bound, upper bound).
***$p < .001$, **$p < .01$, *$p < .05$. †$p < .10$.

education systems. In this sense, the data of two representative cohorts of the Swiss TREE panel survey (Hupka-Brunner et al. 2021; TREE 2016a), which the present article draws on, provide a highly valuable resource for the further development of the Swiss education system.

The TREE data show that the percentage of school-leavers failing to gain direct, undelayed access to certifying upper-secondary level education dropped considerably (from 22.9 % to 19.1 %). However, the trend is not as progressive as could have been expected taking into account the 16-year time lag between 2000 and 2016, the changes in major context factors between the two cohorts (e. g., a better overall ratio of supply and demand in the VET market) as well as the further efforts undertaken to provide a higher level of VET promotion and structural measures (Gomensoro and Meyer 2021).

The analyses of the covariance structure of the two data sets (Tables 3 and 4) indicate a considerable link between students' individual characteristics and their probability to successfully manage the transition. Female students, students with lower math test scores and those speaking a language other than the teaching language at home showed a lower chance to succeed. This was also true for students having attended tracks with low academic requirements at lower-secondary level. The four mentioned effects occur independently of each other and therefore the associated disadvantages may cumulate for certain students. Addressing RQ1, students' lower-secondary track affiliation indeed affects their probability of successful transitions to upper-secondary level education beyond the effects of other individual characteristics considered at student level.

Interestingly, the comparison of the fully specified multivariate models across cohorts (Model 2 in Tables 3 and 4) suggests that the role of socioeconomic background at student level is less prominent in cohort 2 than in cohort 1, whereas the importance of having attended a lower-secondary track with extended requirements seems to have risen. This interpretation is supported by the pattern of bivariate correlations conducted prior to the multilevel analyses (Table 2) as well as by the descriptive average SES differences between students with successful transitions compared to those with unsuccessful transitions at this point (see section 5.1).

As mentioned above, transition rates to post-compulsory general or vocational education systematically vary between schools in both cohorts, and a significant and meaningful variance proportion could be linked to indicators of the student body composition, answering RQ2. Yet, the pattern of results suggests that the relative importance of the indicators taken into account at school level changed across this time period. As displayed in Tables 3 and 4, students' advantages in their transition to upper-secondary education due to a socioeconomically more privileged student body composition decreased in cohort 2 compared to the earlier cohort (Model 2). This finding reflects a decreased dependence of transition rates on the social composition of schools within the Swiss education system.

With regard to the impact of students' individual track affiliation, the analysis of cross-level interactions revealed two interesting results for cohort 2: In schools with a socioeconomically more privileged student composition (Model 4) as well as in schools with a higher average math performance (Model 5), students' transition into post-compulsory education was more closely associated with their individual track affiliation. In the latter model, the positive school-level effect of higher average math test scores (as previously shown in Model 2) became insignificant. Therefore, the positive results that were ascertained for schools with a higher performing student composition seem to be only due to those students attending tracks with extended requirements. Beyond these two cross-level effects, we observed no differential effects for cohort 1 or 2. So overall and addressing RQ3, between-school differences regarding school composition can indeed have the potential to affect the relationship between students' individual track affiliation and their probability of successful transitions, but this was observed for only two of the six examined cross-level interactions and only for cohort 2.

As mentioned above, the percentage of students of cohort 2 who failed to gain direct, undelayed access to upper-secondary education remained rather high. Taking into account individual and societal costs, the implementation of additional measures to support and mentor the transition process at this threshold as well as during the critical first year after leaving compulsory schooling seems advisable. Furthermore, we found that the rates of successful transitions considerably differed between schools and were related to the student body composition. These findings indicate that measures to compensate for the schools' differences in transition rates and disadvantaged compositional profiles would be appropriate to provide students with more equal chances of successful transitions. At the same time, our results demonstrate that students with certain individual characteristics face a substantially higher risk of a delayed or failed transition. This is particularly true when such individual risk factors accumulate, like being a girl, growing up in a home where the language mainly spoken is not the teaching language, showing lower school achievement and being affiliated to a school track with lower educational requirements. Therefore, students exhibiting combinations of such risk factors would be a rewarding target group for individual interventions that aim at increasing their chances of a successful transition into post-compulsory education.

With the present study, we certainly face some limitations: In our analyses, we only consider whether the transition appears to be successful one year after the end of compulsory education. We did not consider whether the transition finally led to a post-compulsory degree or whether students who failed to make the transition in the first year were successful at a later point in time. Furthermore, we neither distinguished between general education and VET, nor between the largely varying levels of (academic) requirements within VET. For further analyses, we plan to address these distinctions. Beyond this, we used a relevant, yet rather limited set

of indicators of school composition characteristics, as we drew on the theoretical framework model on mediation processes of school-contextual effects (Baumert et al. 2006; extended model by Scharenberg 2019), which aims at conceptualizing educational contexts as differential environments for learning and development.

In this sense, the present paper is an important attempt to apply this framework model to outcomes other than school achievement and to examine its relevance for post-compulsory educational and vocational trajectories. However, further variables associated with (successful) transitions, such as students' non-cognitive characteristics (e. g., learning motivation or academic self-concept) as well as information on the school culture and characteristics of their catchment area should be part of subsequent in-depth analyses, as transitions are complex and multi-factorial processes. Moreover, the comparability of the two cohorts is limited by differences in the study design and sampling, so that differences in the results cannot be unequivocally attributed to changes in the Swiss education system. Finally, when interpreting our results, one has to bear in mind that, for methodological reasons, we conceptualized lower-secondary tracking as an individual-level variable in our multilevel analyses (representing students' individual track affiliation).

Future research perspectives based on the present paper may relate to the question of how students in cohort 2 proceed on their further educational or vocational pathways. For upcoming TREE 2 panel waves, we plan to use the present analytical framework to study lagging effects of individual characteristics, tracking and school composition on students who have finished their post-compulsory education and obtained an upper-secondary certificate. We thus strive to identify individual and school-level risk factors that might hamper Swiss youths' educational progress and success.

In conclusion, our analyses extend the so far existing empirical knowledge on differential environments for learning and development by examining a key indicator of students' educational biography as outcome variable. Our findings underscore the importance of compositional and institutional characteristics for students' developmental trajectories into (young) adulthood as well as the need for educational and policy measures to counterbalance school-related risk factors.

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Smoother School-to-Work Trajectories in the Early 2010s? Evidence for School-Leavers With At Most Intermediate-Level Certificates and Regional Disparities in Germany

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Abstract: The study examines differences in the school-to-work trajectories (STWT) across time and federal states in Germany. It uses administrative data of school-leavers with at most intermediate-level certificates from 2009, 2011 and 2013. While the chances of a smooth STWT improved by increasingly favourable economic development after 2009, the relative disadvantage of school-leavers with low certificates continued. The probability of a problematic STWT remained unaffected and did not vary according to state differences in subsidized training schemes.

Keywords: School-to-work transition, short-term trends, subsidized training schemes, German federal states

Kontinuierlichere Übergänge Schule – Erwerbsleben in den frühen 2010er Jahren? Befunde für Schulabgänger:innen mit maximal Realschulabschluss und regionale Unterschiede in Deutschland

Zusammenfassung: Die Studie untersucht Unterschiede im Übergang von der Schule ins Erwerbsleben über die Zeit in den deutschen Bundesländern. Sie nutzt administrative Daten für Schulabgänger:innen mit maximal Realschulabschluss der Jahre 2009, 2011 und 2013. Trotz insgesamt besserer Chancen auf einen reibungslosen Übergang über die Zeit bestanden die relativen Nachteile von Schulabgänger:innen mit niedrigen Abschlüssen fort. Die Wahrscheinlichkeit eines problematischen Übergangs blieb unverändert und variierte nicht nach regionalen Unterschieden bei Übergangsmassnahmen.

Schlüsselwörter: Übergang Schule-Erwerbsleben, kurzfristiger Wandel, geförderte Übergangsmassnahmen, Bundesländer, Deutschland

Des transitions école-emploi plus lisses au début des années 2010 ? Constats sur les jeunes à certification faible ou moyen au niveau secondaire inférieur et différences régionales en Allemagne

Résumé : Cet article examine les différences dans les chances de transition au fil du temps et entre les Länder allemands. Il utilise des données administratives des jeunes sortant de l'école obligatoire en 2009, 2011 et 2013. Les chances d'une transition lisse se sont améliorées après 2009. Cependant, les désavantages relatifs aux jeunes sortant de filières à niveau bas et moyen ont persisté. La probabilité d'une transition problématique est restée inchangée et n'a pas varié en fonction des différences regionales entre les Länder.

Mots-clés : Transition école-emploi, changement à court terme, mesures de transition subventionnées, Länder allemands

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1   Introduction

The challenges faced by young people in the transition from school to working life depend, among other things, on the market and institutional conditions that young people find both in their local context and at the time of their leaving school (e. g., Hillmert et al. 2017). In Germany, labor market conditions have improved significantly since the mid-2000s. After an extended period of relatively high youth unemployment in the early 2000s, the unemployment rate began to decline after 2005, from a high of approximately 12 % to about 6 % in 2011. It then remained at a similar level before continuing to decline slightly from 2013 to 2019 (Statistics of the Federal Employment Agency 2022). Even the so-called Great Recession in the wake of the economic and financial crisis of 2008 and 2009 broke this trend only temporarily (Bell and Blanchflower 2011; Dietrich and Möller 2016).

Moreover, the German vocational education and training (VET) market has been marked by substantial changes since the early 2010s. Although training opportunities for young people have recently improved, young people interested in VET remain without training places, while, at the same time, training companies experience difficulties in filling their apprenticeship vacancies (BMBF 2015).

These developments in the VET market are perceived as alarming in political and public debates (e. g., BIBB 2016). The attractiveness of vocational training, the requirements of companies for trainees and the training interests of young people are at the core of the discussion. Trends toward academic education and – due to demographic changes – a declining number of youths contribute to complex shifts in the interests and opportunities of young people and companies. Against this background, the current debate focuses on strategies at the two ends of the education distribution, for raising the attractiveness of apprenticeships for students with *Abitur* (i.e., the German university entrance certificate) and for improving access to apprenticeships for students leaving school without or with low secondary school-leaving certificates (German *Hauptschulabschluss*). Students with an intermediate secondary school-leaving certificate (German *Realschulabschluss*) are often discussed as a reference group that meets the expected requirements in VET (e. g., Holtmann et al. 2019).

It remains unclear how the chances of young people with different school-leaving certificates are changing against the backdrop of the recent developments in the VET market. It has often been argued that school-leavers without or low certificates are most affected by changes in the opportunity structure (e. g., Jacob and Solga 2015), and accordingly may also benefit from the overall improved market situation with regard to their school-to-work transitions (STWT). In general, school-leavers without certificate or low certificates have been in the focus of the political debate because they are often forced to accept longer waiting periods until they find an apprenticeship. For young people who experience difficulties in the STWT, extensive subsidized training schemes exist. The schemes have been expanded, especially in

times of high youth unemployment. In the 2010s, the number of participants did decline, but not to an extent the overall improved economic conditions would lead us to expect (Euler and Nickolaus 2018). It is often argued that the schemes have become institutionally established as a constitutive pillar of German education policy (Jacob and Solga 2015; Kohlrausch and Islertas 2022) and are thus dependent on its federal structures. Although schemes are also provided by the German Federal Employment Agency (FEA), they are largely federal state programmes (Autorengruppe Bildungsberichterstattung 2010). The number and type of schemes vary across federal states, thus providing varying opportunity structures at the regional level (Kohlrausch and Islertas 2022).

In this paper, we investigate the disparities in the transition from school to working life between students with low and intermediate school-leaving certificates in Germany, and we examine whether these disparities vary by the opportunity structures according to time and location at which one leaves school. How did the chances of experiencing a smooth transition from school to working life change for school-leavers with school-leaving certificates at lower and intermediate levels in the early 2010s? Do trends differ depending on the volume of available training schemes in the federal states?

Using longitudinal administrative data on the STWT of school-leavers from 2009, 2011 and 2013, we examine transition trajectories over several years as outcomes, which allows us to understand differences in STWT from a holistic perspective. By doing so, we can distinguish the STWTs of young people who face no or only temporary transition problems from those with persistent difficulties. This approach is fruitful for describing the social and context characteristics relevant in the STWT and for discussing policy implications (e. g., Dorsett and Lucchino 2014).

Our study contributes to existing research in the following ways. First, it extends the research on social inequalities in the STWT in the late 2000s and early 2010s in Germany (e. g., Holtmann et al. 2019; Achatz et al. 2022; Busse 2020; Brzinsky-Fay 2022) which has not yet addressed changes in the period of changing opportunity structures in the VET market. By doing so, our study takes into account the importance of short-term trends that are often hotly debated in politics and public discussion (Hillmert et al. 2017). Second, our study builds on previous research regarding the importance of regional contexts in the STWT, mainly local labour market conditions, for moderating social inequalities (Weßling et al. 2015; Hillmert et al. 2017; Bacher et al. 2017; Eckelt and Schauer 2019). To date, little research has considered how regional differences in educational and labour market policies account for heterogeneity in the STWT (Bacher et al. 2017). Our study specifically focuses on differences in subsidized training schemes that are primarily regulated at the level of the German states (Länder), controlling for further local labour market conditions.

2 The German Context and Developments

2.1 Vocational Education and Training

In Germany, STWTs are shaped by a highly standardized and stratified VET system (Kleinert and Jacob 2019). Company-based apprenticeships constitute a major part, with approximately 500 000 new entrants each year (Autorengruppe Bildungsberichterstattung 2020). Apprenticeships provide 2.5 to 4 years of occupation-specific training, mainly in industries, crafts and trades. The acquisition of skills at the workplace, in combination with general education in schools, provides advantages in terms of prospects for qualified employment and career development within the training company (e. g., Franz and Zimmermann 2002). Moreover, approximately 200 000 young people take up full-time school-based VET programmes for largely intermediate-level white-collar occupations in the health, social, and media sectors.

Depending on the school-leaving certificate acquired in compulsory lower-secondary education[1], young people are allocated to different VET segments (Protsch and Solga 2016). Most full-time vocational schools formally require at least an intermediate-level school-leaving certificate, whereas access to company-based apprenticeships is not formally regulated. Here, companies act as gatekeepers with regard to applicant selection (see section 3.2).

The supply of apprenticeship positions by firms and the demand for positions from young people have changed in the early 2010s. In the wake of the Great Recession, supply increased from approximately 580 000 registered positions offered in 2009 to approximately 600 000 in 2011 and declined again thereafter (BIBB 2014). With regard to demand, fewer and fewer young people aspired to obtain apprenticeships over the years; the numbers declined from 653 000 VET applicants in 2009 to 614 000 in 2013 (BIBB 2014). One reason for this decline has been the decreasing number of students in low- and intermediate-level lower secondary schools. Moreover, an increasing number of young people are investing in academic education (Dionisius and Krekel 2014). The number of training positions that remain vacant at the beginning of the training year each September has increased significantly over the years, from 18 000 in 2009 to approximately 34 000 in 2013. At the same time, approximately 88 000 young people in 2009 and 84 000 in 2013, respectively, remained without an apprenticeship position (BIBB 2014). The figures illustrate the mismatch on the vocational training market.

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1   Germany has a highly tracked school system. Students are usually separated into different tracks after 4th grade, in some states (German *Länder*) after 6th grade. At the end of lower secondary education, students leave compulsory school education with a low certificate (German *Hauptschulabschluss*) or an intermediate certificate (German *Realschulabschluss*). Some students leave school without a certificate. Formally, the certificates can be obtained at different types of schools.

2.2   Subsidized Training Schemes

Vocational preparation programmes and short-term training courses provided by vocational schools, companies and training providers are available for young people who experience problems finding apprenticeship positions. In sum, the schemes form the so-called transition segment of the German VET system, which is a term used in official reports to distinguish them from fully qualifying VET (e. g., Autorengruppe Bildungsberichterstattung 2010; 2018). The schemes intend to prepare school-leavers to take up regular apprenticeships and do not lead to a vocational qualification (BIBB 2018). Although the schemes differ in terms of objectives, target groups and design, Dionisius and Kreckel (2014) refer to three common key functions. First, young people are guided to training maturity by learning basic vocational skills and gaining vocational orientation. Second, young people are given the opportunity to complete a (lower secondary) school-leaving certificate. Third, the schemes provide a bridging opportunity for young people who are ready for training but have not found a training place in the current training year. Some programmes also cover compulsory education up to the age of 18.

The "transition segment" can also be defined more broadly if other alternatives to regular apprenticeships are considered (e. g., Ulrich 2008). These alternatives comprise out-of-company vocational training, as well as some full-time school-based programmes in occupations that apprenticeships usually train for (Lex and Geier 2010; Eckelt and Schauer 2019). These fully qualifying programmes are geared to young people who have dropped out of apprenticeships, including trainees affected by company insolvencies or the deterioration of the training market in the eastern states after the German reunification. In addition, depending on the general educational system of the federal states, specialized upper secondary schools, grammar schools or commercial schools can be alternatives to apprenticeships for young people with intermediate-level secondary school-leaving certificates (Ulrich 2008).

According to the definition of the "transition segment" applied in the official reports, in 2008, 34 percent of all new entrants into VET entered subsidized training schemes instead of fully qualifying apprenticeships or school-based programmes (Autorengruppe Bildungsberichterstattung 2010). The share of new entrants into the "transition segment" ranged from more than 40 % in Schleswig-Holstein, Lower-Saxony, and Baden-Württemberg to slightly above 20 % in Bavaria, Saxony-Anhalt and Saxony (Table 1) (Autorengruppe Bildungsberichterstattung 2010). From 2008 to 2012, the shares decreased in all states, but did so to varying degrees (Autorengruppe Bildungsberichterstattung 2010; 2014). For example, the decline is not consistently sharpest in the states with the highest shares in 2008 either. Overall, the ranking of the states according to shares of new entries into training schemes remains largely the same during the observation period.

Differences across the German federal states have arisen in response to regional economic conditions and structures in the VET market (Kohlrausch and Islertas 2022).

Table 1   Share of New Entrants into Subsidized Training Schemes in All
                 Entrants into Vocational Training and Education*, 2008 and 2012

	2008 (in %)	2012 (in %)	Difference 2008–2012 (in percentage points)
Schleswig-Holstein	46.7	30.5	16.2
Lower-Saxony	42.6	34.1	8.5
Baden-Württemberg	40.3	37.2	3.1
Saarland	38.2	30.5	7.7
North Rhine-Westphalia	36.4	27.4	9.0
Rhineland-Palatinate	36.4	28.4	8.0
Hessen	32.4	25.1	7.3
Bremen	32.2	28.0	4.2
Mecklenburg-Vorpommern	27.9	15.9	12.0
Brandenburg	27.5	15.5	12.0
Hamburg	27.0	20.6	6.4
Berlin	25.7	18.9	6.8
Thuringia	24.6	15.8	8.8
Bavaria	23.7	15.5	8.2
Saxony-Anhalt	21.9	19.3	2.6
Saxony	21.6	14.5	7.1

*All young people who start either apprenticeships, fully qualified training in vocational schools or programmes in the "transition segment". Source: Autorengruppe Bildungsberichterstattung 2010; 2014.

Structures may remain stable over time when recurrent cooperation and interaction between central actors have become institutionalized (e. g., Martin and Sunley 2006). In the case of the subsidized training schemes, established structures exist as part of the educational planning of the federal states, as well as when providers of training schemes have established cooperations with the FEA or in regional educational networks. The importance of regional institutional cooperation, networking and coordination in Germany has been increasingly emphasized (e. g., BIBB 2009; Stöbe-Blossey et al. 2019).

3   Theoretical Perspectives

3.1   The Ideal Type of Smooth STWT and Variations

The life course approach stipulates that institutions of the welfare state and the labour market shape the course of individual lives (Kohli 1985). How the transition from school to working life evolves is particularly determined by the established vocational training programmes, their availability and their duration and regulations regarding access and content (see Section 2.1). They are also influential for young people's expectations and expectations of relevant others, such as teachers, career

counsellors or parents, as to when and which transitions are made (e. g., Heinz and Krüger 2001). From this perspective, the STWT process, as a series of single steps and decisions, is structured by opportunities shaped by the educational and vocational training system in the labour market (Meulemann 1990). The resulting transition patterns, or trajectories, reflect social structures in the STWT because groups of young people pass through similar stages at similar points in time (Sackmann and Wingens 2003) and because differences in the transition to VET have an impact on the later entry into the labour market (Blossfeld 1990).

In Germany, normative ideas about the ideal-typical linear STWT are particularly determined by the predominant role of apprenticeships (Heinz 1999) and social expectations with respect to the integrative power of a smooth transition from school to apprenticeships and thence to employment (e. g., Brzinsky-Fay 2007; Brzinsky-Fay and Solga 2016). Particularly for young people with lower secondary school-leaving certificates, apprenticeships are considered the "royal road" to employment, as, due to their low formalization of access rules, they are seen as the most accessible form of VET (Eckelt and Schauer 2019; Protsch and Solga 2016).

Although a large group of young people with low and intermediate school-leaving certificates still pass directly from school to apprenticeships and from apprenticeships to regular employment, recent analyses also illustrate the diversification of STWT (e. g., Hupka-Brunner et al. 2011; Geier 2013; Kohlrausch and Richter 2016; Holtmann et al. 2019; Autorengruppe Bildungsberichterstattung 2020; Busse 2020; Achatz et al. 2022; Brzinsky-Fay 2022). The results also show that the subsidized training schemes play a formative role in this. While some scheme participants take up regular vocational training, others face problematic trajectories in which access to VET is delayed by several years or never takes place. Thus, literature critically examines whether and for which young people the schemes are mere temporary alternatives or "waiting loops", and for which groups the measures build up qualifications and create or even improve opportunities (e. g., Lex and Geier 2010, Heinz 2014; Holtmann et al. 2019; Holtmann et al. 2021).

3.2   Disparities in Access to a Smooth STWT by School-Leaving Certificates

Theoretically, disparities in the STWT by school-leaving certificate arise from the competition for apprenticeships and the associated subsequent transition to gainful employment. School-leavers who are interested in apprenticeships must apply for VET positions and are then recruited by companies seeking trainees. Human capital theory explains differences in access to apprenticeships according to productivity differences that depend on educational investment (Becker 1993). Since the productivity of applicants for apprenticeships is not directly observable, school-leaving certificates are used in the recruitment process as easily observable signals (Spence 1973). Thus, companies prefer young people with higher school-leaving certificates to those with lower school-leaving certificates.

Thurow's (1979) job competition model further specifies that the relative position of the applicants in the job queue matters. This model assumes that employers rank the applicants according to their assumed trainability so that school-leavers with higher certificates are ranked higher. Employers recruit trainees from the queue until all vacant training positions are filled. Thus, school-leavers' chances to enter apprenticeship depend on the number of applicants as well as on the number of positions available.

Economic conditions play a role in this model. When companies provide more apprenticeship positions in times of economic upswing, such as in the early 2010s, more young applicants are recruited from the queue and can directly enter apprenticeship.

› Hypothesis 1: Young people leaving school in the years after 2009 are more likely to transition smoothly from school to work compared to school-leavers from 2009.

Trends toward higher education play a role in the relative ranking of school-leavers with lower school-leaving certificates. When more school-leavers with intermediate-level school-leaving certificates decide to continue in general education, school-leavers with no or low certificates consequently move ahead in the queue of applicants. Thus, it is assumed that school-leavers with no or low school-leaving certificates benefit more from the general economic trends post-2009. In fact, they may catch up with school-leavers holding intermediate-level certificates, leading to less inequality in the STWT between school-leavers with different certificates.

› Hypothesis 2a: Differences in the chances of a smooth STWT between school-leavers with no or low school-leaving certificates and school-leavers with intermediate-level certificates will decrease over the period of observation.

However, this expectation is dimmed by further evidence on discrediting and stigmatizing of school-leavers with at most low secondary school-leaving certificates as lacking the necessary skills and maturity to start VET. From this perspective, school-leavers with no or low school-leaving certificate may be excluded from the applicant queue altogether (e. g., Solga and Kohlrausch 2013). The disadvantageous situation of school-leavers with low certificates is exacerbated if they refrain from actively searching for VET training places because they expect to fail from the very start (e. g., Solga 2002; 2005).

› Hypothesis 2b: School-leavers with no or low school-leaving certificates have consistently high risks of a problematic STWT compared to those with intermediate-level certificates.

In addition to apprenticeships, the available subsidized training schemes provide opportunities for school-leavers, particularly low-qualified young people. Scheme

participation depends on institutional allocation processes, as well as on the educational choices of the school-leavers themselves (Rahn et al. 2016). The young people may choose the programmes as an alternative to regular training if they expect difficulties in finding an apprenticeship and decide to take the opportunity to catch up on or improve their school-leaving certificate (Lex and Geier 2010). Moreover, gatekeepers such as career counsellors assign young people to training schemes who are not considered "mature" enough for vocational training or those who cannot find an apprenticeship (e. g., Leuze et al. 2011).

The regional availabilities of training schemes are expected to feed into the preferences of young people when they emulate what their peers do after leaving school. This assumption has been spelled out with regard to the relation between regional occupational structures and occupational aspirations (e. g., Flohr et al. 2020), but may be of similar relevance for training programmes. If school-leavers know peers who are in subsidized training schemes, they may specifically search for these opportunities when it comes to decide what to do after school. Moreover, career counsellors and other relevant persons such as teachers can direct young people to available subsidized training schemes. Procedures for allocating scheme places are of relevance here. Allocation regimes of schools are based on fixed quotas as well as the purchase of scheme places from providers by the FEA. In sum, we assume that school-leavers without certificate or low certificate are more likely to be diverted from smooth STWTs via apprenticeships, if more alternatives to regular VET are available.

› Hypothesis 3: The larger the share of subsidized training schemes in all VET opportunities offered in the federal state is, the greater the differences between school-leavers with no or low certificates and intermediate-level certificates are with regard to their chances of a smooth transition (Hypothesis 3a), and the more stable the differences by school-leaving certificates are over time (Hypothesis 3b).

4   Data and Methods

4.1   Data

We use administrative data from the German FEA. First, we use data from the career counseling (CC) procedures and draw a 5 percent random sample of young people who were registered for CC in 2009, 2011 and 2013. The data cover all young people who were seeking advice from the CC service or who were searching for apprenticeships via the FEA. As not all students in Germany take up the services of the FEA, implying that the data do not represent all school-leavers in the selected years. The scarce evidence available regarding the take-up of CC in Germany suggests that CC is particularly promoted in low-track lower secondary schools (German

Hauptschulen), while take-up is hardly correlated with individual characteristics and parental background (Fitzenberger et al. 2020). With the official statistics at hand, we can see that the shares of students from low-track schools are slightly overrepresented in the CC data compared to their share among all school-leavers in Germany (Autorengruppe Bildungsberichterstattung 2010; see also Achatz and Schels 2020).

The CC data provide information on the school-leaving year, which is necessary to restrict the samples to school-leavers. As the CC data are available only for the period from 2008 onward, we have to limit the analysis to the selected years. The CC data also provide individual information such as gender, school-leaving certificate and nationality. We restrict the samples to those aged 21 or younger who completed a general education with a lower or intermediate school-leaving certificate. We add information drawn from the data of the occupational rehabilitation services.

The CC data are merged with data from the Integrated Employment Biographies (IEB) provided by the Institute for Employment Research (IAB) to obtain a longitudinal dataset for the post-compulsory school career. The IEB spell data provide individual information about periods of standard and marginal employment, apprenticeship, unemployment, receipt of unemployment insurance benefit, receipt of means-tested basic income support (welfare benefit), participation in training schemes and other active labour market programmes (Dorner et al. 2010). The information is confined to activities in the core business of the FEA. Thus, it should be mentioned here that the data do not contain information on periods in school-based vocational training, general education, subsidized schemes in programmes provided by the federal states or non-standard employment or non-employment (e. g., self-employment, civil servant or homemaker). The structure of the spell data allows us to precisely track the start and the end, though not the type of these unreported activities.

The data for the analysis comprise information on the labour market biographies of 31 643 individuals, namely, 10 502 school-leavers from 2009, 10 361 from 2011 and 10 780 from 2013. To cover the formative period of vocational education and entry into working life, we observe 66 consecutive months beginning in July of the year of leaving school for each individual.

The individual data are combined with regional context data. Information on the participants in subsidized training measures by federal states is available from the Integrated Reporting on Education and Training (iABE) (Dionisius and Krekel 2014) as reported in the National Educational Reports (Autorengruppe Bildungsberichterstattung 2010) and the Federal Statistical Office. Further information on regional unemployment and school-leaving cohorts is measured at the level of administrative districts (German *Kreise*), made available by the Federal Statistical Office.

4.2   Operationalization

Dependent variables

We examine differences in the STW trajectories by applying sequence analysis and cluster analysis. In the longitudinal data, we assign one of nine unique labour market states to each month after leaving school (see Table A1, online appendix[2]). We apply the optimal matching algorithm to measure the (dis)similarity of the individual STWT sequences (Elzinga 2003), and we fix the costs of insertion and deletion operations at the value of 1 and substitution costs at the value of 2. The resulting distance matrix is used in a hierarchical Ward cluster analysis to group similar sequences into clusters of ideal-typical transition patterns. This procedure is a replication of our analysis for a single school-leaver cohort from 2008 (Achatz et al. 2022). For the school-leavers in 2009, 2011, and 2013, we find a comparable fine-grained cluster solution. The identified nine clusters show the heterogeneity of the STWT. For reasons of clarity, we restrict the following analysis to three selected trajectories.[3] Figure 1 displays the selected trajectories as sequences of all the individuals in each pattern (upper plot), aggregate monthly distribution of labour market states (middle plot), and the most frequent status per month (lower plot).

Figure 1   School-to-Work Trajectories (Sequence Index Plot, Status Proportion Plot, Modal Plot)
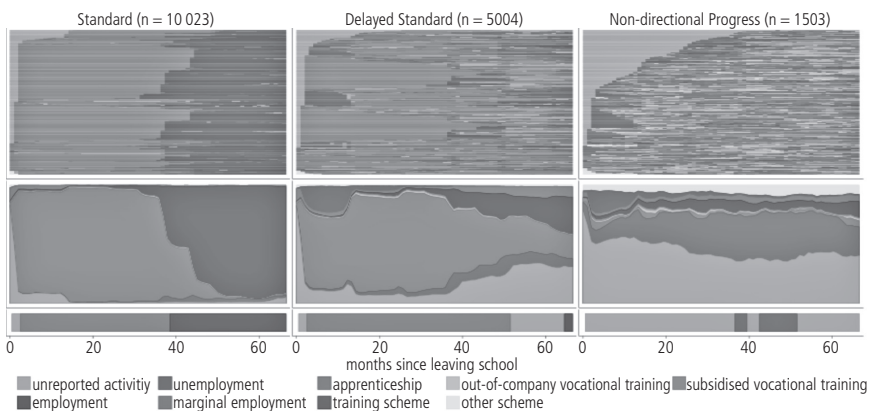
Note: Pooled number of observations for school-leavers of school leaving years 2009, 2011, and 2013, sequence index plots (upper panel) are plotted for randomly selected 500 individuals each. Source: Career counseling data, Integrated Employment Biographies.

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2   Additional material is available online under https://doi.org/10.6084/m9.figshare.23592795.v1.
3   Table A2, online appendix, reports the distribution of all nine STW trajectories.

› Standard transition: the school-leavers are in an apprenticeship for an average of three years before entering regular employment until the end of the observation period.
› Delayed standard transition: the school-leavers pass from an apprenticeship to employment, but experience periods of scheme participation or unreported activities before entering an apprenticeship and short periods of unemployment mainly at the transition into employment. The overall transition is delayed.
› Non-directional progress: the school-leavers flounder between diverse labour market states (Vuolo et al. 2014), including repeated unemployment and participation in active labour market programmes, such as training schemes.

The three trajectories represent the relevant variation in the complexity and diversity of the transition processes. In the smooth standard trajectory, the socially expected activities of apprenticeship and employment follow one another almost without an interruption (see also Brzinsky-Fay 2007). The delayed standard trajectory is marked by temporary breaks before and after apprenticeship. The non-directional progress trajectory is highly problematic, as young people do not experience stable apprenticeships or employment during the entire observation period. The three patterns can be clearly interpreted based on our data and are not blurred by long periods with other activities that are not reported in the administrative data used.[4]

Independent variables

Our main independent variables of interest are the year of leaving school (2009, 2011, 2013) and the type of school-leaving certificate at the end of lower secondary education. We differentiate between school-leavers with intermediate certificates (German *Realschulabschluss*) and school-leavers with low certificates who left school either without any certificate or a German *Hauptschulabschluss*. We control for welfare receipt in the household, gender, foreign nationality and participation in vocational rehabilitation, a scheme for people with disabilities and therefore an indicator for special needs. These are well-known factors influencing the STWT (e.g., Achatz et al. 2022; Reims and Schels 2022).

