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Choosing new careers: patterns of occupational change within vocational education and training and fulfillment of career aspirations in Germany

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Abstract

This study investigates occupational changes in the German vocational education and training system among “stopouts,” i.e., individuals who terminate their training prematurely and switch to another occupation. We examine whether occupational changes are related to the fulfillment of career aspirations and changes in key occupational characteristics such as gender typing, social status, and task profiles. Utilizing longitudinal data from the German National Educational Panel Study and employing latent class analyses, we scrutinize patterns of change in occupational characteristics across different social categories. Results indicate that the majority of stopouts switch to occupations more aligned with their career aspirations, reflecting individual agency in career development. We identify two types of latent classes of occupational change: one in which characteristics remain more or less consistent with the previous position, reflecting practices of fine-tuning, and another showing notable task profile differences compared to the previous position. The latter primarily concerns medium-educated individuals who face a wider array of career opportunities compared to their lower-educated counterparts. Our findings emphasize the dynamic nature of career decision-making and stress the need for support for individuals undergoing career transitions. Career counselors and practitioners can use these insights to encourage alignment with individual occupational aspirations, address career compromises, and promote exploration based on interests, particularly among individuals with a medium-level education and diverse career options.

Keywords Occupational change, Vocational education and training, Career aspirations, Occupational compromises, Young people, NEPS, Germany

Introduction

Dropping out of vocational education and training (VET) is often portrayed as a worrying issue, as it can be associated with adverse future outcomes, including lower job security, poorer health, and diminished well-being if adolescents drop out for good

(Gesthuizen and Solga 2014; Michaelis and Findeisen 2023; Patzina and Wydra-Somaggio 2020). In Germany, 27% of all training contracts in the dual system end prematurely (Federal Institute for Vocational Education [BIBB] 2023). However, only a small portion of terminated contracts lead to permanent dropout from VET, leaving individuals without any formal vocational qualification (Boockmann et al. 2014; Patzina and Wydra-Somaggio 2021; Uhly 2015). The majority of those terminating go on to obtain a vocational qualification at a later stage (Krötz 2024; Uhly 2015). This group is referred to as “stopouts” because they leave their VET position temporarily, as opposed to “dropouts” who leave the VET system altogether. Stopouts typically choose a different VET occupation (“occupational stopouts”) or pursue the same VET occupation in a different training company (“company stopouts”) (Holtmann and Solga 2023). In this study, we focus on occupational stopouts, studying the adjustments in occupational characteristics that take place as a result of changing training occupations.

Recent studies highlight the importance of distinguishing between dropouts and stopouts, and point to the different predictors and mechanisms that may determine each outcome (Krötz 2024): for example, stopouts are generally inclined to leave VET earlier than dropouts (Holtmann and Solga 2023; Wydra-Somaggio 2021). Additionally, factors such as financial stability and a higher income increase the likelihood of someone being a stopout rather than a dropout (Bessey and Backes-Gellner 2015; Wydra-Somaggio 2021). Also, studies on the intention to change occupations among VET apprentices highlight the role of performance-based factors, such as task complexity (Krötz and Deutscher 2022) and trainee’s negative perceptions of work performance (Findeisen et al. 2023), as well as personality, such as prosocial behavior and being open to new experiences (Holtmann and Solga 2023).

While these studies provide important insights into the factors that precede (occupational) stopouts, little is known about the nature of these occupational changes in terms of occupational characteristics. Particularly in the early stages of VET, stopping out may be the result of an ongoing process of career development, which is essentially about optimizing the match between self-concept and occupation. Key categories that individuals compare and match when choosing an occupation are gender type, social status, and vocational interests (Gottfredson 2002). A growing body of research on career compromises and unfulfilled aspirations addresses the consequences of a mismatch (Gjerustad 2016; Nießen et al. 2022). Compromises in gender type, prestige, or interests can lead to dissatisfaction and a higher risk of dropout (Ahrens et al. 2021; Beckmann et al. 2023). Changing VET occupations can thus be seen as a means of realizing one’s desired occupation, which can either be the occupation the trainee aspired to before entering the VET system but was initially unable to achieve, or a different occupation newly aspired to as a result of reorienting during the first VET occupation. In both cases, we understand occupational change to be the result of individual agency in the process of career development (Schoon and Heckhausen 2019). “Agency” refers to an individual’s ability to make deliberate choices, set goals, and take actions that affect their life and environment. It involves processes such as planning, goal setting, and action regulation, all within the context of social opportunities and constraints. In essence, the notion of agency emphasizes the role of the individual as an active agent who shapes their own path and influences their environment (Goller and Harteis 2017; Goller and Paloniemi 2022).

We investigate occupational changes among stopouts from VET using large-scale longitudinal data from the German National Educational Panel Study (NEPS) in order to answer the following questions: First, do young people change occupations with the aim of accomplishing their initial career plans or at least of achieving something similarly ambitious? Second, are there typical patterns of average occupational change in gender type, social status, and job task profiles associated with occupations? Third, do patterns of occupational change differ systematically by key social category, including gender and educational qualification? The results of our study shed light on the patterns of career (re)orientation among VET trainees and the role of individual agency in realizing career aspirations. Our analyses show that, on average, occupational stopouts go on to take up an occupation that is more in line with their aspirations. Two patterns of changes in occupational characteristics can be identified here: changes in which similar occupational characteristics are maintained and changes where the task profile differs from that of the first occupation, which is particularly widespread among medium-educated individuals, highlighting the dynamic nature of career decision-making. These results can help counselors and practitioners understand young people's decision-making behavior and develop appropriate measures for improving the early matching of individuals and careers through career guidance.

Theorizing and previous research

To gain a more comprehensive understanding of occupational stopouts, it is essential to examine the process of career development. According to Gottfredson (2002), from early childhood through formal education, individuals undergo distinct developmental stages during which their career options become increasingly specific. She refers to these stages as *circumscription* and *compromise*.

First, Gottfredson's theory states that individuals constantly compare their self-concept, which encompasses their interests and abilities, with the perceptions and stereotypes they hold about certain occupations, along with associated social positions and judgments. This process involves the consideration of key elements such as gender type, social status, and occupational interests. Adolescents gradually eliminate occupational options as cognitive abilities mature, narrowing their "zone of acceptable alternatives" through circumscription. Second, transitioning from education to the labor market often requires individuals to make career compromises, i.e., they may have to adapt their initial career aspirations to align with the available training opportunities and consider alternative career paths.

Such career compromises can however harm young people's self-concept and thus have detrimental consequences, especially if the chosen training occupation deviates considerably from the initially desired career (Gottfredson 2002). The self-discrepancy theory (Higgins 1987) and the multiple discrepancies theory (Michalos 1985) state that discrepancies between goals and achievements in general are key predictors of psychological well-being and satisfaction. There is empirical evidence that working in an occupation that differs from early aspirations is related to long-term adverse psychological outcomes, such as lower psychological well-being and higher levels of distress (Carr 1997; Creed and Blume 2013; Hardie 2014; Nießen et al. 2021; Tsaousides and Jome 2008). Career compromises are also associated with adverse career outcomes, such as lower levels of job satisfaction, work adjustment, and work motivation (Ashforth and

Saks 2000; Creed and Gagliardi 2015; Irving and Montes 2009; Tsaousides and Jome 2008; Turnley and Feldman 2000).

A change in occupation can also be the result of occupational reorientation. While Gottfredson notes that career options once ruled out during the circumscription process are seldom revisited, exceptions may arise when individuals encounter “some formative new experience or some notable or consistent change in their social environment” (Gottfredson 2002). This suggests that individuals who discover during their initial VET that their chosen occupation does not match their evolving occupational self-concept, or who develop other occupational interests due to social influences, may undergo occupational reorientation, resulting in a change in VET occupation.

Given these circumstances, occupational changes among stopouts can be a way of coping with unfulfilled occupational aspirations, both to preserve their occupational self-concept and to overcome the associated negative feelings. Apprentices who have made career compromises or who are reorienting their careers could thus move to occupations that correspond to their initial or modified occupational aspirations. This is supported by empirical findings on German apprentices indicating that not being trained in one’s desired occupation is associated with a higher risk of dropping out (Beckmann et al. 2023; Beicht and Walden 2013; Holtmann and Solga 2023).

Dimensions of career changes

According to Gottfredson (2002), individuals making career choices are particularly focused on protecting their social self, i.e., the way they are perceived by society. In this context, individuals develop career aspirations in line with the three core elements of an occupational self-concept: gender typing, social status, and occupational interests.

Gender type

The significance of preserving gender typing in one’s self-concept is evident in horizontal gender segregation, the distinction between typical “male” and “female” occupations (Charles and Grusky 2004). Despite an increasingly dominant ideology of gender egalitarianism and a considerable decline in gender discrimination during the 20th century, this segregation persists, especially in Western countries including Germany (Charles and Bradley 2009; Charles and Grusky 2004). This persistence can partly be attributed to the widespread prevalence of essentialist notions of gender, which posit inherent differences between women and men, such as the notion that women are naturally more competent in people-oriented tasks and men in things-oriented tasks (Charles and Bradley 2009; Ridgeway and Correll 2004; Su et al. 2009). In Western societies, career choices are viewed as expressions of identity rather than just economic need (Cech 2013; Charles 2017). Consequently, young men and women choose occupations that allow them to express themselves, often relying on essentialist gender beliefs – which may reproduce gender segregation in labor markets (Charles 2017).

