

Spatial mobility and occupational status attainment in the transition from school to work in Germany

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ABSTRACT

This study investigates opportunities for occupational status attainment through spatial mobility in early stratification processes. We focus in particular on how this relationship is conditioned by young people's occupational status aspirations as well as by institutional and local structural opportunities, thereby scrutinizing how spatial mobility may contribute to unequal career opportunities. Empirically, we analyze occupational status attainment in the transition from school to Vocational Education and Training (VET) in Germany. Using longitudinal data from the German National Educational Panel Study (NEPS) combined with fine-grained regional information, we show that young people who commute or relocate for a VET position are more likely to secure higher-status VET positions. Yet spatial mobility is only associated with higher occupational status attainment among young people with higher levels of occupational status aspirations, among those originating from structurally weak regions, and among those with at least intermediate secondary school-leaving certificates. We conclude that spatial mobility can enable young people to overcome regional disadvantages, functioning as an agentic strategy for pursuing occupational goals more effectively. At the same time, it tends to widen status differentials between socially stratified educational groups and remains shaped by local structural opportunities.

1. Introduction

The transition from school to work is a pivotal stage in young people's life courses that lays the foundations for future career placement. From a life-course perspective, early occupational status attainment is a fundamental developmental milestone in youth and deserves particular attention. Empirical research has shown that early status attainment is a strong predictor of an individual's long-term labor market prospects (Korpi & Mertens, 2003; Manzon et al., 2014) and thus serves as a predominant driver of social stratification in advanced societies (DiPrete et al., 2017; Kerckhoff, 2001).

One possible strategy for attaining higher occupational status in the transition from school to work is spatial mobility—that is, commuting or relocating for a vocational training position, a university program, or one's first significant job (Hoffmann & Wicht, 2023; Mitze &

Javakhishvili-Larsen, 2020). Spatial mobility has been identified as a key mechanism in shaping status attainment (Jacob et al., 2019; Reichelt & Abraham, 2017). However, its role in occupational status attainment processes during the crucial transition from school to work remains understudied (see Waibel, 2019, for an exception). In particular, there is limited evidence on whether spatial mobility in this transition is a promising strategy for labor market entrants to secure higher-status positions. Also, little is known about how spatial mobility and occupational aspirations—two crucial expressions of agency—jointly impact the status attainment process. Furthermore, there is a paucity of research examining whether the impact of spatial mobility on occupational status attainment varies according to the institutional and structural opportunities available to young people. Such studies are highly desirable, however, as they would offer deeper insights into young people's institutionally canalized pathways and how

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their intentional actions may be facilitated or constrained by their action field (Heckhausen & Buchmann, 2019; Schoon & Heckhausen, 2019).

To address these research gaps, we focus on the transition from school to Vocational Education and Training (VET) in Germany. We study the role of spatial mobility—encompassing both commuting and relocation—in this transition and aim to answer the following research questions: 1) Do spatially mobile young people obtain higher-status VET positions? 2) To what extent is the association between spatial mobility and occupational status attainment moderated by young people's occupational aspirations, their local opportunity structures, and their level of schooling?

We use longitudinal data from the German National Educational Panel Study (NEPS), Starting Cohort Grade 9, merged with fine-grained information on regional opportunity structures. We distinguish between two categories of spatial mobility: young people who become spatially mobile either within or beyond their functional regional labor market (RLM; Kosfeld & Werner, 2012). More precisely, young people are defined as being spatially mobile if they commute or relocate for their VET position from their home district to another district *within* or *between* functional labor markets. We measure occupational status attainment using the International Socio-Economic Index 2008 score (ISEI-08; Ganzeboom, 2010) of the first VET position after graduation from general secondary school.

Our contribution to research on the emergence and perpetuation of social inequalities in the transition from school to work is twofold: First, we examine the role of spatial mobility in shaping unequal chances of occupational status attainment in the transition from general secondary education to VET. Second, we place particular emphasis on how this role is conditioned by young people's occupational goals and the structural opportunities available to them. Occupational aspirations, local labor market conditions, and young people's level of schooling might affect the decision to become spatially mobile, but also, and more importantly, determine the extent to which spatial mobility enables access to higher-status positions (Lent et al., 2006; Middeldorp, 2016; Mitze & Javakhishvili-Larsen, 2020). By considering the moderating role of these factors, our study aims to enhance our understanding of unequal opportunities for status advancement through spatial mobility.

2. Institutional background

The transition from school to VET represents the first significant entry into the labor market for around half of the young people in Germany (Autor:innengruppe Bildungsberichterstattung, 2024: Tab. E2-web). The German VET system is organized around two main types of programs: dual apprenticeship programs, which combine firm-based training with vocational schooling, and school-based programs, which primarily take place in educational institutions. These two types of programs differ markedly in terms of the occupational fields that they train for. Commercial and trade skills are primarily taught through dual apprenticeship programs, whereas training for occupations in the care and education sector is typically provided through school-based programs. In total, the German VET system encompasses over 300 occupations that vary widely in status and future labor market prospects, and access to these occupations is predominantly structured by the highly tracked general secondary school system (Protsch & Solga, 2016; Schels & Schwarz, 2020).

From an international perspective, the association between social origin and both educational achievement and attainment is particularly strong in Germany (OECD, 2018). After four years of primary school (six in some federal states), students are tracked into hierarchically structured types of general secondary school. Following five to nine years of secondary schooling—typically completed between ages 15 and 19—students obtain either no, lower, intermediate, or upper secondary school-leaving certificates.

These socially stratified certificates largely determine access to VET positions. Selection into both school-based programs and dual

apprenticeship programs depends on prior school-leaving certificates, with higher levels of schooling providing access to higher-status occupations. Individuals with an upper secondary school-leaving certificate are the only group eligible to pursue tertiary education. Yet, they may also enter the full range of VET occupations if they forgo university. Conversely, individuals with intermediate school-leaving certificates face limited access to the highest status VET occupations, while those with no or lower school-leaving certificates encounter significant barriers. Although formal restrictions only exist in school-based programs, competitive selection processes in the VET market effectively exclude most low-educated applicants from higher-status VET occupations (Protsch & Solga, 2016).

The strongly credentialized institutional pathways channel future opportunities such that early educational choices and achievements have cumulative and lasting effects on occupational trajectories (DiPrete et al., 2017; Heckhausen & Buchmann, 2019). Understanding how educational attainment, spatial mobility, and local opportunity structures interact in status attainment processes is thus particularly consequential from a life-course perspective.

3. Previous research and theory: the role of spatial mobility for occupational status attainment in the transition from school to work

3.1. Spatial mobility in the labor market and in school-to-work transitions in Germany

Spatial mobility in the labor market is widespread: A significant portion of workers commute daily over longer distances to work or even relocate for a job. This is also the case in Germany. While about half of the German workforce has a daily commute of less than 10 km, about 30 % commute between 10 and 25 km, and about 20 % have an even longer commute (DESTATIS, 2024), resulting in an average commuting duration in the middle of the European range (Eurostat, 2020; Giménez-Nadal et al., 2022). Germany also takes a moderate position in Europe regarding relocation, with a prevalence of relocations of around 3 % per year and move distances mostly being relatively short (Stawarz & Sander, 2020). While relocations over shorter distances are typically associated with family-related reasons or considerations relating to the residential environment, relocations over longer distances are predominantly due to job- or training-related reasons (Hofmann & Rüger, 2024). As in many Western countries, the average commuting duration and distance in Germany have increased in recent decades, while the prevalence of relocations has tended to decline (Rüger et al., 2018; Skora et al., 2024).

In most countries, including Germany, young people navigating the transition from school to work are the most spatially mobile group in the labor market. They exhibit the longest average commuting durations (Eurostat, 2020) and the highest relocation rates, typically moving from more rural to more urban areas (Stawarz & Sander, 2020). Although the transition from school to VET in Germany takes place at a relatively young age, spatial mobility is also an important strategy for young people searching for a VET position, as opportunities for occupational status attainment are unevenly distributed across different regions (Eckelt & Schauer, 2019; Hillmert et al., 2017; Weßling et al., 2015; Wicht & Nonnenmacher, 2017). Some regional labor markets are close to the idea of 'escalator regions' with better opportunities for status advancement (Détang-Dessendre & Molho, 1999; Fielding, 1992), while in other regions, opportunities are scarce. Regional labor markets differ substantially in their occupational structures, firm composition, and training capacities (Kleinert et al., 2018), giving rise to pronounced spatial inequalities in access to VET positions. While some regions offer comparatively favorable access to higher-status occupations, young people in structurally disadvantaged regions face a more limited supply of VET positions, greater competition, and a higher risk of failing to enter VET at all (Eckelt & Schauer, 2019; Hickmann et al., 2025;

Hillmert et al., 2017). Against this backdrop, many young people expand their search radius in the school-to-VET transition beyond the local labor market through commuting or relocation (Herzer & Ulrich, 2020; Hoffmann, 2025; Hoffmann & Wicht, 2023; Jost et al., 2019).