We use several indicators for differences in the overall opportunity structures at the federal state level. We are particularly interested in the share of new entrants into subsidized training schemes among all entrants into VET. In order to capture the ranking between the states (see Section 2.2), we calculated the average of the shares from 2008, 2010 and 2012 for each state. As school-leavers' alternatives to apprenticeships depend on the educational system in their federal state (see Section 2.2), we use two further indicators as context controls. First, we consider the

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4   It should be noted that variants of smooth standard transitions via vocational schools and general education may remain hidden in other clusters where the data report no entries either for a longer period or for the whole observation period (see Figure A1, online appendix, see also Achatz et al. 2022).

Table 2 Independent Variables, Description

Individual level		
Variable	%	
School-leaving year		
2009	33.2	
2011	32.7	
2013	34.1	
Low-level school-leaving certificate (Ref: intermediate)	38.9	
Welfare receipt in the three years before leaving school		
no receipt	77.6	
up to 23 months	14.7	
24 months and longer	7.8	
Non-German nationality (Ref.: German)	10.4	
Female (Ref.: male)	45.9	
Person in vocational rehabilitation (Ref.: no)	5.5	
total	100.0	(n = 31 643)

Regional level				
Variable	Level	mean	std. dev.	n
Share of new entrants into transition segment	individual	0.27	0.08	31 643
	federal state	0.27	0.08	16
Share of students in school-based alternatives	individual	0.05	0.04	31 643
	federal state	0.06	0.05	16
Ratio of students in general vs. vocational education at upper secondary level	individual	0.65	0.14	31 643
	federal state	0.60	0.16	16
Local unemployment rate	individual	0.08	0.04	31 643
	administrative district	0.08	0.04	402
Local share of school-leavers with university entrance diploma among all school-leavers	individual	0.33	0.10	31 643
	administrative district	0.33	0.10	402

Source: Career counseling data, Integrated Employment Biographies, Federal Statistical Office.

availability of school-based alternatives as indicated by the share of participants in school-based vocational training among all new entrants in fully qualifying vocational training courses. Second, we account for the availability of alternatives in general education indicated by the ratio of students in upper secondary general education compared to VET. We use further indicators to control for the local situation in the vocational training market (e. g., Hillmert et al. 2017). We control for unemployment rates as an indicator for the economic situation. We also use the regional share of school-leavers with a German Abitur among all school-leavers, which is an indicator for competition between school-leavers (Kleinert and Kruppe 2012).

For the multivariate analysis, all context-level variables are z-standardized. To specify possible nonlinear associations, the squared terms of the variables are also included in the models. Table 2 provides an overview of all independent variables.

4.3   Methods

We estimate multilevel models that consider the hierarchical data structure where individuals (level 1) are nested in regional labour markets at the level of administrative districts (level 2) and in federal state contexts (level 3). We specify linear probability models (LPMs) to estimate the probabilities of passing trajectories using the Stata command mixed (see Bacher et al. 2017; Rabe-Hesketh and Skrondal 2008 for further information).[5] We separately estimate several models for each of the three selected trajectories. We estimate a model with school-leaving year as the only covariate to disentangle the variance at the individual level and federal state level beyond trends (Model 0) and a model with the defined set of individual and context covariates (Model 1). Of particular interest for the investigation of trends in disparities by school-leaving certificates is a model with interaction effects between school-leaving certificate and school-leaving year (Model 2). We specify Model 3 with a cross-level triple interaction of school-leaving certificate, school-leaving year and share of new entrants into subsidized training schemes at the federal state level to model how trends differ across regional contexts. We graphically present the results of the models with interaction terms by predicting the probability of being in a specific transition pattern according to school leaving year and level of school-leaving certificate.

5   Results

First, we explore how the chances of experiencing a smooth transition have developed overall across the school-leavers of different years (see also Table A2, online appendix). In our sample of school-leavers with low and intermediate certificates, the standard STWT is the largest cluster. 30 percent of the school-leavers in 2009 passed a standard STWT, compared to 32 % of the school-leavers in 2011 and 33 % of those in 2013. At the same time, the share of young people in the delayed standard transition declined; 18 % of the school-leavers of 2009 are to be found in this transition pattern, compared to 16 % of the school-leavers of 2011 and 14 % in 2013. The findings support Hypothesis 1 that the chances for a smooth STWT improved for young people who left school in the economic upswing that occurred after 2009. In contrast, the shares of school-leavers who are in the problematic

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5   Even though multinomial logistic regressions would be an appropriate alternative for the dependent variable, LPM eases both the interpretation of the results, particularly the interaction terms, and comparison across different model specifications.

trajectory of non-directional progress hardly change over time. The share is 5 % among the school-leavers in 2009 and 2011 and 4 % among the school-leavers in 2013. The findings of linear multilevel regression models support the trends (see Model 0, Tables A3 [standard transition], A4 [delayed standard transition] and A5 [non-directional progress], online appendix).[6]

Next, we ask how the transition chances of school-leavers with low and intermediate certificates vary by school leaving year, as addressed in Hypotheses 2a and 2b. Figure 2 presents the predicted probabilities for the selected trajectories estimated from the models with interaction terms between school-leaving year and certificate

Figure 2   Predicted Probabilities of Experiencing School-to-Work Trajectories by School-Leaving Year and School-leaving Certificate (n = 31 643)
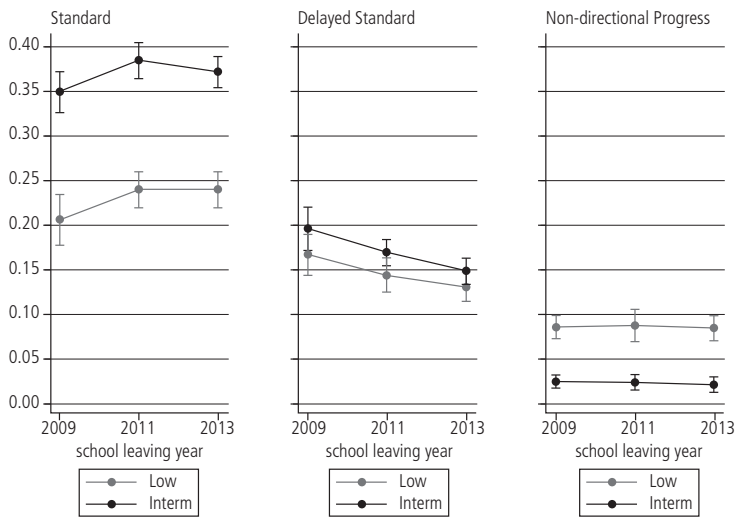
Notes. The results from separate multilevel linear probability models for each outcome, 95% confidence intervals, prediction from Model 2 (see Tables A3 [standard transition], A4 [delayed standard transition] and A5 [non-directional progress], online appendix). Control variables on individual level: gender, German nationality, welfare receipt in the family, participant in vocational rehabilitation; control variables at regional level: share of new entrants into transition segment, share of students in school-based alternatives, ratio of students in general/vocational education, local unemployment rate, share of school-leavers with university entrance diploma. Source: Career counseling data, Integrated Employment Biographies, Federal Statistical Office.

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6   The multilevel linear probability models with school-leaving year as the only covariate (Model 0) allow us to capture the share of variance in the outcomes at the federal state level and regional level (see Tables A3, A4, A5, online appendix). We find rather minor differences in the probability of engaging in a specific trajectory between federal states and regions, conditioned only on the school leaving year. As discussed in previous research on regional differences in STWT (Bacher et al. 2017), this is also due to models with binary outcome variables and rather large variance at the individual level. We are still able to identify significant context variable effects. Including further covariates in Models 1–3 reduces the remaining state-level and region-level variance.

(Model 2). The trends over school-leaving years, as previously described, are almost parallel for school-leavers with low school-leaving certificate and intermediate-level certificate. Both groups face a higher probability of making a standard transition when leaving school in 2011 or 2013 compared to 2009 and a lower probability of experiencing a delayed standard transition. Compared to their peers with intermediate-level certificates, school-leavers with low certificates stably face an approximately 12 percentage points lower predicted probability of experiencing a smooth standard transition and an approximately 3 percentage point lower predicted probability of experiencing a delayed standard transition. Contrariwise, the predicted probability of non-directional progress is consistently approximately 6 percentage points higher among school-leavers with low certificates than among their peers with intermediate-level certificate. Thus, we find no evidence for Hypothesis 2a that school-leavers with low certificates have particularly benefited from the overall better conditions in the period of observation. The social differences have not been reduced over time. However, with regard to the probability of non-directional transitions, there is support for Hypothesis 2b. There is a subgroup of low-qualified school-leavers who have consistently high risks, regardless of the overall improving conditions for others.

Finally, we examine whether the trends in disparities by school-leaving certificate vary by the context conditions, as defined by the available training schemes in the federal states. Figure 3 shows the findings from Model 3, with a three-way interaction between school-leaving year, school-leaving certificate, and average share of new entrants in the "transition segment" at the state level. The probabilities of making a smooth standard transition (Figure 3a), a delayed standard transition (Figure 3b) or non-directional progress (Figure 3c) are predicted at the mean ("average") and one standard deviation ("below average" and "above average") of the distribution of the "transition segment's" size.

The probability of experiencing a smooth standard transition is highest overall for the school-leavers in the federal states with a smaller-than-average number of available training schemes. We also see that there are few differences in the probability of making a smooth standard transition between states with an average or larger-than-average "transition segment". Moreover, the *difference* between school-leavers with low or intermediate-level school-leaving certificates in the probability of making a standard transition is significantly more pronounced in the states with a smaller-than-average number of entries into training schemes (14 percentage points compared to 9 percentage points in the other federal states). Across the observed variations by federal state, school-leavers with low and intermediate certificates have equally benefited from the developments in the school-leaving years since 2009, as seen in the overall parallel trends.

Regarding the probability that school-leavers experience a delayed standard transition, we find rather similar patterns across the state-level differences in the "transition segment". The disparities between school-leavers with low and intermediate certifi-

Figure 3   Predicted Probabilities of Experiencing School-to-Work Trajectories by School-Leaving Year and School-leaving Certificate, Variation by Size of Subsidized Training Schemes at the Federal State Level (n = 31 643)

a) Standard Transition

b) Delayed Standard
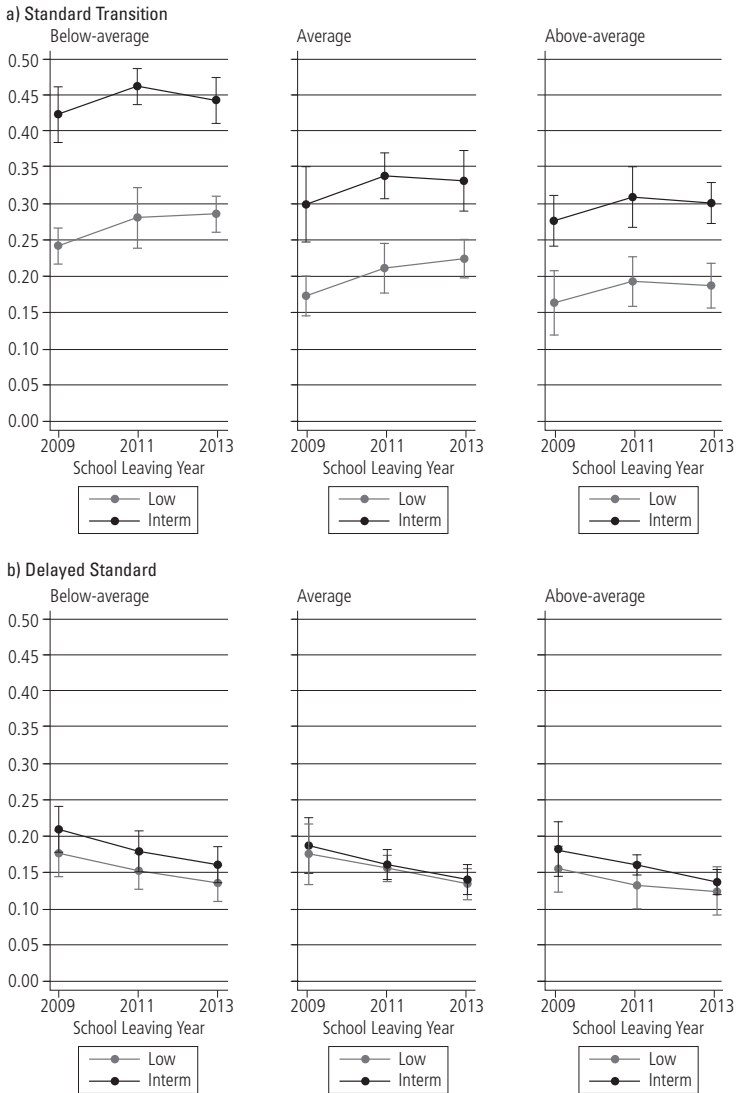
Continuation of Figure 3.
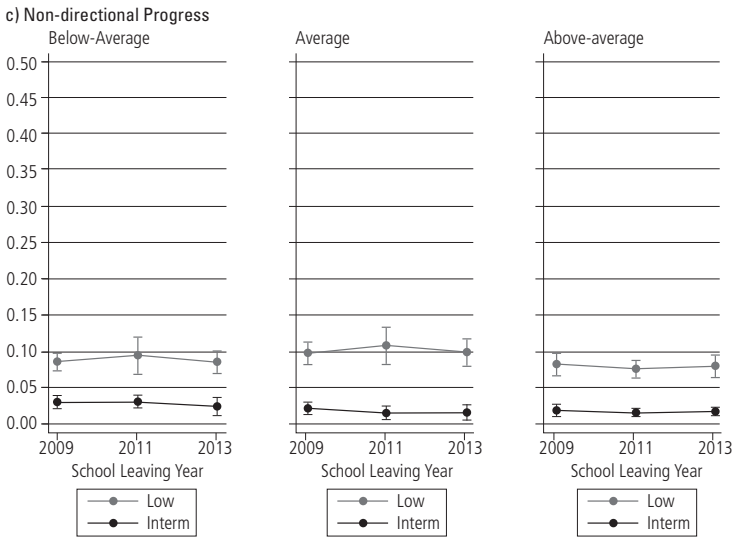
c) Non-directional Progress

Notes: The results from separate multilevel linear probability models for each outcome, 95 % confidence intervals, prediction from Model 3 (see Tables A3 [standard transition], A4 [delayed standard transition] and A5 [non-directional progress], online appendix). Control variables on individual level: gender, German nationality, welfare receipt in the family, participant in vocational rehabilitation; control variables at regional level: share of new entrants into transition segment, share of students in school-based alternatives, ratio of students in general/vocational education, local unemployment rate, share of school-leavers with university entrance diploma. Source: Career counseling data, Integrated Employment Biographies, Federal Statistical Office.

cates seem to be weaker in federal states with an average-sized "transition segment", but they are not significantly different compared to those found in other state-level contexts. Additionally, the hinted-at decline in the disparities by school-leaving certificate in federal states with an above-average-sized "transition segment" over time is not significant. Thus, the differences in the probability of making a delayed standard transition between school-leavers with low school-leaving certificates and those with intermediate-level certificates and the parallel decline over time are similar over all surveyed state-level contexts.

Finally, the probability of experiencing non-directional progress is also similar and occurs by similar margins for school-leavers with certificates of both levels across state-level differences in the "transition segment". In states with an average-sized "transition segment", the school-leavers with low certificates seem to face a somewhat higher probability of non-directional progress after leaving school compared to the intermediate-qualified school-leavers. However, the difference is not significantly different from that in other federal states.

Overall, we find no evidence for the hypothesis that the more extensive the "transition segment" is, the stronger the differences in STWT between school-leavers

with low and intermediate-level certificates are (Hypothesis 3a), and the more stable the differences by school-leaving certificates are over school-leaving years (Hypothesis 3b).

6   Discussion

This study of Germany investigates whether and how the chances for a smooth STWT of school-leavers with low or intermediate certificates changed during the early 2010s, which were marked by an economic upswing. To examine this question, we make use of a holistic perspective on STWTs to evaluate differences in progression within the five years after leaving school based on a large administrative dataset.

The first key finding of the study is that school-leavers from the early 2010s find improved chances of a smooth standard transition compared to school-leavers from the year 2009, who left school during the time of the so-called Great Recession; this improvement is evidenced by a higher probability of following the "royal route" via apprenticeship into employment and a lower probability of making a delayed transition. These trends emerge clearly, even if changes range within a few percentage points during the short observation period. We can conclude that STWTs are more or less smooth depending on the situation in the vocational training market, but frictions in economically slack times can be partly compensated by the German VET system (see also Brzinsky-Fay and Solga 2016). The observed trends are similar for school-leavers with low and intermediate-level school-leaving certificates. Both groups are shown to have equally benefited from the improving market conditions in the early 2010s, which translates into an "elevator effect". The relative disadvantages of school-leavers with low certificates in making a smooth transition have persisted throughout the period of observation. They could not catch up with their peers with intermediate certificates.

Second, we observe a group of school-leavers with severe problems in the STWT who fail to gain access to both apprenticeship and employment. This group remained untouched by the economic upswing during the period of observation. This evidence is in line with previous research, which points to groups of young people that are more permanently detached from the labour and vocational training market (Eckelt and Schauer 2019). This may be either because they are labelled as not trainable or employable or because they themselves withdraw from important steps of vocational training and employment. The concept of "cooling out" with regard to motivation and ambition suggests that both processes mutually reinforce each other (Solga 2002; 2011).

Third, although there are remarkable differences across the German federal states with regard to the share of young people entering subsidized training schemes for so-called disadvantaged youth every year, this hardly makes any between-state differences in transition chances. It is particularly noteworthy that the risk of mak-

ing a non-directional transition does not differ by the size of the so-called transition segment. This means that the at-risk group among the school-leavers is not reached by the existing training schemes. We can still see that the availability of training schemes and market opportunities are linked; i. e., in federal states with a below average-sized "transition segment", school-leavers in general are more likely to experience a standard transition. This association is not to be interpreted causally. If companies who provide a large number of apprenticeships are located in a federal state, then fewer subsidized training schemes must be established. This interplay between the market and the "transition segment" may constitute regional differences in the context conditions for individual transition opportunities. One reason for the presence of only slight differences at the federal state level may be that the types of available training schemes are more important than the relative size of the "transition segment". We capture further variations at the federal state level by using indicators for school-based vocational training alternatives and alternatives in general education as control variables. This approach may still only scratch the surface of when federal state policies weigh schemes for different target groups. The development of further context indicators remains on the agenda for future research.

This brings us to the limitations of our study. We have to take into account that the period of observation from 2009 to 2013, although considered as years of upheaval in the vocational training market, represents only a short period in time. The situation on the labour market in Germany has been easing since 2005; however, the career counseling data used in this study were first set up for 2008. We therefore cannot take into account further years back. Future research will also have to address how track-specific disparities in the STW trajectories have developed more recently with regard to the COVID-19 crisis or a possibly upcoming energy crisis.

A further limitation is that the administrative dataset only contains information on selected labour market activities. Information on episodes in general education, school-based vocational training, training schemes not funded by the Federal Employment Agency, or non-employment, such as parental leave, are lacking. The dataset only records the start and end dates of these unreported activities in the timeline of the STWT. Thus, the selected trajectories may not represent the overall variety of transition patterns, particularly standard transitions via school-based training (Autorengruppe Bildungsberichterstattung 2020; Holtmann et al. 2019). Based on this, the data are less suitable to analysing possible changes in the gendered structures of STWTs. In Germany, higher shares of male school-leavers aspire to occupations trained in apprenticeships, while higher shares of female school-leavers opt for school-based vocational training in health and social professions (e. g., BIBB 2016; Autorengruppe Bildungsberichterstattung 2018). Likewise, parenthood is likely to affect the STWT of young females and males differently. However, we consider the latter to be a minor problem in the present analysis, as most young people examined were aged between 17 and 23 years.

Moreover, our study is a description of disparities in the STWT by school-leaving certificates over time and place. However, there is little individual information available in the administrative data, particularly no information on individual agency or ambitions (e. g., Holtmann et al. 2017). Future research has to examine the mechanisms why negative processes of (self-)selection are not undermined even in good economic times and by the available training schemes.

Finally, we have to mention that we assessed qualitative differences in the STWT based on notions of linearity in the trajectories and smoothness. However, this is only one facet by which to distinguish successful from less successful STWTs. Further insights into trends of social inequality may emerge when, for example, placement in different occupational segments or social status achieved in young adulthood are considered (e. g., Brzinsky-Fay and Solga 2016).

Despite these limitations, we have been able to map STW trajectories with the present study, including selected subsidized training measures and unemployment, both in great detail and for a large number of young people across several years of school leaving. In particular, the pattern of problematic non-directional progress can be clearly contrasted with transitions via apprenticeships, which are still predominant in Germany. Against this background, our findings provide important information that is relevant for public debate. The focus of the debate is often on the economic conditions in the vocational training and labour market. As the STWT process depends on far more complex factors (see also Kohlrausch and Islertas 2022), the debate must go beyond. Regardless of time and local context, the questions remain how to reduce disparities in the STWT between school-leavers with low and intermediate certificates and how to reach the at-risk group of young people who do not get a foothold in the labour market.

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Diverging Educational Aspirations Among Compulsory School-Leavers in Switzerland

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Abstract: Educational aspirations play an important role in shaping students' educational trajectories and destinations. Drawing on longitudinal data from the TREE2 study, this paper investigates the effect of tracking on the formation and adjustment of the educational aspirations of Swiss students upon leaving compulsory school. We show that educational aspirations are highly responsive to the educational track attended in upper secondary education. While students in general education tend to stick to their aspirations, their counterparts in vocational programmes exhibit less stable aspirations.

Keywords: Educational aspirations, tracking, upper secondary education, panel data, Switzerland

Divergierende Bildungsaspirationen von Schulentlassenen in der Schweiz

Zusammenfassung: Bildungsaspirationen dienen als wichtiger Orientierungsrahmen bei der Ausgestaltung von Bildungsverläufen. Der vorliegende Artikel untersucht mittels Längsschnittdaten der TREE2-Studie die Herausbildung und Anpassung von Bildungsaspirationen beim Übergang in die Sekundarstufe II. Die Ergebnisse belegen, dass Jugendliche in der Schweiz ihre Bildungsaspirationen am besuchten Ausbildungsgang ausrichten. Während jene in allgemeinbildenden Ausbildungen an ihren ursprünglichen Bildungsaspirationen festhalten, neigen jene in beruflichen Ausbildungen dazu, ihre Bildungsaspirationen anzupassen.

Schlüsselwörter: Bildungsaspirationen, Bildungsübergänge, Sekundarstufe II, Längsschnittdaten, Schweiz

Aspirations éducatives divergentes parmi les diplomé·e·s de l'école obligatoire en Suisse

Résumé : Les aspirations éducatives jouent un rôle important dans la détermination des trajectoires et des destinations éducatives des élèves. En s'appuyant sur les données longitudinales de l'étude TREE2, cet article étudie la formation et l'ajustement des aspirations éducatives des élèves suisses à la fin de l'école obligatoire. Nous montrons que les aspirations éducatives sont très sensibles à la filière suivie dans le degré secondaire II. Les élèves en formations générales ont tendance à rester fidèles à leurs aspirations, alors que les élèves en formations professionnelles ont des aspirations moins stables.

Mots-clés : Aspirations éducatives, orientation, degré secondaire II, données de panel, Suisse

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1   Introduction

Educational pathways are marked by a series of choices that shape students' development and educational destinations. Educational aspirations play an important mediating role in these processes. The educational goals adolescents consider of value are believed to direct and motivate the effort they apply during their educational careers, thereby increasing their chances of succeeding in the education system (e. g., Bandura 2006; Caprara et al. 2008; Domina et al. 2011). Accordingly, many researchers have demonstrated that educational aspirations predict students' educational attainment (e. g., Morgan 2005; Beal and Crockett 2010; Bozick et al. 2010; Guo et al. 2015; Schoon and Burger 2021). Investigating the dynamics that give rise to educational aspirations thus provides an essential basis for understanding educational mobility.

There is an ongoing debate regarding the factors that contribute to the formation of educational aspirations. Established theoretical frameworks such as the Wisconsin model of status attainment (WM) (Sewell et al. 1969; 1970) or rational choice theory (RCT) (Erikson and Jonsson 1996; Breen and Goldthorpe 1997; Esser 1999) suggest that a variety of contextual conditions shapes educational aspirations. The school context is of particular significance as it provides a frame of reference for students when forming and revising their educational aspirations, especially in tracked and highly stratified education systems (Buchmann and Dalton 2002; Buchmann and Park 2009; Parker et al. 2016). On the one hand, sorting students according to their academic achievement creates distinct learning environments, in which some educational destinations are perceived as more favourable than others (Buchmann and Dalton 2002; Roth 2017; Van den Broeck et al. 2018). On the other hand, track placement conveys a strong signal about academic abilities and prospects, which students may consider when setting their educational goals (Buchmann and Park 2009; Karlson 2015; Geven and Forster 2021).

So far, few studies (e. g., Hegna 2014; Karlson 2015; Bittmann and Schindler 2021) have investigated how tracking relates to educational aspirations. The present study contributes to this strand of literature by examining the temporal dynamics of educational aspirations among students that have completed compulsory school in Switzerland. We aim to show how track allocation is related to a potential revision of educational aspirations, considering the entire spectrum of educational pathways. Using longitudinal data from the second cohort of the Transitions from Education to Employment study (TREE2) and examining both the level of educational goals and the way compulsory school-leavers adjust their educational goals, this study underlines the importance of tracking for educational aspirations. Our results show that the educational pathways adolescents pursue after compulsory school not only determine the educational destinations to which they aspire, but also give rise to a process of divergence with respect to educational goals.

The remainder of this article is structured as follows: The next section establishes a theoretical framework and outlines the state of research on the formation and adjustment of educational aspirations. The third section describes the data and analytical strategy that were pursued. After presenting the results in the fourth section, concluding remarks discuss our findings critically.

2 Theoretical Background

2.1 Educational Aspirations

Educational aspirations have been studied thoroughly over recent decades, across various disciplines. Despite being frequently considered in research, there is no universally accepted definition of educational aspirations (Morgan 2005; Trebbels 2015). We rely on the conceptualisation proposed by Haller (1968). Building on classical aspiration theory (Lewin et al. 1944), Haller (1968, 484) defines the term aspiration as a "cognitive orientational aspect of goal-directed behavior". Hence, aspirations reflect goals individuals set for themselves, given various alternatives. In the case of educational aspirations, the spectrum of alternatives typically follows a hierarchical order, with academically demanding educational degrees (e. g., more time-consuming, requiring specific certificates or performance) on one end of the spectrum, and less demanding on the other (Lewin et al. 1944; Haller 1968).

Haller (1968) further distinguishes between realistic and idealistic aspirations. This distinction acknowledges that the goals individuals wish to achieve may not necessarily coincide with the goals individuals perceive as achievable. Idealistic aspirations thus reflect wishes regarding desired outcomes that are "not limited by constraints on resources" (Hauser and Anderson 1991, 270) and are usually understood as an individual's commitment to achieving a desired goal regardless of the chances of realising this goal (Rojewski 2005; Trebbels 2015). Conversely, realistic aspirations relate to desired outcomes when taking the likelihood of actually achieving this outcome into account, considering constraints and resources (Haller 1968; Stocké 2013; Trebbels 2015). Empirical evidence suggests that students and their parents generally hold higher idealistic than realistic educational aspirations, while both are highly correlated (e. g., Becker and Gresch 2016; Gölz and Wohlkinger 2019; Hadjar and Scharf 2019; Becker et al. 2022). This paper focuses on realistic aspirations as we acknowledge that this type of aspiration is more sensitive to altered circumstances in the social context, transcends mere wishes, and is a more precise reflection of the goals towards which students direct their effort.

In summary, aspirations motivate and channel effort towards desired goals. Educational aspirations are expressed preferences on a spectrum of educational destinations that are typically arranged in order of difficulty. As it has been repeatedly shown that educational aspirations are predictive of future educational attain-

ment (e. g., Beal and Crockett 2010; Bozick et al. 2010; Schoon and Burger 2021), investigating how students adapt their aspirations upon leaving compulsory school is pertinent.

2.2   Theoretical Explanations for Educational Aspirations

RCT and the WM frequently serve as points of departure in the literature when it comes to explaining the formation of educational aspirations. From the perspective of RCT, students are expected to be forward-looking and informed actors who try to maximise individual utility. Accordingly, considering benefits, costs and the probability of success, students are thought to aspire to the educational degree that carries the highest subjective expected utility (Erikson and Jonsson 1996; Breen and Goldthorpe 1997; Esser 1999).

There is ample evidence that students align their educational aspirations in the light of information on their likelihood of succeeding in education. Not only is there a strong correlation between achievement and aspirations (Khattab 2015; Karlson 2019; Bernardi and Valdés 2021). Research also suggests that students tend to stick to their aspirations when they are on track to attain the educational degree to which they aspire (Buchmann and Park 2009; Bittmann and Schindler 2021; Geven and Forster 2021). Furthermore, research provides evidence that students aspire to educational destinations they perceive to be most beneficial for later labour market prospects (Dumont et al. 2017; Salazar et al. 2020; Lievore and Triventi 2021). Recent studies that explicitly model the decisive factors of RCT buttress the assumption that educational aspirations reflect rational cost–benefit calculations (Gölz and Wohlkinger 2019; Jakob and Combet 2020; Zimmermann 2020; Lievore and Triventi 2021).

In contrast, the WM stresses the role of social influence (Sewell et al. 1969; 1970; Haller and Portes 1973). According to the WM, social origin and cognitive skills are linked to educational attainment via educational achievement and the influence of significant others. Significant others are "persons exerting the greatest influence" (Sewell et al. 1970, 1015), commonly specified as parents, friends, classmates and teachers. The mediating role of significant others is based on the idea that, in order to evade cognitive dissonances (Woelfel and Haller 1971), students conform to the pressure exerted by others when forming their educational aspirations. They do so either by imitating their role models' educational aspirations or by aligning their educational aspirations with the expectations of authority figures – their parents in particular (Sewell et al. 1970).

Social influence has proved to be a viable factor in explaining educational aspirations. In particular, the role of parents has been repeatedly stressed: it is suggested that students align their educational aspirations with their parents' expectations (e. g., Marjoribanks 2002; 2003; Augustine 2017; Roth 2017; Forster 2021; Schoon and Burger 2021). While the influence of the family provides a baseline

for the initial formation of educational aspirations, it is assumed that peers become an increasingly important source of influence during adolescence (Osterman 2000; Brechwald and Prinstein 2011). The literature provides consistent evidence showing that students adopt their friends' and classmates' educational aspirations (Frost 2007; Roth 2017; Raabe and Wölfer 2019; Lorenz et al. 2020). However, doubts have been raised concerning the robustness of these findings amid potential confounding bias caused by selection effects. For instance, Kretschmer and Roth (2021) demonstrate that selection and peer influence contribute independently to similar aspirations within peer networks. Moreover, some studies show that student–teacher relations mediate the extent of peer influence when forming educational aspirations (Baker et al. 2014; Van den Broeck et al. 2020).

The underlying factors used to test the assumptions of RCT and the WM – most notably social origin and educational achievement – are likely to be linked. Morgan (1998) claims that the WM inherently incorporates processes of rationality, as regards the way that students "adopt the expectations that others have of them and add these to their own expectations formed independently through their own rational self-reflection" (Morgan 1998, 136). The implication that both rational calculus and social influence affect the formation of educational aspirations simultaneously has been given empirical support (Gabay-Egozi et al. 2015; Trebbels 2015; Gölz and Wohlkinger 2019; Zimmermann 2020).

Even though RCT and the WM have proved to be reliable for explaining educational aspirations, the two approaches are not free from criticism. On the one hand, RCT has been criticised for ignoring the role of unobserved early choices and, therefore, the possibility of procedural educational decision-making (Erikson et al. 2005). On the other hand, a major issue of the WM concerns its disregard for institutional constraints imposed by the education system (Kerckhoff 1977; Sewell et al. 2003). In light of this criticism, we agree that one has to consider the altering social and institutional circumstances along educational careers. We therefore argue that educational aspirations should be analysed from a longitudinal perspective, paying particular attention to processes that give rise to altered institutional and social circumstances – such as tracking – to highlight the malleability of aspirations during adolescence.