Empirical evidence confirms the tendency towards a gender-typical career, starting from childhood (Helwig 2004). This tendency is influenced by gender-typical preferences regarding work values or tasks (Busch-Heizmann 2015; Grove et al. 2011), which are shaped by parental influence and gender-role behavior alongside social expectations and stereotypes (Busch-Heizmann 2015; Eagly et al. 2020; Young and Schieman 2018). The initial orientation towards gender-typical occupations is further reinforced

during the search for a training position. Young people seeking VET who originally had gender-atypical aspirations tend to deviate from them during the application process, leaning towards gender-typical career choices (Kleinert and Schels 2020). Apprentices in gender-atypical occupations are more prone to drop out of VET (Beckmann 2023; Haverkamp and Runst 2015) and occupations pursued in subsequent career paths are more strongly segregated by gender than are youthful aspirations (Alm 2015). Thus, the prevalent gender-specific segregation appears to increase at later points in people's careers, which supports our following assumption regarding the changes in gender typology when changing occupations during training: considering the research on horizontal gender segregation and career compromise, we expect that stopouts will, on average, switch to occupations that, compared to their first training occupation, more strongly correspond to their gender.

Social status

In addition to ensuring an acceptable gender identity, the social status of one's occupation is another crucial aspect of protecting one's social self during career development: individuals will attempt to avoid falling below their desired social status (Gottfredson 2002). Theories of (bounded) rational educational decisions point in a similar direction (e.g., Boudon 1974; Breen and Goldthorpe 1997). These theories state that decisions, such as regarding occupational change, stem from weighing costs and benefits. Individuals evaluate their occupational situation (in light of factors such as expected costs and the probability of success) primarily based on the expected benefits. The higher the social status of the attained VET occupation relative to an individual's aspirations, the more value they will attach to it.

Empirical studies show that students with a higher social status tend to have higher status aspirations (Schoon and Polek 2011), while those with a lower social status often lower their aspirations during the application process (Schels and Abraham 2021). Furthermore, apprentices with parents who themselves have a lower level of education are subject to a higher risk of dropping out (Beicht and Walden 2013; Michaelis and Richter 2022). Although there is no research on whether changing occupations could improve the prospects of apprentices from families with a lower social status, data on occupational mobility indicates that occupational changes often lead to an increase in social status (Gesthuizen and Dagevos 2008).

We expect that stopouts are, on average, likely to change to VET occupations with a higher (or at least equal) social status as compared to their initial choice.

Occupational interests

Person-environment-fit theories highlight the interplay between individual traits, such as, in particular, personality structure and occupational interests, and the occupational environment (Edwards et al. 2002; Holland 1997). These theories suggest that individuals are inclined towards occupations that resonate with their occupational interests. A mismatch between an individual's occupational interests and the task profile of their current occupation can lead to increasing dissatisfaction. Individuals thus tend to leave such an occupational environment in search of another that better suits their needs.

Interest significantly impacts VET completion, as evidenced by research linking occupational interest, motivation, and satisfaction with the training to dropout intentions

and actual dropout behavior (Ahrens et al. 2021; Cents-Boonstra et al. 2019; Volodina et al. 2015). Fostering trainees' interest in their VET can help prevent them dropping out, as satisfaction notably rises when there is alignment between individuals' interests and their work environment (Etzel and Nagy 2021). However, other studies imply that interest congruence with occupations has a limited impact on dropout rates, while alignment with specifically realistic interests yields a slight decrease (Michaelis and Findeisen 2022). Studies considering the development of occupational interest during VET suggest that both initial low interest levels and subsequent loss of interest predict dropout intentions (Powers and Watt 2021). Furthermore, former trainees report that a change in their interests was related to dropping out (Böhn and Deutscher 2022). These findings indicate that interests may not match the chosen occupation from the outset or may undergo changes during VET.

In light of these considerations, it can be assumed that stopouts change occupations because they are not congruent with their personality structure. These individuals are likely to transition into VET occupations with a task profile that more closely aligns with their occupational interests. Conversely, it is also possible that stopouts will move into occupations that do not match their interest profile, especially if they would otherwise have to compromise in terms of gender or social status. Our study cannot determine the exact direction of the change in occupational tasks, as we do not measure individual task preferences. We can therefore only expect task profiles to undergo a change of an undetermined nature from the initial to the target VET occupation.

Present study and hypotheses

Building on previous theorizing and research, we examine occupational changes among stopouts from VET in Germany. We contribute to the literature in three ways: first, we investigate ways in which occupational changes are used to realize initial career plans. Second, we examine the occupational characteristics associated with occupational changes, including gender typing and the social status of occupations, as well as occupational task profiles. Third, concerning all these characteristics, we analyze different patterns of change and their distribution across key social categories, including gender and educational qualification, given that career plans and opportunities guiding occupational change might differ across these groups (Lent et al. 2002). To this end, we use large-scale longitudinal data from the German NEPS on occupational stopouts ($n=376$; 52% females). This allows for an in-depth analysis of occupational changes by providing information on career compromises, and makes it possible to merge multiple occupational data on initial and target VET occupations.

Following the theory of circumscription and compromise (Gottfredson 2002), which emphasizes the role of individual agency in the process of career development, we expect stopouts to transfer to VET occupations that are more, or at least not less, in line with their desired occupation (Hypothesis 1). In addition, the theory points to the relevance of gender type and social status as key dimensions of occupational choice and provides reason to assume that the target VET occupations are more in line with gender identity (Hypothesis 2) and entail a higher (or at least equal) social status (Hypothesis 3) compared with the initial VET occupations. The assumption that increasing social status is a motivation for occupational change is also supported by rational choice theory (e.g., Breen and Goldthorpe 1997). In addition, person-environment-fit theory (Edwards et al.

2002; Holland 1997) posits that career development is governed by individual occupational interests related to the task profiles associated with occupations. Since we have no information about individual task preferences, we expect that the task profiles will change (Hypothesis 4), but cannot express an expectation regarding the direction of change.

While we can formulate hypotheses about mean-level changes between the characteristics of the initial and target VET occupations, our analyses of patterns of occupational change and their distribution across the key social categories will be exploratory using latent class analysis.

Data and methods

Sample

We use large-scale data from the German NEPS, Starting Cohort 4 (SC4), version 13.0.0 (Blossfeld and Roßbach 2019; NEPS Network 2021). The data comprises a representative sample of 14,540 students attending ninth grade at regular schools in Germany and covers students' transition from the general school system to the VET system and their further paths therein. The NEPS thus provides unique data for observing apprentices' entry and pathway through the German VET system and possible changes in VET occupations. The first survey was carried out in the classroom via paper-and-pencil interviewing (PAPI) in autumn 2010 (Wave 1), followed by a second survey in spring 2011 (Wave 2). From tenth grade onwards, subsequent surveys took place annually in the classroom via PAPI (Waves 3–8). Individuals who left general schooling were interviewed biannually (Waves 3–6) and later annually (Wave 7 onwards) using computer-assisted telephone interviewing (CATI). We used data from Wave 1 to Wave 13.

The analysis sample of this study includes apprentices who terminated their VET prematurely to take up a different VET occupation within 24 months after termination and for whom we have valid information about the variables under study. Table 1 provides an overview of the stepwise sample restrictions, starting with the full sample of apprentices who entered into VET after graduating from general schooling. Occupational stopouts are defined as apprentices taking up a different VET occupation within 24 months, whereas apprentices who take up another VET position in the same occupation are considered to be company stopouts and hence excluded from the analysis sample.

Table 1 Stepwise sample restriction

	<i>N</i>
Starting VET after general schooling	7,709
Dropping out of VET (self-initiated or employer/school-initiated)	1,072
Dropping out of VET (only self-initiated)	870
Entering different VET within 24 months (stopouts)	473
Occupational stopouts (excluding company stopouts)	391
Valid occupational information	376*
Valid information on educational qualification	332**

Notes * This analysis sample is used for conducting the latent class analysis. ** This analysis sample is used for analyzing class membership.

Variables

Fulfillment of occupational aspirations

The apprentices were asked once after starting a new VET episode to what extent their current VET occupation matched their desired occupation. This information is, therefore, available both for the first episode as well as for further VET episodes started after a stopout. The scale ranges from 1 (strongly disagree) to 5 (strongly agree).

VET occupations of the first and second apprenticeship were provided by the apprentices ("In which profession exactly did/do you do this vocational training? Please give me the exact title, for example, as it appears in your training contract"). Open answers were coded based on the five-digit German Classification of Occupations from 2010 (KldB 2010), provided by NEPS.

Gender type of VET occupations

We use the four-digit German Classification of Occupations from 2010 to merge occupation-related characteristics. We use the proportion of same-sex employees in the occupation, as determined in the 2011 Census, to map the gender typing of occupations (German Federal Statistical Office 2014). The scale ranges from 0 to 100.

SES of VET occupations

We utilized the International Socio-Economic Index (ISEI; Ganzeboom et al. 1992) to map the social status of VET occupations. The ISEI stands out as an internationally recognized, conceptually robust, and extensively used measure of SES. This index goes beyond merely gauging income; it also considers the years of education required to qualify for a certain occupation (Züll 2016). The latest version, ISEI-08, was estimated and validated using International Social Survey Program (ISSP) data from the years spanning 2002 to 2007. This dataset encompasses information on the occupation, education, and personal income of 200,000 workers in 42 countries worldwide, including Germany (Ganzeboom 2010). The scale ranges from 11 to 88.

Task profiles of VET occupations

We rely on the operationalization of occupational tasks by Dengler et al. (2014), which measures the proportion of analytical, interactive, cognitive, and manual routine and non-routine tasks at the three-digit level of the German Classification of Occupations 2010. The task measures are based on an expert database of the German Federal Employment Agency about competencies and skills usually required to perform a job. The operationalization was initially developed in the context of the task-based approach, according to which the increasing wage inequality in many industrialized countries can be explained in reference to task changes (non-routine vs. routine tasks) (Autor et al. 2003). The operationalization also, however, captures tasks related to individual occupational interests. As we are not interested in questions related to task routine, we combined the share of manual routine and non-routine tasks. The scales range from 0 to 1, indicating the proportion of the task in each occupation.