3.2. Spatial mobility as an investment

Individuals who are spatially mobile broaden their job-search radius and, thus, might gain access to better labor market positions that are not available to them in their local labor market. At the same time, spatial mobility also comes with costs, as individuals bear transportation or relocation costs, for example, to reach more distant workplaces. In the (predominantly) economic literature, spatial mobility as a job-search strategy is therefore typically conceptualized as an investment in human capital that individuals are expected to make only if the returns exceed the associated costs (Sjaastad, 1962). Accordingly, empirical research showed that spatial mobility is related to higher earnings in cases of unemployment-to-job mobility (Caliendo et al., 2017; Huttunen et al., 2018; Kekezi & Boschma, 2021), and job-to-job mobility (Kratz & Brüderl, 2013; Lehmer & Ludsteck, 2010; Reichelt & Abraham, 2017). Moreover, the returns to spatial mobility are expected to vary with the level of human capital investment, as higher-educated job seekers have a broader range of occupational alternatives and face higher opportunity costs when accepting positions below their qualification level (Mitze & Javakhishvili-Larsen, 2020). In line with this theoretical prediction, monetary returns to spatial mobility tend to increase with the level of education (Ganesch et al., 2019; Lehmer & Möller, 2008; Lemistre & Moreau, 2009; Mitze & Javakhishvili-Larsen, 2020), and they can be absent or even negative for those with low levels of education as a result of forced migration (Lemistre & Magrini, 2011; Venhorst & Cörvers, 2017). Beyond monetary outcomes, several studies have also demonstrated a positive relationship between spatial mobility and job-match quality (Caliendo et al., 2017; Meliciani & Radicchia, 2016; Reichelt & Abraham, 2017).

The economic perspective on spatial mobility as an investment can also be applied to young people transitioning from school to work. Arguably, for young people, spatial mobility is associated with particularly high monetary and social costs (e.g., the necessity to buy a first car or to move out of the parental home). Despite the costs it entails, spatial mobility is indeed associated with monetary returns when individuals transition from education to the labor market (Detemple, 2025; Kidd et al., 2017; Middeldorp, 2016; Mitze & Javakhishvili-Larsen, 2020), even though these returns appear to vary with distance covered and young people's socio-demographic characteristics. Drawing on French data on youth and using monthly wages as the outcome measure, Lemistre and Moreau (2009) document decreasing returns to spatial mobility with distance and increasing returns with educational attainment for men, and consistently lower marginal returns for women.

Less is known about the role of spatial mobility for occupational status attainment in the transition from school to work. Arguably, status returns to spatial mobility should be more important for young people than monetary returns in this transition as occupational status has been identified in the literature as one of the key job characteristics that young people factor in when making career choices (Basler & Kriesi, 2019; Gottfredson, 2002; Nießen et al., 2022; Schoon & Polek, 2011). However, status returns to spatial mobility in youth have rarely been studied. An exception is the study by Waibel (2019), which shows that being spatially mobile during post-secondary education in Germany is associated with a higher occupational status at a later stage in the life course—specifically, three years after finishing education. This study, however, did not examine whether and how the relationship between spatial mobility and early status attainment is moderated by young people's aspirations and structural opportunities.

3.3. Spatial mobility and occupational aspirations as expressions of individual agency shaped by socio-cultural contexts

Building on the socio-ecological developmental concept of individual agency and the notion of life-course canalization (Heckhausen & Buchmann, 2019; Schoon & Heckhausen, 2019), we understand transitions as critical windows of opportunity within people's institutionalized life courses, laying the foundation for future occupational careers. In navigating the transition from school to work, young people act as agents in their own status attainment processes in relation to and interaction with significant others in the socio-cultural contexts in which they are embedded. Socio-cultural contexts include families, the opportunity structure of the local labor market, and the education and credentialing system. Education systems, including their transition regimes, can create strong path dependencies (DiPrete et al., 2017; Kerckhoff, 2001). For young people, local labor market structures, in addition to institutional pathways tied to their level of schooling, delineate the action field of opportunities and constraints in their status attainment processes (Heckhausen & Buchmann, 2019; Schoon & Heckhausen, 2019). In other words, individual agency does not evolve independently but might be either supported or constrained by structural conditions and institutional arrangements.

Following Schoon and Heckhausen (2019: 137), we define agency “as intentional action, i.e. the capability to set goals (i.e. intention), plan their pursuit and attainment in the future (i.e. action planning; foresight), and allow behavior to be guided by goal pursuit (i.e. action-regulation).” Within this framework, spatial mobility represents both action planning and an expression of individual behavior guided by the pursuit of occupational goals. Importantly, whether young people are actually able to choose spatial mobility as a job-search strategy to attain a higher occupational status very much depends on the socially stratified economic and social support they can count on and the subjectively expected returns. A variety of factors appear to be associated with mobility decisions, including social origin (Impicciatore & Tosi, 2019; Prix et al., 2024; Witte et al., 2023), gender (Prix et al., 2024), migration background (Lemistre & Magrini, 2011; Witte et al., 2023), and previous educational attainment (Lemistre & Magrini, 2011)—but also cognitive and non-cognitive skills (Bernard, 2022; Bütikofer & Peri, 2017; Jokela, 2009; Jokela et al., 2008). At the same time, local opportunity structures have been shown to affect individuals' decision to become spatially mobile (Ganesch et al., 2019; Hoffmann & Wicht, 2023; Rickmeier, 2023; Venhorst & Cörvers, 2017).

Moreover, career choices—encompassing job-search strategies such as spatial mobility—are significantly driven by the level of occupational aspirations (see also Hoffmann, 2025; Hoffmann & Wicht, 2023). Previous research has shown that higher occupational aspirations are associated with higher status attainment, supporting the idea that occupational aspirations are intentional actions that shape the strategies pursued to attain occupational goals (Nießen et al., 2022; Schoon & Lyons-Amos, 2016; Schoon & Polek, 2011). Similarly, Lent et al. (2006) emphasized the critical role of occupational aspirations in shaping career-related decisions. In turn, occupational aspirations are themselves shaped by the structural conditions and institutional constraints and opportunities young people encounter in their proximate and wider socio-cultural contexts (Flohr et al., 2020; Wicht, 2016; Wicht & Ludwig-Mayerhofer, 2014).

3.4. Theoretical expectations

Building on previous theorizing and research, we aim to improve our understanding of how young VET seekers manifest their agency through their occupational aspirations and spatial mobility, and how their status attainment processes evolve in relation to the structural conditions of local labor markets and the institutionally canalized pathways related to the level of schooling.

To account for the interrelated roles of occupational aspirations and

spatial mobility in shaping early occupational status attainment, we propose two hypotheses. First, we refer back to the economic perspective of spatial mobility as an investment in human capital (Nakosteen et al., 2008; Sjaastad, 1962) and hypothesize that being spatially mobile is positively associated with the occupational status of young people's first VET position, even when occupational aspirations are considered (Hypothesis 1). Second, we expect that higher occupational status aspirations are associated with more effective job-search strategies, including spatial mobility, as a means to realize the occupational goals young people have set for themselves. Thus, we hypothesize that the positive association between spatial mobility and occupational status attainment is stronger among young people with higher levels of occupational aspirations than among those with lower levels of occupational aspirations (Hypothesis 2).

Moreover, local labor market structures determine the range of VET opportunities young people face. In regions with few opportunities for status advancement, spatial mobility can be a strategic choice to attain higher-status occupations, despite the associated costs resulting from commuting or relocating. Among young people originating from such regions, those who are spatially mobile should attain higher-status VET positions than those who are not. Conversely, in regions with plenty of opportunities, young people have less incentive to become spatially mobile. Spatially mobile individuals originating from such prosperous regions may even experience penalties in occupational status. Taken together, these considerations lead us to hypothesize that spatial mobility is more strongly associated with occupational status attainment among VET entrants from structurally weak regions than among those from structurally strong regions (Hypothesis 3).