The literature puts forward other determinants that moderate or go beyond the assumptions of RCT and the WM. Some researchers relate the formation of educational aspirations to psycho-social factors such as self-esteem (e. g., Rothon et al. 2011), school and emotional engagement (e. g., Lazarides et al. 2016), and optimism (e. g., Salmela-Aro and Upadyaya 2017). Furthermore, some research suggests that students adjust their educational aspirations when experiencing economic setbacks (e. g., Taylor and Rampino 2014; Renzulli and Barr 2017; Salazar et al. 2020). While it has been repeatedly shown that female students set more ambitious educational goals than their male peers (e. g., Gil-Flores et al. 2011; Berrington et al. 2016),

students with a migration background are found to have higher educational aspirations than native students with comparable academic achievement (e. g., Hadjar and Scharf 2019; Van den Broeck et al. 2020).

2.3   Changes in Educational Aspirations and the Role of Tracking

Considering institutional and social context is pivotal for explaining educational aspirations. So is the focus on educational transitions, as the corresponding changes in context have far-reaching implications – be it a change in the learning environment, the adapted cognitive requirements of differently oriented curricula or a related shift in labour market prospects. The significance of educational transitions is particularly amplified in education systems with early and rigorous tracking (Maaz et al. 2008; Bol and van de Werfhorst 2016; Van de Werfhorst 2019). Sorting students into different tracks creates distinct learning environments as regards students' abilities, interests and social backgrounds. Further, tracking imposes institutional constraints and limits the range of accessible alternatives, while at the same time opening up or consolidating others. Both RCT and the WM implicitly provide additional arguments for why tracking students should affect their aspirations.

From the perspective of RCT, it is assumed that students form their educational aspirations in accordance with what they perceive as maximising utility. When provided with new information, RCT expects that students will revise their educational aspirations (Morgan 1998; Zafar 2011). One of the most relevant pieces of information here is the continuous evaluation of academic abilities (Morgan 2005; Bozick et al. 2010; Khattab 2015). Information about academic abilities, however, transcends mere grades. As Karlson (2015) argues, placement in a specific educational track conveys a strong signal that affects students' beliefs independently of their actual academic abilities, because it involves a process of social labelling (Oakes 2005). Being in a specific track "makes publicly visible the opportunities of achieving success in the educational system" (Karlson 2015, 118). Social labels enter the process of rational calculus by altering students' perceptions of their probability of succeeding. Karlson holds that the behavioural implications of this labelling process depend on the degree of unambiguousness of the signals conveyed by track placement and whether the new information revealed by track placement conforms or conflicts with previous ability signals. Put differently, students are expected to respond more strongly to clear signals as compared to mixed ones, and to consistent signals as compared to inconsistent ones (de Boer et al. 2010; Karlson 2015).

The WM provides a different argument as to why students are likely to revise their educational aspirations upon proceeding to a new educational stage. Sorting students into tracks according to academic achievement creates distinct social contexts for students. Students find themselves in a new learning environment and are confronted with new significant others – be it peers or educators – who may exert social pressure towards specific educational goals (Oakes 2005; Van den Broeck

et al. 2018; Kretschmer and Roth 2021). The degree of stratification and the social selectivity of track allocation defines how distinct these new learning environments are from each other. In particular, when tracking starts at an early age, the impact of primary and secondary effects of social origin (Boudon 1974) is found to be exacerbated, reducing the overall socio-economic and achievement-related hetero-geneity at later educational stages (e. g., Maaz et al. 2008; Van de Werfhorst and Mijs 2010). In turn, the reduced heterogeneity accentuates the bias regarding the specific educational goals students are influenced to pursue (Buchmann and Dalton 2002; Parker et al. 2016; Van den Broeck et al. 2018). For example, students in the aca-demically most demanding track are likely to be exposed to a learning environment that predominantly promotes pursuing the academically most demanding degrees.

Despite these theoretical arguments about the role of educational transitions in tracked education systems for the formation and adjustment of educational aspirations, this subject has received limited scientific attention. Buchmann and Dalton (2002) investigate the role of tracking for aspirations in differently stratified education systems. They note that a high level of stratification limits the degree to which significant others influence educational aspirations. It appears that in a more stratified education system, "there is little room for interpersonal effects" (Buch-mann and Dalton 2002, 99), in such a way that track placement largely pre-empts the educational goals students set for themselves. This argument is in line with research from highly stratified education systems that reveals a systematic pattern of educational aspirations depending on the academic track that students attend. Students attending general academic tracks tend to have higher educational aspira-tions than those in non-academic tracks (Buchmann and Park 2009; Roth 2017; Van den Broeck et al. 2020; Zimmermann 2020; Bittmann and Schindler 2021; Geven and Forster 2021).

Recent studies report systematic track-related differences in the way students adjust their educational aspirations in light of transitions to the next educational stage. Karlson (2015) demonstrates for the US that students placed in high-ability tracks experience an upward shift in educational expectations, particularly when placement is consistent across different subjects. While those entering a high-ability track from a low-ability track show substantial increases in educational expectations, those moving downward are more likely to decrease their expectations. Similarly, Geven and Forster (2021) provide evidence for the German context suggesting that students are more likely to adjust their educational aspirations upwards if their track placement in lower secondary education exceeds their expectations – and vice versa. Another recent study from Germany indicates that upon entering lower second-ary education, high-ability students in non-academic tracks experience a gradual decrease in their aspiration of acquiring a university entry certificate. In contrast, almost all of their counterparts in the academic track stick to their previous aspi-ration of obtaining a university entry certificate. This relationship is mediated by

social origin, which contributes to a process of divergence (Bittmann and Schindler 2021). Evidence from Norway suggests that, compared to those in general education, students in vocational programmes are substantially more likely to redirect their educational aspirations away from tertiary education upon approaching the transition to upper secondary education. After entering upper secondary education, this relationship vanishes, suggesting that tracking plays a more substantial role during the decision-making process preceding the transition than during the transition itself (Hegna 2014). Contrary to earlier findings suggesting that students' aspirations are resilient over time (Grodsky and Riegle-Crumb 2010; Andrew and Hauser 2011), these studies underline that many students revise their educational aspirations during educational transitions.

2.4   The Present Study

This study contributes to the literature on educational aspirations by analysing track allocation as a major driver for the formation and adjustment of educational aspirations. Whether tracking defines opportunities and constraints, sends ability signals or alters the composition of significant others, we expect that transitioning from one educational stage to another incites students to revise their educational aspirations. Further, we expect that this is particularly apparent in highly stratified education systems such as Switzerland's (Buchmann and Dalton 2002; Buchmann and Park 2009; Parker et al. 2016).

In Switzerland, students are sorted into lower secondary school tracks according to their academic record, usually in seventh grade. Track placement at this stage is essential as it sets the course for future educational opportunities (Buchmann et al. 2016; SCCRE 2018; Combet 2019). Compulsory schooling in Switzerland ends with lower secondary education in ninth grade. In upper secondary education, students are primarily channelled into either high-ability general education (baccalaureate schools and upper secondary specialised schools) (about 29 %) or primarily firm-based vocational education and training (VET) with varying academic requirements (about 60 %) (SCCRE 2018; Gomensoro and Meyer 2021; FSO 2021). Students in specific VET programmes can obtain a vocational baccalaureate degree enabling them to enter universities of applied sciences. The strong segmentation of Swiss upper secondary education into several distinctly different tracks or programmes requires an empirical approach that reflects the variety of viable educational pathways after compulsory school. To this end, and unlike previous studies, we go beyond reducing educational aspirations to a dichotomy between tertiary and non-tertiary level educational goals.

While general education primarily prepares students for entry into tertiary education, VET prepares them for entry into the labour market. In contrast, VET programmes that allow obtaining a vocational baccalaureate facilitate tertiary education and labour market entry. Despite the politically claimed permeability of the

Swiss education system, scholars consistently demonstrate that track placement in upper secondary education is predictive of the highest educational attainment (e. g., Buchmann et al. 2016). Furthermore, studies reveal that track allocation at lower and upper secondary levels is characterised by substantial social selectivity (e. g., Becker and Glauser 2018).

Two issues will be investigated in our study: the general impact of tracking on aspirations; and whether track placement is related to distinct patterns of aspirational adjustments. We assume that we will find the highest educational aspirations among students in general education and the lowest among students in VET. While the academically most demanding general education track is geared towards entering tertiary education, students in the least academically demanding VET track are prepared for labour market entry. As institutional constraints limit students' ability to switch tracks, this narrows down the range of feasible educational destinations. At the same time, track placement sends out a strong ability signal. Students in the academically most demanding track are signalled that their academic abilities most likely exceed those of their counterparts in academically less demanding tracks, which encourages them to set high educational goals – and vice versa. In both cases, students entering new learning environments are influenced by significant others, which are now less heterogeneous due to the social sorting that accompanies tracking. This, in turn, contributes to the unambiguousness of the influence of significant others when students evaluate the educational alternatives to which they should aspire. We expect that this consolidates the tendency of students in the academically most demanding track to set high educational goals – and vice versa.

We further propose that track placement systematically affects how students adjust their educational aspirations upon leaving compulsory school. Again, given the institutional constraints limiting the range of feasible educational destinations, the ability signal conveyed through track placement and the distinct influence by significant others, some educational destinations become less or more feasible and desirable. Students in general education are unambiguously geared towards setting high educational goals. Consequently, we expect these students to predominantly adjust their educational aspirations upwards or to stick to their already high initial aspirations. Analogously, we expect students in VET to predominantly adjust their educational aspirations downwards or to stick to their already low initial aspirations. In contrast, for VET programmes that lead to a vocational baccalaureate, we expect the ability signal to be fuzziest and the influence exerted by significant others to be most diverse. Coupled with the variety of educational pathways students can follow upon completing these programmes, we expect to find the most substantial adjustments of educational aspirations – both upwards and downwards.

3   Data and Methods

3.1   Sample

This study draws on longitudinal data from TREE2 (TREE 2022). TREE2 surveys the educational and occupational pathways of compulsory school-leavers in Switzerland. This data comprises a sample of 8'429 students who participated in Switzerland's large-scale assessment study AES (Assessment of the Attainment of Educational Standards; in German: Überprüfung des Erreichens der Grundkompetenzen, ÜGK), in 2016 (Hupka-Brunner et al. 2021). The population covered by TREE2 includes all Swiss ninth-grade students in school year 2015/2016 who did not repeat their ninth grade in the subsequent school year. This article draws on data from the AES baseline survey and the first and third waves of TREE2 from 2017 and 2019, respectively.[1]

The sample is restricted to the 5'850 respondents who participated in all three surveys. Since the research design requires complete information on the dependent variable of realistic educational aspirations in at least the AES baseline and TREE2 third wave, the sample size is reduced to 3'501 respondents. Excluding respondents with missing information for the explanatory variables, the size of the analytical sample amounts to 3'294 individuals that completed compulsory school in 2016. Comparisons of the weighted analytical sample with the original sample weighted for participation in waves 1 and 3 do not indicate any systematic biases.[2] When we describe the variables below, we refer to the weighted descriptives of the baseline survey.

3.2   Measurements

The dependent variable of realistic aspirations is deduced from the question "What do you think will be the highest educational degree that you will attain one day?", with seven ordinal response categories ranging from a two-year VET certificate (EBA) to a tertiary degree from a university. Due to the insignificant number of observations relating to aspiring to obtain a two-year VET certificate, this category is merged with the second category of the three- to four-year VET certificate (EFZ). At the end of compulsory school, students aspire to either an upper secondary-level VET diploma (29.4 %), a vocational baccalaureate (13.9 %), a general baccalaureate (5.7 %), a tertiary-level VET diploma (11.4 %), a university of applied science or teacher education degree (16.5 %), or a university degree (23.1 %). As the wording of this question incorporates an anticipatory perception of the likelihood of suc-

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1   The analyses presented in this study rely on provisional pre-published data of TREE2's third wave as of July 2022.

2   Descriptive statistics of the analytical sample across all survey waves are provided by the authors upon request.

cessfully attaining the desired educational degree, the dependent variable reflects realistic educational aspirations (Haller 1968; Hupka-Brunner et al. 2016).

A categorical variable contrasting the educational degree aspired to at the end of compulsory school and three years later, in 2019, is created to measure the adjustment of realistic educational aspirations. We define students as having stable aspirations (45.1 %) if the educational degree to which they aspire does not change over the observed period. Conversely, students adjust their aspirations downwards (16.0 %) or upwards (38.9 %), respectively, if their reported realistic aspiration in 2019 is lower or higher than at the end of compulsory school, in 2016.

The independent variable of interest captures students' educational track in upper secondary education. We categorise the multitude of educational programmes into the following four categories. The category general education (36.1 %) encompasses entirely school-based programmes that allow students to acquire a baccalaureate degree or a specialised school diploma. Students attending two-to four year vocational education and training (EBA and EFZ) are combined under the category VET (42.0 %). The category vocational baccalaureate comprises all programmes that allow students to acquire a vocational baccalaureate (4.5 %). Lastly, we group paid employment, internships, interim solutions, or pursuing a non-certified education within the category NET (not in education or training) (17.4 %). Since previous educational decisions primarily determine track allocation at the upper secondary level, we include a measure capturing the requirement level for the track attended during the last year of compulsory school. This variable distinguishes between high (35.3 %), advanced (39.6 %), and basic requirements (23.0 %), and a separate category for students in integrated schools, alternative programmes, or special education needs classes (2.1 %).

Given the various factors previous studies (e. g., Rothon et al. 2011; Berrington et al. 2016; Hadjar and Scharf 2019; Salazar et al. 2020) have identified as determinants of educational aspirations, and thus as potential confounders, we consider several control variables in the multivariate analyses. We control for educational achievement by calculating the grade point average for first and second school language, mathematics and science in the last year of compulsory school (mean = 0.06, SE = 0.02). A composite measure capturing the perceived parental pressure to achieve (Böhm-Kasper et al. 2000) acts as a control influence exerted by parents (mean = –0.01, SE = 0.02). Concerning socio-demographic characteristics, the regression models include dummy variables for sex (53.3 % females), migration background (25.8 %) and foreign language spoken at home (19.9 %). To capture multiple dimensions of social origin, we further control for highest parental educational attainment (43.2 % with tertiary education, 45.6 % with upper secondary education, and 11.2 % with compulsory schooling only), highest parental ISEI-08 score (Ganzeboom 2010) (mean = 0.13, SE = 0.02), and the number of books at home (Kunter et al. 2002) (mean = 4.41, SE = 0.03).

3.3   Analytical Approach

When investigating the effects of track placement on the educational aspirations of compulsory school-leavers in Switzerland, this study follows a two-step approach. In the first step, we aim to identify factors contributing to the formation of educational aspirations from a longitudinal perspective. To this end, we analyse the educational degree to which students aspire by estimating random-effects ordered logistic models for unbalanced samples. These models allow for individual intercepts, and thus consider that observations from the same individual are correlated. Provided that these random intercepts are uncorrelated with predictor variables in the model, this estimation procedure yields less biased estimates as it accounts for unobserved heterogeneity between individuals (e. g., Wooldridge 2020; Rabe-Hesketh and Skrondal 2022). To account for systematic temporal trends, these models include wave-specific dummy variables. While keeping the number of students in the analytical sample constant, we apply maximum-likelihood estimation and gradually extend the regression models by including additional covariates.

In the second step, we analyse whether track placement is systematically associated with the way students adjust their educational aspirations, namely sticking to the same degree aspired to at the end of compulsory school or adjusting the aspiration downwards or upwards, respectively. In order to estimate the likelihood of exhibiting one of these three patterns simultaneously, we estimate multinomial logistic regression models (e. g., Long and Freese 2014; Greene 2018). The results of the multinomial models are presented in terms of average marginal effects, which facilitates comparing estimates of nested models and reduces bias related to unobserved heterogeneity (Mood 2010).

4   Results

4.1   Educational Aspirations of Compulsory School-Leavers in Switzerland

The educational goals compulsory school-leavers in Switzerland set for themselves cover the entire range of obtainable degrees. Figure 1 depicts realistic educational aspirations over the observed period and illustrates the interrelations between them. Four aspects immediately stand out.

First, some educational degrees are aspired to more frequently than others. Three years into upper secondary education, in 2019, 19 % of the entire analytical sample does not aspire to a degree beyond VET. In contrast, more than half aspire to a degree at a university of applied sciences or teacher education.

Second, the illustrated changes in realistic educational aspirations over time disprove the claim that adolescents only rarely revise the educational goals they set at an earlier age (e. g., Grodsky and Riegle-Crumb 2010; Andrew and Hauser 2011). Over the considered period from 2016 to 2019, 55 % of compulsory school-leavers

Figure 1   Educational Aspirations Over Time
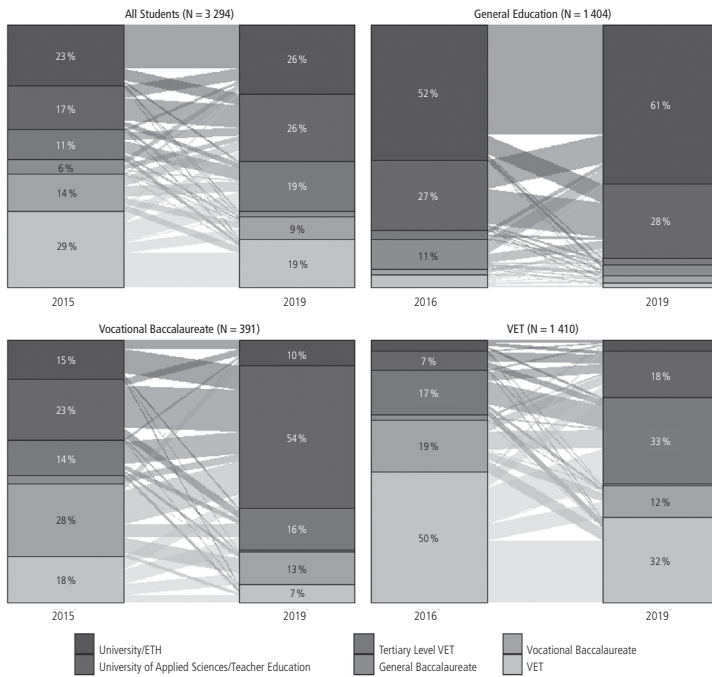
Note: Weighted percentage (N = 3294), students not in education (NET) in 2019 not shown, Data: TREE2, own calculations.

have adjusted their initial educational aspirations. Notably, 8 % of the respondents return to the degree to which they originally aspired but report other aspirations in between. However, the extent to which students adjust their educational aspirations differs across tracks. While six out of ten students in general education exhibit stable educational aspirations over time, only 39 % of VET students and 30 % of students in a programme leading to a vocational baccalaureate have stable aspirations.

Third, a positive trend becomes apparent when comparing the percentages of degrees aspired to from 2016 and 2019. Three years into upper secondary education, the adolescents considered in the analyses set overall higher educational goals than they do at the end of compulsory school. In total, more cases raise their educational aspirations (39 %) than decrease them (16 %). This pattern, again, varies across tracks. While one quarter of students in general education raise their educational aspiration, we observe a substantially higher percentage of upward adjustments among students in VET (45 %) and students in programmes leading to a vocational baccalaureate (50 %).

Lastly, Figure 1 clearly indicates that students aspire to different educational degrees depending on track placement in upper secondary education. A pattern emerges: students in general education predominantly aspire to a university degree, whereas 32 % of students in VET do not aspire to a degree beyond their current training. Less than 5 % of VET students aspire to a university degree, although the overall share of VET students aspiring to a degree at universities of applied sciences or teacher education increases from 2016 to 2019. In programmes leading to a vocational baccalaureate, individuals display a remarkable shift in aspirations towards obtaining a degree from a university of applied sciences or teacher education (54 %).

Overall, descriptive analyses of educational aspirations reveal that a substantial number of students considered in our analyses revise their educational aspirations upon leaving compulsory school. Not only are there indications of specific adjustment patterns over time, there is also compelling evidence that students systematically differ in terms of their educational aspirations depending on the educational track they attend. This assessment leads us to investigate further how the formation of educational aspirations is affected by tracking, and whether changes in educational aspirations depend on track placement at the upper secondary level.

4.2   Formation of Educational Aspirations

In the first step, we investigate the relation between of track placement and realistic educational aspirations by estimating random-effects ordered logistic regressions. Table 1 presents the results of these models in terms of odds ratios for aspiring to a higher educational degree, along with 95 % confidence intervals in parentheses.

Model 1 solely includes the variables of primary interest, Model 2 introduces controls for grades and perceived parental pressure, Model 3 controls for socio-demographic characteristics, and Model 4 contains the full set of predictors. The estimated effects of track placement prove reasonably robust across all four models.

In Model 4, regarding track placement in lower secondary education, we find that the conditional odds of aspiring to a higher educational degree are lower (OR = 0.237, $p < 0.001$) for students in the advanced track compared to their counterparts in the high requirement track. Students attending a basic requirement track show an even lower likelihood of setting higher educational goals (OR = 0.090, $p < 0.001$).

The negative effects of track placement are even more pronounced in upper secondary education. Adolescents in VET (OR = 0.109, $p < 0.001$), programmes leading to a vocational baccalaureate (OR = 0.196, $p < 0.001$) or those currently not in education or training (OR = 0.125, $p < 0.001$) show a significantly decreased likelihood of aspiring to a higher educational degree than their counterparts in general education. The effects of track placement are in line with the findings of Buchmann and Park (2009), who show that students' aspirations align with the orientation of the track they attend, and that students adapt their educational goals in accordance with the ability signals they receive (Karlson 2015).

Table 1   Random-Effects Ordered Logistic Regression Models on Educational Aspirations. Odds Ratios with 95 % Confidence Intervals

	Model 1 Realistic Aspirations	Model 2 Realistic Aspirations	Model 3 Realistic Aspirations	Model 4 Realistic Aspirations
Lower Secondary Track (Ref. High Requirements)				
Advanced Requirements	0.201***	0.185***	0.263***	0.237***
	(0.154, 0.261)	(0.144, 0.240)	(0.205, 0.338)	(0.186, 0.303)
Basic Requirements	0.064***	0.061***	0.101***	0.090***
	(0.045, 0.091)	(0.043, 0.087)	(0.071, 0.142)	(0.064, 0.127)
Other	0.237***	0.202***	0.258***	0.219***
	(0.112, 0.502)	(0.101, 0.405)	(0.136, 0.486)	(0.120, 0.399)
Upper Secondary Track (Ref. General Education)				
NET	0.082***	0.106***	0.101***	0.125***
	(0.059, 0.113)	(0.077, 0.147)	(0.074, 0.140)	(0.092, 0.172)
VET	0.069***	0.083***	0.096***	0.109***
	(0.053, 0.090)	(0.064, 0.108)	(0.074, 0.124)	(0.084, 0.142)
Vocational Baccalaureate	0.137***	0.156***	0.180***	0.196***
	(0.103, 0.184)	(0.117, 0.207)	(0.136, 0.239)	(0.148, 0.258)
Wave (Ref. 2016)				
2017	1.381***	1.383***	1.397***	1.398***
	(1.203, 1.586)	(1.205, 1.588)	(1.217, 1.604)	(1.218, 1.605)
2019	2.511***	2.572***	2.499***	2.555***
	(2.209, 2.854)	(2.263, 2.924)	(2.200, 2.839)	(2.248, 2.903)
Parental Pressure		1.161**		1.041
		(1.049, 1.286)		(0.940, 1.153)
Average Grade		1.889***		1.722***
		(1.710, 2.085)		(1.566, 1.895)
HISEI 08			1.409***	1.365***
			(1.271, 1.562)	(1.232, 1.511)
Parental Education (Ref. Tertiary Education)				
Compulsory Schooling Only			0.384***	0.409***
			(0.272, 0.543)	(0.291, 0.575)
Upper secondary education			0.474***	0.498***
			(0.390, 0.577)	(0.411, 0.604)
Number of Books at Home			1.218***	1.168***
			(1.136, 1.305)	(1.091, 1.251)
Language Spoken at Home (Ref. Test Language)				
Other			1.306	1.309
			(0.981, 1.738)	(0.990, 1.730)
Immigration Status (Ref. Native)				
Migration Background			2.253***	2.294***
			(1.712, 2.966)	(1.755, 3.000)
Sex (Ref. Male)				
Female			0.909	0.884
			(0.764, 1.082)	(0.743, 1.052)
BIC	149561.3	148002.5	147091.7	145863.0
N of students	3294	3294	3294	3294
Observations	8938	8938	8938	8938

Note: Weighted estimates of random-effects ordered logistic models. Conditional odds ratios (OR), 95 % confidence intervals in parentheses. Cut points and sigma squared have been omitted. Predictors HISEI 08 and Average Grade are z-standardied. * $p < 0.05$,   ** $p < 0.01$, *** $p < 0.001$. Data: TREE2 (2022), own calculations.

Over the observed three-year period, students set increasingly higher educational goals. Compared to the baseline survey of 2016, the conditional odds of a higher educational aspiration increase by a factor of 1.398 ($p < 0.001$) for the first survey wave of 2017 and more than double for the third survey wave of 2019 (OR = 2.555, $p < 0.001$). Our findings suggest that students generally opt for higher aspirations later in upper secondary education.

For the first set of controls, we find that perceived parental pressure to achieve is unrelated to educational aspirations (OR = 1.041, $p > 0.05$), underlining the notion that peers become a more important source of influence during adolescence, as compared to parents (Osterman 2000; Brechwald and Prinstein 2011). Further, we see that an increase by one standard deviation in grade point average increases the conditional odds of aspiring to a higher degree by a factor of 1.722 ($p < 0.001$). This supports findings on the effect of educational achievement on aspirations, as reported by several other studies (e. g., Khattab 2015; Roth 2017; Karlson 2019; Bernardi and Valdés 2021).

The second set of controls reveals that socio-demographic characteristics are strongly predictive of educational aspirations. An increase by one standard deviation of the highest parental ISEI is related to an increase in the conditional odds of aspiring to the next higher degree (OR = 1.365, $p < 0.001$). Adolescents whose parents have not attained tertiary education are predicted to set lower educational goals for themselves (compulsory schooling only: OR = 0.409, $p < 0.001$, upper secondary education: OR = 0.498, $p < 0.001$). In a similar vein, the number of books at home is significantly positively related to the educational degree aspired to (OR = 1.168, $p < 0.001$). These results confirm the crucial role of social origin in the formation of educational aspirations, as illustrated by previous research (e. g., Buchmann and Dalton 2002; Baker et al. 2014; Roth 2017; Gölz and Wohlkinger 2019).

Furthermore, and in line with previous research (e. g., Salikutluk 2016; Hadjar and Scharf 2019; Van den Broeck et al. 2020), we find a positive but statistically insignificant effect for speaking other languages at home (OR = 1.309, $p > 0.05$) and a positive significant effect for having a migration background (OR = 2.294, $p < 0.001$). Unlike findings from previous studies (e. g., Gil-Flores et al. 2011; Baker et al. 2014; Berrington et al. 2016), our model predicts lower educational aspirations for girls than for boys, although this effect is not statistically significant (OR = 0.884, $p > 0.05$).

Summarising the results from these models, we find substantial support for our hypothesis that track placement has a direct effect on the formation of aspirations. To illustrate this effect, Figure 2 depicts predictive margins from Model 4 for each educational goal considered, depending on track placement in lower and upper secondary education. In the upper panels, we see the predicted probabilities by lower secondary track. This reveals that students in high requirement tracks aspire to more demanding degrees than their counterparts in basic requirement tracks, who aim mainly for VET degrees. In advanced tracks, however, students are predicted to aspire

Figure 2   Predicted Educational Aspirations by Track Placement
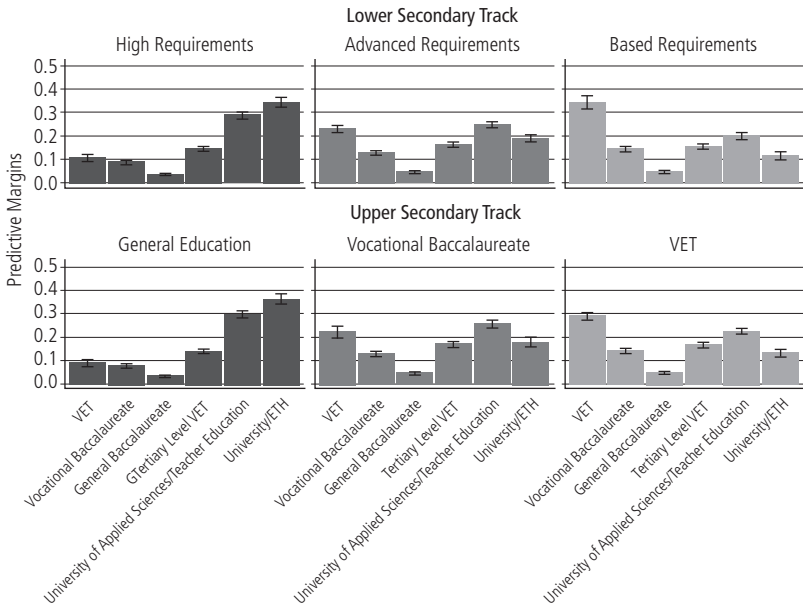
Note: Predictive margins with 95 % convidence intervals calculated from Model 4 in Table 1. Data: TREE2, own calculations.

in almost equal parts to VET or tertiary education, while the largest share realistically aspires to a university of applied sciences or teacher education. Focusing on the lower panels showing predicted probabilities by track placement in upper secondary education, an almost identical picture emerges. Students in general education aspire to the highest degrees, while VET students are still most likely to aspire to a VET diploma. Students in programmes leading to a vocational baccalaureate are again the most diverse in their predicted aspirations, with the largest share aspiring to a university of applied sciences or teacher education, followed by VET and university.

4.3 Adjustments of Educational Aspirations Upon Leaving Compulsory School

After bringing forward evidence that track placement has an effect on which educational degrees students aspire to, we examine to what extent the transition to upper secondary education is related to how compulsory school-leavers adjust their educational aspirations. In doing so, students' educational aspirations at the end of compulsory school are contrasted with their aspirations three years into upper secondary education. Using multinomial logistic regression, we examine whether students' educational aspirations were stable, shifted downwards or upwards, re-

Table 2   Multinomial Logistic Regression Models on Adjustments of
               Educational Aspirations from 2016 to 2019. Average Marginal
               Effects with 95 % Confidence Intervals

	Stable	Downwards	Upwards
Lower Secondary Track (Ref. High Requirements)			
Advanced Requirements	−0.074**	−0.038	0.112***
	(−0.130, −0.018)	(−0.081, 0.006)	(0.057, 0.167)
Basic Requirements	−0.019	−0.048	0.067
	(−0.095, 0.057)	(−0.102, 0.006)	(−0.007, 0.141)
Other	−0.063	−0.041	0.104
	(−0.201, 0.076)	(−0.144, 0.062)	(−0.041, 0.249)
Upper Secondary Track (Ref. General Education)			
NET	−0.150*	0.211***	−0.061
	(−0.278, −0.021)	(0.094, 0.327)	(−0.174, 0.052)
VET	−0.136***	0.069**	0.067*
	(−0.198, −0.073)	(0.026, 0.112)	(0.005, 0.129)
Vocational Baccalaureate	−0.245***	0.084***	0.161***
	(−0.312, −0.179)	(0.034, 0.134)	(0.092, 0.231)
Parental Pressure	0.007	0.012	−0.019
	(−0.017, 0.031)	(−0.006, 0.030)	(−0.044, 0.005)
Average Grade	0.020	0.000	−0.021
	(−0.001, 0.042)	(−0.016, 0.016)	(−0.042, 0.001)
HISEI 08	0.000	−0.012	0.012
	(−0.025, 0.025)	(−0.030, 0.006)	(−0.013, 0.037)
Parental Education (Ref. Tertiary Education)			
Compulsory Schooling Only	−0.029	−0.061*	0.090*
	(−0.110, 0.051)	(−0.114, −0.008)	(0.011, 0.169)
Upper Secondary Education	−0.063**	−0.028	0.090***
	(−0.110, −0.016)	(−0.064, 0.008)	(0.044, 0.137)
Number of Books at Home	−0.003	0.007	−0.004
	(−0.019, 0.013)	(−0.003, −0.018)	(−0.020−0.012)
Language Spoken at Home (Ref. Test Language)			
Other Language	−0.047	−0.001	0.049
	(−0.109, 0.014)	(−0.046, 0.043)	(−0.015, 0.112)
Immigration Status (Ref. Native)			
Migration Background	0.004	0.010	−0.014
	(−0.054, −0.061)	(−0.034, 0.054)	(−0.073, 0.046)
Sex (Ref. Male)			
Female	0.007	0.016	−0.022
	(−0.034, 0.047)	(−0.014, 0.045)	(−0.063, 0.018)
N of students	3294		
BIC	41523.590		
Pseudo R² (McFadden)	0.035		

Note: Weighted estimates of multinomial logit regression. Average marginal effects (AME), 95 % confidence intervals in parentheses. Predictors HISEI 08 and Average Grade are z-standardised. * p < 0.05, ** p < 0.01, *** p < 0.001. Data: TREE2 (2022), own calculations.

spectively, over this period. Table 2 presents the results in terms of average marginal effects and 95 % confidence intervals in parentheses.