Gender

We differentiate between male and female persons. No other category is provided in the NEPS data.

Educational qualification

Considering the highly stratified German VET system (Protsch and Solga 2016), the frequency of occupational changes is strongly connected to an individual's educational qualification, which, in turn, is closely tied to parental SES. Hence, educational qualifications serve as a dual reflection, capturing both the objectified parental SES at the offspring level and the institutionalized opportunities embedded in the education system. We used the highest school-leaving qualification achieved before entering VET and differentiated between low (*Hauptschulabschluss*, the reference category), medium (*Mittlere Reife*), and high (*Fachhochschulreife/Abitur*, i.e., the university entrance qualification) educational qualifications.

Table 2 provides an overview of the distribution of all variables used in our study.

Analytical strategy

In the first step, we analyzed the occupational changes related to the fulfillment of occupational aspirations as well as the characteristics of occupations (gender-typing, SES, and tasks) by comparing the mean values of the initial and target VET occupations and the discrepancy between them. In this way we were able to discern occupational changes in the form of level differences and the extent of the change.

In the next step, we carried out a latent class analysis (LCA; Lazarsfeld and Henry 1968) using the “gsem” command in Stata SE 17 in order to exploratively identify types

Table 2 Descriptive statistics

Variable	N	M	SD	Min	Max
First VET (initial occupation)					
Fulfillment of occupational aspirations (1: strongly disagree to 5: strongly agree)	376	3.19	1.46	1	5
Gender type	376	70.21	29.63	0.49	99.76
Social status (ISEI)	376	39.01	14.43	17.79	75.43
<i>Task profiles (share between 0 and 1)</i>					
Manual tasks	376	0.38	0.29	0	0.94
Cognitive tasks	376	0.25	0.19	0.00	0.80
Analytical tasks	376	0.20	0.14	0.02	0.73
Interactive tasks	376	0.17	0.17	0	0.51
Second VET (target occupation)					
Fulfillment of occupational aspirations (1: strongly disagree to 5: strongly agree)	375	3.89	1.11	1	5
Gender type	376	70.37	28.2	0.66	99.76
Social status (ISEI)	376	37.20	12.52	16.08	75.43
<i>Task profiles (share between 0 and 1)</i>					
Manual tasks	376	0.35	0.30	0	1
Cognitive tasks	376	0.26	0.19	0	0.80
Analytical tasks	376	0.20	0.13	0	0.63
Interactive tasks	376	0.20	0.18	0	0.58
Social characteristics					
Gender:	376				
Female		0.52		0	1
Male		0.48		0	1
Educational qualification:	332				
Low		0.29		0	1
Medium		0.45		0	1
High		0.14		0	1

Notes N=number of observations, M=mean, SD=standard deviation, Min=minimum, Max=maximum

of occupational change patterns based on the z-standardized initial and target values of gender typing, social status, and tasks of occupations. LCA is commonly used to classify individuals based on several conceptually related but distinct constructs. Since actual class membership is not observed, a major advantage of LCA over cluster analysis is that classification uncertainty is an explicit component of the statistical model.

Following relevant methodological literature (Weller et al. 2020), we used several criteria to determine the appropriate number of latent classes. The selection of the classes was primarily based on the interpretability of the class solution in terms of content, whereby the classes had to contain at least 10% of the apprentices in order to be considered representative. In addition, we used fit indices to establish a balance between model parsimony and fit. We plotted the changes in AIC and BIC values with an increasing number of classes to determine at which step the improvement in model fit was discontinued for the first time. We also estimated average posterior class probabilities for each of the latent classes to ensure classification accuracy.

Finally, we analyzed how class membership was distributed across major social categories, including gender and educational attainment, in order to identify social inequalities in class membership. These descriptive analyses also served to validate the class solutions.

Results

Are occupational stopouts related to the fulfillment of occupational aspirations?

We first assessed whether occupational stopouts are related to an average improvement in apprentices' perceived fulfillment of occupational aspirations, as expected in Hypothesis 1. Figure 1 displays the standardized discrepancy in apprentices' perceived fulfillment of occupational aspirations between the first and second occupation (left panel), illustrating that a significant amount (up to 31%) does not experience any change.

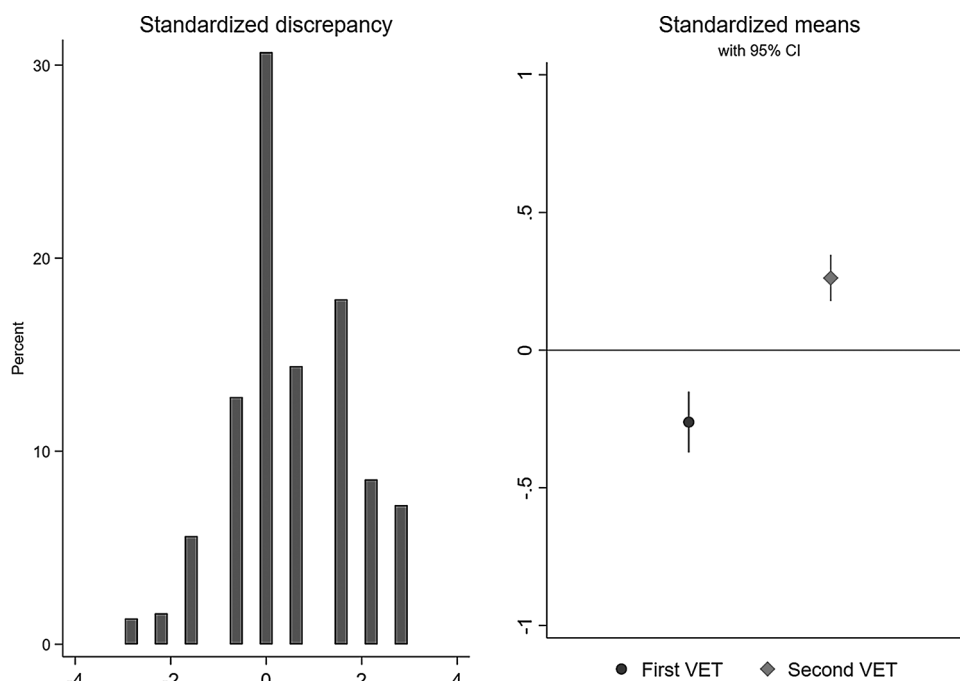


Fig. 1 Changes in the fulfillment of aspirations between first and second VET

As can be seen from the distribution of discrepancies, occupational stopouts can be related to both downward and upward changes in the fulfillment of occupational aspirations, with the distribution tilting towards positive discrepancies. 21% of stopouts experience a decrease and 48% an improvement (16% even a large improvement of 3 or 4 scale points) in the fulfillment of aspirations. This is also reflected in the comparison of the standardized means of the first and second occupations (right panel). On average, occupational stopouts experience an improvement of 0.53 standard deviations (corresponding to 0.70 scale points). This difference is statistically significant with $p < 0.001$ based on a paired t-test; with a Cohen's d of 0.41 it corresponds to a large effect size. These results confirm our theoretical expectation that occupational changes are frequently undertaken in order to fulfill occupational aspirations (Hypothesis 1).

Are occupational stopouts related to changes in occupational characteristics?

To assess whether occupational stopouts are related to changes in occupational characteristics, we again inspect the distribution of the discrepancies between the first and second VET occupations (see Fig. 2). Results show that a large number of occupational stopouts take place in situations where there are very small or no changes across all occupational characteristics. The discrepancy distribution for occupational characteristics is overall not clearly tilted toward one direction, showing that both upward and downward changes in gender type, social status, and occupational tasks occur to a similar extent. For social status, the distribution is slightly tilted to the left, indicating that occupational stopouts are more frequently related to a decrease in social status. These tendencies are also reflected in the standardized mean changes, plotted in Fig. 3. The occupational characteristics do not differ substantially between initial and target occupations. In line with the distribution of discrepancies, occupational changes are on average related to a small decrease in social status of 0.13 standard deviations (corresponding

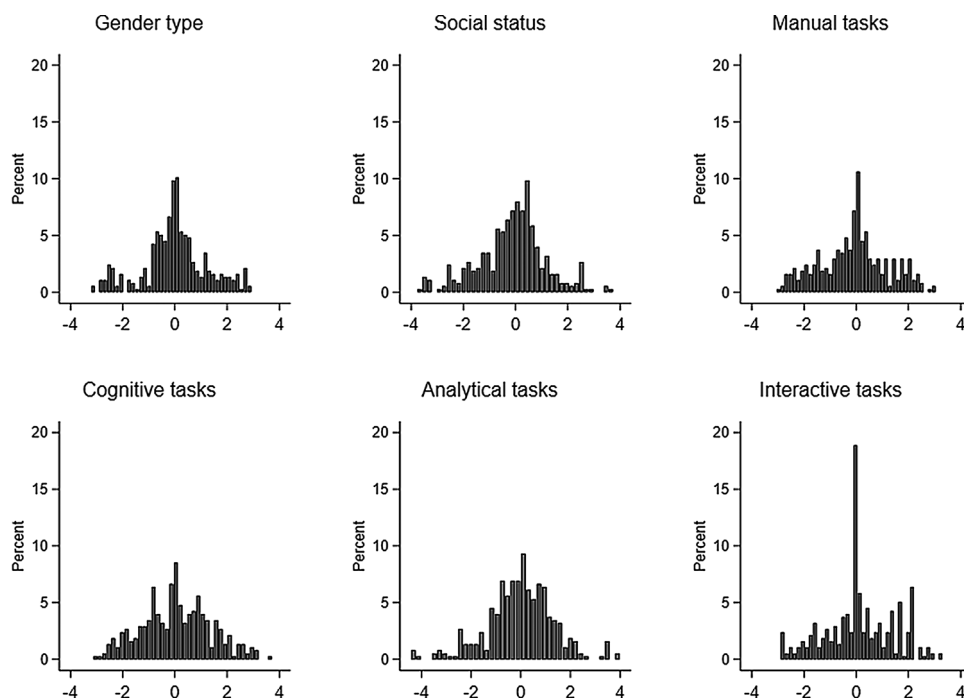


Fig. 2 Standardized discrepancy of occupational characteristics between first and second VET