Furthermore, we expect gains in occupational status through spatial mobility to differ between educational groups. Given that higher-status VET occupations are typically out of reach for individuals with lower secondary school-leaving certificates in the German VET market (see Section 2), we expect this group's agency to be constrained. Their opportunities to attain a higher-status VET position through spatial mobility are limited. From an economic perspective, they also do not need to attain a particular high occupational status to reap the expected returns to their comparably lower investment in human capital. Higher-educated VET seekers, on the other hand, have a wider range of occupational alternatives available to them. They would forgo potential status returns to their investments by choosing a lower-status VET position in their local area rather than becoming spatially mobile to reach a higher-status VET position. Therefore, we hypothesize that the positive association between spatial mobility and occupational status attainment increases with the level of schooling (Hypothesis 4).

4. Data and methods

4.1. Data

Our analyses are based on longitudinal data from the German National Educational Panel Study (NEPS), Starting Cohort Grade 9 (Blossfeld & Roßbach, 2019; NEPS Network, 2021). This panel study started in 2010, featuring an initial national probability sample of 14,540 9th graders attending German secondary schools. The data were well suited to answer our research questions, as they provide detailed episode data on students' educational trajectories and career paths, including transitions to VET, and at the same time comprise in-depth measures of individual, motivational, and socio-structural characteristics, including occupational aspirations measured before leaving general school. Furthermore, the data include regional identifiers at the small-scale district level (NUTS-3 regions) for both the place of school (used as a proxy for the place of residence) and the place of VET. With this information, we were able to measure spatial mobility within and between functional regional labor markets (RLM) and to merge regional indicators to map local opportunity structures.

The initial survey took place in the classroom during Grade 9 in the

fall of 2010, and the respondents were re-interviewed once or twice each year thereafter. As young people in Germany can leave the general school system at different stages, we used data from waves 1 through 14 (NEPS Network, 2021), which allowed us to observe the school-to-VET transition of young people who left the general school system between 2011 and 2017. From the initial sample, we analyzed all respondents who started their first fully qualifying VET position (both dual apprenticeship and school-based programs) within 24 months after graduating from general secondary school ($N = 5828$). Students who entered tertiary education or other educational programs were excluded.

4.2. Analytical strategy

We conducted our analysis of the role of spatial mobility in occupational status attainment during the transition to VET in Germany in two steps. First, we examined the association between spatial mobility (within and between RLMs) and occupational status attainment in terms of the first fully qualifying VET position. For this step, we estimated general linear regression models both without and with controlling for occupational status aspirations, local labor market conditions measured by the commuter balance, level of schooling, and other variables known to influence both spatial mobility and occupational status attainment (see Section 4.4 'Control variables'). In interpreting the results, it should be kept in mind that although occupational status aspirations are a key determinant of both spatial mobility and occupational status attainment, controlling for this variable does not fully eliminate concerns about self-selection into spatial mobility.

Second, we analyzed whether the role of spatial mobility for occupational status attainment varies with the capacities to set occupational goals in the form of occupational aspirations and with structural and institutional opportunities. Specifically, using the full model with controls, we introduced interaction terms to examine the joint role of spatial mobility and (1) occupational status aspirations, (2) local labor market conditions, and (3) level of schooling for occupational status attainment among youths entering VET.

All analyses were conducted using Stata 17 (StataCorp, 2021). To account for the clustering of observations within RLMs, we used cluster-robust standard errors. We z-standardized all continuous independent and control variables. Thus, the regression parameters indicate standardized mean differences, and as such, they represent a measure of effect size. To deal with missing values in the dependent and independent variables, we employed a two-level multiple imputation procedure with random intercepts to generate 50 imputations using Blimp 3.1 (Enders et al., 2018). This imputation procedure allowed us to consider the multilevel structure of the data. The imputation model included all variables used in the analysis models. Table 1 shows the proportion of missing values before imputation for every variable for the analysis sample.

4.3. Focal measures

Occupational status attainment. Our dependent variable measures occupational status attainment in the first fully qualifying VET position (both dual apprenticeship and school-based programs), coded using the International Socio-Economic Index 2008 (ISEI-08; Ganzeboom, 2010). The ISEI is a well-established measure of occupational status, incorporating information on required educational qualifications and income for specific occupations. The variable is presented on a 10–90 metric.

Spatial mobility. Our independent variable captures the spatial mobility behavior of young people. Our measure of spatial mobility encompasses both commuting and relocations associated with entering the first VET position. Following previous research on the German context (Hoffmann & Wicht, 2023; Reichelt & Abraham, 2017), we used the concept of RLMs (Kosfeld & Werner, 2012) for our measurement of spatial mobility. RLMs, which consider commuting flows to and from economic centers, are well-suited to represent regional units where

Table 1
Sample statistics.

	Mean/ %	S.D.	Min	Max	N	% Missing
Focal measures						
Occupational status attainment (ISEI-08)	38.86	13.44	11.56	84.14	5707	2.08
Spatial mobility, ref. no					5828	0
Within RLMs	16.40					
Between RLMs	21.65					
Occupational status aspirations (ISEI-08)	46.02	17.79	11.56	88.7	4816	17.36
Commuter balance	-10.93	28.33	-148.94	65.64	5828	0
Secondary school-leaving certificate, ref. upper					5796	0.55
Intermediate	49.74					
No/Lower	26.30					
Control variables						
Highest parental occupational status (ISEI-08)	48.64	19.45	11.74	88.96	5149	11.65
Gender, ref. male	46.45				5824	0.07
Migration background, ref. none	21.96				5740	1.51
Reasoning	8.33	2.44	0	12	5109	12.34
Global self-esteem	38.91	6.38	12	50	5038	13.56
Legal age, ref. underage	40.75				5776	0.89
Search duration, ref. VET position in first year after general schooling	19.90				5828	0
Large areas of Germany, ref. South					5828	0
Central	29.65					
North	17.43					
East	14.16					
Variables for robustness analyses						
Urbanity, ref. urban	38.68				5828	0
Distance-based measurement of spatial mobility, ref. no mobility (up to 25 km)	25.46				5828	0
Regional average ISEI of new training contracts	37.50	1.13	33.86	41.35	5828	0

Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

job-related decisions and actions occur (Wicht et al., 2020). The calculation of RLMs is based on the German administrative districts (NUTS-3) and condenses the 401 districts into 141 RLMs. Fig. A1 in the appendix illustrates the delineation of RLMs in relation to administrative district boundaries.

To operationalize spatial mobility, we compared the administrative district of an individual's general secondary school with that of the first VET position. Based on this comparison, we distinguish three categories: (1) not mobile (i.e., entered VET in the home district) (reference group), (2) mobile within own RLM, or (3) mobile between RLMs. On average, spatial mobility between RLMs entails longer distances than spatial mobility within RLMs (Hoffmann & Wicht, 2023). By using this measurement, spatial mobility in our analyses mainly refers to commuting to a VET position rather than moving, yet some young people also relocate for their VET position (Hoffmann & Wicht, 2023).

Occupational status aspirations. Occupational aspirations were measured before entering the VET system while the respondents were still in school through an open-ended question: "Considering everything you know right now, what will probably be your occupation in the future?" Occupational aspirations measured in this way are also considered expectations or realistic (as opposed to idealistic) occupational aspirations. We mapped the occupational status associated with the aspired occupation in the same way as for occupational status attainment, using the ISEI-08 scale. Thus, in our empirical analyses, we measure occupational aspirations specifically as occupational status aspirations. This information was collected annually or biannually from Grade 9 until the end of schooling. We used the most recent measurement before the respondents left the general school system. Table A1 in the appendix (left column) shows the bivariate relationship between spatial mobility and terciles of occupational status aspirations. Young people who have high occupational status aspirations while still in school show indeed higher levels of spatial mobility when entering their first VET position (around 47 %) compared to those with only medium or low levels of occupational status aspirations (around 38 % and 32 %, respectively).

Local opportunity structure. To measure local opportunity structures, we used the commuter balance of the administrative district of the respondent's place of school (at the NUTS-3 level) for the year they graduated. This established indicator reflects the structural strength and overall attractiveness of the home district as a location for employment and training opportunities (Hoffmann & Wicht, 2023; Royer & Leibert, 2024). The commuter balance is calculated as the disparity between inbound and outbound commuter shares, normalized against the total labor force, and multiplied by 100. Lower values indicate structurally weaker districts, whereas higher values indicate structurally stronger districts. The Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR, 2022) provided the data. Table A1 in the appendix (middle column) shows the bivariate relationship between spatial mobility and terciles of the commuter balance scale. Spatial mobility spans the entire scale but is more prevalent among young people from districts with a low commuting balance (around 51 %) than among those from districts with a medium and high commuting balance (around 35 % and 30 %, respectively).