Track placement in upper secondary education is an influential predictor of whether and in which direction students adjust their educational aspirations after leaving compulsory school. Individuals pursuing any other pathway than general education are significantly less likely to stick to the educational aspirations they had at the end of compulsory school. These effects are sizeable, with VET students being 13.6 percentage points (pp.) less likely (p < 0.001), and those in programmes leading to a vocational baccalaureate even 24.5 pp. (p < 0.001) less likely to stick to their aspirations. In contrast, holding other covariates constant, students in VET are 6.9 pp. (p < 0.01) more likely, and those pursuing a vocational baccalaureate 8.4 pp. (p < 0.001) more likely to lower their educational aspirations upon leaving compulsory school. Yet students in the aforementioned tracks are also more likely to adjust their educational aspirations upwards (VET: AME = 0.067, p < 0.05, vocational baccalaureate: AME = 0.161, p < 0.001). Thus, students in these two tracks exhibit a similar pattern of aspirational adjustment when compared to those in general education. In addition to these findings, the track attended at the end of lower secondary education is also statistically related to the way students adjust their aspirations. Compared to their counterparts in the high requirement track, students who attended the track with advanced requirements show a higher likelihood of adjusting their educational aspirations upwards (AME = 0.112, p < 0.001). However, those who attended the other two lower secondary tracks considered do not differ from students in the high requirement track regarding their adjustment of their educational aspirations.

In contrast to the results in Table 1 predicting the level of educational aspirations, socio-demographic factors, perceived parental pressure and educational achievement only play a limited role in explaining adjustments of educational aspirations. Although adolescents whose parents have no tertiary degree show a higher propensity to set higher educational goals, neither the highest parental ISEI nor the number of books at home are related to aspirational adjustments.

While treating all other covariates as they were observed, the predicted probabilities in Figure 3 clearly indicate that students in the academically most demanding general education track are least likely to adjust the educational goals they set at the end of compulsory school. The multinomial regression model in Table 2 predicts that 54.8 % (+/– 4.3 pp.) of students in general education will stick to their educational aspirations over the observed period. Conversely, only 11.5 % (+/– 2.3 pp.) of these students lower their educational aspirations. Students in VET (18.3 % +/– 2.9 pp.), and particularly those in programmes leading to a vocational baccalaureate (19.9 % +/– 4.4 pp.), are substantially more likely to adjust their educational goals downwards upon entering the upper secondary level. In contrast, 40.4 % (+/– 3.4 pp.) of VET students and 49.8 (+/– 5.9 pp.) of students in programmes leading to a

Figure 3   Effects of Track Placement on Adjustments of Educational
                  Aspirations
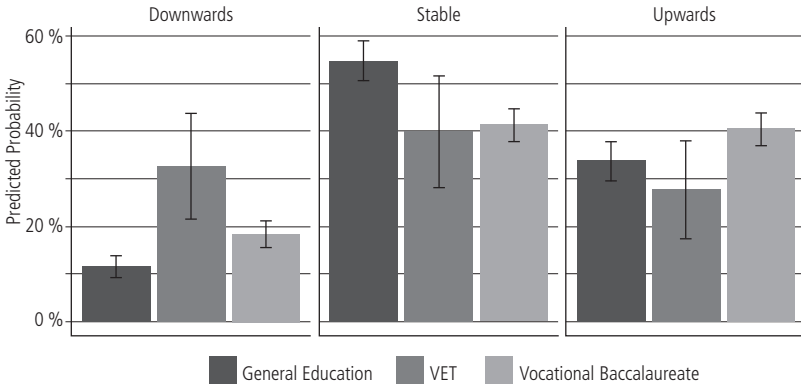
Note: Predicted probabilities with 95% confidence intervals (N = 3294), Data: TREE2, own calculations.

vocational baccalaureate set higher educational goals than they set at the end of
compulsory school.

   Overall, our results on the adjustment patterns with respect to educational
aspirations only partially support our hypotheses and findings from previous
research. In line with the mechanisms suggested by RCT and the WM, students
placed in the academically most demanding track of upper secondary education
are less likely to lower their educational goals. This pattern closely mirrors recent
evidence from Germany (Bittmann and Schindler 2021; Geven and Forster 2021), a
country whose education system is similarly stratified. Students in the track leading
to a vocational baccalaureate degree appear to receive a rather mixed ability signal
(Karlson 2015), coupled with a less marked influence of significant others towards
aspiring to specific educational goals (Van den Broeck et al. 2020). This is exem-
plified by the fact that more than two-thirds of students in this track adjust their
educational aspirations upwards or downwards. However, students pursuing VET
are not dissuaded from setting more ambitious educational goals. On the contrary,
an equal share of these students stick to their aspirations or set higher educational
goals. This finding contradicts Hegna's (2014) and Bittmann and Schindler's (2021)
notion that students in vocationally oriented tracks are increasingly diverted from
aspiring to tertiary degrees.

5   Conclusion

Educational aspirations play an important role in shaping students' educational trajectories and destinations. In this study, we examined the formation and dynamics of educational aspirations among compulsory school-leavers in Switzerland, drawing on longitudinal data from the TREE2 study. Theoretical frameworks for explaining educational aspirations, namely RCT and the WM, suggest that proceeding to the next educational stage constitutes a pivotal moment for revising educational aspirations, particularly in highly stratified education systems such as Switzerland's.

Our first analysis of the effect of track placement on the formation of educational aspirations shows that aspirations strongly diverge by track in lower and upper secondary education. Students in academically demanding tracks set substantially higher educational goals than those in the academically least demanding tracks, with those attending intermediary programmes situated in between. This finding proves robust when controlling for various other determinants of educational aspirations identified by previous research.

However, investigating how students adjust their aspirations after leaving compulsory school reveals more nuanced insights. Supporting our hypothesis, we find that students in general education tend to adjust their aspirations upwards or stick to their – generally high – initial aspirations. Further, in line with our expectations, students in programmes leading to a vocational baccalaureate adjust their aspirations the most, either by lowering or by increasing their initial educational goals. Contrary to our expectations, the results suggest that students entering VET are not dissuaded from setting higher educational goals after leaving compulsory school. Students in VET not only stick to or lower their aspirations, they also substantially increase them. This result suggests that students in VET develop aspirations for tertiary education much later than their counterparts in general education. This argument is in line with the fact that many VET graduates enrol in a subsequent vocational baccalaureate programme (e. g., Trede et al. 2020).

The results of the two analyses combined draw an interesting picture. On the one hand, they underline theoretical arguments by showing the unambiguous effects of general education, as this track is strongly oriented towards tertiary education and is accompanied by strong ability signals (Karlson 2015) as well as the influence of significant others towards aspiring to a specific educational goal (Van den Broeck et al. 2018). Similarly, they prove a good fit for intermediary tracks with no clear track orientation, fuzzier ability signals and more diverse influence exerted by significant others. On the other hand, the upward adjustment in the VET track is surprising under the theoretical premises. A similar pattern is observed by Basler and Kriesi (2019) for the occupational aspirations of adolescents in Switzerland.

How can we explain this interesting finding? Like Hegna (2014), we find that social characteristics strongly affect the formation of aspirations, while only barely

affecting the way students adjust their aspirations. Empirically, the revision of aspirations is found to be mainly based on track placement and factors that change with it. First, beliefs about costs and benefits strongly mediate the formation of aspirations that coincide with milieu-specific norms, explaining the strong correlation between social characteristics and aspirations in the first place. Second, as track placement limits the spectrum of viable educational options, sends ability signals, and alters the constellation of significant others, there is less space in which milieu-specific norms can unfold. Students will not only assess their opportunities and abilities according to track placement, but also within a track (Bittman and Schindler 2021). When track placement exceeds or is below the students' expectations, they are more likely to revise their aspirations (Geven and Forster 2021). These new evaluations comprise their perceptions of abilities, motivation, and possible opportunities in the future (Heckhausen and Buchmann 2019). Consequently, track placement can shape beliefs about appropriate aspirations for a specific track upon its completion.

Students who complete VET are potentially about to enter the labour market and see that further investment directly affects their prospects. From their perspective, it is reasonable under certain preconditions, or in light of specific beliefs, to set goals for the next stage, as they have already passed a hurdle by obtaining a qualifying certificate. General education tracks do not prepare students to directly enter the labour market as they are oriented towards tertiary education. Given the investment students have already made, it seems most reasonable to follow this orientation and to stick to their aspirations as the hurdle of labour market entry is still ahead.

Despite identifying robust effects across different model specifications, this study has some limitations. The three-year period examined in this study is a specific, though undeniably important, snapshot of a student's educational career. However, the study does not provide insights into the long-term processes behind the formation of educational aspirations, nor does it allow us to evaluate whether and to what extent educational aspirations are realised. Further, the data does not explicitly enable us to model the proposed mechanisms of rational calculus and social influence. Neither can we control for students' educational performance in upper secondary education (which is an undeniably important determinant of educational aspirations; e. g., Khattab 2015; Karlson 2019), or for the learning environment. We further acknowledge the notion of Buchmann and co-authors (2016) that VET programmes are unique and offer different opportunities, and thus may best be treated as a heterogeneous category. Specifically, it is plausible that the requirement levels of different VET programmes correlate with the adjustment of educational aspirations.

The identified track-specific disparities in how students form and adjust their educational aspirations add to an emerging strand of literature and contribute to a deeper understanding of students' educational mobility in Switzerland. Although this cannot be determined here, these mechanisms are presumably more pronounced in the highly stratified Swiss education system than in systems with comprehensive

secondary education (Buchmann and Dalton 2002; Parker et al. 2016). Although aspirations do not predetermine educational outcomes, they deserve adequate scientific attention. By demonstrating that educational aspirations are subject to temporal dynamics that are markedly shaped by track placement, we aim to contribute to a better understanding of educational trajectories. On this basis, we encourage researchers to investigate processes of aspirational change further. Specifically, we believe that explicit identification of the underlying mechanisms for, and examining the long-lasting implications of the adjustment of educational aspirations are promising approaches in this regard.

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Parental Investment in Children's Educational Pathways: A Comparative View on Swiss and Migrant Families

Chantal Kamm*, Andrés Gomensoro**, Marieke Heers***, and Sandra Hupka-Brunner**

Abstract: What strategies do parents adopt when it comes to realizing the aspirations they have for their children's educational career? Drawing on a longitudinal and intergenerational mixed-method study, we explore the complex interplay between children's educational pathways and parental educational aspirations and strategies. We focus on parents of modest social status (with and without migration background) whose children's educational trajectories have developed successfully.

Keywords: Parental strategies, parental investment, parental aspiration, second generation immigrant, mixed methods

Elterliche Investitionen in den Bildungsweg der Kinder: eine vergleichende Betrachtung von schweizerischen Familien und Migrationsfamilien

Zusammenfassung: Auf welche Strategien greifen Eltern zurück, wenn es um die Verwirklichung der Aspirationen geht, die sie für die Bildungslaufbahn ihrer Kinder haben? Anhand einer längsschnittlichen und intergenerationellen Mixed-Methods-Studie untersuchen wir das komplexe Zusammenspiel von Bildungsverläufen der Kinder und elterlicher Bildungsaspirationen und -strategien. Der Fokus liegt auf Eltern mit bescheidenem sozialem Status (mit und ohne Migrationshintergrund), deren Kinder eine erfolgreiche Bildungskarriere durchlaufen haben.

Schlüsselwörter: Elterliche Strategien, elterliche Bildungsinvestitionen, elterliche Bildungsaspirationen, zweite Generation von Einwanderern, mixed methods

Investissement parental dans le parcours scolaire des enfants : une approche comparative des familles suisses et migrantes

Résumé : Quelles stratégies adoptent les parents afin de réaliser les aspirations qu'ils ont pour le parcours scolaire de leurs enfants ? En s'appuyant sur une étude longitudinale et intergénérationnelle à méthode mixte, nous explorons l'interaction complexe entre les parcours éducatifs des enfants et les aspirations et stratégies éducatives des parents. Nous nous concentrons sur les parents de statut social modeste (avec ou sans origine migratoire) dont les enfants ont connu un parcours scolaire réussi.

Mots-clés : Stratégies parentales, investissement parental, aspiration parentale, deuxième génération d'immigré·e·s, méthodes mixtes

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1   Introduction

The work of Bourdieu and others has established that social origin is a crucial predictor of educational careers and labour market integration and that educational systems play a key role in (re)producing social inequalities (Bourdieu and Passeron 1987; Kramer and Helsper 2011; Esser 2016; Becker and Hadjar 2017). This holds for the general population, but it is particularly pronounced for students with a migrant background.

Theories of structure and agency are useful for explaining educational pathways because family action (agency) takes place under certain institutional constraints and opportunities (structure). These conditions tend to differ for families with and without a migration background because parents with a migration background have experienced their own educational pathway in a different educational system. This creates additional challenges for families with an immigrant background, especially in an early tracking and complex educational system like Switzerland. Contrary to most other countries, vocational education and training (VET) is widely used and recognized in Switzerland. Consequently, families with an immigrant background tend to have less experience with VET and therefore tend to perceive vocational education as a less suitable educational option (Wolter and Zumbuehl 2017). In addition, fear of discrimination in the apprenticeship market can lead to the exclusion of VET as an educational option (Imdorf 2017). Families with a migration background often have fewer resources that they can activate to support their children on their educational journey: For example, parents with a migration background may lack the language skills to actively engage in their children's educational career. Taken together, this implies that, compared to native parents, migrant parents might (need to) develop different strategies to support their children in their pathway through the educational system. The latter has not yet been fully understood and will be analysed in this article. In addition, we attempt to fill the knowledge gap on the effect of high (academic) aspirations in a dual VET-dominated system, focussing on parents with few financial resources.

In this study, we analyse parental strategies and pay particular attention to potential differences between "second-generation" (2G)[1] groups and offspring from families without a migration background. Having a migration background is frequently considered a risk per se in education. In Switzerland, it often correlates with modest social origin and low educational attainment; both characteristics hamper

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1   2G individuals were born in Switzerland or immigrated before the age of 5 (before the start of compulsory schooling), and their parents were born abroad; first generation (1G) individuals were born abroad and arrived after the age of 4; native Swiss were born in Switzerland and have at least one parent born in Switzerland. These definitions do not consider citizenship in order to include all descendants of a given migratory flow (and not only those who are not naturalized). We focus on the 2G because we are interested in young adults who make their educational experiences in Switzerland but whose parents have grown up in different systems. Consequently, the young adults and their parents might be exposed to varying educational reference systems.

access to academically more demanding educational tracks at lower secondary and post-compulsory education levels (Sacchi et al. 2011). In addition, allocation to less demanding tracks at the lower secondary level has a highly irreversible effect on educational pathways due to the strong segregation and segmentation of tracks in Switzerland (Meyer and Hupka-Brunner 2019). At the same time, immigrant descendants outperform their native peers when controlling for socioeconomic status SES and other relevant characteristics (Glick and White 2004; Crul et al. 2012) with respect to upward educational mobility (Schnell and Fibbi 2016) and vocational pathways to tertiary education (Murdoch et al. 2016). This surprising result might be explained by the high educational aspirations observed within migrant families (Portes et al. 2010; Anderson and Maassen 2014). A possible explanation for the high aspirations is that upward mobility can be understood as a strong motivation for migration, which is often transferred to the children ("immigrant optimism"; see, e. g., Kao and Tienda 1995; Fernández-Reino 2016). However, little is known about parental behaviour when it comes to putting these aspirations into practice.

To analyse parental behaviour, the concept of parental investment (PI) is useful. Based on the *sequential model of action phases* by Heckhausen and Buchmann (2019), in this study, we decompose PI in their children's education into three inter-related components: (1) parental aspirations - educational objectives, (2) available resources within the family - means of action and (3) parental strategies - mobilization of resources to achieve the objectives. We focus on families with young adults who, to date, have been educationally successful despite a modest socio-economic background. We analyse their parents' aspirations and further educational pathways. Families from various countries of origin are compared to Swiss parents, accounting for the heterogeneity of social origin among young adults of the second-generation in Switzerland (see Fibbi et al. 2007).

To analyse the role of parental investment in children's education, we use two data sources: First, the second cohort of the TREE (Transitions from Education to Employment) panel survey (TREE2; Hupka-Brunner et al. 2021) to study the entry into upper secondary education and its relationship with parental resources and aspirations. Second, we analyse qualitative interviews conducted amongst Swiss and migrant parents of TREE2 respondents in the context of PICE[2]. The qualitative analysis allows us to establish different types of inductive parental strategies and how they are related to parental aspirations and resources, and whether there are differences according to parents' country of origin (including Swiss native parents).

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2   PICE is an SNF-funded study (184906), designed as an add-on survey of the TREE panel study. See part 3 for more information.

2 Educational Pathways and the Role of Parental Investment

2.1 Different Views on Successful Educational Pathways in the Swiss Context

Educational success is a multifaceted construct, including both objective and subjective indicators. In the next sections, we describe how educational success is defined in the Swiss context.

In the vast majority of Swiss cantons, lower secondary level education is tracked into several programmes with varying academic requirements.[3] Track allocation at lower secondary level strongly predetermines access to the various programmes at upper secondary level. Young adults who attend a track with extended or high requirements at the lower secondary level have more options for post-compulsory education than young people who attend a lower secondary school with basic requirements[4]. Given the better access to subsequent educational programmes, attending a lower secondary track with extended or high requirements can be considered a success.

In the transition to upper secondary education, the Swiss school system allows for general and vocational education and training programmes, with slightly less than 60 % of a cohort attending VET (either directly or after a transitional solution) and slightly more than 30 % attending general education (Federal Statistical Office 2021).

Obtaining a VET diploma is highly valued in Switzerland. In this regard, Switzerland differs from many other countries, where only general education certificates grant access to the tertiary level. Within certain limitations, upper secondary level VET diplomas, also entitle one to participate in tertiary-level education. This implies that many Swiss parents consider completion of an upper secondary level VET diploma a success, while many migrant parents tend to attach a higher value to general education (Cattaneo and Wolter 2013; Tjaden and Scharenberg 2017). However, other studies (e. g., Abrassart et al. 2018) show differences in parental aspirations between migrant groups. Overall and compared to natives, migrant parents and their descendants more often aspire to university education, for which the Swiss educational system usually requires a general baccalaureate. These differences between Swiss and migrant parents must be interpreted against the background of different educational experiences and different values attached to educational credentials in the countries of origin. Therefore, when analysing educational success in Switzerland, not only general education tracks, but also VET programmes are crucial (Schafer and Baeriswyl 2015). In addition to considering the nuances of the

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3   For a more detailed illustration of the Swiss education and training system, see https://www.edk. ch/en/education-system/diagram.

4   In vocational education, apprentices are selected and trained by the training company. Thus, access to vocational education is also designed for young people from school tracks with low requirements. In reality, young people who have attended school types with basic requirements are more likely to encounter access difficulties. Young adults who have attended school types with extended/high requirements have better chances of access.

Figure 1   Factors Explaining Educational Success, Inspired by Heckhausen & Buchmann 2019
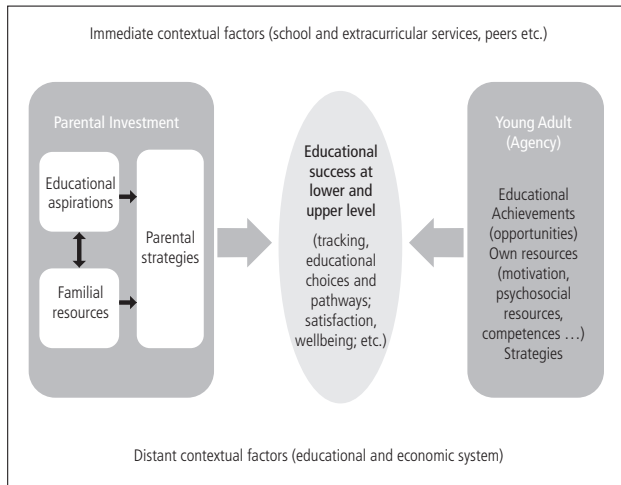
Swiss educational system, we take a longitudinal perspective based on life-course theories, which allows us to look at educational *pathways,* thus providing a holistic picture of educational success.

2.2   The Model of Parental Investment

To investigate the role of parental resources, strategies and aspirations in pathways towards post-compulsory education of young adults in Switzerland, we develop a model that takes into account the interplay between structure and agency (see Figure 1).

Taking a life course perspective, we assume that individual decision-making processes and parental behaviour are influenced by immediate and distant contextual factors (Evans 2007; Tucci 2017). An individual's range of action is strongly influenced by the opportunities in the respective educational system and institutional context. Furthermore, young adults and parents are embedded in a broader social context that further influences decision-making. Parental investment (PI) is seen as an important element influencing children's educational success (Desforges et al. 2003; Perna and Titus 2005). The latter is the focus of this article: the role of PI in children's education, which we further operationalize into three components.

First, parental educational aspiration can be defined as a goal-directed motivation that influences educational choices and investment in education. As it is operationalized here, parental aspirations are realizable anticipations and conditional on children's academic performance and educational opportunities (Portes et al. 2010).

Second, to realize one's educational aspirations, resources need to be available or potentially accessible. These include economic, cultural (including proficiency in one of the national languages and knowledge of the school system) and social capital, time, relationships within the family and between family and school. Gofen (2009) shows that non-material resources such as spending time, setting priorities and families' belief systems and values are important and can be activated to overcome a lack of (material or cultural) resources, particularly in migrant families.

The third component of PI are parental strategies, that is, how parents mobilize and use the resources in order to realize their aspirations. Parental strategies include a goal and the activation of means and may or may not include "action phases" (Heckhausen and Buchmann 2019). This implies that parental strategies may include active involvement, but also the decision to remain passive in order to encourage the child's agency or freedom of choice. In this sense, our definition of parental strategies goes beyond other definitions of parental involvement.

The three PI components affect each other and are shaped by immediate and distant contextual factors. Our empirical analysis focuses on the different aspects of PI and their interplay.

Applying the model to different groups (of migrant background in this article) contributes to sociological theory: Considering different past experiences (which are reflected in varying experiences in educational and value systems) allows to evaluate the importance of structure in which agency occurs (Evans 2007). Varying reference systems (e. g., local/national and social contexts, family histories and values) shape individual strategies and aspirations, leading to varying definitions of what "successful" educational pathways are. In addition, it is useful to reflect on the specific aspect of parental investment against the background of these different contexts.

3   Measurement Methods and Analyses

3.1   Research Questions and Data

To understand the role that migrant and Swiss parents' investment play in the educational success of their children, we apply a sequential mixed-method design (Creswell and Creswell 2018) to answer the following three questions: (1) What is the effect of parental aspirations on post-compulsory educational attendance? (2) What configurations of strategies do we find among parents of educationally successful young adults? (3) How do these strategy patterns interrelate with educational aspirations and resources? Throughout the analysis, we compare Swiss families and families of different countries of origin.

The first question is addressed by analysing data from the second cohort of TREE that covers a nationally representative sample (initial n = 8 429) of compulsory school leavers in 2016 (after 11th grade, age 15–16). TREE2 (Hupka-Brunner

et al. 2021) is a panel study at yearly intervals (across several post-compulsory years) that emphasizes on observing educational and employment trajectories. It includes comprehensive data on respondents' school situation (e. g., lower secondary track attendance, mathematics test scores), family resources (parents' level of education and occupation, economic resources, etc.) and educational aspirations of parents at the end of compulsory school. Additionally, we make use of TREE2's detailed information on respondents' educational situation when entering upper secondary education in 2017.

To answer the second and third questions, we use qualitative data from the TREE add-on study PICE. Within PICE, we interviewed TREE2 respondents and – if possible – one of their parents (n = 48). As we focus on the parental perspective in this paper, details of parents' interviews included in this paper are displayed in Appendix 3.

The qualitative sample includes parents 1) who are of modest social origin (below average socio-economic status and primary or secondary education) and 2) whose child has attended an advanced or high requirement track at the end of lower secondary education. We interviewed the parent who, according to the child, was more actively involved in the child's education (73 % mothers). We compare Swiss native and immigrant parents from the main low-skilled labour migration flows, namely those from Spain, Italy, Portugal, the Balkan countries, Turkey and Sri Lanka.

The qualitative interviews have been conducted online.[5] We conducted problem-centred interviews (Witzel 2000). The parental interview focused on their definition of educational success for their child, the evaluation of PI at all stages of the child's educational career and the (in)coherence of strategies over time both in a retrospective and present view. This article takes an intergenerational perspective: We consider parental aspirations as reported by the young adults (research question 1) and parents' own reports on their strategies and aspirations (research questions 2 and 3).

3.2 Data Analysis

In the quantitative analysis of TREE2, first, we observe the differences between the majority group and the 2G groups in terms of parental aspiration levels[6] (reported by the TREE2 respondents at the end of compulsory school) and of the educational status in the first post-compulsory year (n = 7 971, as we account exclusively for those who participated in 2017). For parental aspiration, we distinguish three categories: "My parents want me to complete a VET programme", "My parents want me to study"[7] and "I don't know/My parents have no opinion about it". "To study" implies

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5   This was due to the situation of the COVID-19 pandemic.
6   Parental aspirations, as operationalized here, should be considered realistic (Haller 1968) as they
     are affected by young adults' previous educational pathways.
7   The original wording in German and French («Meine Eltern wünschen, dass ich studiere»";
     « Mes parents souhaitent que je fasse des longues études ») differ a bit from the Italian wording

future attendance of Universities, Universities of Applied Sciences and Universities of Teacher Education. With regard to educational status at the beginning of upper secondary education (observed in 2017), we distinguish four categories: "Not in certifying education"; "VET (2–4 years)"; "Vocational baccalaureate"; "General education". Second, we assess the effect of parental aspirations on the transition into upper secondary education. We develop two multinomial logistic regression models to compare average marginal effects (AME) between Swiss families and different 2G groups (n = 7 889 as we account exclusively for those who participated in 2017 with no missing values). The dependent variable of both models is the educational status in 2017. The independent variables include individual characteristics (sex and migration background), resources within the family (parental socio-economic status and educational attainment), educational outcomes (lower secondary track, math score measured at the end of compulsory school) and the regional context (language region). In the second model, we add parental aspiration levels (the variable of interest) to compare the differences between the models in terms of AME. By comparing the two models, we quantify the potential effect of parental aspiration on upper secondary track attendance in percentage points (PPs). The model statistics strongly support adding parental aspiration as a predictor. All statistical results are representative for the compulsory school leavers in the 2016 population, as we account for the longitudinal weights in order to compensate for panel attrition and initial sample bias.

In the qualitative analysis, a structured content analysis (Kuckartz 2016) with a deductively defined basic structure and a subsequent inductive and collaborative coding process was carried out (Mayring 2015). The comparative analysis led to a qualitative typology following the structure of Kelle and Kluge (2010). Starting with a large variety of 38 inductively defined parental strategies adopted at different moments in children's educational pathways, these are then reduced based on relevant comparative dimensions (Kelle and Kluge 2010, 91 ff.). Defining the two to three most important strategies per parent, we analysed cross-case empirical regularities that led to a definition of four types of parental strategies. We describe the typology process in more detail in section 4.2.

4   Results

4.1   The Relationship Between Parental Aspirations and Post-Compulsory Educational Attendance

Our descriptive results confirm that, as in many other countries, parents with a migration background express higher educational aspiration levels for their children

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(«I miei genitori desiderano che faccia l'università») and leaves more room for the inclusion of other types of tertiary/further education.

compared to Swiss parents (see Table 1). Table 1 shows the anticipated parental aspiration as reported by the young adults and refers to the highest educational aspiration of the parent.

Table 1   Parents' Educational Aspirations Reported by the Young Adult at the End of Compulsory Education (2016) by Migration Background (row %)

Question: What is the highest level of education that your parents would like you to achieve? My parents …	I don't know; … Have no opinion about it	…Want me to complete a VET programme	…Want me to go to university	n (non-weighted)
Swiss native	29 %	47 %	24 %	5847
2G Italy/Spain	16 %	37 %	48 %	140
2G Portugal	22 %	36 %	42 %	221
2G Turkey	7 %	39 %	55 %	112
2G Balkans (Albanian-speaking countries)	14 %	38 %	48 %	286
2G Balkans (other countries)	18 %	43 %	39 %	229
2G Sri Lanka	15 %	31 %	54 %	129
2G Other countries	25 %	22 %	53 %	536
1G all countries	20 %	34 %	45 %	471

Note: (2G = Second-generation; 1G = First-generation; weighted). Source: own calculation based on TREE2 data.

24 % of Swiss young adults perceive their parents as wanting them to study, compared to a range between 39 % and 55 % for parents with a migrant background. This shows the higher aspirations of migrant parents who, on average, are from more modest social backgrounds compared to Swiss parents (except for the group "2G other countries", who are not the focus of this study). Swiss parents more often want their child to complete a VET programme, or they "do not know/have no opinion about it". This last category includes different situations. Previous analyses (Kamm et al. 2021) show that Swiss parents often promote autonomy and want the child to decide for her/himself, that they sometimes do not communicate their aspirations or, less often, that they do not have any aspirations. The preference for general education among migrant parents and the preference for VET among Swiss parents may be linked to migrant parents' "immigrant optimism" (Kao and Tienda 1995; Fernández-Reino 2016), but also to the different educational systems of reference. Indeed, a vast majority of Swiss parents have completed VET themselves and are familiar with it.

      In a next step, we investigate the relationship between parental aspirations and children's educational pathways, comparing migrant with native families. To shed more light on this question, we first describe young adults' educational situation one year after the end of compulsory school (see Table 2). There are considerable differences between Swiss natives and the different 2G groups. Particularly, 2G from

Turkey, the Albanian and other (non-Albanian) Balkan countries and Sri Lanka have a higher risk of not being in a certifying education and less often attend general education. However, part of those differences could be due not only to familial resources and parental aspirations that vary between 2G groups, but also to previous educational outcomes (lower secondary track attendance and academic achievement), contextual differences (language region) and other individual characteristics.

Table 2   Educational Status One Year after the End of Compulsory Education (2017) by Migration Background (row %)

	Not in certifying education	VET (2–4 years)	Vocational baccalaureate	General education	n (non-weighted)
Swiss native	18 %	41 %	9 %	33 %	5847
2G Italy/Spain	21 %	37 %	11 %	31 %	140
2G Portugal	33 %	32 %	6 %	30 %	221
2G Turkey	39 %	37 %	6 %	18 %	112
2G Balkans (Albanian-speaking countries)	28 %	50 %	4 %	18 %	286
2G Balkans (other countries)	25 %	53 %	8 %	14 %	229
2G Sri Lanka	37 %	32 %	8 %	23 %	129
2G Other countries	28 %	23 %	5 %	44 %	536
1G All countries	43 %	25 %	5 %	27 %	471

Note: (2G = Second-generation; 1G = First-generation; weighted). Source: own calculation based on TREE2 data.

To account for these factors, we estimate two multinomial logistic regression models and focus on the AMEs and confidence intervals (see Figure 2). In the first model, we show the difference in the type of education undertaken at upper secondary level between Swiss native students (reference category) and 2G students while controlling for various factors.[8] Model 2 adds parental aspirations.