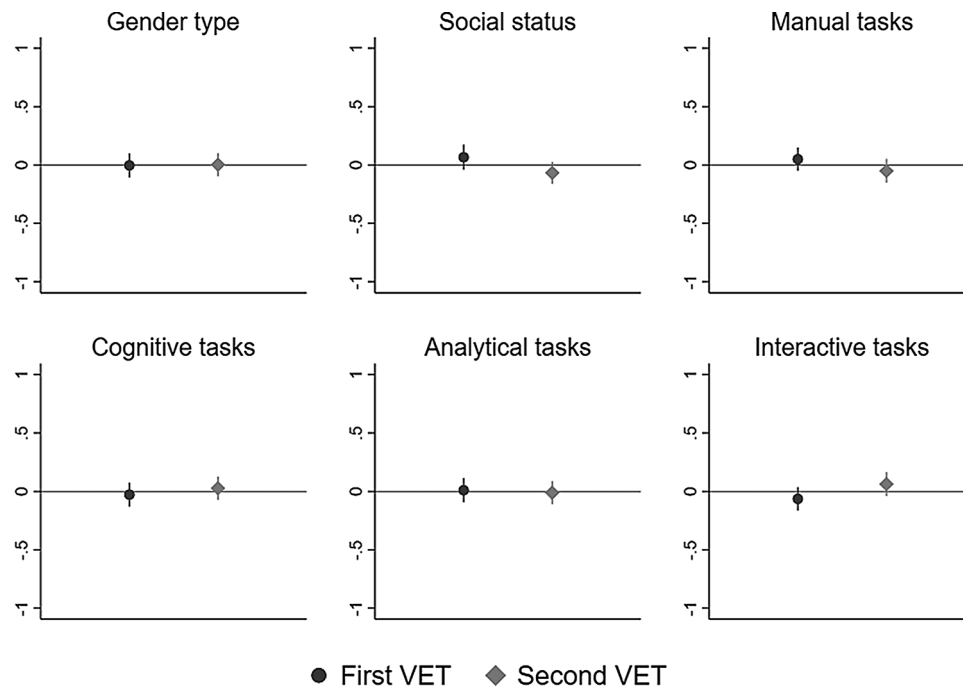


Fig. 3 Standardized means with 95% CI of occupational characteristics of first and second VET

to 1.81 ISEI points, $p < 0.05$). With a Cohen's d of 0.10, this corresponds to a small effect according to recent guidelines (Gignac and Szodorai 2016). The mean differences of the other occupational characteristics were close to zero (with Cohen's d ranging between -0.08 and 0.10) and not statistically significant at the 5%-level. Scatterplots are displayed in the Appendix (Figure A1), showing the relationship between origin and target occupation in more detail.

These results hence do not confirm our theoretical expectation that occupational stopouts move, on average, toward more gender-typical occupations (Hypothesis 2) and show an increase in social status (Hypothesis 3). Nor do the results support our expectation that task profiles will change when switching to a new VET position (Hypothesis 4).

Identifying latent classes of change patterns

Going beyond mean differences across all observations, we next assessed whether different patterns of change could be described based on an LCA. We compared solutions of classes between 2 and 6 primarily based on fit indices and parsimony. The entropy of all solutions reached values above 0.95, indicating that the classes of all solutions are accurately identified. Furthermore, Lo–Mendell–Rubin adjusted likelihood ratio tests indicated that each model fit the data better than the previous ones with $p < 0.001$. The fit indices (BIC and AIC) also revealed that the highest number of classes best describe the data (see Table A1). However, the slope of the fit indices is steepest up to the four-class solution and levels off again from the fifth to the sixth-class solution. We identified the four-class solution as the most parsimonious. We therefore present this solution first but also include the five-class solution in the Appendix (see Figure A2 and Table A2).

Figure 4 shows the average changes in occupational characteristics for the four estimated latent classes. Overall, two “stable” classes (1 and 2) emerged, displaying low levels of change. Stopouts in class 1 ($n = 93$) show almost no changes in their occupational

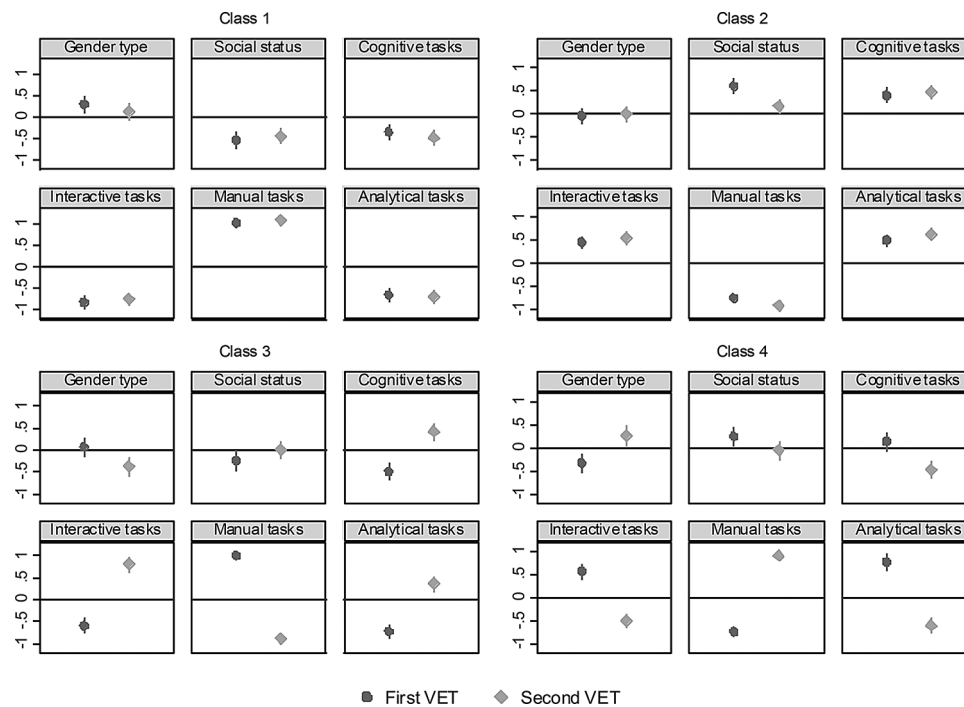


Fig. 4 Patterns of change in occupational characteristics for the four latent classes (standardized)

Table 3 Class membership by social characteristic and fulfillment of occupational aspirations *notes:* varying sample sizes occur due to missing values (listwise deletion). * displayed is the share within each class in percentage points

	Class 1	Class 2	Class 3	Class 4
Gender* ($n = 376$)				
male	78.49	24.00	46.25	52.56
female	21.51	76.00	53.75	47.44
School-leaving certificate* ($n = 332$)				
Low	56.76	14.66	38.57	31.94
Medium	40.54	60.34	47.14	51.39
High	2.70	25.00	14.29	16.67
Fulfillment of occupational aspirations (categorical)* ($n = 375$)				
decrease	25.81	17.60	22.78	20.51
stability	36.56	28.80	30.38	26.92
increase	37.63	53.60	46.84	52.56

characteristics. A paired t-test based on the raw data indicates that the mean changes from t1 and t2 for all occupational characteristics in both classes are not statistically significant, with $p > 0.08$. Cohen's d ranges from -0.17 to 0.18 , indicating small effect sizes. Concerning level differences, occupations in this class can be characterized as gender-typical with a below-average social status and involving a high proportion of manual tasks. Table 3, which shows the distribution of key social categories across the four classes, reveals that stopouts in this class are mainly male apprentices with lower school degrees. Regarding the self-reported fulfillment of occupational aspirations, stopouts in this class more frequently than in other classes experience a decrease or report no changes in the fulfillment of career aspirations. An exemplary change undertaken by male apprentices in this class is moving from "occupations in the production of baked goods and pastries" to "occupations in warehousing and logistics." Table A3

in the Appendix, which reports the frequency of initial and target occupations by class membership, further reveals that “technical occupations in the automotive industries” represent 10% of all initial occupations in this class, followed by “occupations in metal constructing” (9%) and “occupations in nursing” (8%). Two dominant target occupations in this class are “technical service staff in maintenance and repair” with a share of 15% and “occupations in geriatric care” (10%). Table A4 in the Appendix shows the frequency of initial and target occupations by class membership for the five-class solution.

The second class is the largest one ($n=125$). Stopouts in this class show, on average, no changes in their occupational characteristics except for a decrease in social status by 0.43 standard deviations (with $p<0.001$), corresponding to a Cohen’s d of -0.36 , hence a relatively large effect size based on conventional thresholds. Changes in manual tasks also reach statistical significance (with $p<0.001$) and a Cohen’s d of -0.34 , again indicating a relatively large effect. The changes in the other occupational characteristics are statistically insignificant with $p>0.1$. Initial and target occupations are characterized by low levels of manual tasks and above-average levels of interactive, cognitive, and analytical tasks. According to Table 3, apprentices in this class are more often female with medium to high educational degrees. Over half of the stopouts in this group report an improvement concerning their career aspirations, which is the largest share compared to other classes. An exemplary occupational shift of female stopouts is moving from “occupations in the hospitality industry” to “occupations in childcare and child rearing.” According to Table A3, frequent initial occupations are “occupations in child care and child rearing” (13%), “office clerks and secretaries” (10%), “occupations in the hospitality industry” (9%) and “dental assistants” (8%). Stopouts in this class most frequently shift towards “office clerks and secretaries” (12%), followed by “occupations in retail” (11%) and “social care workers (household assistance and family care)” (10%).