Level of schooling. We differentiated between three levels of schooling: no or lower secondary school-leaving certificate, intermediate secondary school-leaving certificate, and upper secondary school-leaving certificate. Table A1 in the appendix (right column) shows the bivariate relationship between spatial mobility and levels of schooling. Spatial mobility is observed across all levels of schooling but is notably higher among those with upper secondary school-leaving certificates (around 52 %) compared to those with intermediate secondary school-leaving certificates (around 36 %) and those with no or only lower secondary school-leaving certificates (around 30 %).

4.4. Control variables and variables for robustness analyses

As spatial mobility is largely influenced by factors that also impact young people's occupational status attainment (Kratz & Brüderl, 2013; Lemistre & Magrini, 2011; Nakosteen et al., 2008), we controlled for a wide range of factors both at the individual and regional levels. Next to occupational aspirations, the local opportunity structure, and the level of schooling—which we also considered as moderators in our analyses (see Section 4.3)—research on school-to-work transitions has shown that both spatial mobility and occupational status attainment are associated with socio-demographic characteristics such as social origin (Hadjar & Becker, 2016; Impicciatore & Tosi, 2019; Prix et al., 2024; Schoon, 2010; Witte et al., 2023), gender (Beicht & Walden, 2017; Nießen et al., 2022; Prix et al., 2024), migration background (Heath et al., 2008; Lemistre & Magrini, 2011; McElvany et al., 2018; Schels & Schwarz, 2020; Witte et al., 2023), cognitive and non-cognitive skills (Bernard, 2022; Burger et al., 2020; Büttikofer & Peri, 2017; Damian

et al., 2015; Jokela et al., 2008; Kuncel et al., 2004; Schoon, 2010; Shifrer & Heili, 2021), and regional factors (Hartung & Weßling, 2025; Hoffmann & Wicht, 2023; Morris, 2023; Venhorst & Cörvers, 2017; Zwysen, 2016). We measured these factors as follows:

Highest parental occupational status. We measured social origin by the highest parental occupational status. As for occupational status attainment and occupational status aspirations, the variable was again measured by the highest ISEI-08 of parental occupations.

Gender. Respondents were asked at every interview whether they are female or male, which in our view reflects their self-defined gender; however, only in a binary way (see Westbrook & Saperstein, 2015, for a critical discussion of questions such as these). Hence, we coded gender as a dummy variable with male students as the reference group.

Migration background. The variable was based on information on students' and parents' country of birth (Kristen et al., 2016). We distinguished immigrants from students with no migration background (reference category). We consider both first-generation immigrants (born outside Germany) and second-generation immigrants (born in Germany but with at least one parent born outside of Germany).

The NEPS data also allowed us to control for cognitive and non-cognitive skills with the following measures:

Reasoning. We accounted for cognitive skills using a measure for reasoning that assessed general cognitive abilities in Grade 9, employing figural reasoning tasks (NEPS-MAT; Pohl & Carstensen, 2012), with possible sum scores ranging from 0 to 12.

Global self-esteem. We captured non-cognitive skills with Grade 9 with a German adaptation of the Rosenberg self-esteem scale (von Collani & Herzberg, 2003), with possible sum scores ranging from 10 to 50.

In addition, we included variables to control for the timing of the transition from school to VET and further heterogeneities at the regional level:

Legal age. The age at the end of general schooling is influential for the options available for spatial mobility (young people in Germany must be at least 18 years old to be legally competent, and older VET seekers are more likely to move out of their parental home). We therefore controlled whether respondents were underage (reference category) or had already reached legal age at the time of leaving general secondary school.

Search duration. As young people might adapt their willingness to be spatially mobile and accept VET positions at different status levels during prolonged unsuccessful application periods, we considered the time spent searching for a VET position after graduating from general secondary school. We distinguished between young people who secured a VET position in the first year after general schooling (reference group) and those who began training only in the second year after general schooling.

Large areas of Germany. We coded the place of school into four large areas that combine German federal states (Frick & Göbel, 2008): Central, North, East, and South (reference category). This regional classification ensures that our findings are not biased by structural differences, particularly since RLMs and NUTS-3 districts vary in size across these broader areas.

In the robustness analyses, we additionally relied on the following variables:

Urbanity. To assess the robustness of our findings across urban and rural regions, we applied a typology from the Federal Office for Building and Regional Planning, which distinguishes between large independent cities and urban districts on the one hand, and rural and sparsely populated districts on the other (BBSR, 2022).

Distance-based measure of spatial mobility. As an alternative indicator of spatial mobility, we calculated the Euclidean distance between the respondent's school district and the district of their first VET position. Based on this measure, we differentiated between no mobility (distances up to 25 km, reference category) and spatial mobility (distances greater than 25 km).

Regional average ISEI of new training contracts. As an alternative

measure of the local opportunity structure, we used the average ISEI of newly signed training contracts at the NUTS3-level. We calculated this measure on an annual basis for the year of leaving the general school system.

Table 1 shows the descriptive statistics of all relevant variables for the analysis sample.

5. Results

5.1. Do spatially mobile young people reach higher-status occupations?

Table 2 reports the results of the stepwise regression for the association between the spatial mobility of young people and the occupational status of their first fully qualifying VET position. The full regression results are presented in Table A2 of the appendix.

In the first model in Table 2, we observe that without further controls, spatial mobility within and between RLMs is associated with a 3.2 and 3.4 ISEI point increase in the socio-economic status of the attained VET occupation, respectively, compared to not being spatially mobile. In the second model in Table 2, adding the complete set of variables for occupational status aspirations, local opportunity structure, level of schooling, as well as all control variables, leads to a notable reduction in the relationship between types of spatial mobility and occupational status attainment. Yet, the associations remain stable and significant. Being mobile within one's own RLM is associated with an increase of the status of the first VET position of 1.5 ISEI points and of 1 ISEI point if young people become mobile between RLMs.

The results support Hypothesis 1, suggesting that spatial mobility is associated with a higher occupational status of the first VET position, regardless of occupational status aspirations and additional controls that might confound the relationship under study. However, there seems to be no additional increase in occupational status attainment from being mobile beyond one's own RLM. In fact, we observe the highest occupational status among those who are spatially mobile within their own RLM.

5.2. Does the relationship between spatial mobility and occupational status attainment vary with young people's occupational aspirations?

Hypothesis 2 stated that the positive association between spatial mobility and occupational status attainment is stronger for individuals with higher levels of occupational status aspirations than for those with

Table 2

Association between spatial mobility and occupational status attainment among VET entrants.

	Dependent variable: occupational status attainment in first fully qualifying VET position (ISEI-08)			
	No controls		Controls	
	B	S.E.	B	S.E.
Spatial mobility, ref. no				
Within RLMs	3.19***	[0.53]	1.53***	[0.44]
Between RLMs	3.40***	[0.45]	0.94*	[0.36]
Occupational status aspirations (ISEI-08)			4.19***	[0.22]
Commuter balance, std.			0.27	[0.17]
Secondary school-leaving certificate, ref. upper				
Intermediate			−2.31***	[0.54]
No/Lower			−7.54***	[0.64]
Constant	37.61***	[0.29]	39.40***	[0.63]
Largest FMI	0.02		0.19	
Average RVI	0.01		0.09	

Notes: Generalized linear regression models; Cluster robust S.E.; N(RLMs) 137, N (districts) 350, N(persons) 5828; 50 imputations. Full regression results are reported in Table A2 in the appendix. * p < 0.05, ** p < 0.01, *** p < 0.001. Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

lower levels. Fig. 1 presents this relationship by displaying the association between spatial mobility and the attained occupational status of the VET position, differentiated by terciles of occupational status aspirations measured before entering VET. In the left panel, the linear predictions (in ISEI points) are shown for the levels of spatial mobility across the low, medium, and high aspiration categories. The right panel presents the predicted difference in attained status between spatially mobile and non-mobile individuals (zero line), again across the three aspiration categories. The full regression results underlying these estimates are presented in Table A3 of the appendix.

First, examining the left figure, the results indicate substantial level differences in ISEI scores across the three categories of occupational status aspirations. Specifically, young people with higher occupational status aspirations attain significantly higher ISEI scores than those with medium or low aspirations. Notably, these differences emerge even while controlling for levels of schooling and other relevant variables. Turning to the right-hand figure, the data reveal that spatial mobility within RLMs is associated with higher status attainment only among young people with medium or high status aspirations. Additionally, among young people who are spatially mobile between RLMs, only those with high status aspirations attain higher-status VET positions, whereas those with medium or low status aspirations do not. These findings support our second hypothesis.

5.3. Does the relationship between spatial mobility and occupational status attainment vary with structural and institutional conditions?