When focusing on VET attendance, we observe that 2G migrants from Portugal, Turkey and Sri Lanka attend VET less often than Swiss natives; the difference is between 16 to 18 percentage points (PPs). By adding parental aspirations, the differences in VET attendance for some groups (when compared to natives) are reduced, but still statistically significant. There are no statistically significant differences for the other groups (when compared to natives), even though the differences between natives and the various 2G groups decrease when taking parental aspirations into account in Model 2. However, 2G youths from Portugal and Albanian countries more often attend general education programmes when controlling for all covariates (Model 1). Again, when adding parental aspirations in Model 2, the differences with

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8   Sex, migration background, parental highest socio-economic index, highest parental education, lower secondary track attended, math score measured at the end of compulsory school and language region.

Figure 2   Average Marginal Effects (and Confidence Intervals [95 %])
                  of Upper Secondary Educational Status (2017) by Students'
                  Migration Background (Reference Category: Swiss Native)
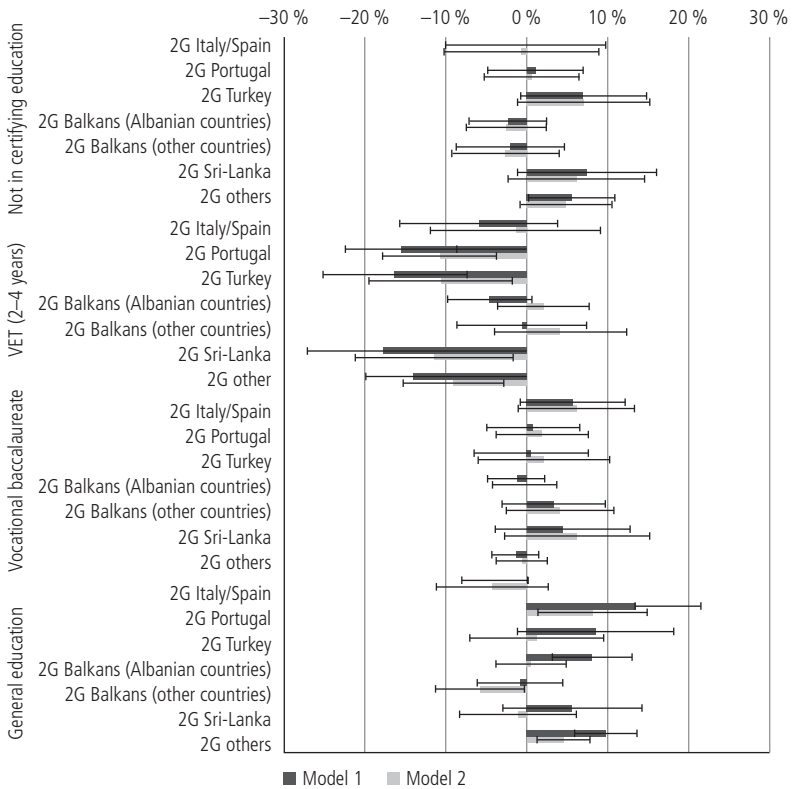
Model 1: controlled variables: Sex, migration background, parental highest socio-economic index, highest parental education, lower secondary track attended, math score measured at the end of compulsory school and language region. Model 2: controlled variables: same as Model 1; parental aspiration. Example of how to read the figure: Compared to Swiss native students and all else being equal, 2G Sri Lankan students are 18 percentage points (PPS, Model 1) less likely to attend VET. This difference is statistically significant (< 5 %) as the confidence intervals do not cross the reference line (0 %). Source: own calculation based TREE2 data.

Swiss natives decrease. This implies that parental aspirations are crucial in the process of attending VET or general education. Migrant parents' aspirations contribute to young adults' higher attendance of post-compulsory general education.

      There are no statistically significant differences between Swiss natives and the various 2G groups in not attending a certifying education or training or in attending a vocational baccalaureate programme. The AMEs are similar in both models.

This implies that migration background does not constitute a risk in itself in those two situations.

Other factors taken into account in the models also contribute to the prediction of educational pathways. Therefore, we now consider potential moderating effects (see Appendix 1 and Appendix 2). Gender is significant in both models, while there are no large changes in AMEs between Model 1 and 2. The same holds for achievement (math test) and lower secondary education. There are differences between the two models with respect to parental socio-economic status and educational attainment. When moving from model 1 to model 2, the differences between the second and fourth quartile decrease, implying that the effect is partly due to parental aspirations. Similarly, the differences between parents with tertiary and secondary education are reduced in the second model, implying that the effect of parental education is partly due to parental aspirations.

To sum up, parental aspirations can be considered a driving factor when it comes to attending the various programmes of upper secondary education. To test our hypotheses, we analyse the differences of regression coefficients for the 2G groups in more detail: for some groups, parental aspirations serve as a pushing factor for attending higher educational tracks at the upper secondary level. This is especially true for the 2G from Portugal, Turkey, the Balkans (both groups) and Sri Lanka, while the coefficient for the 2G from Italy/Spain is not significant.

We now shed more light on the underlying mechanisms that might explain these results. We hold that aspirations are important, but do not fully explain differences in the 2G's educational success. A better understanding of how aspirations translate into educational pathways through the mobilization and development of resources as a parental strategy is crucial. After having analysed young adults' reports of parental aspirations, we shift the perspective to parents' point of view to examine PI as reported in the qualitative interviews.

4.2　Parental Strategies Towards Education and Their Interrelation With Aspirations and Resources

The starting point of the qualitative analysis of research question 2 is a deductive-inductive coding process. We started with the following *"sensitizing concept"*[9] (Kelle and Kluge 2010, 28–30) that needs to be specified in the empirical material: "Strategies include the development, mobilisation and use of existing resources to achieve the (educational) goals" (Heckhausen and Buchmann 2019). Based on our sample of interest, we define "existing resources" as available and potentially accessible resources, including school and extracurricular support services. We inductively identified 38 strategies that are employed at different time points and with different levels of active engagement. Based on the inductively coded interview

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9　Kelle and Kluge (2010) define sensitizing concepts as disciplinary and scientifically shaped world views. They must be substantiated by empirical data.

segments, we identified empirically relevant constellations that represent the starting point for further structuring and analysing regularities of parental strategies. In line with Epstein (2005), we found strategies that reflect a broad definition of parental involvement: the most important ones are learning support and advocating for the child's interest in school. We also identified strategies characterized by controlling activities (on schoolwork, marks and exerting pressure) and compensating strategies (for example, organizing tutoring or financing courses). In addition to these rather *action-oriented* strategies, two sets of strategies resembled rather *reactive* parental strategies. A characteristic feature of these strategies is that parents endeavoured to give their children room to make their own decisions and were prepared to hold themselves back to some degree. They reported that they supported their children emotionally, encouraged and motivated them. However, they also emphasized that they wanted to promote the children's autonomy by letting them take their own decisions and promoting their desires. Overall, the parents described their actions as very conscious and highly reflective when it comes to the promotion of their children's educational pathway.[10] While the *action-oriented* strategies correspond to what Heckhausen and Buchmann (2019) define as "action phases" in order to reach a goal by investing effort and other resources, the *reactive* strategies refer to a conscious decision to step back and/or encourage the child's decision-making.

Based on the recoded aspects, the document map[11] reveals clusters of the most important strategies, taking into account the two to three most important strategies of each parent. Based on empirical and theoretical considerations, we opted for a 4-cluster solution for our typology to which all parental interviews are allocated (see Table A4).

The first type (n = 14) involves parents who mostly report *action-oriented* strategies such as controlling, involvement and compensating. This group does not mention reactive strategies (such as being there or letting the child choose). In the second type (n = 11), parents are involved in the educational processes of their child. Partly they also act controlling, and as a second important strategy, they report to be there, especially emotionally. Parents in the third type (n = 13) highlight the importance of the children's advocacy and are occasionally active-oriented (controlling n = 2, involvement n = 4, compensating n = 4). In type 4 (n = 10), letting the child decide is an important aspect, as well as being there, especially emotionally or financially, while active-oriented strategies are not mentioned by this group.

In the next part, we characterize the four types in more depth and, in order to answer research question 3, we assess the interrelation with aspiration (empirically characterized as aspiring for universities, best/highest education, baccalaureate, VET/higher VET, no aspiration), resources (inductively, the data revealed emotionally, cul-

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10   These parental strategies are reported at a time when the children have already grown up and have been – at least partially – successful in school.
11   The MAXQDA clusters are built on similarity measures based on Russel & Rao (1940), taking into account the appearance of a code as a match, while the absence of a code reduces the similarity.

Table 3   Typology of Parental Strategies and their Interrelation with
                 Aspirations, Resources and Different Groups

Inductive Definition	Aspiration	Resources	High importance for these Groups
Type 1			
Active-oriented (Controlling, Involvement, Compensating) in the education of the child	High aspiration towards tertiary	Emotional, cultural resources Mostly lack of competences	Non-EU Southern EU
Type 2			
Involved in Education, partly controlling. As a second strategy be there (emotionally)	High but open "best/ highest education"	Emotional, cultural and material resources Lack of different resources (mostly competences, financial and social)	Southern EU
Type 3			
Children's advocacy, punctual active oriented	Mostly no aspiration (or not even mentioned)	Mostly emotional and material resources Fewer but diverse lack of resources	Swiss natives
Type 4			
Let the child decide about his/her future, be there if needed (emotionally, financially)	Diverse aspirations	Lack of diverse resources Fewer resources	Swiss natives Non-EU

turally and materially weak ties) and lack of resources (lack of competences, financial resources, system knowledge, social resources, time). Furthermore, we are interested in the differences between parents with and without a migration background. Based on empirical proximity and in order to make group-specific statements, we regrouped the parents with a migration background into three categories: Southern EU (Italy, Spain, Portugal), Non-EU (Balkan-Albanian, Balkan-others, Sri Lanka, Turkey). Table 3 summarizes the main characteristics of each type.

The table reveals a type with mostly active-oriented strategies (type 1); one with mostly reactive strategies (type 4). The other two types are characterized by a combination of action-oriented and reactive strategies (types 2 and 3). The types do not just differ regarding their strategies, but also regarding aspirations and resources. Furthermore, some of the types of strategy seem to be of higher importance for some parental groups than for others. We now have a closer look at the four types by looking at anchor examples and possible explanations of these differences.

Type 1: active-oriented

In the first type, migrant parents from various countries of origin develop and make use of action-oriented strategies to support their children. This is not the case for Swiss parents. Parents of this type are active-oriented, with controlling (as rewarding achievements, expressing authority and moral education) as the most important strategy. Besides controlling behaviour, involvement in the child's education (at home and in school) and compensating strategies (improving their own information/education and help-seeking) also play an important role for those migrant parents. These parents aspire high and mostly towards tertiary level education, more precisely towards universities and baccalaureate schools. The following transcript excerpt from Kushtrim[12], a father who immigrated from Kosovo, illustrates how these controlling strategies go hand in hand with high aspirations: Kushtrim (Kosovar father):

> *Now he's in the third year of [upper-secondary general education school], it's gone well so far. I used to go three-four times there [at school] too. […] He shows his grades here at home. He has good grades. I can see that he's quite on the ball. He studies quite a bit. And now it's for him. It's for him. So I also talk to him quite often. I say "Listen, this is very important". Because it's five years in the cycle [baccalaureate school]. You really have to pass.*

Kushtrim refers to different controlling aspects that are put in place in order to reach the expressed aim, that is, pass the cycle. The father communicates the importance of education to the son on a regular basis. Attaching a high value especially to general education is a common narrative in this type, and in line with previous studies, seems to be a phenomenon that is more often observed among immigrant than Swiss parents (Hadjar and Scharf 2019). Here, the strategy of the father is to put his aspirations into practice through close supervision and active involvement in school.

With regard to parental resources, we observe frequent mention of lack of competencies, particularly proficiency in the locally spoken national language. A minority of type 1 parents report a lack of financial resources or system knowledge. The following citation reveals the interrelation between a lack of resources (here system knowledge) and strategies. Ajda, a Turkish mother, advocates in school for her daughter despite (or even more so because of) lacking knowledge of academic support options. Ajda (Turkish mother):

> *I did everything […] For example, my daughter went to school. [She told me] "Mother, there is a place, the studio.[13]" I even asked my eldest daughter "What is that?" she replied "A friend of mine goes. Her grades are ALWAYS above five and a half." After that I asked at a parent-teacher meeting what it was. Unfortunately, they didn't send her. […] I even spoke to the teacher*

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12   All names of parents and young adults are anonymized using names of the same gender and cultural origin.

13   This is a support programme for gifted students.

in charge. "We don't know the grades. For certain things you have to inform us. We are foreigners." After I said so, they then said "Okay we will give it." After that [she] went there for a year. Before that we didn't know anything about it.

The citation starts with the general perception of "doing everything" to support her child in educational affairs, which is very much in line with the action orientation of type 1. Ajda had to advocate for her child in school in order to have her admitted to the programme for gifted students. Her lack of system knowledge is not experienced as an obstacle. On the contrary, she uses the term "being foreigners" to ask her older daughter for help and to hold the teacher responsible for providing group-specific information. This strategy is representative for type 1-parents, as they report compensating strategies more often than those in the other types.

To sum up, the first type describes the interrelation of high parental aspirations and active-oriented strategies that are typical for those migrant parents. This type describes vividly how educational capital is perceived as a "catalyst for upward social mobility" (Basit 2013, 727). As those (migrant) parents perceive general educational attainment as the most valuable goal, they are willing to activate their own and other available resources within active-oriented strategies in order to realiz e their aspirations.

Type 2: selectively involved

Parents of the second type are – to a somewhat lower degree, but still very often – active-oriented. Most of them describe themselves as being involved in the child's education in school or at home, and some of them exhibit controlling behaviour. In contrast to the first type, being there (emotionally and/or financially) is a second important strategy. Parents are there for their children whenever they need it and become active in key situations. As the parents in the first type, they aspire high, but with a broader definition: they want the best/highest education for their child. The following story exemplifies the combination of open, but high aspiration and punctual parental involvement. Felicidade narrates how she intervened when she heard that her son did not want to pursue general education. Felicidade (Portuguese mother):

When he was at the end of [lower] secondary school, he wanted to do an apprenticeship because it's good to get to the end of the month and have a small salary. Well, all young people like that, but we [the parents] didn't think it was good, because if the child gets good grades, you have to continue further, do you agree? And then it's up to the parents to adapt and to make efforts so that the children can go to school so that nothing is missing for them […] we convinced him by saying that he never lacked anything in life, so if he needs something, we always give it to him.

In Felicidade's narrative, an important life event occurs concerning the educational career of her son, which was largely co-designed by the parents. Contrary to the young adults' goal, both parents aspire towards a continued educational path, but the final degree remains vague. Despite the fact that neither the mother nor the father has a tertiary level degree (the mother left school after compulsory school), they are willing to encourage and financially support the further studies of their child – contrary to reproduction theory (Bourdieu and Passeron 1987). The strategy to overcome lacking financial resources consists of prioritizing education over other goods. The citation reflects a hierarchical logic of preference for general education over VET. Compared with previous studies, this reference system may be considered typical for immigrant parents (Cattaneo and Wolter 2013). The reference system may be different for the first and second generations, as we see in the excerpt. As exemplified above, parents in this type are active during certain crucial transitions in the educational career of their children. Apart from that, they describe their support strategy as being there, listening and motivating. These parents – a majority from Southern EU countries such as Italy, Spain and Portugal – lack different resources, which does not stop them from standing up for their children.

Type 3: letting the child decide, punctually involved

In this type, parents do not express specific educational aspirations. They refuse to express educational aspirations towards their children as well as towards the interviewer. Not having or at least not communicating aspirations is an active decision to promote young people's decisions. Nevertheless, if the child has chosen a (demanding) path, the parents of this type try to support that choice, as the citation of Ruth illustrates. Ruth (Swiss mother)

> *Yes, to a certain extent, we knew what she wanted and that she needed the grades, that we also supported her with her learning, especially in primary school. Later I couldn't always do it either (laughs). […] When she needed help, she came and got it. We never said: "You have to sit down and study now", but: "It would be smarter to sit down and study". So, it's her decision. But it's also her decision what she wants to do in life then.*

As we can see in the transcript, for parents of type 3 the decision-making and help-seeking process needs to be initiated by the child. Punctually, the parents intervene actively if the child asks for it. The parental role is considered to be a learning coach and to empower the child to become an agent of the own learning and decision-making process. In contrast to the first two types, the parenting style is encouraging rather than controlling. In this type, there are more Swiss than migrant parents. Resources or lacking resources are less important compared to the other types. Nevertheless, as we see in the narrative of Ruth, some individuals lack competencies and financial or social resources.

Type 4: the reactive parent

Similarly to type 3, in type 4 we identify a strong intention to let the child decide for his/her educational career. In contrast, the parental decision to step back is even more pronounced. Looking at the wording used, it is obvious that the child is at the centre of the narrative, while in types 1 and 2 the school career is more of a joint project. This strong commitment towards children's choices and actions is revealed in the excerpt of Claudia. Claudia (Swiss mother):

> *So, for us, it is important, very important, that they are independent. And become… and that they really learn a profession and then also earn their living. (laughs) And afterwards, yes [we wish] simply the best for them in any case. Yes. […] He never had any big problems at school, and afterwards he went to baccalaureate school. […] And now after baccalaureate school he went to Lausanne to the EPFL.[14] He had a difficult time afterwards and he dropped out because he had exams after half a year. And that scared him. And of course we motivated him to just keep on looking. And to look for another way. And to simply help him. And now I think he has already found his way. Yes. […] He's now doing an internship for six months, in a factory, in micro technology. And then he will go to a school in Biel.*

Claudia paraphrases the decision-making as a developmental task of her son, where the extension of this phase can be scary. Part of being an adult and independent is – according to Claudia – to make one's own decisions. She perceives the parental role as promoting and instructing the capability of decision-making. Even though the young adult finally decides against the prestigious studies at the EPFL, the parents put no pressure on his continuing or studying something else. On the contrary, they try to reduce the pressure by considering other solutions. This perspective points to a non-objective definition of educational success, where satisfaction and the educational fit matter more than ambitious studies or educational outcomes (for more detail see Kamm et al. 2021). Concerning aspirations, we find different manifestations in this type. Claudia's example shows an openness towards different educational pathways. Her reference system focuses on the aim to "learn a profession". In contrast, the non-EU (particularly Sri Lankan) parents in this type mostly strive for university studies. Compared to the other types, fewer parents of this type refer to available resources, while lacking resources is more important in their narratives.

5   Conclusion

In Switzerland, social origin is a major determinant of educational pathways (OECD 2021). Against this background, this contribution analysed the specific situation of

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14   EPFL is a prestigious, high-ranking polytechnical university in Lausanne.

some migrants, as they are often confronted with unfavourable starting conditions due to fewer resources and different educational reference systems (Kamm et al. 2022). In particular, we have argued that lower familiarity with the Swiss VET system due to parents' own educational system of reference often leads to educational aspirations that are oriented toward general education.

We have shown that, when controlling for social origin and previous educational outcomes, 2G young adults from Portugal and Balkan-Albanian countries enrol more frequently in general education programmes at upper secondary level than the (native) majority group. Furthermore, we observe higher levels of aspirations (i. e., towards academic education) among their parents. Parental aspirations of some 2G groups towards higher education add to our understanding of why they are overrepresented in general education programmes when comparing them to their native counterparts. This shows that – even though immediate and distant contextual factors are crucial for the individual educational pathway – parents, their educational aspirations and educational reference systems are important when it comes to educational success. Our findings support results from other countries' contexts and school systems, showing that parental aspirations matter for educational pathways (Portes et al. 2010; Hadjar and Scharf 2019).

Despite limited resources, parents can realize their academically-oriented aspirations even if the dominant Swiss VET context might suggest alternative pathways. In order to understand what parents actually do and what strategies they adopt, the sequential mixed method design offers a valuable contribution using the qualitative approach to shed light on the underlying mechanisms of high parental aspirations. We revealed a multiplicity of parental strategies that go beyond parental involvement (Epstein 2005). Our typology of parental strategies towards their children's education has identified active-oriented and reactive strategies. Parents' involvement in their child's educational pathway may include certain actions or consciously withholding them and letting the child determine his or her own educational career. Our typology disentangles the interplay between strategies that are shaped by aspirations and available or accessible resources. Furthermore, we observe that native parents tend to adopt reactive strategies (being there if needed and letting the child do/ decide) to support their children's education, while migrant parents tend to favour active-oriented strategies (controlling, involvement and compensating strategies).

The results from both our quantitative and qualitative analyses support this assumption and are in line with previous studies (e. g., Cattaneo and Wolter 2013). They show that immigrant parents – especially from non-EU countries – tend to attach a higher value to general education at upper secondary and tertiary level, while the Swiss parents of our sample refer to a non-hierarchic perception of VET and general education pathways.

Our results also reveal the importance of (opportunity) structures in which individual agency can unfold. Depending on parents' own experiences in specific

educational contexts, this leads to varying implementations of aspirations and strategies to foster their children's education. The (external and internal) reference to a certain group (having a migration background, low SES or some kind of educational distance) per se can be understood as a social categorization and, consequently, as a contextual factor that shapes parental investment.

Despite its contributions, our study has some limitations. 1) As we take an intergenerational perspective, it would be valuable to contrast both perspectives to better understand the dynamics of individual and parental co-agency (Schoon et al. 2021). 2) The young adults report realistic parental aspirations at the end of compulsory school, and it is likely that they are shaped by the context (school tracks and the career opportunities they open up) and future plans. For future research, it would be interesting to compare parental aspirations at different time points and to add a more inductive definition of aspiration. 3) The definition of success in the qualitative sample is rather narrow (focus on track attendance). It remains an open desideratum to take into account subjective aspects of success (satisfaction, job-skills (mis)match, self-efficacy and commitment to job/education).

To sum up, this study adds to our understanding of the importance of (migrant) parents' aspirations for young adults on educational pathways in a highly segregated education system. Furthermore, it reveals how parental aspirations are put into practice by activating available and potentially accessible resources within different strategies. More research taking a multigenerational perspective is needed, and a longitudinal view on the interrelation of different components of parental investment and educational success should be taken. Finally, the focus of this study was on young adults who were educationally successful. The extent to which parents of individuals who are less successful in earlier phases of their educational careers have similar strategies cannot be determined based on our data and remains an important topic for future research.

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Appendix

Table A1   Model 1: Multinomial Logistic Regression on Upper Secondary Educational Status (2017)

|	Not in certifying education			VET (2–4 years)			Vocational baccalaureate			General educations		
	AME	LB	UB	AME	LB	UB	AME	LB	UB	AME	LB	UB
Sex (ref. Female)												
Male	−0.065***	−0.09	−0.04	0.133***	0.106	0.16	0.014+	−0.002	0.029	−0.082***	−0.101	−0.063
Migration background (ref. Swiss native)												
2G Italy/Spain	−0.001	−0.1	0.097	−0.059	−0.157	0.039	0.058+	−0.007	0.123	0.003	−0.079	0.085
2G Portugal	0.011	−0.048	0.071	−0.155***	−0.225	−0.086	0.008	−0.05	0.066	0.136***	0.056	0.216
2G Turkey	0.071+	−0.007	0.149	−0.163***	−0.252	−0.074	0.006	−0.065	0.077	0.086+	−0.011	0.183
2G Balkans (Albanian countries)	−0.023	−0.071	0.025	−0.046+	−0.098	0.007	−0.012	−0.048	0.023	0.081***	0.032	0.13
2G Balkans (others)	−0.020	−0.087	0.047	−0.006	−0.086	0.074	0.034	−0.03	0.098	−0.008	−0.061	0.045
2G Sri-Lanka	0.075+	−0.011	0.161	−0.177***	−0.272	−0.082	0.045	−0.039	0.129	0.057	−0.029	0.143
2G others	0.056*	0.003	0.110	−0.141***	−0.199	−0.084	−0.014	−0.043	0.016	0.099***	0.06	0.137
1G all countries	0.112***	0.063	0.161	−0.188***	−0.241	−0.135	−0.01	−0.045	0.025	0.086***	0.04	0.131
Language region (ref. German)												
French	0.093***	0.062	0.124	−0.137***	−0.169	−0.104	−0.003	−0.021	0.015	0.046***	0.02	0.073
Italian	−0.061**	−0.104	−0.019	−0.026	−0.097	0.045	0.122***	0.072	0.172	0.034+	−0.072	0.003
AES math score	−0.05***	−0.063	−0.038	−0.016*	−0.029	−0.003	0.03***	0.023	0.038	0.036***	0.025	0.046
Lower secondary tracking (ref. Extended requirements)												
No differentiation based on skill level	0.037	−0.079	0.154	−0.178*	−0.328	−0.028	−0.1***	−0.134	−0.065	0.24*	0.083	0.397
High requirements	−0.098***	−0.132	−0.064	−0.348***	−0.39	−0.305	−0.053***	−0.08	−0.026	0.499***	0.448	0.55
Basic requirements	0.166***	0.124	0.208	0.068**	0.022	0.114	−0.091***	−0.11	−0.071	−0.143***	−0.167	−0.119
Highest socioeconomic index – HISEI (ref. Middle low quartile)												
Missing	0.049	−0.041	0.14	−0.06	−0.152	0.033	−0.013	−0.066	0.04	0.024	−0.047	0.095
Low quartile	−0.028+	−0.061	0.004	0.045*	0.01	0.08	−0.01	−0.034	0.013	−0.006	−0.04	0.028
Medium high quartile	−0.026	−0.063	0.011	−0.012	−0.052	0.027	0.013	−0.012	0.039	0.025+	−0.002	0.052
High quartile	0.015	−0.029	0.059	−0.068**	−0.111	−0.025	−0.028*	−0.049	−0.007	0.08***	0.049	0.111
Highest parental education level (ref. Upper secondary education)												
Compulsory schooling or less	0.026	−0.009	0.061	−0.023	−0.065	0.02	−0.021	−0.047	0.004	0.019	−0.02	0.058
Tertiary education	−0.001	−0.031	0.029	−0.052**	−0.085	−0.018	0.001	−0.017	0.018	0.053***	0.028	0.077
Missing/Other	0.089*	0.017	0.162	−0.035	−0.119	0.049	−0.044*	−0.088	−0.001	−0.01	−0.077	0.058

Note: AME = Average Marginal Effect; Levels of significance: *** p < .001, ** p < .01, * p < .05, + p <.1; LB = Lower Bound of 95 % confidence interval; UB = Upper Bound of 95 % confidence interval. Observations = 7 889; Wald chi²(66) = 1930.99; Pro > chi² = 0.0000; Pseudo R² = 0.3229; Log pseudolikelihood = −67749.242; Prob > F = 0.0000. Source: own calculation based on TREE2 data.

Table A2　Model 2: Multinomial Logistic Regression on Upper Secondary Educational Status (2017) including Parental Aspiration

	Not in certifying education			VET (2–4 years)			Vocational baccalaureate			General education		
	AME	LB	UB	AME	LB	UB	AME	LB	UB	AME	LB	UB
Sex (ref. Female)												
Male	-0.067***	-0.091	-0.042	0.129***	0.103	0.156	0.013	-0.003	0.028	-0.075***	-0.094	-0.057
Migration background (ref. Swiss native)												
2G Italy/Spain	-0.006	-0.102	0.09	-0.013	-0.119	0.092	0.062+	-0.01	0.134	-0.042	-0.111	0.027
2G Portugal	0.006	-0.052	0.065	-0.108	-0.178	-0.037	0.019	-0.038	0.077	0.082*	0.014	0.149
2G Turkey	0.071**	-0.011	0.153	-0.106*	-0.195	-0.017	0.022	-0.059	0.104	0.013	-0.07	0.096
2G Balkans (Albanian countries)	-0.025	-0.074	0.024	0.021	-0.035	0.078	-0.002	-0.042	0.038	0.006	-0.037	0.049
2G Balkans (others)	-0.026	-0.093	0.041	0.042	-0.04	0.124	0.042	-0.025	0.109	-0.058*	-0.113	-0.002
2G Sri–Lanka	0.062	-0.023	0.147	-0.114*	-0.212	-0.016	0.063	-0.027	0.153	-0.01	-0.083	0.062
2G others	0.049+	-0.008	0.106	-0.09**	-0.153	-0.028	-0.005	-0.037	0.026	0.046**	0.014	0.079
1G all countries	0.109***	0.058	0.159	-0.146***	-0.199	-0.092	0	-0.038	0.038	0.037+	-0.003	0.077
Language region (ref. German)												
French	0.09***	0.059	0.121	-0.12***	-0.153	-0.088	-0.004	-0.022	0.014	0.034**	0.012	0.057
Italian	-0.063**	-0.105	-0.022	-0.026	-0.094	0.041	0.12***	0.071	0.17	-0.031+	-0.066	0.004
AES math score	-0.049***	-0.061	-0.036	-0.011+	-0.023	0.002	0.031***	0.023	0.039	0.028***	0.018	0.039
Lower secondary tracking (ref. Extended requirements)												
No differentiation based on skill level	0.041	-0.072	0.153	-0.156*	-0.29	-0.022	-0.096***	-0.131	-0.061	0.211***	0.085	0.338
High requirements	-0.08***	-0.116	-0.045	-0.282***	-0.329	-0.236	-0.037*	-0.068	-0.007	0.4***	0.351	0.449
Basic requirements	0.183***	0.139	0.226	0.05*	0.004	0.096	-0.087***	-0.106	-0.067	-0.146***	-0.174	-0.119
Highest socioeconomic index – HISEI (ref. Middle low quartile)												
Missing	0.045	-0.043	0.133	-0.027	-0.12	0.066	-0.002	-0.059	0.055	-0.016	-0.08	0.048
Low quartile	-0.028+	-0.06	0.004	0.039*	0.004	0.074	-0.012	-0.034	0.011	0.001	-0.031	0.032
Middle high quartile	-0.024	-0.06	0.013	-0.003	-0.041	0.035	0.016	-0.008	0.041	0.01	-0.016	0.037
High quartile	0.015	-0.029	0.058	-0.047*	-0.089	-0.004	-0.022*	-0.043	-0.001	0.054***	0.027	0.082
Highest parental education level (ref. Upper secondary education)												
Compulsory schooling or less	0.026	-0.009	0.061	-0.012	-0.054	0.031	-0.019	-0.045	0.006	0.005	-0.03	0.04
Tertiary education	-0.004	-0.033	0.025	-0.031+	-0.064	0.001	0.002	-0.015	0.02	0.033**	0.011	0.055
Missing/Other	0.087*	0.015	0.159	-0.027	-0.105	0.052	-0.043+	-0.087	0.001	-0.017	-0.078	0.043

Table A2 continues on the next page.

Continuation of Table A2.

	Not in certifying education			VET (2–4 years)			Vocational baccalaureate			General education		
	AME	LB	UB	AME	LB	UB	AME	LB	UB	AME	LB	UB
Parental aspiration (ref. Want me to go to University)												
Don't know; have no opinion about it	−0.004	−0.045	0.036	0.071***	0.029	0.113	0.017	−0.004	0.037	−0.083***	−0.11	−0.057
Want me to complete a VET programme	−0.026	−0.06	0.007	0.211***	0.171	0.251	0.044***	0.019	0.069	−0.229***	−0.258	−0.2
Missing	−0.003	−0.068	0.062	0.039	−0.044	0.122	−0.029	−0.073	0.015	−0.007	−0.088	0.075

Note: AME = Average Marginal Effect; Levels of significance: *** p < .001, ** p < .01, * p < .05, + p < .1; LB = Lower Bound of 95 % confidence interval; UB = Upper Bound of 95 % confidence interval. Observations = 7889; Wald chi²(75) = 1878.46; Prob > chi² = 0.0000; Pseudo R² = 0.3547; Log pseudolikelihood = −64567.051; Prob > F = 0.0000. Source: own calculation based on TREE2 data

Table A3   Qualitative Interview Sample of Parents of TREE2 Respondents by Countries of Birth of Parents and Language Region

	Swiss language region		
	German-speaking	French speaking	Total
Country of birth of parents			
Switzerland	9	8	17
Southern EU countries (Italy, Spain, Portugal)	7	8	15
Non-EU countries (Balkans, Turkey, Sri Lanka)	13	3	16
Total	29	19	48

Table A4   Typology Table of Parental Strategies

	Type 1 (N = 14)	Type 2 (N = 11)	Type 3 (N = 13)	Type 4 (N = 10)
Active-oriented controlling	12	5	2	0
Active-oriented involvement	9	8	4	1
Active-oriented compensating	7	1	4	0
Reactive be there	0	10	1	10
Reactive let child do/choose	0	1	10	9

Elisa Banfi and
Matteo Gianni (ed.)
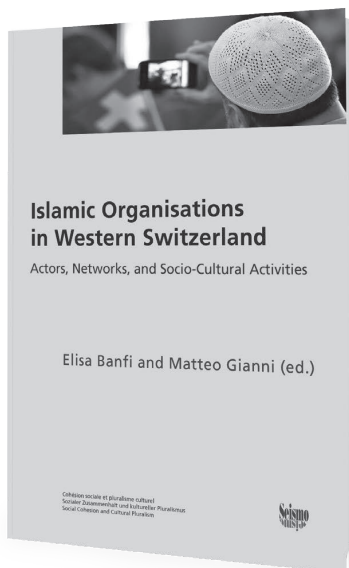
Islamic Organisations in Western Switzerland
Actors, Networks, and Socio-Cultural Activities

Series
Social Cohesion and
Cultural Pluralism

This book shows how, over the past forty years, Islamic organisations in Western Switzerland have established themselves and organised at both the cantonal and national levels. Based on empirical observations, the chapters demonstrate that, contrary to what is often believed, Islamic organisations do not focus their activities only on religious activities. Instead, by improving their deliberative practices, they have facilitated cultural, social, and religious activities while promoting social justice, political recognition, and equality of opportunity, often with programs aiming at reaching beyond the Muslim audience. In particular, the book shows how these organisations have attempted to translate their religious worldview into practices that align also with secular values, allowing them to negotiate and build consensus with public institutions to provide welfare services to both Muslim and non-Muslim populations, as well as programs to prevent radicalisation within a secular and democratic framework. Through deliberative practices, including youth organisations and umbrella Islamic organisations, these groups have found ways to overcome their lack of representation and power in the political sphere. This book goes beyond specific cantonal cases to address broader issues related to the social and cultural engagement of Islamic organisations in Switzerland, bridging the gap between Islamic studies and organisational network studies.plaçant au cœur de l'analyse les récits de ces actrices.