Class 3 ($n=80$) and class 4 ($n=78$) involve stopouts with a high number of changes in occupational characteristics. Both classes are rather gender-balanced (see Table 3). Stopouts in class 3 can be characterized by a decrease in gender typicality by 0.32 standard deviations (with $p<0.05$, Cohen’s $d=-0.28$), and a move toward more cognitive, analytical, and interactive tasks and away from manual tasks. The changes in tasks are statistically significant with $p<0.001$ and reach large effect sizes based on a Cohen’s $d>|0.8|$. Exemplary shifts for male stopouts include moving from “cooks” to “occupations in retail” and for female stopouts from “occupations in nursing” to “occupations in retail.” Table A3 shows that two frequent initial occupations in this class are occupations in nursing (14%) and hairdressing (13%), while a large share of stopouts in this class (35%) shifted toward “occupations in retail.”

Class 4 shows the exact opposite pattern, with stopouts moving, on average, toward more gender-typical occupations (0.60 standard deviations corresponding to a Cohen’s d of 0.54, with $p<0.001$) that are characterized by a higher share of manual tasks (Cohen’s $d=2.64$) and a decrease in cognitive (Cohen’s $d=-0.54$), analytical (Cohen’s $d=-1.12$), and interactive tasks (Cohen’s $d=-1.02$). A comparison of the extent of the changes in the tasks in Class 3 and Class 4 with those of the 1-class solution reported in Section 5.2 reveals a remarkable heterogeneity in the sample, which is masked in the 1-class solution, where Cohen’s d ranges from -0.08 to $+0.10$ and the changes from t_1 to t_2 are not statistically different from zero. An exemplary occupational shift involves moving from “medical assistants” to “occupations in nursing” for female stopouts and moving from

“office clerks and secretaries” to “technical occupations in the automotive industries” for male apprentices. A large share of stopouts in this class (22%) took up their first VET as “social care workers specialized in household assistance and family care.” Frequent target occupations include occupations in nursing (16%) and in geriatric care (14%).

Overall, it appears that if changes occur, they are more pronounced in occupational tasks than in social status or gender type, supporting our expectation that stopouts involve changes in occupational tasks (Hypothesis 4). The results of the LCA also show that while some apprentices use stopping out to move toward more gender-typical occupations (in line with Hypothesis 2) other stopouts move in the opposite direction in relation to gender type (contradicting Hypothesis 2). The same is the case for social status, with some stopouts slightly improving their social status (in line with Hypothesis 3) and another class of stopouts showing a decrease in social status (contradicting Hypothesis 3). Table 4 shows that respondents in class 2 report the highest improvements in the fulfillment of occupational aspirations, followed by class 4 and class 3.

Discussion

Summary

The present study focuses on occupational stopouts, examining the changes they undergo in the fulfillment of career aspirations and key occupational characteristics related to gender type, social status, and occupational tasks. By looking at the new careers they choose, we contribute to the understanding of what drives career change among apprentices who do not complete their first VET and go on to change their VET occupation. Using large-scale, representative German data on occupational stopouts and applying LCA, we sought to identify different patterns of occupational change specific to key social background categories of the apprentices.

Hypothesis 1, based on Gottfredson’s (2002) theory of career development, was supported by our analyses. We expected that trainees would be more likely to achieve their desired occupation when changing occupations, or at least to not move to occupations less in line with their aspirations. In fact, the majority of individuals in our sample were able to switch to a VET occupation that better matches their aspirations, supporting the idea of occupational stopout as a reflection of individual agency (Schoon and Heckhausen 2019). This finding also aligns with studies suggesting correlations between career compromises and dropping out of VET (Beckmann et al. 2023; Beicht and Walden 2013; Holtmann and Solga 2023). Improvement in the fulfilling of aspirations may involve two different groups: on the one hand, there are apprentices who are able to move beyond

Table 4 Mean comparison of discrepancies in the fulfillment of occupational aspirations within and between classes (four-cluster solution)

	Class 1	Class 2	Class 3	Class 4
Class 1	0.305 (0.017)	-0.417 (0.020)	-0.177 (0.337)	-0.212 (0.279)
Class 2		0.722 (0.000)	0.240 (0.200)	0.206 (0.295)
Class 3			0.481 (0.001)	-0.035 (0.863)
Class 4				0.516 (0.001)

Notes: The diagonal displays the discrepancy in means between t_1 and t_2 (and p-values for the undirected hypothesis) for each class based on a paired t-test. Positive values refer to an increase from t_1 to t_2 . The other cells display the difference in the discrepancy between t_1 and t_2 , comparing two classes with one another based on a two-sample t-test

the compromises in the choice of occupation they had to make when taking up their first VET. On the other are the trainees for whom reorientation during their first training leads to a restoration of conformity with their self-concept. However, there is also a smaller proportion of stopouts who find their second VET occupation to be even less desirable than their first. This could be because they left their position not of their own accord but for reasons beyond their control – perhaps because they were not able to perform the tasks required of them to the satisfaction of their supervisors or because other external factors, such as health or family responsibilities, prevented them from remaining in the occupation.

The mean changes in gender typicality, social status, and occupational tasks across all occupational stopouts were small, contradicting our assumptions, previous theorizing, and findings that emphasize occupational changes towards increasing gender typing (Hypothesis 2) and social status (Hypothesis 3) (Alm 2015; Gesthuizen and Dagevos 2008; Gottfredson 2002). However, the LCA provided detailed insights into heterogeneous patterns of change that cut across social categories of apprentices and that remain masked when looking at the whole sample. Our analyses suggested four distinct classes of occupational stopouts, each showing different patterns of change in their occupational characteristics. Two classes were rather stable regarding the occupational characteristics under study and were dominated by one gender, with the male-dominated class (Class 1) pursuing occupations with a lower status and a prevalence of manual tasks. This class predominantly contained individuals with low or medium school leaving qualifications. The female-dominated class (Class 2) exhibited low levels of manual tasks but higher levels of interactive, analytic, and cognitive tasks. Over half of the individuals in this class hold a medium school leaving qualification and reported a notable improvement in the fulfillment of career aspirations. Changes in occupation in these two classes do not seem to be driven by the desire for a substantial improvement in the congruence with the individual's self-concept. Instead, the change was minor, conceivable as a fine-tuning contributing to achieving an occupation more in line with the individual's aspirations, but unrelated to gender typing, social status, and occupational tasks.

Two other gender-homogeneous classes, dominated by individuals with an increased fulfillment of career aspirations, involved larger changes, which, however, primarily had to do with a shift in occupational tasks rather than with substantial alterations in social status or gender typing. Our assumptions about an improvement in gender-type conformity (Hypothesis 2) and social status (Hypothesis 3), in particular, were therefore not supported. According to Gottfredson (2002), these are the categories in which individuals are least willing to compromise. This could explain why there is little change in gender type and social status, as these were already optimized in the first VET choice. Gottfredson posits that individuals are most likely to show a willingness to compromise with respect to their occupational interests. This is consistent with our findings regarding Hypothesis 4, which suggests that occupational shifts primarily involve changes in occupational tasks: classes 3 and 4 show comparatively large changes in occupational characteristics, although in opposite directions. While class 3 presented a shift towards more cognitive, analytic, and interactive tasks and a decrease in manual tasks, class 4 was characterized by a decrease in cognitive, analytic, and interactive tasks and an increase in manual tasks. Given that a medium level of education is predominant in both classes, individuals in these classes are confronted with a more heterogeneous occupational

landscape than those with a lower level of education (Protsch and Solga 2016). The greater range of occupational opportunities could lead to a greater need for exploration and reorientation during VET concerning occupational tasks and skill requirements.

Limitations and future research

While our study provides valuable insights into the characteristics of occupational transitions in the German VET system, several limitations exist that should be acknowledged and addressed in future research. First, occupational stopouts are by definition a selective group that took up VET, made the decision to drop out, and subsequently took up another VET. Our sample is thus characterized, e.g., by an underrepresentation of apprentices with high educational attainment (who potentially exhibit a higher degree of agency when making their career choices). Results should therefore be interpreted against the selection processes that took place before “stopping out.” Second, as is a common issue in longitudinal studies, we were not able to observe all occurrences of stopouts due to panel attrition (right-censoring), potentially limiting the representativeness of our sample. For example, a full observation period of 24 months was only available for 22% of dropouts. Future research could address this problem by collecting more extensive data on apprentices’ pathways through the VET system. Third, while our study measured changes in occupational tasks, we were unable to assess whether the match between apprentices’ occupational interests and their VET occupation would change. Although NEPS data provides information on students’ occupational interests following the RIASEC approach (Holland 1997), currently there is no open-access classification of RIASEC profiles for occupations based on German data. We refrained from alternative operationalizations such as those based on the O*NET database because this classification is adapted to the U.S. labor market and is not perfectly comparable to the German VET system (Handel 2016). Future research should therefore investigate whether occupational stopouts are related to an improved fit between vocational interests and occupation. Finally, there might be further occupational characteristics that enter into apprentices’ decision to stopout that we did not cover in our analyses. For example, occupational changes might be guided by cultural norms at work, (social or physical) work environments, working hours and work-life-balance issues, or available career opportunities and future earnings.