We proposed in Hypothesis 3 that spatial mobility should be more strongly associated with occupational status attainment for VET entrants from structurally weak regions than for those from structurally strong ones. Fig. 2 illustrates the role of spatial mobility in occupational status attainment as a function of the structural strength of the home district, measured by the commuter balance. The figure shows linear predictions

comparing spatially mobile and non-mobile young people across varying values of the commuter balance, showing both absolute (left panel) and relative slope differences, with non-mobile youths serving as the reference group (zero line) (right panel). The full regression results are provided in Table A4 in the appendix.

In line with Hypothesis 3, we find varying associations between spatial mobility and occupational status attainment depending on the structural strength of young people's home districts. We observe that non-mobile VET entrants in structurally weak districts, as measured by low commuter balance values, attain, on average, much lower occupational status than entrants who have been spatially mobile for their VET positions. As displayed in the left panel, the occupational status of non-mobile young people increases markedly with higher commuter balance values. The right panel shows that young people from the structurally weakest districts (commuter balance of -4) attain about 5.5 higher ISEI scores when being spatially mobile within or between RLMs. However, in local labor markets with above-average commuter balance (values of 0 or higher), there is no observable correlation between spatial mobility and occupational status attainment. Moreover, as Fig. 3 shows, we do not observe differences in occupational status attainment between young people who are spatially mobile within and between RLMs. Overall, the findings suggest a pattern in which youths originating from structurally weak home districts attain higher status when being spatially mobile and are penalized when remaining immobile.

Beyond differences shaped by structural conditions, in Hypothesis 4, we posited that the institutional pathways associated with young people's levels of schooling represent a key dimension of the opportunities and constraints they face in the process of status attainment. Fig. 3 shows the linear predictions for the occupational status attainment of spatially mobile VET entrants in comparison to non-mobile entrants across the three educational groups defined by school-leaving certificates, displaying both absolute ISEI score predictions (left panel) and relative predictions, with no spatial mobility serving as the reference

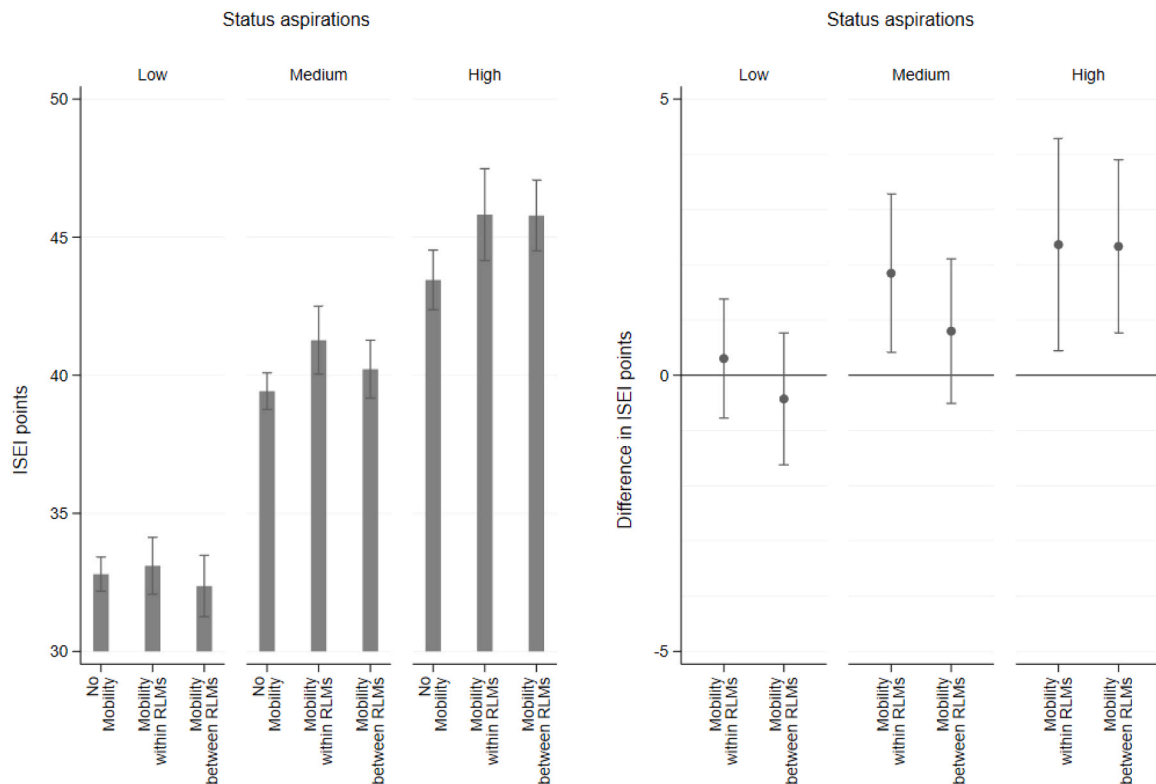


Fig. 1. Association between spatial mobility and occupational status attainment by occupational status aspirations. Note: The figure shows linear predictions of spatial mobility within and between functional regional labor markets (RLMs) with 95 % confidence intervals. Full regression results are reported in Table A3 in the appendix. Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

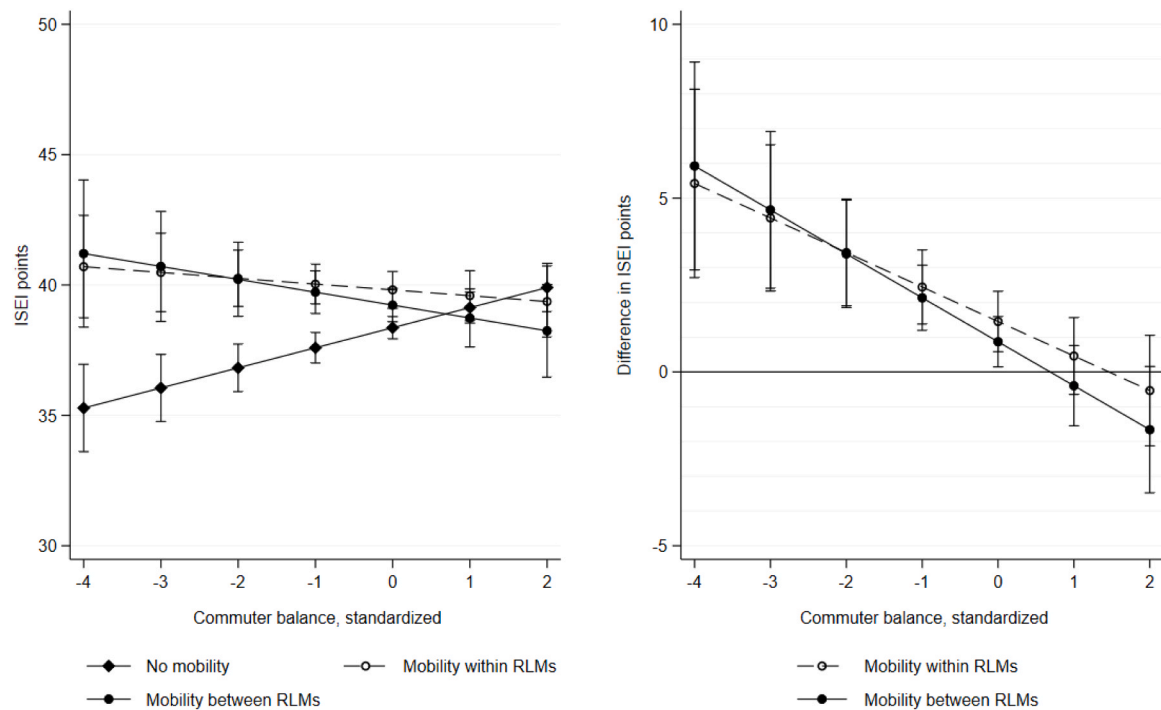


Fig. 2. Association between spatial mobility and occupational status attainment by local opportunity structure. Note: The figure shows linear predictions of spatial mobility within and between functional regional labor markets (RLMs) with 95 % confidence intervals. Negative values indicate structurally weaker districts, whereas positive values indicate structurally stronger districts. Full regression results are reported in [Table A4](#) in the appendix. Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