Elisa Banfi is a senior researcher of the University of Geneva. She has coordinated several research projects funded by the European Commission and by the Swiss National Science Foundation on the social commitment of religious actors.

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With contributions by Çağla Aykaç, Elisa Banfi, Baptiste Brodard, Miryam Eser Davolio, Matteo Gianni, Jérôme Grand, Akbar Nour, Victor Sanchez-Mazas.

Safety First? On the Timing of Moving in With a Partner and Its Determinants

Julia Zimmermann* and Gerald Prein*

Abstract: We analyze the first cohabitation with a partner as one of the key events in the transition to adulthood and consider its interdependencies with other life events, using life course data from the survey AID:A 2019 of the German Youth Institute (DJI). A remarkable finding is that for men, cohabitation with a partner usually occurs after an individual's entry into permanent employment.

Keywords: Cohabitation, permanent employment, school-to-work-transitions, trajectories, event history analysis

Geht Sicherheit vor? Über den Zeitpunkt des Zusammenziehens in einer Partnerschaft und seine Determinanten

Zusammenfassung: Anhand von Lebensverlaufsdaten aus der Studie AID:A 2019 des Deutschen Jugendinstituts (DJI) analysieren wir das erste Zusammenziehen mit einer Partnerin oder einem Partner als eines der Schlüsselereignisse im Übergang zum Erwachsenenalter im Hinblick auf seine Interdependenzen mit anderen Lebensereignissen. Ein bemerkenswerter Befund ist, dass der Zusammenzug mit einer Partnerin oder einem Partner bei Männern in der Regel nach dem Eintritt in eine dauerhafte Beschäftigung erfolgt.

Schlüsselwörter: Kohabitation, unbefristete Beschäftigung, Übergang Schule-Beruf, Verläufe, Verlaufsdatenanalyse

La sécurité d'abord ? Le moment de la cohabitation avec un ou une partenaire et ses déterminants

Résumé : En utilisant les données relatives aux trajectoires de vie de l'enquête AID:A 2019 de l'Institut allemand de la jeunesse (DJI), nous analysons la première cohabitation avec un ou une partenaire comme l'un des événements clés de la transition vers l'âge adulte en terme d'interdépendance avec d'autres événements de vie. Nous arrivons au constat remarquable que chez les hommes, la cohabitation avec un ou une partenaire a généralement lieu après l'entrée dans un emploi stable.

Mots-clés : Cohabitation, emploi à durée indéterminée, transition école-emploi, trajectoires, analyse de survie

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1   Introduction

In recent decades, young people have faced increasing demands to make individually meaningful transitions into adulthood (Billari and Liefbroer 2010). At the same time, life course patterns have considerably diversified and biographical security has declined, especially with respect to educational and employment careers (Groh-Samberg and Wise 2017). Education and employment trajectories are of particular importance for the life course, as they traditionally set the stage for important tasks in the process of reaching adulthood (Schoon and Silbereisen 2009). However, rather little is known about the causal interaction of school-to-work transitions and other key steps in young adulthood, such as cohabitation with a partner.

Beginning in the 1960s, the institution of marriage started to erode, and cohabitation of life partners became detached from family formation. During this time, many values and attitudes about gender changed dramatically; female school enrollment and labor force participation increased, and states began to expand family policies and enhance state support for families (Perelli-Harris and Sánchez Gassen 2012). As a result, cohabitation patterns have undergone significant changes since then. People today often live together before their potential marriage, and the number of those who marry late or not at all is steadily increasing (Hiekel 2014, 21). This development led to the establishment of non-marital romantic relationships as a scientific research subject in its own right (Manning 2020), and thus the transition to a co-residential union also became an important topic of research (Hayford and Morgan 2008; Wagner et al. 2019).

Since being in a long-term committed relationship without being married is now considered "the new normal" (Sassler and Miller 2017, 1), recent research often focuses on the cohabitation of unmarried couples. Unmarried cohabitation is understood among scholars as being either a precursor to marriage, an alternative to being single, or an alternative to marriage (Oppenheimer 2003; Xie et al. 2003; Oppenheimer et al. 1997; Hiekel 2014; Sassler and Miller 2017). Casper and Cohen (2000) point out that dedicated data sources on cohabitation are still lacking – i. e., those in which respondents provide information about non-marital cohabitation relationships. Nevertheless, many studies look at cohabitation in one way or another; some previous studies deal with cohabitation primarily in terms of social reporting (Casper and Cohen 2000; Kiernan 2001; Sassler and Goldschei-der 2004; Stanley et al. 2010; Konietzka and Tatjes 2014; Kuperberg 2014). The vast majority of research to date focuses on the implications of cohabitation for marriage (Oppenheimer 1988) and family formation (Heuveline and Timberlake 2004; Kiernan 2001; Lichter et al. 2016). With regard to the former, previous work focuses particularly on the role of cohabitation in declining marriage rates, in delayed marriages (Rindfuss and Vandenheuvel 1990; Bumpass and Sweet 1991), and in increasing divorce rates (Kline et al. 2004; Jose et al. 2010; Perelli-Harris

et al. 2017). Thus, previous research takes a close look at the outcomes of moving in together (Guzzo 2014).

Another line of research focuses on the differences of cohabiting couples and couples who are "living apart together" (Lois and Lois 2012; Régnier-Loilier 2016; Wagner et al. 2019). Such studies examine the motives for establishing a joint household (Sassler 2004, Rhoades et al. 2009, Huang et al. 2011; Hiekel et al. 2014; Hiekel and Keizer 2015; Coulter and Hu 2017; Krapf 2018; Lewin 2018) or analyze decisions about which partner moves in with the other (Krapf et al. 2021). Other studies focus on the social and economic preconditions for moving in together and related social-inequality aspects. They examine how financial aspects (Clarkberg 1999; Sassler and McNally 2003; Smock et al. 2005; Mulder et al. 2006; Wiik 2009; 2011; Kalmijn 2011; Jalovaara 2012; Lois and Lois 2012; Addo 2014; Wagner et al. 2019), social background (Thornton et al. 1995; Wiik 2009; 2011; Jalovaara 2012; Kuo and Raley 2016; Wagner et al. 2019), and gender differences (Waller and McLanahan 2005; Huang et al. 2011; Lewin 2018; Parker 2020) affect the occurrence of moving in together.

While family sociologists examine the cohabitation of unmarried partners in terms of their effects on marriage, family formation, and partnership stability, the phenomenon can also be understood as a (non-mandatory) step in the transition to adulthood. From the perspective of life course research, the event of moving in with a partner is certainly a pivotal one, to which many other life events are necessarily or potentially related. Moreover, moving in with a partner requires the obvious: a partner. This statement is not trivial, since the chance to form a romantic relationship is characterized by social inequalities. Consequently, the occurrence of the event of cohabitation is also dependent on the availability of a partner (Goldscheider and Waite 1986; Dykstra and Poortman 2010).

In this paper, we analyze the interdependencies between moving in together and other steps in the process of autonomy development, using life course data on educational and occupational biographies from the survey "Growing up in Germany (AID:A 2019)" of the German Youth Institute (DJI). We first examine relevant transitions in adolescence and early adulthood with respect to their timings and temporal order. In a second step, we focus on the timing of cohabitation, identify factors that lead to an earlier or later occurrence of this event, and investigate how these affect further transitions.

2   Theoretical Considerations

Before a couple moves in together, the partners have to make a conscious decision to establish a joint household. This step is also linked to biographical prerequisites, such as entering a stable partnership or leaving the parental home. Thus, if we look at the

life course of an individual – and especially the challenges of young adulthood – we find that moving in with a partner is usually embedded among other events. There are two different theoretical perspectives on the timing of the establishment of a joint household with a partner and the chronological position of this event among other key events in young adulthood. The first strand of theory considers this event as the result of rational decision-making, wherein economic considerations are the main determinants. The second strand of theory considers it in view of the events and processes that structure the life cycle and thus sees cohabitation as one significant step in the biographical path to adulthood.

2.1   Economic Perspectives on Establishing a Household With a Partner

According to economic approaches, the event of moving in with a partner is based on rational decision-making determined by individual preferences, resources, and constraints. The proponents of "new home economics" (most prominently Gary S. Becker) believe that partners benefit from establishing a joint household because they can specialize in the division of labor and thus reduce costs (Becker 1981). In this context, the male breadwinner model was traditionally assumed to be the most efficient specialization, in which men engage in the labor market and women are responsible for domestic work and family care. In line with this strand of theory, cohabitation should be less attractive for men with few economic resources and for women with significant economic capital. The increases in school enrollment and labor force participation of women, the decline in men's earning power, and the establishment of unmarried cohabitation as an alternative to marriage changed these basic assumptions in the decades that followed these societal shifts (Oppenheimer 1988; Blossfeld and Huinink 1991; Sweeney 2002; Sassler and Goldscheider 2004). Therefore, it is often assumed for modern couples that the benefit of living together arises from shared consumption of household public goods and shared leisure, and less from a specialization based on the division of labor (Lundberg et al. 2016). In the course of individualization, romantic relationships are considered an expression of self-actualization, where specific relationship practices create benefits such as intimacy, personal growth, and egalitarianism (Giddens 1992; Hiekel and Wagner 2021). Among couples, moving in together is also considered the foundation for realizing future plans and is seen as a central step on the path to family formation (Wagner et al. 2019). In addition, living together in a partnership may also be beneficial for physical well-being (Lindenberg 2013). However, these advantages also entail costs that need to be covered.

Depending on the initial living situation, the decision to move in together involves material and non-material benefits and costs, both present and future, that have to be weighed against each other. For individuals who still live with their parents, establishing a co-residential union is likely to be more costly than for individuals who already live in an independent household. In addition to new

rental costs and costs to furnish the household, non-material costs – such as lack of experience in homemaking – potentially influence the decision to move in with a partner (Wagner et al. 2019).

Couples who are living apart together face the question of whether they want to continue living in separate places or if they would like to form a joint household. Without doubt, relationship quality and the intention to make a long-term commitment also play crucial roles here (Liefbroer et al. 2015; Krapf 2018; Wagner et al. 2019; Krapf et al. 2021), but the decision to relocate residentially is also determined by cost-benefit considerations. Krapf et al. (2021, 4) describe the costs of moving in together as follows: "First, there are the actual moving costs, including the opportunity cost of spending time on arranging the move as well as the direct cost of transporting one's belongings. Second, there may be other costs related to the move, such as the costs of furnishing and home improvement. Third, long-distance moves create considerable indirect costs because they affect the working and social life of the person who moves".

Even if unmarried cohabitation serves as a trial phase for many couples before marriage and thus may be associated with fewer economic and family obligations than married life (Oppenheimer 2003), the establishment of a joint household entails considerable relocation and acquisition costs, at least in the short term. Therefore, from an economic point of view, moving in together is usually only worthwhile if the expected benefits of living together exceed short-term acquisition costs and, from a couple's perspective, if one assumes a long-term prospective co-residential union. Consequently, it is rational for individuals to include their expected or actual income in these considerations. Permanent employment and a work history without major interruptions of periods of unemployment are likely to contribute positively to such calculations, while precarious employment can lead to conflicts that strain relationship quality (Berninger et al. 2011). As a result, according to economic theories, moving in together is expected to occur after entry into stable employment.

Even though gender role segregation today no longer fully corresponds to the male-breadwinner model postulated by the new household economists, women's labor force participation is still lower than men's, and women's career paths are still characterized by more discontinuities. In this respect, the assumptions of new home economics should still hold some validity today, thereby making economic security (in the sense of entering secure gainful employment) of greater importance for men.

2.2   The Life Course Perspective on Establishing a Household With a Partner

Similar to economic approaches, life course approaches look at the constitution of biographies as the result of intentional actions taken in institutionalized life contexts. However, the life course approach primarily views single biographical events, such as the event of moving in with a partner, as structuring elements in the trajectories to adulthood (Hogan 1978; 1980; Marini 1984a; 1984b; Settersten and Mayer 1997;

Konietzka and Huinink 2003; Settersten 2003; Mortimer et al. 2005; Buchmann and Kriesi 2011). The rhythm of the life cycle is a central topic in life course research; key concepts include the occurrence, timing, duration, and ordering of events, life stages and their corresponding trajectories, transitions, and possible turning points (see Elder et al. 2003 or Macmillan 2005 for conceptual specifications).

In the literature, it is widely assumed that a so-called normal biography, with a predictable sequence of life events, has emerged in the life courses of the postwar period (Osterland 1989). According to these assumptions, processes of institutionalization and standardization contributed to the emergence of a distinct life course structure that also defines the markers of the transitions into adulthood. In this context, age holds a special significance as the pace-setting organizer of life. Social norms are often suggested as an explanation for the observed statistical regularities in the transition to adulthood; these involve concrete values and beliefs regarding the appropriate order and timing of life events (Neugarten et al. 1965, 710).

However, many researchers argue that the idea of a normatively-shaped life course, with defined social roles and pre-structured transitions, no longer applies to the contemporary realities of life. They observe that life courses today are undergoing several significant developments, including processes of de-standardization, de-institutionalization, differentiation, and individualization (Settersten and Mayer 1997; Shanahan 2000; Brückner and Mayer 2005; Macmillan 2005).[1] These also blur the contours of youth as a phase of life. According to this theory, the adolescent normal biography as a biographically fixed sequence of events is dissolving.

According to Blossfeld and Prein (1998, 21), life courses are highly time-related, selective, and cumulative processes that can be characterized by causal and temporal dependencies. Resources are accumulated, opening up or blocking options in different areas of life, thereby determining further paths. From this point of view, the decisive events of the life course are both cause and consequence of other significant events.

2.3   Hypotheses on the Timing of Moving in With a Partner

The theoretical considerations point to two central aspects of the first cohabitation with a partner, for which corresponding hypotheses can be derived. The first aspect involves assumptions about interdependencies between the event of moving in with a partner and other events in the life course. According to economic theory, the establishment of a cohabiting union entails costs that can only be met if a certain level of financial security is achieved. This argument is also supported by life course theory: even though biographical trajectories today may have lost their rigidity and no longer conform to a timetable prescribed by age norms, it is expected that moving in with a partner is determined by earlier events that enable the possibility of moving in with a partner by ensuring some stable financial foundation upon which

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1   For an overview, along with detailed conceptual explanations, see Brückner and Mayer (2005), Konietzka (2010), or Shanahan (2000).

to establish a joint household. Thus, *moving in with a partner is assumed to occur temporally after entering permanent work (hypothesis 1).*

Since we assume that expected income stability plays a decisive role in the decision to enter into a co-residential union, the predicted effect should only be evident for individuals with a permanent contract. Therefore, *prolonged episodes without education, training, or employment should reduce the likelihood of moving in together (hypothesis 2).*

The second aspect that can be extrapolated from the theoretical considerations deals with the social determinants that can foster or impede the timing of moving in with a partner. Since the gendered division of labor assumed by economic theories is still prevalent today (albeit to a lesser degree), we expect a gender effect regarding the importance of economic resources for cohabiting with a life partner. We expect that *for women, both entry into permanent employment and previous educational and employment histories are less significant for moving in with a partner than for men (hypothesis 3).* For the same reason, we expect a gender difference for educational attainment. Therefore, we expect that *men with higher educational resources are more likely to cohabit with their partner, while for women, higher educational resources are more likely to lead to lower transition rates to a co-residential union (hypothesis 4).* A corresponding influence can be assumed for parental educational background: *While a low parental educational level should reduce the likelihood of entering a co-residential union for men, it should increase the likelihood of this for women (hypothesis 5).*

3 Previous Research Findings

Empirical findings on three aspects of cohabitation are of particular relevance to the research interest outlined in this paper: first, findings on the age at which couples move in together for the first time; second, evidence for causal links with other life events and developmental steps that need to be mastered in adolescence; and third, factors of social inequality that may accelerate or impede the key steps in adolescence and, in particular, the formation of a couple household. Importantly, these factors also include gender differences.

Findings on *the age of entry into first cohabitation* vary to some degree in the research literature. There are several reasons for this. To start, the object of study is not always the same: while some researchers have examined the event of moving in together regardless of the partners' marital status (Kley and Huinink 2006; Wiik 2009; Konietzka and Tatjes 2014), others considered the entry into first cohabitation only among unmarried individuals. Among the latter, some studied only premarital cohabitation, that is, the entry into first cohabitation of couples whose partnership later resulted in marriage (Kuperberg 2014), while others also considered individuals who did not marry at all (at least during the observation period) (Konietzka and

Huinink 2003). Another important point is that some authors report the average age at first cohabitation with a partner (Wiik 2009; Kuperberg 2014), while others use the median age (Konietzka and Huinink 2003; Kley and Huinink 2006; Konietzka and Tatjes 2014). For example, Konietzka and Huinink (2003) stated that half of the women born in the 1970s engaged in their first non-marital cohabitation by the age of 23.5 years, and Kuperberg (2014) observed in her sample an average age of 22.4 years for female premarital cohabitants.

The age at which the event of moving in together typically occurs also depends on the cohort surveyed. For example, Kuperberg (2014) notes an average age of 22.2 years for women in premarital cohabitation in the 1985–1999 marriage cohort, and 22.7 years in the 2000–2009 cohort. Furthermore, the findings vary depending on region (Kley and Huinink 2006; Konietzka and Tatjes 2014). For example, Konietzka and Tatjes (2014) state that for both the 1971–1973 and 1981–1983 cohorts, young women in East Germany were younger than those in West Germany when starting a household with their partner (1971–1973: 21.7 vs. 23.3 years [median]; 1981–1983: 22.1 vs. 23.1 years [median]). Kley and Huinink (2006) find almost identical results for East German (21.7 years [median]) and West German (23.6 years [median]) women born in 1971.

Particularly striking are the observed gender differences concerning the age at entry into cohabitation with a partner. The literature consistently finds that women are younger than men when they start cohabiting with their partner (Konietzka and Huinink 2003; Kley and Huinink 2006; Wiik 2009; Konietzka and Tatjes 2014). While the median age of young women born in 1971–1974 is 23.5 years at the start of non-marital cohabitation, that of young men is significantly higher at 27 years (Konietzka and Huinink 2003). Similarly, Kley and Huinink (2006) found a median age of 27.8 years for West German men at first cohabitation with a partner and a median age of 25.8 years for East German men.

Overall, it can be concluded that despite certain limiting factors that must be taken into account when comparing findings on age at the onset of cohabitation with a partner, study results do not diverge very much.

Several studies have also explored associations and interdependencies between different life events in adolescence. "Individuals often experience events simultaneously across life course domains, and changes in one area can encourage or inhibit changes in another," states Guzzo (2006, 384f), whose study examines the embeddedness of union formation in the life course. However, rather few studies specifically investigate *the interaction between first cohabitation with a partner and other life events* in young adulthood. Of particular interest to the present research topic are findings on the relationship between school-to-work-transitions and entry into a cohabitating union. However, some of the studies investigating the preconditions for unmarried cohabitation concurrently examine marriage as a "competing risk" (Thornton et al. 1995; Xie et al. 2003; Sassler and Goldscheider 2004; Guzzo 2006;

Wiik 2009; Kalmijn 2011), which complicates the transferability of those findings. For example, Thornton et al. (1995) examine the influence of school enrollment on union formation, distinguishing between effects on marriage and those on cohabitation. Overall, their results indicate that school enrollment tends to be incompatible with the financial responsibilities of both marital and non-marital cohabitation.

Unfortunately, hardly any studies specifically examine a causal link between entering the labor market and moving in with a partner. However, a large body of research provides empirical evidence on the importance of economic resources for related processes, such as moving out of the parental home and establishing one's own household. These are of particular interest, as the underlying decisions are likely to be similar in their social mechanisms. For instance, Le Blanc and Wolff`s (2006) work emphasizes the importance of financial resources in leaving the parental home; they find that a child's income is far more important to moving out of the parental home than the parents' economic resources. In addition, Aassve et al. (2001), who study young adults leaving the parental home in Italy, find that future income sources and stable employment are important preconditions to establishing one's own household. The authors also provide evidence for the importance of the employment history, as they observe that individuals with episodes of unemployment are less likely to start living on their own. This finding is similar to that of Dykstra and Poortman (2010), who conclude that a poor employment history is associated with a higher probability of remaining single. However, this finding only applies to men.

As can be seen, findings on the impact of life events already provide some evidence that educational level, social origin, and gender substantially structure the life course. Consistent with this, previous research provides further empirical evidence on *determinants that influence the occurrence and timing of cohabitation*. As outlined above, school enrollment has a negative impact on cohabitation. In line with these findings, Konietzka and Tatjes (2014) reveal that highly educated men and women start to cohabit with a partner later in life. Findings on socioeconomic background point in a similar direction: increasing levels of maternal and paternal education are associated with significant postponement of first cohabitation (Wiik 2011). Moreover, as mentioned above, gender has a notable influence on life events. Guzzo (2006, 403) observes gender differences in her study regarding the impact of school enrollment on union formation and concludes: "[…] men's school enrollment […] discouraged union formation, suggesting that despite women's increasing levels of education and employment, men are still expected to have the ability to form and support their own household when forming a new union". Similarly, Aassve et al. (2001) find significant gender differences in their study, concluding that only for men, stable employment is an important prerequisite for moving out of the parental home. Additionally, Kley and Huinink (2006) observe in their study that employment is still less important for women's autonomy development than for men's.

Furthermore, Kalmijn (2011) states, on the basis of his study results, that unemployment, little work experience, low income, and temporary employment on the part of men deter union formation. Comparing the competing risks of cohabitation and marriage, he concludes that marriage appears to be more sensitive to men's economic position than does cohabitation. However, from a life course perspective, the widespread modeling of cohabitation and marriage as competing risks seems unconvincing, given that most unmarried couples view their cohabitation as an intermediate step toward marriage (Hiekel 2014) and not as an outcome independent of marriage (as is assumed by competing risk models).

Thus, research literature already shows that some events in the life course are interrelated and can influence the occurrence of other events. Previous research also indicates that life events are highly characterized by social inequalities, which can significantly influence the occurrence and timing of these events. Empirical findings suggest that these might also be true for moving in with a partner.

4   Data and Analytical Strategy

4.1   Data

The data source for our analyses comes from the survey AID:A 2019 (Growing up in Germany 2019) administered by the German Youth Institute (Kuger et al. 2020).[2] In 2019, the sample was first established, making it the first wave of a panel survey. More than 6,100 households were interviewed using Computer Assisted Personal Interviews (CAPI).[3] Among other topics, educational and employment histories were recorded retrospectively on a monthly basis. They contain detailed information on the nature and context of an episode in addition to the exact beginning and end of it, as well as whether an employment episode is based on a fixed-term or permanent working contract. The resulting data structure thus offers the possibility to trace the educational and employment histories of individuals over years. The two events "moving out of the parental home" and "moving in with a partner for the first time"

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2   Data are publicly available for scientific use at: http://surveys.dji.de. The study was funded by the German Youth Institute (DJI).

3   The sample of the AID:A study is intended to represent the population of 0 to 32-year-olds in Germany. To achieve this, a three-stage approach was taken: In the first step, 262 municipalities were randomly selected with selection probabilities proportional to the number of inhabitants. To achieve this, larger cities were divided into sampling points. Then, in a second step, a fixed number of persons aged 0 to 32 was drawn from the population registers of these sampling points. These persons were contacted and asked to cooperate in the survey. In a third step, all other household members aged 0 to 32 years and all parents of minors who were willing to participate were interviewed as well. With this sampling approach, selection probabilities become unequal between households and clustering has to be considered. Therefore, all analyses had to be conducted using weights and survey statistics.

were recorded as part of a set of questions about major life events. If a specific event had occurred, the year of the first occurrence of this event was registered.

Our analyses are based on a subsample of young people who were at least 18 years old at the time of the interview and who were either still in school but did not aspire to enter university or who had achieved at most an intermediate school-leaving certificate. This means that we exclude all those who might attend university, because they usually have different life trajectories, especially regarding the duration of educational episodes and the corresponding timing of other life events. Furthermore, we exclude from the analyses all those who have never had an intimate relationship before, as they were not "at risk" for moving in with a partner. This results in an initial sample size of N = 1420, which serves as the basis for the analyses.

4.2 Analytical Strategy

The analyses are divided into two stages. In the first step, we look at the traditional key steps in adolescence and early adulthood with regard to their timing and chronological order. The transitions we consider are school-to-work transitions (entering vocational training, obtaining a vocational qualification, entering the labor market) and transitions that affect living arrangements (moving out of the parental home, moving in with a partner for the first time). Due to limited data on marriage timing and birth of a first child, these transitions cannot be modeled in the context of our analysis.

In the second step, we focus on the timing of cohabitation – i.e., the event of moving in with a partner – as a significant (though not mandatory) event on the path to adulthood. The timing of this event represents the dependent variable in the following analyses. Since no information is provided about the month of this event, only the year, the month of transition was set as January, in order to ensure that other events occurring during this year – such as a transition to a permanent job – are not misinterpreted as causal to moving in together. We utilize time-discrete rate models (Yamaguchi 1991, 118 ff.) to test the influence of certain time-constant and time-dependent variables that may affect the occurrence of this life event and may accelerate or delay its timing. Technically, this means that we split our episode data on a monthly basis and estimate logistic regression models with "moving in with a partner" as the dependent variable. In order to identify possible gender effects, the models are calculated separately for men and for women. To capture age dependencies, we include age groups by using three dummy variables (similar to piecewise-constant models) representing four-year intervals on the time axis (under 22 years as the reference group; 22 to under 26 years; 26 to under 30 years; 30 years and older).

The other independent variables relate to the current main activity status and past employment history, as well as to respondents' own and parental educational level. The main activity status includes the categories "employment/internship

without permanent contract", "school/vocational training/study", "NEET (not in education, employment, or training)"[4] and "employment with permanent contract". For the employment biography, the months characterized by periods of NEET are cumulated. The educational level upon leaving general education for the first time differentiates between intermediate school-leaving certificate, lower secondary school-leaving certificate, and no or unclassifiable school-leaving certificate. Parental educational level is determined by the highest educational attainment of both mother and father, differentiated between a university degree, a university entrance qualification, an intermediate school-leaving certificate, a secondary school-leaving certificate, and no school-leaving certificate.

5   Results

5.1   The Event of Moving in Together and Other Life Events in Adolescence and Young Adulthood

The first step of our analyses considers key transitions in adolescence and early adulthood in terms of their timing and sequence, using product limit estimates to assess the transition to different life stages by age. Despite the presumed processes of social de-standardization and individualization, the relevant transitions in adolescence and early adulthood still reveal an order that corresponds in its timing and chronology to traditional patterns.

Figure 1 shows the transitions into different life stages by age. The horizontal line in the middle corresponds to the median. In chronological order, the life events considered here are: 1) transition into vocational training, 2) moving out of the parental home, 3) obtaining a vocational qualification, 4) finding a permanent employment, and 5) moving in with a partner. In our sample, the median age for the transition into vocational training is 18 years. Moving out of the parental home follows significantly later, close to the completion of vocational education, at about 21 years. The entry into permanent employment occurs shortly thereafter, at about the age of 21.5 years. Moving in with a partner generally occurs later, at about age 25.

In contrast to theories predicting an increasing individualization of life courses, the chronology of life events presented here seem to follow a traditional and equally predictable pattern. However, this finding does not shed light on possible correlations between life events and on influential factors that lead to systematic variations in the sequence of events.

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4   This status consists of the stages "unemployed", "military service", "child-raising period", and "other".

Figure 1   The Event of Moving In Together and Other Life Events in
                Adolescence and Young Adulthood (Product Limit Estimates)

------- Vocational training   — · — · · Leaving the parental home   — · — · · Vocational qualification
——— Permanent employment   — — — Moving in with a partner
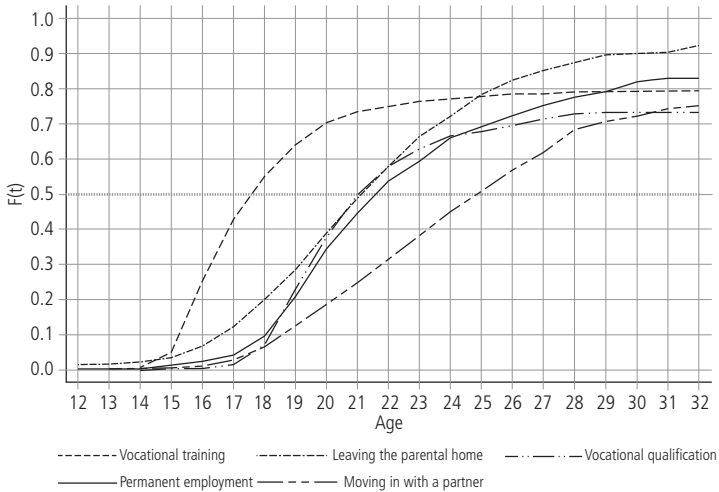
Source: AID:A 2019.

5.2   Determinants of Moving in With a Partner

For the reason given above, in the second step, we focus on variations in the timing of the event of first cohabitation with a partner. Model 1 shows the transition rate when accounting only for age group and main-activity status. In Model 2, the effect of cumulated NEET is added to the model. Model 3 includes the educational level at the time of leaving general education for the first time. Finally, Model 4 incorporates the parents' highest level of education. All models were calculated separately for men and for wome

With respect to age groups, the models for men consistently show that moving in with a partner becomes more likely after the age of 22 years and before the age of 30 years. However, these results do not hold for women: it seems that some women enter into cohabitation even at under 22 years old. Thus, for women, the decision to move in together seems to depend on circumstances other than age.

In terms of the main activity status, gender-specific effects can be found across all four models. For women, there is a significant effect of educational episodes: women who are attending school, vocational training, or university show lower transition rates. For men, however, the expected effect is found that having permanent employment increases the probability of moving in with their partner. Furthermore, there is a negative effect of cumulative NEET for men. This is consistent with the finding that for men, phases of NEET hinder cohabitation. This means that hypotheses 1, 2, and 3 are supported by our data.