Our results point to several further avenues for future research. First, since our results did not show an average trend in changes in gender type and social status associated with occupational stopouts, further investigation is warranted to elucidate the factors influencing these ambiguous shifts and their implications for skill development and occupational dynamics. Contrary to our expectations, our study suggests that social categories such as gender and social status may not be very influential in shaping career transitions at later career stages. Future research could further explore why social categories may not play a significant role here and explore alternative factors that might drive occupational choices and transitions. It must also be considered that not all apprentices have equal opportunities for changing occupations. Future research could integrate regional labor market characteristics and opportunity structures in the analysis of occupational stopouts.

Conclusion

Our study contributes to the literature on the career development of occupational stopouts by identifying patterns of subjective and job-related characteristics that drive career change. We found that most stopouts take up an occupation that is more in line with their aspirations than the one they were in before. This means that some apprentices might have succeeded in moving beyond initial career compromises or underwent career reorientation in the course of their VET.

We identified two types of latent classes of occupational change among stopouts: the first is characterized by the absence of changes in gender type, social status, or occupational tasks when comparing the first and second VET occupations; the mean values of these occupational characteristics are consistent with individuals' gender and educational levels. We assume that this type exhibits fine-tuning in the process of career development. The second type is characterized by relatively stable differences in terms of gender type and social status, and notable differences in occupational tasks. The changes here involved either an increase in cognitive, analytical, or interactive tasks and a decrease in manual tasks, or vice versa, and affected primarily medium-educated individuals regardless of gender. As medium-educated individuals have a wider range of occupational options compared to low-educated individuals, they are more likely to experience reorientation to better match their occupational interests.

Our results point to the dynamic nature of career decision-making and the potential for positive outcomes through occupational change. Career counselors and practitioners in VET can use this as a reference and learn how to better support individuals undergoing career transitions. Some promising approaches could be to recognize and address career compromises and promote exploration based on interests, particularly among the group of medium-educated individuals with plenty of career options.

Moreover, our findings might also help to prevent unnecessary VET terminations, especially when considering career decision-making as a lifelong process. This is particularly relevant for apprentices who seek only minor changes (fine-tuning) in their training occupation. Career counselors and VET practitioners could motivate this group to first complete their initial VET and then consider further specialization by means of additional training. This objective could also be achieved through structural reforms by focusing more on generalist VET programs that allow apprentices to specialize at a later stage (as envisaged by the recent reform of nursing training in Germany, for example).

Appendix

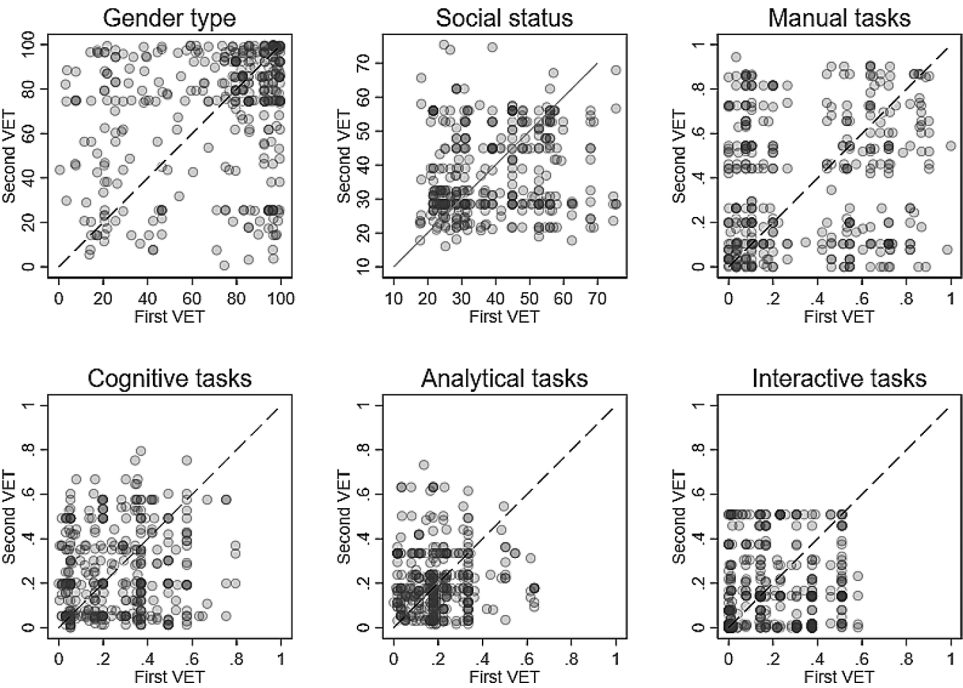


Fig. A1 Relationship between first and second VET occupational characteristics

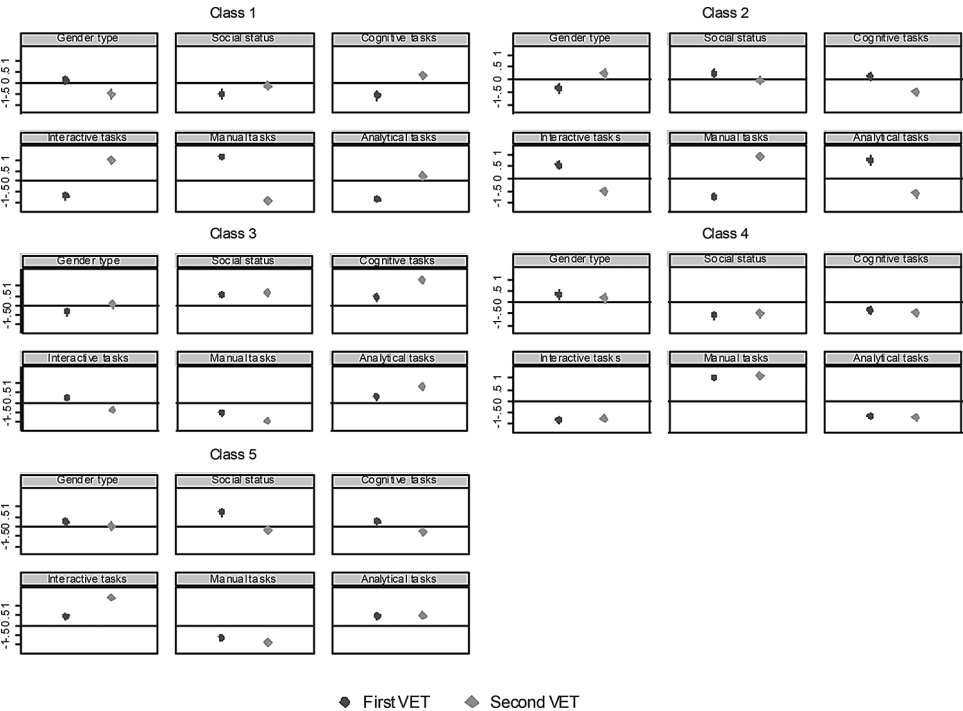


Fig. A2 Description of the 5-class-solution (standardized means)

Table A1 Fit indices of different class solutions					
Number of classes	Class sizes	Entropy	AIC	BIC	VLMR-LRT*
2	$n_{c1}=171, n_{c2}=205$	0.99	12,320.85	12,467.70	-
3	$n_{c1}=171, n_{c2}=83, n_{c3}=122$	0.98	12,064.07	12,262.51	0.00
4	$n_{c1}=93, n_{c2}=125, n_{c3}=80, n_{c4}=78,$	0.97	11,724.20	11,974.23	0.00

Table A1 Fit indices of different class solutions

Number of classes	Class sizes	Entropy	AIC	BIC	VLMR-LRT*
5	$n_{c1}=63, n_{c2}=79, n_{c3}=72, n_{c4}=90, n_{c5}=72$	0.95	11,493.94	11,795.56	0.00
6	$n_{c1}=88, n_{c2}=81, n_{c3}=61, n_{c4}=24, n_{c5}=48, n_{c6}=74$	0.96	11,337.41	11,690.62	0.00

Note: AIC: Akaike information criterion; BIC: Bayesian information criterion; VLMR-LRT: Lo–Mendell–Rubin adjusted likelihood ratio test

Table A2 Class membership by sociodemographic characteristics and fulfillment of occupational aspirations (5-class-solution)

	Class 1	Class 2	Class 3	Class 4	Class 5
Gender* ($n = 376$)					
male	50.79	51.90	33.33	78.89	18.06
female	49.21	48.10	66.67	21.11	81.94
School-leaving certificate* ($n = 332$)					
Low	48.08	31.51	13.24	56.94	16.42
Medium	44.23	52.05	54.41	40.28	64.18
High	7.69	16.44	32.35	2.78	19.40
Fulfillment of occupational aspirations (categorical)* ($n = 375$)					
decrease	28.57	20.25	12.68	24.44	20.83
stability	23.81	26.58	30.99	37.78	31.94
increase	47.62	53.16	56.34	37.78	47.22