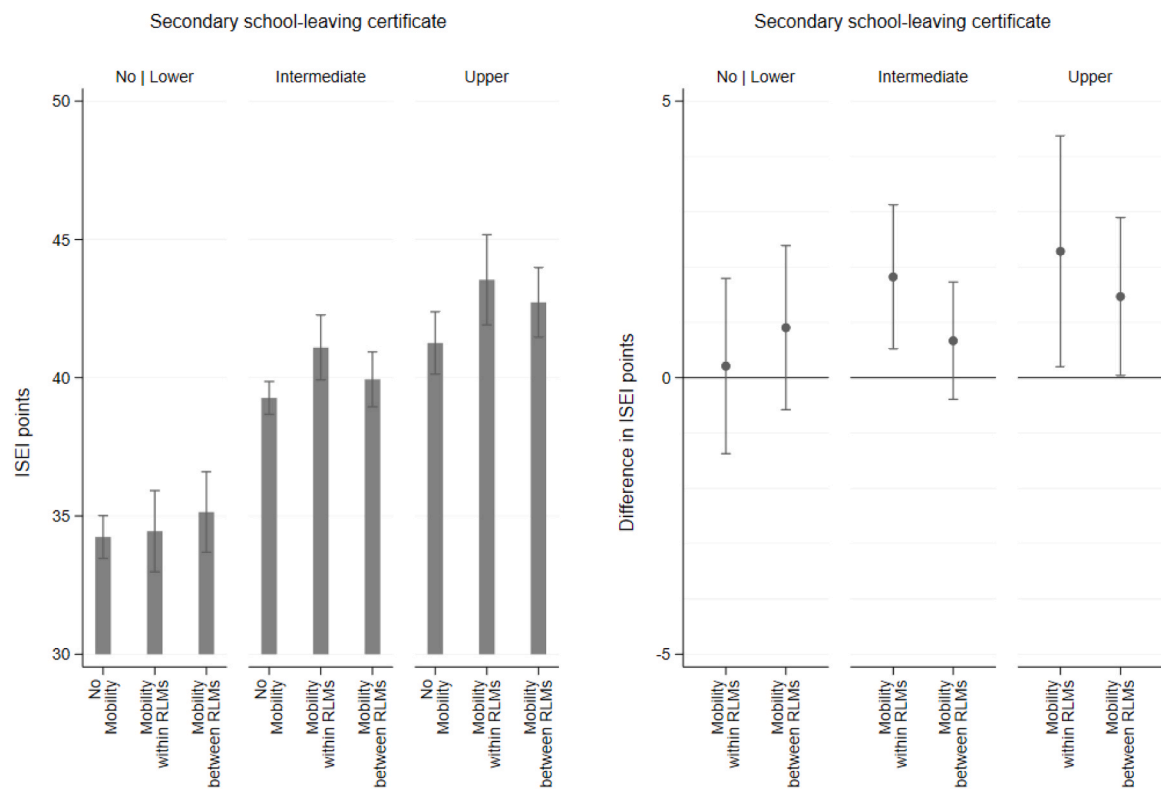


Fig. 3. Association between spatial mobility and occupational status attainment by level of schooling. Note: The figure shows linear predictions of spatial mobility within and between functional regional labor markets (RLMs) with 95 % confidence intervals. Full regression results are reported in [Table A4](#) in the appendix. Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

category (zero line) (right panel). The complete regression results are provided in [Table A4](#) in the appendix.

Like the analysis focusing on occupational status aspirations as a moderator of the relationship between spatial mobility and occupational status attainment, the left panel of Fig. 3 reveals substantial, though somewhat less pronounced differences in occupational status attainment by school-leaving certificates, reflecting institutionally defined pathways to status attainment. We observe general support for Hypothesis 4, albeit with some nuances. As the right panel shows, young people with upper secondary school-leaving certificates—the highest level of schooling—are the only educational group that attains a statistically significant higher status when being spatially mobile both within or between RLMs. For VET entrants with an intermediate secondary school-leaving certificate, this is only the case when being mobile within their RLM. The difference in ISEI points between those who were mobile within their RLM and those who were not mobile among VET entrants with an intermediate level of schooling is similar in magnitude to the difference observed among VET entrants with upper secondary school-leaving certificates. By contrast, young people with lower levels of schooling do not experience observable advantages when being spatially mobile, whether within or between RLMs, when compared to their non-mobile peers.

5.4. Robustness analyses

To confirm the robustness of our findings, we conducted several additional analyses. First, given that commuting distances and occupational opportunities differ between urban and rural areas, we examined whether the association between spatial mobility and occupational status attainment varied by these regional contexts. Table A5 in the appendix presents results from separate models for urban and rural regions, analogously to Table 2. In both types of regions, young people attain higher occupational status when being spatially mobile within their RLMs, but there is no further increase in status when being spatially mobile between RLMs. The associations are stronger for those from rural areas, likely due to a narrower range of VET opportunities in these regions. This robustness analysis is consistent with the interpretation that spatial mobility facilitates status gains in VET for young people, and this holds for both rural and urban youth in Germany.

Second, we applied an alternative, distance-based measure of spatial mobility. In this specification, spatial mobility was defined as a Euclidean distance greater than 25 km between the centroids of NUTS-3 regions. To assess the comparability of this distance-based measure with the RLM-based measure used in our primary analyses, we examined the degree of overlap between the two measures: the distance-based measure captures 34 % of VET entrants who are spatially mobile within RLMs and 92 % of those who are mobile between RLMs. This indicates that the alternative approach is more effective in capturing spatial mobility between functionally defined RLMs. The findings regarding the association between occupational status attainment and spatial mobility based on the distance-based definition of mobility are consistent with the results obtained using the primary definition of mobility between RLMs. VET entrants who are spatially mobile according to this alternative definition show an average increase of 1 point on the ISEI scale compared to immobile VET entrants (see Table A6).

Finally, to strengthen the claim that regional conditions moderate the relationship between spatial mobility and occupational status attainment, we employed the average ISEI of newly signed training contracts in the home district as an alternative measure of the local opportunity structure. While this indicator aligns more closely with our dependent variable, it is limited to dual apprenticeship programs and does not capture the training opportunities available in school-based programs. The correlation between the commuter balance and the average ISEI of new training contracts at the district level is 0.58. Using the alternative measure of the local opportunity structure, the results remain robust; however, the associations are less pronounced. Notably, only the interaction term between the average regional ISEI of newly signed training contracts and spatial mobility between RLMs is

statistically significant at the 5 % level, while the interaction term between this measure and spatial mobility within RLMs does not reach this level of significance (see Table A7).

6. Discussion and limitations

This study aimed to provide new insights into the relationship between spatial mobility and occupational status attainment during the transition from school to work. Using rich German longitudinal data from the NEPS, combined with fine-grained regional information, we demonstrated that spatial mobility is positively associated with higher occupational status attainment already at the early transition from school to the first fully qualifying VET position among German secondary school graduates, aligning with previous research indicating that spatial mobility can be a beneficial job search strategy (see Section 3.2).

Building on the socio-ecological developmental concept of individual agency and the notion of life-course canalization (Heckhausen & Buchmann, 2019; Schoon & Heckhausen, 2019), we showed that spatial mobility and occupational status aspirations, as two expressions of agency, were separately as well as jointly associated with higher occupational status among young VET entrants (Hypotheses 1 and 2). The higher the occupational status aspiration, the stronger the association between spatial mobility and occupational status attainment in the first VET position appeared to be.

Both types of spatial mobility that we considered—within and between functional regional labor markets (RLMs)—appeared equally associated with higher occupational status attainment in the first VET position. This suggests that, on average, functional RLMs offer sufficient training opportunities, reducing the need for mobility beyond these regions. This conclusion is supported by findings from Hoffmann and Wicht (2023) showing that the local availability of occupations matching one's occupational aspirations predicts mobility within but not between RLMs. Nonetheless, spatial mobility between RLMs might be relevant for young people pursuing highly specialized, geographically concentrated occupations, regardless of occupational status.

Moreover, we showed that structural opportunities and constraints—manifested in the conditions of the local labor market and in institutionally canalized pathways related to young people's level of schooling—moderate the relationship between spatial mobility and occupational status attainment. As expected, spatial mobility appears more positively related to occupational status attainment for young people originating from structurally weak home districts (Hypothesis 3). This finding supports the idea of 'escalator regions' (Détang-Dessendré & Molho, 1999; Fielding, 1992). These types of regions not only offer ample training opportunities but also higher-status positions, attracting VET seekers from structurally weaker regions. It also aligns with literature indicating that specific high-status occupations, such as those in STEM fields (Jost et al., 2019), are geographically concentrated, making spatial mobility necessary (Hoffmann & Wicht, 2023; Kleinert et al., 2018).