Table 1   Transition Rate of Entering a Co-Residential Union (Duration in Months Since Leaving General Education, Time-Discrete Rate Models, Log Odds Ratios, Standard Errors in Brackets)[a]

Independent Variables	Model 1 male	Model 1 female	Model 2 male	Model 2 female	Model 3 male	Model 3 female	Model 4 male	Model 4 female
Age group								
under 22 years	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
22 to under 26 years	0.324* (0.158)	−0.141 (0.148)	0.420* (0.167)	−0.126 (0.151)	0.319* (0.159)	−0.133 (0.148)	0.365* (0.160)	−0.116 (0.154)
26 to under 30 years	0.344 (0.212)	−0.162 (0.230)	0.485* (0.221)	−0.131 (0.242)	0.330 (0.212)	−0.164 (0.228)	0.407 (0.220)	−0.100 (0.231)
30 years and older	−1.311* (0.579)	−1.225 (0.802)	−1.076+ (0.590)	−1.189 (0.809)	−1.308* (0.579)	−1.218 (0.800)	−1.458* (0.674)	−1.058 (0.807)
Main activity status								
Employment/internship without permanent contract	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
School/vocational training/study	−0.203 (0.239)	−0.539* (0.223)	−0.166 (0.244)	−0.541* (0.223)	−0.257 (0.236)	−0.616** (0.219)	−0.116 (0.259)	−0.683*** (0.209)
NEET	−0.020 (0.330)	−0.256 (0.254)	0.297 (0.339)	−0.196 (0.250)	0.020 (0.325)	−0.206 (0.248)	−0.074 (0.348)	−0.321 (0.252)
Employment with permanent contract	0.514* (0.215)	−0.058 (0.246)	0.496* (0.218)	−0.069 (0.247)	0.485* (0.210)	−0.120 (0.239)	0.534* (0.233)	−0.190 (0.218)
Education and employment history								
Cumulative NEET (months)			−0.022* (0.010)	−0.004 (0.007)				
School leaving certificate when leaving school for the first time								
Intermediate school leaving certificate					0.000 (0.000)	0.000 (0.000)		
Secondary school diploma					−0.193 (0.174)	−0.252 (0.177)		
No/other school diploma					−0.368 (0.285)	−0.634* (0.307)		
Highest educational level among parents								
University degree							0.000 (0.000)	0.000 (0.000)
University entrance qualification							−0.129 (0.264)	0.479+ (0.273)
Intermediate school leaving certificate							−0.373+ (0.224)	0.273 (0.244)
Secondary school diploma							−0.150 (0.237)	0.342 (0.258)
No school diploma							−0.966+ (0.554)	0.669+ (0.353)
Intercept	−5.312*** (0.222)	−4.136*** (0.211)	−5.326*** (0.228)	−4.134*** (0.212)	−5.186*** (0.223)	−3.969*** (0.210)	−5.191*** (0.294)	−4.267*** (0.294)
n (number of individuals)	763	657	763	657	763	657	696	607

Note: [a]: In this table, log odds ratios for transition probabilities are reported. Positive coefficients imply an increase in transition probability and thus a shorter expected duration until the event of moving in with the partner occurs. Accordingly, negative coefficients mean a decrease in transition probability and therefore a longer expected duration until cohabitation. +p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001. Source: AID:A 2019.

The educational level only shows a significant effect for women; compared to the reference category, women without a school degree are significantly less likely to start a joint household with their partner. However, with regard to the other (non-significant) coefficients, we see a tendency that men and women with a lower educational level are less likely to enter into cohabitation. Thus, for hypothesis 4, we can conclude that the level of education among women does not have the expected effect on the transition to a co-residential union. Women without a school degree have even lower transition rates to a co-residential union compared to women with a secondary school diploma or an intermediate school-leaving certificate.

The highest level of parental education has different effects on women and men in terms of the transition rate to cohabitation. Young men whose parents have lower educational levels – and especially when they have no school diploma – are less likely to cohabit with their partner; in contrast, women move in with their partner sooner if their parents have a lower level of education. Therefore, hypothesis 5 can be confirmed.

6   Discussion and Conclusion

So far, the cohabitation of life partners has primarily been studied from a family sociological approach. From a life course perspective, the event of moving in with a partner has received little attention. However, it is certainly of interest to know how earlier events influence the event of moving in together and how this directs the course further, such as the timing and occurrence of other life events. In any case, the establishment of a co-residential union can be regarded as an important step on the path to adulthood.

For the majority of men, however, this step is not undertaken until a certain level of economic security is guaranteed: our results show that the event of moving in together usually follows the event of entering permanent employment, while a similar correlation between these two events cannot be identified for women. This finding is remarkable in that it suggests that Becker's assumptions about the gender-based division of labor in households still have empirical relevance today. Despite rising female labor market participation, it still seems to be the responsibility of men to ensure a breadwinning status for economically dependent family members.

Since economic resources – and, in particular, the transition to permanent employment – seem to be important for the transition into cohabitation with a partner (at least for men), it is necessary to take a closer look at school-to-work transitions. Different factors influence the transition into vocational training and into permanent employment. Most of these are well known: in Germany, for example, Buchholz and Kurz (2008, 72) identify that East Germans and migrants face especially high risks in the transition to a stable position in the labor market

and that education and occupational classes have become more important across birth cohorts. These and similar findings have been observed in a large number of studies and can also be found in our data, and they point to an endogenous causal relationship between biographical steps in vocational training and employment on the one hand and steps in family formation on the other.

Nevertheless, our study results have some limitations. First, due to data limitations, we were unable to test the effects of some factors that may influence the decision to move in together. This is particularly true for information about respondents' partners at the time of the first cohabitation (e.g., activity status, age, educational level, major life events, income, and other economic resources), but also for certain relationship characteristics (e.g., spatial distance before moving in together, or relationship quality). Furthermore, we have no information about the time of an eventual first marriage, shared children,[5] nor the possible end of a relationship or cohabitation. We also do not know exactly who is "at risk" for cohabitation, because while we excluded anyone who has never had a partner, some may have separated and stayed single. Finally, due to our restrictions on the sample group, the findings cannot be generalized to individuals with high educational attainment.

This yields some implications for future research. It would be reasonable for upcoming studies to examine the event of cohabitation more specifically from a life-course perspective. In empirical research, such an approach requires that both potentially important preceding and subsequent events be captured precisely. In order to expand the models to include partner characteristics that may affect the decision to establish a co-residential union, it would be necessary to collect this information from dating couples in prospective longitudinal studies. Meanwhile, the AID:A survey reaches the third wave of its longitudinal study with AID:A 2023, which allows both a continuation of retrospective episodic data on school-to-work transitions as well as a prospective monitoring of life circumstances.

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5   In preliminary analyses, we also examined the effects of other possible determinants, such as a preceding pregnancy. Since the inclusion of these variables did not fundamentally alter the results presented here, but their validity was questionable due to the data limitations, these events were not included as independent variables in the models.

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Back to the Features. Investigating the Relationship Between Educational Pathways and Income Using Sequence Analysis and Feature Extraction and Selection Approach

Leonhard Unterlerchner*, Matthias Studer*, and Andrés Gomensoro**

Abstract: This article compares two methods to study the link between educational pathways and income. Sequence analysis provides a holistic view but might fail to identify key trajectory characteristics. A new validation method overcoming this limit is proposed. Feature extraction and selection can directly identify these key characteristics. The conclusion summarizes the strengths and weaknesses of each method and provides guidelines on how to choose a method to study the relationship between a previous trajectory and a later-life outcome.

Keywords: Sequence analysis, cluster validation, feature extraction and selection, income, educational pathways

Back to the Features. Untersuchung des Zusammenhangs zwischen Bildungswegen und Einkommen mit Hilfe von Sequenzanalyse und Verfahren zur Auswahl und Extraktion von Merkmalen

Zusammenfassung: Der Artikel vergleicht zwei Methoden zur Untersuchung der Zusammenhänge zwischen Bildungswegen und Einkommen. Die Sequenzanalyse bietet eine ganzheitliche Sicht auf die Verläufe, aber sie kann die wichtigsten Verlaufsmerkmale, die das Einkommen erklären, ausser Acht lassen. Wir entwickeln eine neue Methode, die diese Einschränkung überwindet. Die Methode der Merkmalsextraktion und -auswahl identifiziert diese Schlüsselmerkmale direkt. Abschliessend werden die Vor- und Nachteile zusammengefasst und Leitlinien für die Methodenauswahl gegeben.

Schlüsselwörter: Sequenzanalyse, Merkmalsextraktion und -auswahl, Einkommen, Bildungswege

Back to the features. Étude du lien entre revenu et parcours de formation à l'aide de l'analyse de séquence et de techniques d'extraction et de sélection de caractéristiques

Résumé: L'article compare deux méthodes pour étudier les liens entre parcours de formation et revenu. L'analyse de séquences offre une vue globale, mais n'identifie pas de caractéristiques clefs. Une nouvelle méthode de validation dépassant cette limite est proposée. L'extraction et la sélection de caractéristiques permettent d'identifier directement les caractéristiques clefs. La conclusion résume les forces et faiblesses de chaque méthode et propose des recommandations pour l'étude des liens entre trajectoires et résultat postérieur.

Mots-clés: Analyse de séquences, validation de typologie, extraction et sélection de caractéristiques, revenu, parcours de formation

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1   Introduction[1]

Several studies have been conducted on the occupational integration of the younger generation – a major political concern in Western societies (Arum and Shavit 1995; Brzinsky-Fay 2007; Gauthier and Gianettoni 2013). In this process, education is often considered a key resource for successful integration into the labor market (Bills 2003; Kramarz and Viarengo 2015). Studies have highlighted the role of education to explain status attainment and social reproduction (Meyer 2009), unemployment risk (Benda et al. 2019), job quality (Geier et al. 2013), employment prospects, and income (Korber and Oesch 2019).

The relationship between education and indicators of occupational integration, such as income, is often investigated by considering educational attainment (Gomensoro et al. 2017; Korber and Oesch 2019). Educational attainment, as an outcome of educational pathways, has been consistently shown to be positively associated with income (Falcon 2016; Gomensoro et al. 2017).

However, life course literature emphasizes the need to situate any outcome, such as education or income, within the constantly evolving trajectories of individuals (Bernardi et al. 2019). Several studies have examined how school-to-work trajectories affect later employment prospects from this perspective. Educational pathways might be interpreted by employers to evaluate the productivity of candidates (Spence 1973). In Switzerland, educational pathways, including bridging programs between lower and upper secondary levels and early unemployment after vocational education, were found to be associated with lower income and occupational status (Sacchi and Meyer 2016). More generally, atypical educational pathways involving, for instance, delayed education or repetitions of schooling years may also be interpreted as signals of lower productivity or motivation by employers. These developments call for a deeper understanding of how education, considered as a process, is linked with later-life employment prospects such as income (Gomensoro and Bolzman 2015; Zimmermann and Seiler 2019).

Methodologically, estimating how an entire trajectory is linked with later-life outcomes is not straightforward. Three approaches can be distinguished. The first approach involves using a proxy for the key dimension of the previous trajectory. In educational research, educational attainment or the number of years spent on education could be used as Previous Trajectory Proxy (PTP). These proxy indicators are often collected retrospectively and do not require a full longitudinal design. However, they generally focus on a specific aspect and do not consider the whole trajectory. The second approach relies upon sequence analysis to build a typology of educational pathways, which is later used in a regression to explain income (e. g.,

Gomensoro and Bolzman 2015; Zimmermann and Seiler 2019). However, creating a typology implies simplification of the data, which might lead to wrong conclusions (Studer 2013). The third approach, introduced by Bolano and Studer (2020), proposes a procedure based on feature extraction and selection, to understand the specific aspects of a previous trajectory linked with later life outcomes.

This article aims to review these three methodological approaches and discuss their applications to the study of the relationship between educational pathways and income. We further compare their results and highlight their connection to different research questions. We show that sequence analysis and PTP approaches lead to similar results, even if the latter approach is more efficient from a statistical point of view. By design, sequence analysis focuses on the identification of recurrent trajectories and, therefore, fails to capture atypical trajectories. Alternatively, by adapting the feature extraction and selection approach to account for educational attainment, several aspects of atypical trajectories are found to be significantly associated with income at age 30.

Additionally, we propose a new method to validate a sequence analysis typology to be subsequently used in regression. The method measures the impact of the data reduction of cluster analysis on the studied relationship. It does so by computing the share of the original relationship, measured without prior clustering, that is accounted for by a typology. As illustrated by our application, it can be used to guide the choice of the number of groups. This method is available using the *clustassoc* function of the *WeightedCluster R* library (Studer 2013).

This article is organized as follows. We begin by briefly presenting the Swiss education system and its expected educational pathways before introducing the data and the coding of the variable. We then present each method and the associated results. We conclude by comparing the results and interpretations before making recommendations regarding the choice of method.

2 Overview of the Swiss Education System

The Swiss educational system is considered to be highly selective and to reproduce social inequalities (Meyer 2009). This inequality is often attributed to the lower secondary tracking system in which pupils are oriented early toward different types of upper secondary education (Gomensoro et al. 2017). While the pre-baccalaureate or extended requirement tracks at the lower secondary level allow direct access to all types of upper secondary education, including general baccalaureates and school-based vocational education and training (VET), the attendance of basic requirements tracks only allows direct access to firm-based VET. Therefore, lower secondary education tracking strongly impacts upper secondary education (Hupka-Brunner et al. 2010; Falter 2012; Buchmann et al. 2016). Those oriented in high

requirement tracks almost exclusively attend general education or a vocational baccalaureate (89 %), while most in basic requirement tracks attend VET (69 %) (Gomensoro and Meyer 2021).

The transition between lower and upper secondary education is often considered to be direct. However, more than 20 % of the students undertake one or two years of transitional solutions after compulsory schooling and thus experience discontinuities in the transition to secondary education (Sacchi and Meyer 2016).

At the upper secondary level, VET is the norm in Switzerland and enjoys a higher degree of social prestige in comparison to other countries. With a duration of two to four years and covering more than 230 different professions with significant variance in intellectual requirements, VET is undertaken by nearly two-thirds of young people in Switzerland (Gomensoro and Meyer 2021). These trainings provide a rapid transition into the labor market (OFS 2018), and offer good employment and income prospects, albeit lower than general (Korber and Oesch 2019) and tertiary diplomas (Gomensoro et al. 2017). During or post VET, apprentices can undertake a vocational baccalaureate, a diploma acquired by 14 % of young people in Switzerland. Vocational baccalaureate allows transitions between VET and general tertiary education, and more than two-thirds of those with a vocational baccalaureate pursue general or VET tertiary education (OFS 2018). General upper secondary education (general baccalaureate and specialized schools), undertaken by about one-third of young people in Switzerland (Gomensoro and Meyer 2021), allows access to general tertiary education.

Tertiary education can be categorized into vocational and general. Vocational tertiary education is accessible to students with work experience who obtain a secondary VET diploma. General tertiary education is accessible to students who obtain a general or specialized (and under certain conditions a vocational) baccalaureate (Gomensoro et al. 2017; Gomensoro and Bolzman 2019). General tertiary education can be undertaken either in universities or in universities of applied science/pedagogy. The latter is more oriented toward rapid labor market integration, and their curriculums tend to be shorter.

Previous findings on the link between education and income, demonstrated an income gradient across educational attainment levels. Holders of tertiary level credentials – either academic or vocational – earned the highest income. Among holders of secondary level diplomas, VET credentials are associated with the highest income at the beginning of the career, but this tendency is then reversed around the age of 30 (Gomensoro et al. 2017; Korber and Oesch 2019; Zimmermann and Seiler 2019).

3   Data

We rely on the first cohort of the TREE (TRansitions from Education to Employment) survey. This is a longitudinal follow-up of a nationally representative sample of compulsory school leavers. It includes comprehensive data measured at different points in time and covers a span of 14 years, based on nine survey waves (TREE 2016). The TREE data allows us to relate the trajectory between ages 15 and 30 with the wage perceived at age 30.

Educational pathways are captured using monthly episodic information on educational status from September 2000 to December 2014, i. e., 172 monthly records.[2] These educational pathways are described using six states; the first two states depict upper secondary education. Secondary II Vocational Education and Training (SECII VET) includes all types of two-to-four-year VET programs and vocational baccalaureate. Secondary II General Education (SECII Gen.) includes upper secondary general baccalaureates and specialized schools. The next two states characterize tertiary education. Tertiary General Education (TER Gen.) regroups universities and universities of applied sciences/pedagogy. Tertiary VET includes all types of vocational tertiary education such as higher specialized schools and higher VET. The fifth state is Transitional Solutions (TS) which groups bridging programs, pre-apprenticeships, internships, and non-awarding education. The final state is out of education or training (OET) which groups all the situations not involving education such as work, joblessness, or inactivity. We grouped these situations for two reasons. First, we aim to focus on educational trajectories, which do not include working status per se. Second, low level of complexity is required to comprehensively compare methodological approaches. This implies focusing only on one dimension of the life course: education.

Educational attainment is measured using the highest achieved qualification. Secondary VET qualifications are the most frequent and cover a wide range of occupations. Income expectations may differ dramatically depending on the economic sector, such as the banking or retail sectors. To account for this diversity, we distinguish between secondary VET levels using the Stalder and Nägele (2011) classification. This six-level ordinal scale depicts the requirement level and the prestige of secondary VET qualifications. We grouped levels one to three and levels four to six, along with commercial school diplomas.

The employment outcome is operationalized using full-time equivalent (FTE) income measured in 2014. This is a composite variable computed from all working episodes observed in 2014. Since we use full-time equivalent income, the results are not impacted by differences in employment rates (see Gomensoro 2022 for computation details).

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2   Episodic data on education are currently not included in the TREE1 data release. They can be obtained from TREE on request.

Several control variables are considered to explain income. To avoid anticipatory analysis, these variables are taken from the baseline survey in 2000 at the end of compulsory school. We control for the sex of the respondent as educational choices are highly segregated (Gauthier and Gianettoni 2013; Imdorf and Hupka-Brunner 2015), and this helps to account for the gender wage differences (Bertschy et al. 2014; Korber and Oesch 2019). The lower secondary school track is of key importance and is implicitly linked with unmeasured skills (Meyer 2009). We also control for the linguistic regions as they favor different educational pathways (Scharenberg et al. 2017), and the labor markets and wages are different (Gomensoro et al. 2017). Finally, we rely on parental household wealth with a continuous variable as a proxy to control for social origin (Samuel et al. 2013).

Finally, we retained all cases without missing information, resulting in the final sample of 2 230 observations. Sampling weights are used throughout the analysis to compensate for attrition and deletion of missing data.

All the statistical analyses were performed with the *R* statistical software (R Core and Team 2020) using *Boruta* (Kursa and Rudnicki 2010), *TraMineR* (Gabadinho et al. 2011), and *WeightedCluster* (Studer 2013) packages.

4   Methodological Strategies

The aim of the article is to investigate the differences, complementarities, strengths, and weaknesses of the three methodological approaches to examine the relationship between a previous trajectory and a future-life outcome. Accordingly, we applied them to the study of the relationship between educational pathways and later-life income.

Each subsection presents one method before presenting the associated results. We further highlight the main required decisions and how to specify the typology in this setting. We use the feature extraction and selection (FES) approach and discuss its parametrization to understand the relationship between income and relevant atypical patterns observed in educational pathways. Finally, we compare the results and discuss their expected respective contributions.

4.1   Educational Attainment as Previous Trajectory Proxy

The relationship between education and income is often studied using educational attainment. Such a strategy implicitly summarizes the educational pathway followed by an individual using a single indicator, educational attainment. The highest educational attainment is a commonly accepted measurement of human capital and institutionalized cultural capital (Bourdieu 1979; Becker 1993). This information is even directly used by employers and employees to bargain wages. Therefore, it is expected to have a direct impact on income. This is a perfect example of the previous trajectory proxy approach as the whole educational process is operational using one

indicator. However, since it only relies on completed education, it does not capture bridge education programs (or any non-award study), incomplete, off-time, or repeated education spells. Any information on the trajectory itself is, therefore, omitted.

To study this relationship, we rely on linear regressions with income as a dependent variable. As informed in the data section, we control for linguistic regions, parental household wealth, sex, and lower secondary school track. The results of this linear regression are presented in the first column of Table 1.

These results are in line with previous findings (Gomensoro et al. 2017). Tertiary general degrees are associated with the highest income levels, followed by tertiary VET. No significant differences are observed between secondary educational levels, such as between secondary VET levels. Finally, individuals who have not achieved any qualification earn the lowest income. Interestingly, we do not observe any significant differences between secondary VET and general education levels.

In conclusion, we observe an income gradient following educational attainment. The PTP approach takes education into account by considering the cumulated acquired educational capital as described by Becker (1993). Furthermore, it does not require a longitudinal follow-up, and does not consider the path leading to this educational attainment. The use of Sequence Analysis (SA) precisely aims to focus on the path itself.

4.2 Sequence Analysis

Several authors have relied on SA to take educational pathways into account (Laganà et al. 2014; Pollien and Bonoli 2018; Zimmermann and Seiler 2019). Such an approach aims to consider education as a process, rather than only as an outcome. Correspondingly, it aims to understand how the pathways followed by individuals might affect their later-life income. Aside from educational attainment, the off-track educational pathways, for instance, those characterized by detours, reorientations, or longer than expected durations, may cause different school-to-work transitions and career paths (Brzinsky-Fay 2007; Achatz et al. 2022).

SA aims to provide a holistic view of trajectories or processes by creating a typology of the trajectories. This typology is expected to describe the different (ideal-) types of trajectories observed in the data. They can then be used in regression models to study the link between the type of previous educational pathway and later-life income. Here, we start by describing the typology creation, highlighting the key decisions to be made, and the recent developments in SA to answer common criticisms. We also propose a new method to validate the typology to be used in subsequent regression. We then use the typology in the same regression model as the educational attainment model before discussing the advantages of each approach.

Table 1   Regression Models of Full-Time Equivalent Income Depending on Educational Pathways Using a Previous Trajectory Proxy (PTP), Sequence Analysis (SA) and Feature Extraction and Selection (FES)

	PTP		SA		PTP & SA		PTP & FES	
Educational attainment (ref.: higher level of SECII VET)								
Lower level of SECII VET	-953.26	(442.04)*			-849.82	(442.22)	-778.64	(440.14)
Level of SECII VET missing	-324.27	(272.92)			-280.12	(274.35)	-320.30	(272.13)
Lower secondary	700.27	(578.57)			740.76	(577.38)	711.66	(570.47)
Secondary general	-484.55	(261.54)			-402.63	(280.05)	-322.97	(270.12)
Tertiary VET	1346.14	(224.38)***			1354.30	(256.54)***	970.91	(274.52)***
Tertiary general	1595.09	(221.66)***			1800.44	(325.72)***	1809.31	(324.62)***
Educational pathways (ref.: secondary VET)								
Secondary VET and tertiary general			1589.15	(231.41)***	384.81	(302.07)		
Secondary VET and tertiary VET			1145.12	(213.56)***	203.54	(251.51)		
Short tertiary general			1284.91	(239.83)***	-165.93	(330.62)		
Long tertiary general			621.48	(258.67)*	-900.84	(352.31)*		
Secondary general and tertiary VET			305.33	(270.41)	-326.71	(295.28)		
Sequence features								
TS → SECII VET							-791.78	(182.21)***
SECII VET → TS							550.82	(161.06)***
SECII VET → TER VET							686.06	(235.50)**
Start of SECII Gen in 2nd year							-1833.93	(570.59)**
Start of SECII VET in 7th year							-1147.63	(779.80)
Time spent out of education (ref.: under 3 years)								
Between 3 and 9 years							1284.11	(306.12)***
More than 9 years							1476.83	(372.34)***
Time spent in TER Gen.							2.74	(4.50)
Lower secondary track (ref.: extended academic requirements)								
Basic academic requirements	-437.38	(197.08)*	-579.83	(194.05)**	-446.41	(196.75)*	-414.27	(195.20)*
Pre-gymnasial	-140.51	(176.17)	72.99	(182.93)	-6.72	(179.45)	-4.75	(177.93)
No formal tracking	-609.84	(514.28)	-560.34	(522.65)	-532.50	(512.88)	-603.70	(507.81)
Sex (ref.: female)	1108.98	(139.05)***	961.11	(148.87)***	963.90	(145.79)***	975.31	(139.87)***

Continuation of Table 1 on the next page.

Continuation of Table 1.

	PTP		SA		PTP & SA		PTP & FES	
Linguistic region								
French	−467.88	(184.76)*	−576.48	(187.54)**	−375.91	(185.57)*	−377.99	(182.68)*
Italian	−902.14	(326.96)**	−705.12	(338.43)*	−639.20	(332.00)	−720.74	(326.64)*
Parental household wealth (continuous)	268.42	(87.08)**	297.27	(88.38)**	264.86	(86.78)**	259.04	(85.85)**
Constant	4 981.06	(195.06)***	5 027.46	(158.02)***	4,950.90	(201.10)***	3 530.31	(399.95)***
Observations	2 230		2 230		2 230		2 230	
R^2	0.12		0.08		0.13		0.15	
BIC	43 229.28		43 301.85		43 245.16		43 217.28	

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. SECII Gen: Secondary General Education; SECII VET: Secondary VET; TER VET: Higher Vocational Education and Training; TER Gen.: Tertiary General Education; TS: Transitional Solutions; OET: Out of Education or Trainin.
Source: TREE wave 1, author's calculation

Typology

The typology of sequences is created in three steps. First, all individual sequences are compared to one another using a distance measure. Second, based on the previous information, similar sequences are grouped using cluster analysis. Finally, the typology is validated using one of the available methods. We discuss their relative strength and propose a new method.

In order to group similar trajectories, one needs to compare them. This step is technically achieved by using a distance measure. From a substantive point of view, this comparison is carried out by relying on a criterion. The life-course perspective emphasizes several key aspects of trajectories to be taken into account and could serve as criteria to compare sequences (Settersten and Mayer 1997; Billari et al. 2006). These aspects can be grouped into timing, duration, and sequencing aspects of trajectories (Elzinga and Studer 2015; Studer and Ritschard 2016). Each of these aspects can be theoretically linked with later-life income.

The *sequencing* refers to ordering of the various states of educational pathways, and codes the dynamics of the trajectory. *Sequencing* also captures the *quantum,* i. e., the presence or absence of specific steps in trajectories. Differences in sequencing are often considered to have strong later-life consequences. For instance, Sacchi and Meyer (2016) showed that following a bridging program might hinder the careers of those experiencing it and therefore result in lower income. Similarly, pathways characterized by many back-and-forth movements in education are expected to result in lower income, as educational attainment and occupational experience would typically remain low. The *timing* aspect refers to when states and transitions are experienced within trajectories. Differences in *timing* are also expected to have later-life consequences, an idea framed under the *critical or sensitive period model* in epidemiology (Kuh et al. 2003). For instance, delayed start of tertiary education has been found to result in lower income in the United States (Yu 2021). Finally, the *duration* aspect corresponds to the time spent in each state. Longer tertiary education has been found to be associated with lower income prospects in Italy (Aina and Casalone 2011). The time spent in education can, for instance, be lengthened by reorientations or year repetitions

Several distance measures, which differ according to their sensitivity to the above-mentioned aspects, are available (Studer and Ritschard 2016). The choice among them should be made according to the aspects regarded to be theoretically relevant by the researchers. In our application, all three aspects are important, but a choice is required. We used the optimal matching distance with standard parameters, which is shown to be sensitive to the sequencing and duration aspects (Studer and Ritschard 2016). Sequencing is a key aspect to uncovering the various (potentially atypical) successions of education spells and coding the path leading to tertiary education for instance. The duration aspect is central for capturing the duration of tertiary education or repeated years.

Once the sequences are compared, cluster analysis can be used to create a typology by grouping similar trajectories and assigning dissimilar ones to different groups. Here, we use the Partitioning Around Medoids (PAM) algorithm, which aims to minimize a global criterion (Han et. al. 2017).

Cluster analysis always produces a typology, which may or may not reveal a structure found in the data (Levine 2000). Specifically, the typology might be a statistical artifact. Therefore, it is imperative to carefully evaluate its quality, which is also a key step in choosing the number of groups or the clustering algorithm. In this article, we first evaluate the statistical quality of the typology using cluster quality indices (CQI), as usually recommended (Piccarreta and Studer 2018). We then propose a new method specifically designed to assess the quality of a typology to be used in a subsequent regression. Further, we show how it overcomes a common issue with the CQI's approach.

The statistical quality of a clustering can be measured using several CQIs (see Studer 2013 for a review). These indices typically take into account the homogeneity of the types and their separation. Cluster analysis simplifies the data by reducing the differences between all the individual sequences to the differences between a few types. This is a necessary step to understanding the diversity of the trajectories, but there is an *oversimplification* risk. If the types are homogeneous, this risk is low. Conversely, cluster separation ensures that we are not creating unnecessary distinctions between trajectories. The Average Silhouette Width (ASW) is the most used index that balances these two aspects.

The left-hand side plot of Figure 1 presents the value of the ASW for different groups. The best clustering solutions are then found for two groups, which show the highest ASW.

Since CQIs lack clear interpretation thresholds, Studer (2021) proposed comparing the obtained CQI to the ones obtained by clustering randomly generated *similar* but *non-clustered* data, i. e., the CQI values obtained when we should not cluster the data. These CQI values, obtained by clustering non-clustered data, are represented using thin gray lines in Figure 1. Using these CQI values, a more formal statistical test for the presence of a clustering structure in the data can be derived. The threshold value of this test, which accounts for multiple testing, is represented using a dotted horizontal line. Since all CQI values are above this line, we can conclude that a "significant" structure is found in the data for all number of groups. These CQI values can also be used to standardize the observed ASW values, making them more comparable across different groups. The standardized values are represented in the right-hand side plot of Figure 1. These standardized ASW values still favor clustering with two or three groups, but a local maximum is found for six groups.

When the typology is subsequently used in regressions, any within-cluster variation of the trajectories is ignored. Indeed, all trajectories clustered in the same type are described by a single value, i.e., the type itself. As shown by Studer (2013),

Figure 1   Average Silhouette Width (ASW) Values for Varying Number of
                  Groups and ASW Values Obtained by Clustering Randomly
                  Generated Similar but Non-Clustered Data Using the Combined
                  Null Model
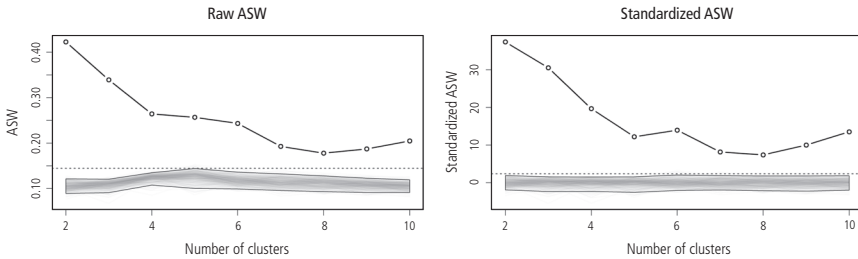
Note: see Studer, 2021. Figure available in color at https://centre-lives.ch/sites/default/files/figunterlerchner2023.pdf#page=1.
Source: TREE wave 1, author's calculation.

the remaining within-cluster heterogeneity can lead to wrong conclusions, if it is linked with the outcome of interest, i. e., income in our case. Here, the clustering in two groups mostly distinguishes secondary VET without further educational curriculum from other pathways (See Figure 5 in the appendix). However, if the distinction between secondary general education pathways followed or not followed by tertiary education is important to explain future income, we would not capture it with this typology. Since all these pathways are now described using the same type, we would wrongly conclude that the educational pathway is not relevant to explain income. In this article, we propose a new method to ensure that we are not simplifying relevant variations of the trajectories. This method is made available through the *clustassoc* function of the *WeightedCluster R* library.

The relationship between trajectories and covariates can be studied directly using discrepancy analysis (see Studer et al. 2011). This method evaluates the strength of the relationship with a Pseudo-R^2, measuring the share of the variation of the trajectories explained by a covariate and the statistical significance of the relationship. The method works without prior clustering, and therefore, without data simplification. However, discrepancy analysis has a strong limitation. There is no indication of how the trajectories differ according to the included covariates. Consequently, most studies continue to rely on cluster analysis.

In our case, income is found to be significant using discrepancy analysis, and the strength of the association is measured with a Pseudo-R^2 of 0.71 %. It should be noted that low Pseudo-R^2 values are expected in SA because the diversity of the trajectories is generally very large (Studer et al. 2011; Liao and Fasang 2021). However, there is no indication of how the pathways vary according to income.

Figure 2   Evolution of Cluster Quality Measures for a Typology Used in
                  Subsequent Regression
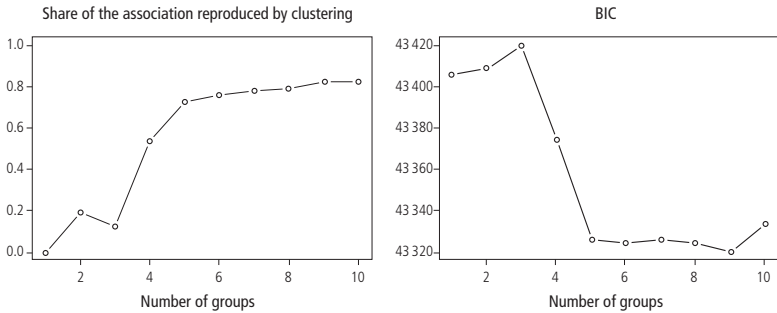
Source: TREE wave 1, author's calculation.