Table A3 Frequency of initial and target occupations by class membership (4-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
Cass 1				
Initial occupation (first VET)				
2521	Berufe in der Kraftfahrzeugtechnik	Technical occupations in the automotive industries	10	10.75
2441	Berufe im Metallbau	Occupations in metal construction	8	8.60
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	7	7.53
2930	Köche/Köchinnen (ohne Spezialisierung)	Cooks (without specialization)	6	6.45
3434	Berufe im Anlagen-, Behälter- und Apparatebau	Occupations in plant, vessel, tank and apparatus construction	5	5.38
2234	Berufe im Holz-, Möbel- und Innenausbau	Occupations in wood construction, furniture and cabinet making, and interior finishing	4	4.30
2922	Berufe in der Back- und Konditoreiwarenherstellung	Occupations in the production of baked goods and pastries	4	4.30
3214	Berufe in der Dachdeckerei	Occupations in roofing	3	3.23
3421	Berufe in der Sanitär-, Heizungs- und Klimatechnik	Occupations in sanitation, heating, ventilating, and air conditioning	3	3.23
6330	Berufe in der Gastronomie (ohne Spezialisierung)	Occupations in gastronomy (without specialization)	3	3.23
Target occupation (second VET)				
5131	Technische Servicekräfte in Wartung und Instandhaltung - Helfer-/Anlernertätigkeiten	Technical service staff in maintenance and repair – unskilled/semi-skilled tasks	14	15.05
8210	Berufe in der Altenpflege (ohne Spezialisierung)	Occupations in geriatric care (without specialization)	9	9.68

Table A3 Frequency of initial and target occupations by class membership (4-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
3214	Berufe in der Dachdeckerei	Occupations in roofing	4	4.30
3321	Berufe für Maler- und Lackiererarbeiten	Painters and varnishers	4	4.30
2423	Berufe in der spanenden Metallbearbeitung	Occupations in metalworking: cutting	3	3.23
2441	Berufe im Metallbau	Occupations in metal construction	3	3.23
2510	Berufe in der Maschinenbau- und Betriebstechnik (ohne Spezialisierung)	Occupations in machine-building and -operation (without specialization)	3	3.23
2521	Berufe in der Kraftfahrzeugtechnik	Technical occupations in the automotive industries	3	3.23
3421	Berufe in der Sanitär-, Heizungs- und Klimatechnik	Occupations in sanitation, heating, ventilation, and air conditioning	3	3.23
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	3	3.23
Class 2				
Initial occupation (first VET)				
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child rearing	16	12.80
7140	Büro- und Sekretariatskräfte (ohne Spezialisierung)	Office clerks and secretaries (without specialization)	12	9.60
6322	Berufe im Hotelservice	Occupations in hotel service	11	8.80
8111	Zahnmedizinische Fachangestellte	Dental assistants	10	8.00
6210	Berufe im Verkauf (ohne Produktspezialisierung)	Occupations in retail (without product specialization)	7	5.60
8110	Medizinische Fachangestellte (ohne Spezialisierung)	Medical assistants (without specialization)	6	4.80
8171	Berufe in der Physiotherapie	Occupations in physiotherapy	6	4.80
8314	Berufe in der Haus- und Familienpflege	Social care workers specialized in household assistance and family care	5	4.00
6231	Berufe im Verkauf von Back- und Konditoreiwaren	Retail occupations selling baked goods, pastries, and confectionaries	4	3.20
7311	Assistenzkräfte in Rechtsanwaltskanzlei und Notariat	Assistants in lawyers' and notaries' offices	4	3.20
4132	Berufe im chemisch-technischen Laboratorium	Occupations in chemical/technical laboratories	3	2.40
8172	Berufe in der Ergotherapie	Occupations in occupational therapy	3	2.40
Target occupation (second VET)				
7140	Büro- und Sekretariatskräfte (ohne Spezialisierung)	Office clerks and secretaries (without specialization)	15	12.00
6210	Berufe im Verkauf (ohne Produktspezialisierung)	Occupations in retail (without product specialization)	14	11.20
8314	Berufe in der Haus- und Familienpflege	Social care workers specialized in household assistance and family care	12	9.60
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child rearing	11	8.80
6231	Berufe im Verkauf von Back- und Konditoreiwaren	Retail occupations selling baked goods, pastries, and confectionaries	6	4.80

Table A3 Frequency of initial and target occupations by class membership (4-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
7130	Berufe in der kaufmännischen und technischen Betriebswirtschaft (ohne Spezialisierung)	Occupations in business administration and technical business management (without specialization)	6	4.80
8111	Zahnmedizinische Fachangestellte	Dental assistants	6	4.80
6121	Kaufleute im Groß- und Außenhandel	Management assistants in wholesale and foreign trade	5	4.00
8110	Medizinische Fachangestellte (ohne Spezialisierung)	Medical assistants (without specialization)	4	3.20
6230	Berufe im Verkauf von Lebensmitteln (ohne Spezialisierung)	Sales occupations (retail) selling foodstuffs (without specialization)	3	2.40
6322	Berufe im Hotelservice	Occupations in the hospitality industry	3	2.40
7141	Fremdsprachensekretäre/-sekretärinnen und Fremdsprachenkorrespondenten/-korrespondentinnen	Foreign language secretaries and foreign language correspondence clerks	3	2.40
7230	Berufe in der Steuerberatung	Occupations in tax consultancy	3	2.40
8313	Berufe in Heilerziehungspflege und Sonderpädagogik	Educational specialists in social care work and special needs education	3	2.40
Class 3				
Initial occupation (first VET)				
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	11	13.75
8231	Berufe im Friseurgewerbe	Occupations in hairdressing	10	12.50
2234	Berufe im Holz-, Möbel- und Innenausbau	Occupations in wood construction, furniture and cabinet making, and interior finishing	6	7.50
2922	Berufe in der Back- und Konditoreiwarenherstellung	Occupations in the production of baked goods and pastries	5	6.25
2521	Berufe in der Kraftfahrzeugtechnik	Technical occupations in the automotive industries	4	5.00
2930	Köche/Köchinnen (ohne Spezialisierung)	Cooks (without specialization)	4	5.00
3321	Berufe für Maler- und Lackiererarbeiten	Painters and varnishers	3	3.75
6330	Berufe in der Gastronomie (ohne Spezialisierung)	Occupations in gastronomy (without specialization)	3	3.75
8210	Berufe in der Altenpflege (ohne Spezialisierung)	Occupations in geriatric care (without specialization)	3	3.75
8232	Berufe in der Kosmetik	Occupations in cosmetics	3	3.75
Target occupation (second VET)				
6210	Berufe im Verkauf (ohne Produktspezialisierung)	Occupations in retail (without product specialization)	28	35.00
8111	Zahnmedizinische Fachangestellte	Dental assistants	7	8.75
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child rearing	7	8.75
8314	Berufe in der Haus- und Familienpflege	Social care workers specialized in household assistance and family care	5	6.25
6121	Kaufleute im Groß- und Außenhandel	Management assistants in wholesale and foreign trade	4	5.00
6231	Berufe im Verkauf von Back- und Konditoreiwaren	Retail occupations selling baked goods, pastries, and confectionaries	3	3.75
7140	Büro- und Sekretariatskräfte (ohne Spezialisierung)	Office clerks and secretaries (without specialization)	3	3.75

Table A3 Frequency of initial and target occupations by class membership (4-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
8110	Medizinische Fachangestellte (ohne Spezialisierung)	Medical assistants (without specialization)	3	3.75
9212	Berufe im Dialogmarketing	Occupations in dialogue marketing	3	3.75
Class 4				
Initial occupation (first VET)				
8314	Berufe in der Haus- und Familienpflege	Social care workers specialized in household assistance and family care	17	21.79
6210	Berufe im Verkauf (ohne Produktspezialisierung)	Occupations in retail (without product specialization)	7	8.97
7140	Büro- und Sekretariatskräfte (ohne Spezialisierung)	Office clerks and secretaries (without specialization)	5	6.41
8171	Berufe in der Physiotherapie	Occupations in physiotherapy	5	6.41
6322	Berufe im Hotelservice	Occupations in the hospitality industry	4	5.13
8110	Medizinische Fachangestellte (ohne Spezialisierung)	Medical assistants (without specialization)	4	5.13
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child rearing	4	5.13
2631	Berufe in der Informations- und Telekommunikationstechnik	Occupations in information and telecommunication technology	3	3.85
4310	Berufe in der Informatik (ohne Spezialisierung)	Occupations in computer science (without specialization)	3	3.85
Target occupation (second VET)				
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	12	15.38
8210	Berufe in der Altenpflege (ohne Spezialisierung)	Occupations in geriatric care (without specialization)	11	14.10
2521	Berufe in der Kraftfahrzeugtechnik	Technical occupations in the automotive industries	6	7.69
8231	Berufe im Friseurgewerbe	Occupations in hairdressing	6	7.69
5131	Technische Servicekräfte in Wartung und Instandhaltung - Helfer-/Anlern Tätigkeiten	Technical service staff in maintenance and repair – unskilled/semiskilled tasks	5	6.41
8321	Berufe in der Hauswirtschaft	Occupations in housekeeping	3	3.85

*Displayed are all occupations with at least $n=3$ observations**Table A4** Frequency of initial and target occupations by class membership (5-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
Class 3				
Initial occupation (first VET)				
7140	Büro- und Sekretariatskräfte	Office clerks and secretaries	7	9.72
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child rearing	7	9.72
6210	Berufe im Verkauf (ohne Produktspezialisierung)	Occupations in retail (without product specialization)	5	6.94
6322	Berufe im Hotelservice	Occupations in the hospitality industry	5	6.94
8110	Medizinische Fachangestellte (ohne Spezialisierung)	Medical assistants (without specialization)	3	4.17
8111	Zahnmedizinische Fachangestellte	Dental assistants	3	4.17