Regarding differences between educational groups, we tested whether the positive association between spatial mobility and occupational status attainment increases with the level of schooling (Hypothesis 4). Our findings reveal that spatial mobility is not associated with a higher-status VET position for young people with no or only lower secondary school-leaving certificates. However, it appears to be associated with significantly higher-status VET positions for those with intermediate and upper secondary school-leaving certificates. This finding is consistent with extensive research on selective spatial mobility (Granato et al., 2015; Kanbur & Rapoport, 2005; Lemistre & Magrini, 2011), which suggests that spatial mobility pays off only for those with higher educational qualifications. Particularly in Germany's highly stratified education system (Protsch & Solga, 2016), those with higher qualifications are better able to take advantage of the opportunities offered by spatial mobility, leading to greater status gains.

While we have taken extensive measures to ensure the robustness of

our findings, certain limitations of our research design should be acknowledged. First, it is essential to note that, although opportunities to improve occupational status through spatial mobility remain limited for young people with lower levels of schooling, they may still choose this strategy to expand their training opportunities. By broadening their search radius, they might improve their chances of securing any VET position, even if this does not lead to substantial status gains. More generally, our study focused on how spatial mobility relates to occupational status attainment, an outcome that can have decisive cumulative implications for future labor market prospects, including long-term monetary returns. However, young people may choose to become spatially mobile for multiple reasons beyond occupational status, such as employment stability after VET, career advancement opportunities, or access to further training. These outcomes were not covered in our analyses as potential benefits of spatial mobility and represent important avenues for future research.

Second, spatial mobility is a non-random, self-selected choice, and unobserved characteristics may influence both the decision to become mobile and subsequent occupational outcomes. While we controlled for a rich set of individual, educational, and regional characteristics—including occupational aspirations measured prior to the transition into VET—, this approach can only mitigate, not eliminate, concerns about unobserved confounding factors. However, the structure of our data and our focus on the very first labor market-related transition after leaving school do not permit credible causal identification strategies such as difference-in-differences or instrumental-variable models, as the required conditions (e.g., exogenous intervention, repeated pre- and post-treatment outcome measures, or valid instruments) are not met. Our findings should thus be interpreted as conditional associations rather than causal effects.

A third limitation concerns our operationalization of spatial mobility, which encompasses both commuting and relocation. We cannot distinguish between these two forms of spatial mobility empirically in our data. However, we consider this a minor limitation, as both commuting and relocation are positively associated with monetary outcomes and career opportunities, and our focus lies on mobility across labor market boundaries rather than residential change per se.

A related fourth limitation concerns possible border effects, which might produce some unsystematic noise in our results (Coughling & Novy, 2021). Young people living close to the border of their district might start a VET program in a neighboring district, thereby being classified as spatially mobile. Yet they might be able to reach their employer or vocational school in just a few minutes. While such situations are rarely avoidable in spatial research, we consider these imprecisions acceptable for our study, as we do not expect any systematic bias arising from them.

Finally, although our analyses considered heterogeneity by regional context and level of schooling, we do not explicitly address intersectional dimensions that are likely to shape both spatial mobility decisions and labor market outcomes through complex and interacting mechanisms. Prior research indicates that associations between spatial mobility, regional context, and labor market outcomes vary across social groups, including gender as well as socioeconomic and migration background (Detemple, 2025; Hartung et al., 2022; Hickmann et al., 2025; Kubitzka & Weßling, 2025). A comprehensive treatment of these processes is beyond the scope of the current study, but represents an important direction for future research.

7. Conclusion

Making a successful transition from school to work is crucial for labor market placement at both early and later stages of the life course (Schoon & Heckhausen, 2019). In all industrialized countries, education systems sort and allocate young people into stratified positions within the labor market (Kerckhoff, 2001). Additionally, regional disparities are further stratifying factors within countries. Our study on

school-to-VET transitions in Germany emphasizes that young people's occupational choices are shaped by the social-cultural contexts in which they are embedded. Spatial mobility—as an expression of young people's agency—is associated with higher occupational status attainment and, thus, helps to mitigate the lack of opportunities in young people's home districts. The complex interplay between spatial mobility and structural opportunities and constraints contributes to the accumulation and manifestation of inequalities in status attainment at labor market entry.

Specifically, our findings suggest that spatial mobility benefits young people from structurally weak districts and those with higher levels of schooling. This has far-reaching implications for social inequalities. First, young people facing limited local opportunities can potentially overcome disadvantages through spatial mobility. Second, although young people with higher levels of schooling are already privileged in status attainment, spatial mobility tends to widen the gap between them and those with lower levels of schooling. The fact that spatial mobility does not expand occupational options for individuals with no or lower secondary school-leaving certificates shows that institutionally created hurdles based on educational credentials are challenging to overcome.

These findings have important implications for policy and practice. Spatial mobility does not enhance occupational prospects for individuals with lower school-leaving certificates, despite their investment in commuting or relocation. Thus, reducing institutional hurdles based on educational credentials, which canalize opportunities for advancement, appears essential. Furthermore, policies should support spatial mobility for young people from structurally weak districts, as it can help to reduce regional inequalities in status attainment. Such policies may include improving access to financial resources, transportation, and housing to provide the necessary infrastructure for spatial mobility. As recruiting young people for VET positions has become increasingly difficult in recent years in Germany (DIHK, 2024), employers in dual apprenticeship programs and governmental authorities organizing school-based programs might become more and more inclined to support such measures.

At the same time, policies that promote spatial mobility should also be considered from a broader structural perspective. The selective out-migration of young people—often described as internal brain drain—substantially reshapes population distributions and reinforces demographic imbalances between regions (Stawarz & Sander, 2020). By disproportionately reallocating VET seekers from structurally weak regions, such mobility may weaken these regions' long-term economic and social development, while simultaneously generating brain gain in economically stronger destination regions (Etzo et al., 2025). Moreover, origin regions may lose applicants for existing VET positions, while competition intensifies in destination regions, potentially constraining opportunities for local youth (Herzer & Ulrich, 2020). Recognizing these structural implications enables a more balanced assessment of spatial mobility, acknowledging both its opportunity-enhancing potential for the individual VET seeker and its possible unintended consequences at the regional level.

CRedit authorship contribution statement

Alexandra Wicht: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Paula Protsch:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Laura Menze:** Writing – review & editing, Methodology, Conceptualization. **Katarina Weßling:** Writing – review & editing, Methodology, Conceptualization.

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training in a spatial context” and “Regional (infra-)structure and processes of occupational segmentation in vocational education and training,” based at the Federal Institute for Vocational Education and Training (BIBB). The work of the research groups is funded by the German Federal Ministry for Education, Family Affairs, Senior Citizens, Women, and Youth (BMBFSFJ).

Appendix

Table A1

Spatial mobility by occupational status aspirations, commuter balance and level of schooling, column percentages

	Occupational status aspirations (terciles)			Commuter balance (terciles)			Secondary school-leaving certificate		
	Low	Medium	High	Low	Medium	High	No/Lower	Intermediate	Upper
Spatial mobility									
No	67.87	61.57	52.86	50.59	65.21	70.04	69.73	64.40	47.87
Within RLMs	14.45	16.51	19.44	22.85	13.00	13.36	14.61	16.87	17.52
Between RLMs	17.68	21.92	27.69	26.56	21.79	16.61	15.66	18.73	34.60
N	1612	1738	1466	1943	1946	1939	1533	2899	1364

Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

Table A2

Association between spatial mobility and occupational status attainment among VET entrants, full regression results

Dependent variable: occupational status attainment in first fully qualifying VET position (ISEI-08)				
	Without controls		With controls	
	B	S.E.	B	S.E.
Spatial mobility, ref. no				
Within RLMs	3.19***	[0.53]	1.53***	[0.44]
Between RLMs	3.40***	[0.45]	0.94*	[0.36]
Occupational status aspirations (ISEI-08), std.			4.19***	[0.22]
Commuter balance, std.			0.27	[0.17]
Secondary school-leaving certificate, ref. upper				
Intermediate			−2.31***	[0.54]
No/Lower			−7.54***	[0.64]
Highest parental occupational status (ISEI-08), std.			0.55***	[0.16]
Gender, ref. male			5.30***	[0.40]
Migration background, ref. none			−0.48	[0.40]
Reasoning, std.			0.25	[0.18]
Global self-esteem, std.			0.21	[0.16]
Legal age, ref. underage			0.34	[0.40]
Search duration, ref. VET position in first year after general schooling			−0.24	[0.41]
Large areas of Germany, ref. South				
Central			0.33	[0.35]
North			−0.86	[0.49]
East			−1.48*	[0.60]
Constant	37.61***	[0.29]	39.40***	[0.63]
Largest FMI	0.02		0.19	
Average RVI	0.01		0.09	

Notes: Generalized linear regression models; Cluster robust S.E.; N(RLM) 137, N(districts) 350, N(persons) 5828; 50 imputations. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