Multifactor discrepancy analysis extends the previous method and allows measuring a relationship while controlling for other covariates. Here, we propose to measure the relationship between trajectories and income while controlling for the typology. If the income's Pseudo-R^2 remains at the same level, it means that the typology does not capture the relationship between income and trajectories. In other words, the typology simplifies all the relevant information to capture this relationship. Conversely, if the income Pseudo-R^2 is much lower, it means that the typology reproduces the key information to understand the income–pathway relationship. Using this strategy, we can compute the share of the original Pseudo-R^2 that is taken into account by our clustering.

Figure 2 shows the evolution of the share of the original association reproduced by the clustering for a varying number of groups. A minimum of five groups is required to reproduce most of the association (approximately 80 %), and nine groups would give the best results. However, this means that 20 % of the variation cannot be reproduced by a typology. By comparison, with only two groups, as recommended by the ASW, one would only reproduce 20 % of the association and overlook 80 % of the relationship between educational pathways and income.

Han et al. (2017) proposed a similar strategy to evaluate typologies. Their procedure evaluates the efficiency of a typology to explain a key variable, such as income, using the Bayesian Information Criterion (BIC), which measures the explanatory power of a typology while accounting for complexity. As a recall, the BIC should be minimized. The right-hand side plot of Figure 2 presents the evolution of the BIC of a linear model explaining income according to a typology in different number of clusters. The general trend follows our previous approaches and the results lead to the same conclusion. However, the BIC approach faces two issues. First, the data reduction of the clustering can lead to the creation of a statistical relationship

(see Studer 2013), and this would not be captured using the BIC. Conversely, the proposed approach would identify it, as the association would not be significant from the beginning. Second, the BIC approach provides no information on the extent to which the data reduction of clustering affects the considered relationship.

Summarizing, the ASW favors clusterings with few groups with a local maximum for six groups and any number of groups is found to be "significant." Meanwhile, the newly developed method shows that at least five groups are required to describe the relationship between educational pathways and income. Therefore, we retain six groups, which are presented in Figure 3. The newly developed method further highlights that 20 % of the association with income cannot be reproduced using a typology with fewer than ten groups.

The typology, though obtained using explorative methods, is in line with the Swiss education system. It clearly distinguishes educational pathways according to the upper secondary track followed by an individual. There are three types of pathways that start with a spell in secondary VET education.

The first type is *Secondary VET,* characterized by a direct transition out of education (usually meaning employment). It corresponds to the expected VET curriculum of the Swiss education system. About 80 % of these pathways end with a VET qualification, either from the secondary or tertiary level. Interestingly, approximately half of these pathways start with a spell in transitional solutions, such as bridge education programs. Therefore, the typology cannot distinguish pathways with or without transitional solutions. The second type identifies the pattern of *Secondary VET* and *Tertiary General* education, where 65 % of the pathways end up with a tertiary general qualification. Finally, the last type describes the patterns of secondary VET followed by tertiary VET education, where 68 % of the students obtain a tertiary VET qualification. Collectively, these three groups account for 64 % of the observations in the sample.

The second set of pathways starts with a general education spell. A first type, named *Short Tertiary General,* groups sequences characterized by general secondary education followed by higher tertiary education, with a median time of 48 months spent in tertiary education. In this group, 81 % of the individuals hold a tertiary general degree. The *Long Tertiary General* group is similar to the previous one, but the median time spent in higher tertiary education is 86 months. Approximately 90 % of the individuals in this group obtain a tertiary general degree. Finally, a third type identifies those pursuing secondary general education followed by tertiary VET education. More than 50 % of the individuals in this group obtained a tertiary VET qualification, but 31 % ended up with a secondary general qualification. This type regroups relatively diverse pathways, including those starting with transitional solutions.

The typology seems to effectively describe the expected pathways in the Swiss education system. Consequently, the typology is strongly associated with the high-

Figure 3   Typology of Educational Pathways in Six Groups, Sequences
                  Ordered From the Starting State
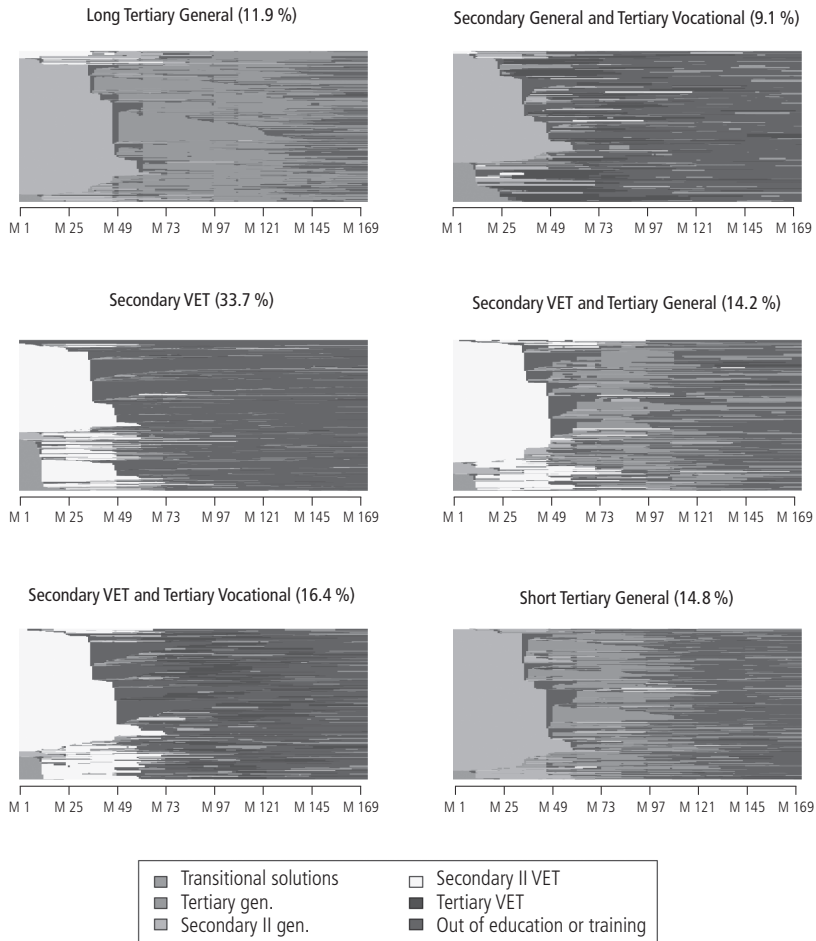
Note: Individual educational pathways, in months. Figure available in color at https://centre-lives.ch/sites/default/files/
figunterlerchner2023.pdf#page=3.
Source: TREE wave 1, author's calculation.

est educational attainment (Cramér's V = 0.46). However, the SA approach makes
further distinctions between pathways ending with the same qualifications but dif-
fering in spell lengths. This is the case for the *Short Tertiary General* and *Long Tertiary
General* groups. It also distinguishes the steps leading to tertiary education. The
typology reveals a group following secondary VET before entering tertiary VET and
another group following secondary general before entering tertiary VET. However,

the typology also fails to identify the pattern starting with transitional solutions or the pathways ending without qualifications. Those patterns are included in broader types. Furthermore, the secondary general followed by tertiary education type seems to regroup relatively diverse pathways.

Regression Model

Once the typology of the educational pathway is created, it can be used in regression models as any categorical variable. Correspondingly, we can investigate the relationship between income and education, based on the pathways instead of the highest educational attainment. To obtain comparable results, we used the same control variables. The results are presented in Table 1.

The results of the two approaches are similar. In both cases, tertiary education is associated with higher wages followed by secondary education. However, the SA typology makes further distinctions within tertiary education. Tertiary general education following secondary VET is associated with the highest wages, followed by the tertiary vocational and short tertiary general types.

The type *Long Tertiary General* is associated with a lower wage. Individuals in this group might not have the time to complete their occupational integration in the studied age range (until age 30). They are still at the beginning of their occupational careers and have limited occupational experience. Measuring income at an older age would probably lead to a different conclusion.

We observe lower wages if tertiary VET follows general education, as no significant difference with *Secondary VET* type is found. However, as already discussed, this group is relatively heterogeneous. It is, therefore, difficult to draw any clear conclusion. Finally, the SA typology cannot capture individuals without any qualifications.

From a statistical perspective, the highest educational attainment model provides a better performance than the SA model, as it explains a higher share of the income variation ($R^2 = 11.7\%$ vs. R2 = 8.5 %). It is also a more parsimonious model according to the BIC. This can probably be explained by the fact that the SA typology only imperfectly accounts for educational attainment, which remains a vital piece of information to explain later-life income. Further distinctions made by the SA typology on the pattern leading to tertiary education or on time spent in tertiary general education do not fully compensate for this loss. It also fails to account for the difference in wages of those without qualifications. The similarity of the conclusions is confirmed by looking at the model including the PTP and SA approaches, where the coefficients of the typology becomes non-significant, except for the distinction between short and long tertiary general education. This is further confirmed by the comparison of the BICs, which shows that the increase in explanatory power is not compensated by the loss of parsimony. Logically, the recurrent pathways are those leading to the main educational attainments; therefore,

both approaches convey similar statistical information. As pointed out by Labussière et al. (2021), the focus of SA on common patterns makes it difficult to shed light on atypical paths. However, it provides a useful holistic view on common trajectories, in line with the life-course perspective (Bernardi et al. 2019).

4.3 Feature Extraction and Selection

Bolano and Studer (2020) proposed using the feature extraction and selection (FES) procedure to study the link between a previous trajectory and later-life outcome. This method works in two steps. First, potentially interesting characteristics are extracted from the trajectories. Second, the characteristics that are statistically relevant in explaining the outcome are selected. Overall, the method aims to identify the key characteristics of trajectories to explain income.

In this section, we start by presenting the method and its application to study the relationship between educational pathways and income. In the meantime, we discuss its use to understand how the critical characteristics of educational pathways are linked with later-life income.

Feature Extraction

The first step is to identify characteristics of the trajectories that might be relevant to identify later-life income. Bolano and Studer (2020) proposed a framework to automatically extract a set of these characteristics, called features. Their procedure aims to capture key aspects of trajectories according to their duration, timing, and sequencing. These three aspects are potentially relevant as they can each be associated with common life-course models linking previous trajectories and later-life outcomes (Bolano and Studer 2020). However, the authors insist on the need to adapt it to the research objectives. In this section, we briefly describe the extracted features, their relevance for our research, and their required specifications.

The *duration* aspect of the trajectories refers to the time spent in each state. This aspect covers the potential impact of exposure to a given situation (Kuh et al. 2003; Bolano and Studer 2020). For instance, the overall exposure to tertiary education is typically considered to have later-life consequences. This aspect also aims to capture the potential effect of deviation from the expected spell duration (sometimes referred to as "spacing," see Settersten and Mayer 1997). This is a key aspect of educational trajectories, where educational spells have expected durations. Deviations from these durations, resulting (for instance) from repeating a year, could be linked with later-life income (Aina and Casalone 2011). In the framework developed by Bolano and Studer (2020), the *duration* aspect is measured by creating one variable storing the overall time spent in each of the states. We, therefore, end up with eight duration features.

The *timing* aspect refers to when state and transitions occur in trajectories. Deviation from expected timings is also expected to have consequences on later-life

income (Aina and Casalone 2011). Typically, starting or ending an education spell at an unexpected age could be interpreted as a lack of commitment by employers. Bolano and Studer (2020) propose to capture this aspect by considering the timing of key transitions and events. In our case, we considered the timing of the start and end of each education spell. Technically, the timing of events is captured by measuring whether each event occurred in predefined age ranges. The dummy variable resulting from it takes the value 1 if the transition occurs in the given age range, and 0 otherwise.

In our application, we used the same age ranges for every transition, by considering periods of 12 months. Transitions are measured yearly, which should not lead to a significant loss of information since the start and end of education spells are expected to take place once a year. However, it could also be interesting to consider theoretically driven age ranges. For instance, one might code whether the transition is occurring at before, or after the expected time. The procedure resulted in the automatic creation of 106 features to measure the timing of transitions in the trajectories.

Finally, the *sequencing* aspect refers to the ordering of the state and the presence of specific spells in trajectories. Typically, following a bridge education spell before secondary VET or experiencing a direct transition might be interpreted differently. Bolano and Studer (2020) propose to rely on frequent subsequence mining to identify frequent successions of states within trajectories. This method automatically finds recurrent subsequences of varying lengths and creates dummy variables storing the presence or absence of each pattern. For instance, the pattern "SECII VET" stores the presence of a secondary VET spell in trajectories. The feature "SECII VET → TER VET" stores the presence of a secondary VET spell followed, directly or later on, by a tertiary VET spell. Due to the first pattern being embedded in the second one, the two features are overlapping. All patterns of a maximum length of three occurring in at least 5 % of the trajectories were considered, resulting in 170 sequencing features.

The feature extraction step aims to automatically identify potentially relevant aspects of the trajectories to explain later-life income. Overall, we extracted 282 features of pathways. However, these features are most probably not all relevant to explain later-life income.

Features Selection

The second step is to select the relevant features to explain later-life income. This selection is automatically made using a machine-learning algorithm. Following Bolano and Studer (2020), we relied on Boruta (Kursa and Rudnicki 2010). This algorithm aims to select all the features that are relevant to explain the outcome, even if they are redundant.

Technically, Boruta is an extension of random forest, an ensemble method based on regression trees. The random forest works by estimating many regression trees (500 in our cases) to explain the outcomes. These trees are estimated on random subsamples of the data and features. All these trees are then combined (i. e., averaged) to predict the outcome. Random forest has several key features. First, it can capture non-linear relationships and interaction effects between features. Second, it can be used to identify the features that are recurrently important in explaining the outcome by computing an "importance" score. However, this score lacks well-defined threshold values.

In order to select a subset of significant features, multiple testing should be taken into account. This is a key issue when considering 282 potential features. With the usual 5 % threshold, one could expect 0.05·282 = 14.1 features to be flagged as significant if all 282 features were independent of the outcome. The Boruta algorithm provides threshold values for the importance scores, which allows the selection of "significantly important" features. Internally, this is achieved using permutation tests taking into account multiple testing.

Bolano and Studer (2020) discuss the controlling of confounders in the selection process. This is performed by residualization of the outcome variable, i.e., income. The method allows avoiding selecting features that are indirect measurements of key dimensions, such as gender or unmeasured skills. To keep our presentation simple, we controlled for sex (as a gender pay gap is expected), and lower secondary school track. In this article, we propose to further control for the highest educational attainment. Accordingly, we aim to identify the features of the pathways explaining income, net of the effect of educational attainment. We, therefore, look specifically at the characteristics of the pathways that are not taken into account by educational attainment, such as incomplete or delayed education.

Selected Features

Table 2 presents the 25 features selected by Boruta and their "importance" score: four are related to durations, seven are related to timing aspect, and 14 are related to sequencing.

To simplify the interpretation of the results, we propose relying on correlation plots and feature clustering. Figure 4 presents a graphical representation of the Pearson correlation between the selected features, hatched circles represent negative correlations. This plot highlights the overlaps in the information carried by the features. The features are ordered according to their similarities, and the clustering of the features in nine groups is represented using black squares. Combined with Boruta's importance scores, we can use this clustering to guide our interpretation.

The time spent in secondary VET is the most important feature, but it is highly correlated with several other features, making it difficult to interpret. Looking more closely at the features involving secondary VET, several patterns can be identified.

Table 2   Features Selected by the Boruta Algorithm

Features selected			
Sequencing		Duration (time spent)	
TS → SECII VET → OET	8.4	SECII VET	10.2
TS → SECII VET	8.0	SECII Gen	7.4
SECII VET → OET → OET	6.3	OET	4.3
TS → OET → SECII VET	6.2	TER GEN.	4.0
TER GEN. → OET → OET	5.0	Timing of transitions	
TER GEN. → OET → TER GEN.	4.5	Start SECII Gen in 2nd year	5.8
OET → SECII VET	4.0	Start TER Gen. in 3rd year	4.5
SECII VET → TS	4.0	Start SECII VET in 7th year	4.4
SECII VET → OET → TER VET	3.9	End TS in 2nd year	4.1
OET → TER GEN. → TER GEN.	3.8	End TER Gen. in 5th year	3.9
SECII Gen → OET	3.5	End SECII VET in 5th year	3.6
SECII VET → TER VET	3.5	End TS in 1st year	3.4
SECII VET → TS → OET	3.3		
SECII Gen	3.2		

Note: SECII Gen: Secondary General Education; SECII VET: Secondary VET; TER VET: Higher Vocational Education and Train-
ing; TER Gen.: Tertiary General Education; TS: Transitional Solutions; OET: Out of Education or Training.
Source: TREE wave 1, author's calculation.

First, and most importantly, several features capture the pattern of transitional solu-
tions or OET before secondary VET (*TS → SECII VET → OET*; *TS → SECII VET*;
TS → OET → SECII VET; *OET → SECIIVET*; *End TS in 2nd year*).
Second, different patterns of further education are found to be relevant, including
tertiary or transitional solutions spells (*SECII VET → TS*; *SECII VET → OET → TER
VET*; *SECII VET → TER VET*; *SECII VET → TS → OET*). The feature "*SEC
VET → OET → OET*" regroups both situations because it implies an education
spell between the two spells of OET. Interestingly, starting secondary VET edu-
cation seven years later also seems to be linked with later-life income (feature
start SECII VET in 7th year). Ending secondary VET later is also selected but its
interpretation is difficult, as the feature is linked with longer VET education and
bridge formation.

Conversely, secondary general education is also listed among the most important
features, either through its presence in the patterns (*SECII Gen. → OET and SECII
Gen.*) or the overall time spent in it. Interestingly, the delayed start of secondary
general education is also flagged as important (*start SECII Gen. in 2nd year*).

Several features linked to tertiary education are selected, either following
vocational or general secondary education spells. The overall time spent in tertiary
general education is strongly linked with several patterns including the timing of

Figure 4   Correlations and Clustering of the Features Selected by the
                  Boruta Algorithm
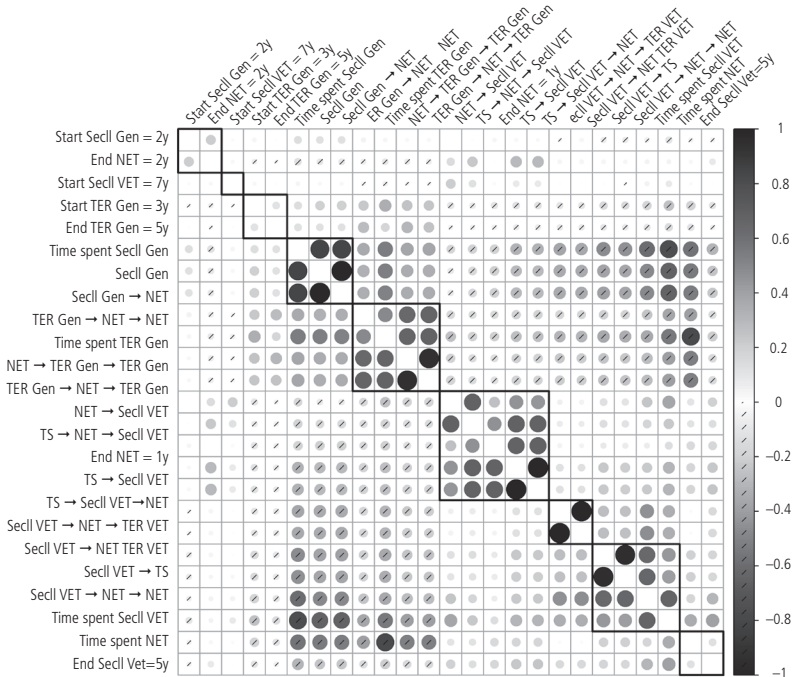
Note: Figure available in color at https://centre-lives.ch/sites/default/files/figunterlerchner2023.pdf#page=4.
Source: TREE wave 1, author's calculation.

higher education spells (*End TER Gen.in 5th year*; *Begin TER Gen. in 3rd year*), and
back-and-forth movement in tertiary general education (*TER Gen. → OET → OET*;
TER Gen. → OET → TER Gen.; *OET → TER Gen. → TER Gen.*).
Finally, the time spent not in education nor training is strongly negatively corre-
lated with secondary general and tertiary education spells. Its interpretation is not
straightforward as it mostly regroups working spells and is therefore linked with
working experience. Looking at the partial dependence plot (see Figure 6 in the
appendix), a non-linear relationship and interaction effect with other features can be
identified. There is a substantial average income increase for those with more than
36 months in OET, followed by another increase after 9 years in OET. However,
the latter increase is found only for some observations (depending on the value of
the other features) and a stable evolution, or even a decrease, is expected for others.

Regression Model

Boruta aims to identify all the features linked with an outcome. Based on random forest, it can capture non-linear relationships and interaction effects between features. However, even with the use of partial dependence plots, the interpretation of how the features are related to the outcome remains difficult. To understand these relationships, Bolano and Studer (2020) proposed to include the features in a regression model. This also makes the results comparable with the other approaches presented so far. However, the features are overlapping and strongly correlated, and therefore, including all of them in the same model would raise multicollinearity issues. Hence, they rely on a carefully and comprehensively chosen subset of the features.

Following our discussion, we selected seven features. We selected the patterns *TS* ➝ *SECII VET* to capture bridge formation and *SECII VET* ➝ *TER VET* and *SECII VET* ➝ *TS* to measure the two types of further educational spells following secondary VET. We included the time spent in tertiary education and the one in OET in three categories as identified before. Finally, the features related to delayed entry into secondary education were also added.

We used the same controls as in the previous models to make them comparable. Our specification of the selection procedure controlled for the highest educational attainment, to emphasize the specific effects of the features. Therefore, we also included it in the model. This model is presented in the fourth column of Table 1.

Compared with the previous models, the coefficients of the highest educational attainment are similar in their direction, but not in their size. The coefficients of no qualification and tertiary VET qualification are lower compared to the previous model and the one for tertiary general education is greater. This is directly related to the features added to the model.

Delayed entry into general secondary education and transitional solutions before secondary VET is associated with lower income. These results are in line with the one from Sacchi and Meyer (2016), who found lower income and occupational status attainment for those following bridge programs after compulsory education.

Continuing education after a secondary VET qualification is positively associated with income, as shown by the coefficient of the patterns "*SECII VET* ➝ *TS*" (which includes non-awarding education) and "*SECII VET* ➝ *TER VET*." The relationship with tertiary VET is even stronger if we consider that higher educational attainment is also taken into account and is significant. It shows that the path leading to tertiary VET is relevant, probably because it leads to different types of institutions and, therefore, qualifications. The Federal Office of Statistics (OFS 2021) reached similar conclusions. They found that further education spells following secondary VET are frequent and associated with upward mobility and higher income.

The time in OET is highly significant and shows a non-linear relationship. Those who spent less than three years in OET have lower incomes. This could be related to a lower work experience or a shortened occupational integration process.

The relationship is non-linear and bounded, as a longer time OET is only linked to a lower increase.

The time spent in higher general education is not significant on top of tertiary general qualification. Further investigation shows that this is directly linked with the time in OET, as the two are strongly negatively correlated. In this sense, the results presented here are fully compatible with the one from SA, where we found lower income for those experiencing long tertiary education spells. However, the "feature" approach provides a clearer interpretation, by emphasizing the role of work experience.

From a statistical point of view, the "feature" model is better than the SA or PTP models; it explains a higher share of income variation and is more parsimonious according to the BIC, even if some of the included features remain non-significant. These results were expected, as our parametrization of the FES approach combines information from the highest educational attainment and the pathways, and therefore relies on more information. The key conclusions of the PTP and SA models are also confirmed by the FES approach, which further highlights the role of bridge education. Generally, these results highlight that aside from educational attainment, the paths leading to it are also important. Atypical paths or delayed timing might well be interpreted as signals (Spence 1973).

5 Conclusion and Discussion

In this article, we compared three methods to study the relationship between educational pathways and later-life income. We started with educational attainment as an illustration of the Previous Trajectory Proxy (PTP) approach. Here, we primarily aimed to offer a contrast to the other methods and highlight their relative benefits. Unsurprisingly, the approach mostly underlined the income gradient following educational attainment level and confirmed previous research (Gomensoro et al. 2017; Korber and Oesch 2019). However, by design, it does not consider the path followed by individuals and does not require longitudinal data.

The Sequence Analysis (SA) approach focuses on educational pathways described as a sequence of educational situations. It then provides a typology of recurrent or typical paths observed in the data. While it requires longitudinal data, it provides a holistic view of trajectories in line with the life-course perspective. The obtained typology distinguishes educational pathways according to the upper secondary track followed by individuals, and then by tertiary education or the end of education spells. The typology is strongly associated with educational attainment, but still makes further distinctions according to the spell lengths in some states, or the steps leading to tertiary education. However, atypical patterns, such as those starting with transitional solutions or ending without qualifications, are not identified (for

instance, in our research one cluster regrouped quite diverse pathways). Labussière et al. (2021) explored alternative coding of trajectories to overcome this limitation.

When used in a regression, the SA typology also emphasizes the income gradient following the education level. It further highlights that the path leading to tertiary education is relevant and the lowest wage is earned by those following long tertiary education pathways, due to their lower occupational experience. Similar results were reported by Zimmermann and Seiler (2019), both on the typology obtained and on its relationship with income.

The educational attainment model showed better performance from a statistical perspective than the SA model. The SA typology only imperfectly accounts for educational attainment, which provides key information to explain later-life income. This is expected, as no information on graduation was included in the coding of the pathways. However, the typology remains highly associated with educational attainment and, therefore, conveys similar information.

Finally, we used the feature extraction and selection (FES) approach. By adapting the selection procedure to account for educational attainment, we identified 25 educational pathway features linked with later-life income. A comprehensive selection was required before specifying a regression model. Our use of correlation plots and hierarchical clustering allowed the identification of several key aspects, some of which were previously highlighted by the SA typology. Interestingly, the approach highlighted the importance of delayed entry and transitional solutions before upper secondary education. This confirms the results from Sacchi and Meyer (2016) on the negative relationship between income and bridging solutions. It also emphasized the role of awarding and non-awarding educational spells following secondary VET. Finally, it showed that a minimal occupational experience of three years is important to explain income at age 30. This shed new light on the results of long tertiary education spells identified with SA.

From a statistical point of view, the FES approach leads to the best regression model. This is expected, since it combines information on educational attainment with information on the pathway followed by individuals. Our results showed that the path itself is important to understand later-life outcomes. Although causal interpretation is not warranted, critical patterns such as bridge years or continuing education as well as the path followed until a given type of credentials are associated with later life income. Negative and positive signals, as well as skill acquisition, might play a role in the sociological understanding of these findings. However, educational attainment remains a key characteristic to explain later life income.

This methodological comparison illustrates the strengths of each approach. The PTP approach can lead to clear results if it is well-defined and captures the key aspects of the previous trajectory. However, it often may fail to capture the relationship with more peculiar aspects of the previous trajectory. SA provides a descriptive and holistic perspective on recurrent trajectories. However, it might fail to capture

the relationship between trajectories and an outcome. The proposed methodology can help choose the number of groups and lower the risk of misleading conclusions. Nevertheless, we do not recommend a simple application of SA if atypical trajectories are of interest. Alternative coding of trajectories or other distance measures might provide better results in such cases (Labussière et al. 2021). Finally, FES allows a detailed understanding of the characteristics of a previous trajectory that are linked with the outcome. The selection criteria obtained through residualization can be further specified to consider confounders and / or PTP, such as educational attainment. However, the selected features are redundant, and their number might be overwhelming, even with the proposed use of correlation plots and hierarchical clustering. By doing so, FES can refine the results obtained with PTP and sharpen them by identifying key dimensions lacking in the proxy.

We also made several methodological contributions. First, we discussed the specification of the selection procedure to account for educational attainment. Generally, such specification allows us to understand the specificities of the path taken, aside from the current situation, to explain a later-life outcome. This has many applications in life-course research.

Second, we developed a new validation technique for SA typologies to be used subsequently in regression. The method works by looking at the share of the direct relationship between sequences and the outcome that is accounted for by the typology. It ensures that the simplification carried out by the clustering step of SA does not eliminate key information to explain an outcome. In our analysis, the method emphasized the need to use at least five groups to understand the relationship between recurrent trajectories and income, instead of only two groups for the usual cluster quality index (CQI) approach. It further highlighted that, even with five groups, part of the relationship was not captured by the typology. This method will have many uses, as most SA applications subsequently rely on regressions. It is available in the *clustassoc* function of the *WeightedCluster R* library (Studer 2013).

Our analysis has several limitations. First, we considered school-to-work transitions until age 30. However, it might be too early to fully capture the consequences of educational pathways. As shown by the FES analysis, some respondents might not have completed their transition to employment. The next releases of the first cohort of the TREE survey should allow this. Second, we only considered educational pathways, even though the TREE data contains information about employment/unemployment. Finally, we used an automatic procedure to extract features regarding the timing of transitions, using constant and predefined time ranges (every 12 months). However, it might be interesting to directly distinguish between "on-time" and "off-time" transitions. This would reduce the number of potential features – a strategy generally recommended by the data mining literature (see Bolano and Studer 2020) – and ease the interpretation of the results.

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Appendix

Figure 5   Typology of Educational Pathways in Two Groups, Sequences Ordered From the Starting State
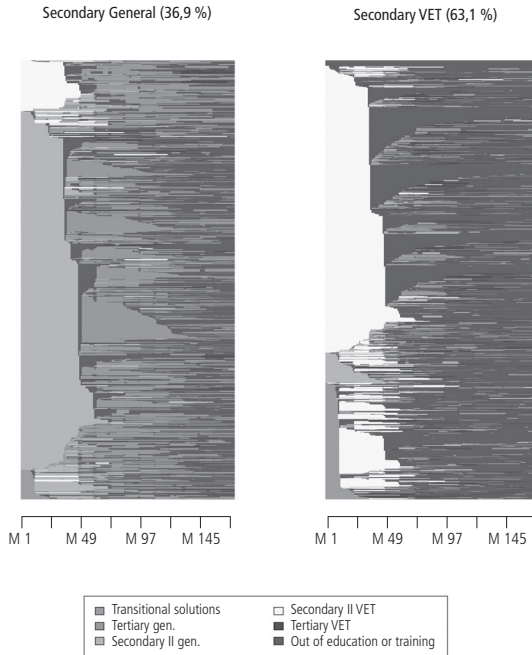
Note: Individual educational pathways, in months. Figure available in color at https://centre-lives.ch/sites/default/files/figunterlerchner2023.pdf#page=5.
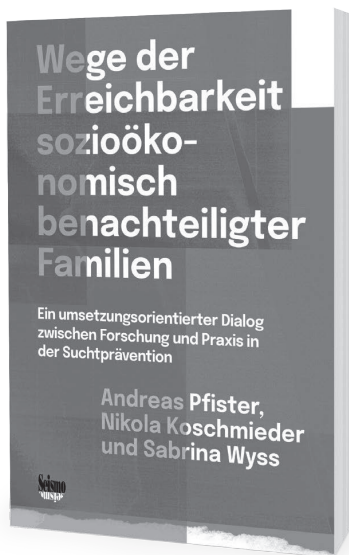Source: TREE wave 1, author's calculation.

Figure 6   Partial Dependence Plot of the Estimated Effect of Time Spent Not in Education nor Training on Residualized Income
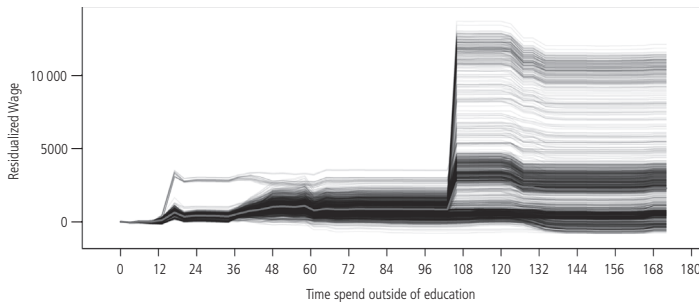
Note: Monthly income of all working activities. Figure available in color at https://centre-lives.ch/sites/default/files/figunterlerchner2023.pdf#page=6.
Source: TREE wave 1, author's calculation.

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