Table A4 Frequency of initial and target occupations by class membership (5-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	3	4.17
8171	Berufe in der Physiotherapie	Occupations in physiotherapy	3	4.17
Target occupation (second VET)				
7140	Büro- und Sekretariatskräfte	Office clerks and secretaries	16	22.22
8111	Zahnmedizinische Fachangestellte	Dental assistants	9	12.50
7130	Berufe in der kaufmännischen und technischen Betriebswirtschaft (ohne Spezialisierung)	Occupations in business administration and technical business management (without specialization)	7	9.72
8110	Medizinische Fachangestellte (ohne Spezialisierung)	Medical assistants (without specialization)	6	8.33
4310	Berufe in der Informatik (ohne Spezialisierung)	Occupations in computer science (without specialization)	4	5.56
7230	Berufe in der Steuerberatung	Occupations in tax consultancy	4	5.56
2611	Berufe in der Mechatronik	Occupations in mechatronics	3	4.17
7141	Fremdsprachensekretäre/-sekretärinnen und Fremdsprachenkorrespondenten/-korrespondentinnen	Foreign language secretaries and foreign language correspondence clerks	3	4.17
Class 1				
Initial occupation (first VET)				
8231	Berufe im Friseurgewerbe	Occupations in hairdressing	10	15.87
2234	Berufe im Holz-, Möbel- und Innenausbau	Occupations in wood construction, furniture and cabinet making, and interior finishing	6	9.52
2922	Berufe in der Back- und Konditoreiwarenherstellung	Occupations in the production of baked goods and pastries	5	7.94
2930	Köche/Köchinnen (ohne Spezialisierung)	Cooks (without specialization)	5	7.94
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	5	7.94
2521	Berufe in der Kraftfahrzeugtechnik	Technical occupations in the automotive industries	4	6.35
3321	Berufe für Maler- und Lackiererarbeiten	Painters and varnishers	3	4.76
8210	Berufe in der Altenpflege (ohne Spezialisierung)	Occupations in geriatric care (without specialization)	3	4.76
Target occupation (second VET)				
6210	Berufe im Verkauf (ohne Produktspezialisierung)	Occupations in retail (without product specialization)	28	44.44
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child rearing	5	7.94
6121	Kaufleute im Groß- und Außenhandel	Management assistants in wholesale and foreign trade	4	6.35
8111	Zahnmedizinische Fachangestellte	Dental assistants	4	6.35
6231	Berufe im Verkauf von Back- und Konditoreiwaren	Retail occupations selling baked goods, pastries, and confectionaries	3	4.76
8314	Berufe in der Haus- und Familienpflege	Social care workers specialized in household assistance and family care	3	4.76
9212	Berufe im Dialogmarketing	Occupations in dialogue marketing	3	4.76
Class 5				
Initial occupation (first VET)				
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child rearing	9	12.50

Table A4 Frequency of initial and target occupations by class membership (5-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
8111	Zahnmedizinische Fachangestellte	Dental assistants	7	9.72
6322	Berufe im Hotelservice	Occupations in the hospitality industry	6	8.33
7140	Büro- und Sekretariatskräfte	Office clerks and secretaries	5	6.94
8314	Berufe in der Haus- und Familienpflege	Social care workers specialized in household assistance and family care	4	5.56
6231	Berufe im Verkauf von Back- und Konditoreiwaren	Retail occupations selling baked goods, pastries, and confectionaries	3	4.17
8110	Medizinische Fachangestellte (ohne Spezialisierung)	Medical assistants (without specialization)	3	4.17
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	3	4.17
8171	Berufe in der Physiotherapie	Occupations in physiotherapy	3	4.17
Target occupation (second VET)				
6210	Berufe im Verkauf (ohne Produktspezialisierung)	Occupations in retail (without product specialization)	14	19.44
8314	Berufe in der Haus- und Familienpflege	Social care workers specialized in household assistance and family care	14	19.44
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child-rearing	13	18.06
6231	Berufe im Verkauf von Back- und Konditoreiwaren	Retail occupations selling baked goods, pastries, and confectionaries	6	8.33
6121	Kaufleute im Groß- und Außenhandel	Management assistants in wholesale and foreign trade	5	6.94
6230	Berufe im Verkauf von Lebensmitteln (ohne Spezialisierung)	Retail occupations selling foodstuffs (without specialization)	3	4.17
6322	Berufe im Hotelservice	Occupations in the hospitality industry	3	4.17
8313	Berufe in Heilerziehungspflege und Sonderpädagogik	Educational specialists in social care work and special needs education	3	4.17
Class 4				
Initial occupation (first VET)				
2521	Berufe in der Kraftfahrzeugtechnik	Technical occupations in the automotive industries	9	10.00
2441	Berufe im Metallbau	Occupations in metal construction	8	8.89
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	7	7.78
2930	Köche/Köchinnen (ohne Spezialisierung)	Cooks (without specialization)	5	5.56
3434	Berufe im Anlagen-, Behälter- und Apparatebau	Occupations in plant, vessel, tank, and apparatus construction	5	5.56
2234	Berufe im Holz-, Möbel- und Innenausbau	Occupations in wood construction, furniture and cabinet making, and interior finishing	4	4.44
2922	Berufe in der Back- und Konditoreiwarenherstellung	Occupations in the production of baked goods and pastries	4	4.44
3214	Berufe in der Dachdeckerei	Occupations in roofing	3	3.33

Table A4 Frequency of initial and target occupations by class membership (5-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
3421	Berufe in der Sanitär-, Heizungs- und Klimatechnik	Occupations in sanitation, heating, ventilation, and air conditioning	3	3.33
6330	Berufe in der Gastronomie (ohne Spezialisierung)	Occupations in gastronomy (without specialization)	3	3.33
Target occupation (second VET)				
5131	Berufe in der Lagerwirtschaft	Occupations in warehousing and logistics	14	15.56
8210	Berufe in der Altenpflege (ohne Spezialisierung)	Occupations in geriatric care (without specialization)	8	8.89
3214	Berufe in der Dachdeckerei	Occupations in roofing	4	4.44
3321	Berufe für Maler- und Lackiererarbeiten	Painters and varnishers	4	4.44
2423	Berufe in der spanenden Metallbearbeitung	Occupations in metalworking: cutting	3	3.33
2441	Berufe im Metallbau	Occupations in metal construction	3	3.33
2510	Berufe in der Maschinenbau- und Betriebstechnik (ohne Spezialisierung)	Occupations in machine-building and -operating (without specialization)	3	3.33
2521	Berufe in der Kraftfahrzeugtechnik	Technical occupations in the automotive industries	3	3.33
3421	Berufe in der Sanitär-, Heizungs- und Klimatechnik	Occupations in sanitation, heating, ventilation, and air conditioning	3	3.33
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	3	3.33
Class 2				
Initial occupation (first VET)				
8314	Berufe in der Haus- und Familienpflege	Social care workers specialized in household assistance and family care	17	21.52
6210	Berufe im Verkauf (ohne Produktspezialisierung)	Occupations in retail (without product specialization)	7	8.86
7140	Büro- und Sekretariatskräfte	Office clerks and secretaries	5	6.33
8171	Berufe in der Physiotherapie	Occupations in physiotherapy	5	6.33
6322	Berufe im Hotelservice	Occupations in the hospitality industry	4	5.06
8110	Medizinische Fachangestellte (ohne Spezialisierung)	Medical assistants (without specialization)	4	5.06
8311	Berufe in der Kinderbetreuung und -erziehung	Occupations in child care and child rearing	4	5.06
2631	Berufe in der Informations- und Telekommunikationstechnik	Occupations in information and telecommunication technology	3	3.80
4310	Berufe in der Informatik (ohne Spezialisierung)	Occupations in computer science (without specialization)	3	3.80
Target occupation (second VET)				
8130	Berufe in der Gesundheits- und Krankenpflege (ohne Spezialisierung)	Occupations in nursing (without specialization)	12	15.19
8210	Berufe in der Altenpflege (ohne Spezialisierung)	Occupations in geriatric care (without specialization)	12	15.19
2521	Berufe in der Kraftfahrzeugtechnik	Technical occupations in the automotive industries	6	7.59
8231	Berufe im Friseurgewerbe	Occupations in hairdressing	6	7.59

Table A4 Frequency of initial and target occupations by class membership (5-class-solution)

KldB	Name of occupation (German)	Name of occupation (English)	n	%
5131	Berufe in der Lagerwirtschaft	Occupations in warehousing and logistics	5	6.33
8321	Berufe in der Hauswirtschaft	Occupations in housekeeping	3	3.80

* Displayed are all occupations with at least $n=3$ observations

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Author contributions

Alexandra Wicht Conceptualization, Methodology, Formal analysis, Writing—original draft, Writing—review and editing; Janina Beckmann Conceptualization, Methodology, Data curation, Formal analysis, Writing—original draft, Writing—review and editing; Matthias Siembab Conceptualization, Writing—original draft, Writing—review and editing; Lisa Herrmann Conceptualization, Writing—original draft, Writing—review and editing. All authors have read and agreed to the published version of the manuscript.

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Data availability

The analyses are based on data from the National Educational Panel Study (NEPS): Starting Cohort Grade 9, <https://doi.org/10.5157/NEPS:SC4:12.0.0> (H.-P. Blossfeld and Roßbach 2019; NEPS Network 2021). The authors are not the owners of the data and have no permission to distribute this data; however, the data is available for scientific use under restricted conditions to comply with the relevant data protection regulations and to ensure the anonymity of the participants. The basis for the use of the data is a data-use agreement. The authors accessed the NEPS data through the Research Data Centre at LifBi—Leibniz Institute for Educational Trajectories at <https://www.neps-data.de/Data-Center/Data-Access> (accessed on 28 February 2024). The task profile data, linked to occupations via the 3-digit code of the KldB 2010, is publicly available from the Research Data Centre of the Federal Institute for Employment Research and can be downloaded at http://doku.iab.de/fdz/reporte/2014/MR_12-14_data.zip (accessed on 28 February 2024). The syntax files for data preparation and analysis are accessible at <https://doi.org/10.7802/2791>.

Declarations

Competing interests

We have no known conflicts of interest to disclose.

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