Table A3

Association between spatial mobility and occupational status attainment by occupational status aspirations, full regression results

Dependent variable: occupational status attainment in first fully qualifying VET position (ISEI-08)		
	B	S.E.
Spatial mobility, ref. no		
Within RLMs	0.30	[0.54]
Between RLMs	−0.43	[0.60]
Occupational status aspirations (ISEI-08, terciles), ref. low		
Medium	6.62***	[0.47]

(continued on next page)

Table A3 (continued)

Dependent variable: occupational status attainment in first fully qualifying VET position (ISEI-08)		
High	10.65***	[0.66]
Commuter balance, std.	0.30	[0.15]
Secondary school-leaving certificate, ref. upper		
Intermediate	-2.31***	[0.53]
No/Lower	-7.26***	[0.64]
Moderator: Occupational status aspirations (ISEI-08, terciles), ref. low		
Within RLMs × medium	1.54	[0.87]
Between RLMs × medium	1.23	[0.96]
Within RLMs × high	2.06	[1.09]
Between RLMs × high	2.76**	[0.98]
Highest parental occupational status (ISEI-08), std.	0.57***	[0.16]
Gender, ref. male	4.96***	[0.39]
Migration background, ref. none	-0.41	[0.41]
Reasoning, std.	0.24	[0.18]
Global self-esteem, std.	0.20	[0.15]
Legal age, ref. underage	0.38	[0.40]
Search duration, ref. VET position in first year after general schooling	-0.26	[0.40]
Large areas of Germany, ref. South		
Central	0.40	[0.35]
North	-0.70	[0.47]
East	-1.45*	[0.57]
Constant	33.77***	[0.67]
Largest FMI	0.21	
Average RVI	0.13	

Notes: Generalized linear regression models; Cluster robust S.E.; N(RLM) 137, N(districts) 350, N(persons) 5828; 50 imputations.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

Table A4

Association between spatial mobility and occupational status attainment by local opportunity structure and level of schooling, full regression results

Dependent variable: occupational status attainment in first fully qualifying VET position (ISEI-08)				
	Commuter balance		Secondary school-leaving certificate	
	B	S.E.	B	S.E.
Spatial mobility, ref. no				
Within RLMs	1.45**	[0.44]	2.28*	[1.06]
Between RLMs	0.87*	[0.37]	1.47*	[0.72]
Occupational status aspirations (ISEI-08), std.	4.18***	[0.22]	4.18***	[0.22]
Commuter balance, std.	-7.55***	[0.64]	-7.02***	[0.77]
Secondary school-leaving certificate, ref. upper	0.77***	[0.21]	0.26	[0.17]
Intermediate				
No/Lower	-2.31***	[0.54]	-1.98**	[0.65]
Moderator: commuter balance				
Within RLMs × commuter balance, std.	-0.99**	[0.33]	–	–
Between RLMs × commuter balance, std.	-1.26**	[0.39]	–	–
Moderator: Secondary school-leaving certificate, ref. upper				
Within RLMs × intermediate	–	–	-0.46	[1.32]
Between RLMs × intermediate	–	–	-0.80	[0.89]
Within RLMs × no/lower	–	–	-2.07	[1.35]
Between RLMs × no/lower	–	–	-0.56	[1.03]
Highest parental occupational status (ISEI-08), std.	0.55***	[0.16]	0.55***	[0.16]
Gender, ref. male	5.28***	[0.40]	5.30***	[0.40]
Migration background, ref. none	-0.54	[0.41]	-0.48	[0.41]
Reasoning, std.	0.27	[0.18]	0.25	[0.18]
Global self-esteem, std.	0.20	[0.16]	0.21	[0.16]
Legal age, ref. underage	0.38	[0.40]	0.36	[0.40]
Search duration, ref. VET position in first year after general schooling	-0.26	[0.41]	-0.24	[0.41]
Large areas of Germany, ref. South				
Central	0.29	[0.35]	0.31	[0.35]
North	-0.91	[0.48]	-0.87	[0.49]
East	-1.52*	[0.58]	-1.49*	[0.60]
Constant	39.37***	[0.62]	39.07***	[0.71]
Largest FMI	0.20		0.20	
Average RVI	0.09		0.09	

Notes: Generalized linear regression models; Cluster robust S.E.; N(RLM) 137, N(districts) 350, N(persons) 5828; 50 imputations. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

Table A5

Association between spatial mobility and occupational status attainment among VET entrants, separately for urban and rural regions

Dependent variable: occupational status attainment in first fully qualifying VET position (ISEI-08)				
	Urban		Rural	
	<i>B</i>	S.E.	<i>B</i>	S.E.
Spatial mobility, ref. no				
Within RLMs	1.15*	[0.58]	2.19**	[0.67]
Between RLMs	0.70	[0.46]	1.19*	[0.57]
Occupational status aspirations (ISEI-08), std.	3.90***	[0.29]	4.70***	[0.34]
Commuter balance, std.	0.39	[0.20]	-0.04	[0.30]
Secondary school-leaving certificate, ref. upper				
Intermediate	-2.85***	[0.65]	-1.30	[0.98]
No/Lower	-8.46***	[0.81]	-6.13***	[1.08]
Highest parental occupational status (ISEI-08), std.	0.55*	[0.21]	0.55*	[0.27]
Gender, ref. male	5.12***	[0.53]	5.50***	[0.60]
Migration background, ref. none	-0.38	[0.51]	-0.58	[0.61]
Reasoning, std.	0.26	[0.25]	0.25	[0.26]
Global self-esteem, std.	0.04	[0.20]	0.47	[0.25]
Legal age, ref. underage	-0.01	[0.47]	0.95	[0.66]
Search duration, ref. VET position in first year after general schooling	-0.18	[0.47]	-0.27	[0.73]
Large areas of Germany, ref. South				
Central	0.79	[0.48]	-1.07	[0.78]
North	-0.18	[0.67]	-1.79*	[0.73]
East	-0.68	[1.19]	-2.46***	[0.69]
Constant	39.83***	[0.86]	38.66***	[1.07]
N	3574		2254	
Largest FMI	0.20		0.17	
Average RVI	0.10		0.10	

Notes: Generalized linear regression models; Cluster robust S.E.; N(RLM) 137, N(districts) 350, N(persons) 5828; 50 imputations. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: NEPS, Starting Cohort Grade 9 (doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

Table A6

Association between spatial mobility and occupational status attainment among VET entrants, an alternative distance-based measure of spatial mobility

Dependent variable: occupational status attainment in first fully qualifying VET position (ISEI-08)		
	<i>B</i>	S.E.
Spatial mobility, ref. no mobility (up to 25 km)	0.98*	[0.39]
Occupational status aspirations (ISEI-08), std.	4.20***	[0.22]
Commuter balance, std.	0.22	[0.17]
Secondary school-leaving certificate, ref. upper		
Intermediate	-2.29***	[0.54]
No/Lower	-7.51***	[0.65]
Highest parental occupational status (ISEI-08), std.	0.56***	[0.16]
Gender, ref. male	5.32***	[0.40]
Migration background, ref. none	-0.52	[0.40]
Reasoning, std.	0.27	[0.18]
Global self-esteem, std.	0.20	[0.16]
Legal age, ref. underage	0.39	[0.40]
Search duration, ref. VET position in first year after general schooling	-0.25	[0.41]
Large areas of Germany, ref. South		
Central	0.28	[0.37]
North	-0.92	[0.49]
East	-1.57**	[0.59]
Constant	39.60***	[0.63]
Largest FMI	0.20	
Average RVI	0.09	

Notes: Generalized linear regression models; Cluster robust S.E.; N(RLM) 137, N(districts) 349, N(persons) 5828; 50 imputations.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: NEPS, Starting Cohort Grade 9

(doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.

Table A7

Association between spatial mobility and occupational status attainment by local opportunity structure, an alternative measure using the regional average ISEI of new training contracts

Dependent variable: occupational status attainment in first fully qualifying VET position (ISEI-08)		
	<i>B</i>	S.E.
Spatial mobility, ref. no		
Within RLMs	1.48***	[0.44]
Between RLMs	0.85*	[0.38]
Occupational status aspirations (ISEI-08), std.	4.17***	[0.22]
Regional average ISEI of new training contracts, std.	0.66*	[0.26]
Secondary school-leaving certificate, ref. upper		
Intermediate	-2.34***	[0.54]
No/Lower	-7.60***	[0.64]
Moderator: regional average ISEI of new training contracts		
Within RLMs × regional average ISEI of new training contracts, std.	-0.58	[0.42]
Between RLMs × regional average ISEI of new training contracts, std.	-0.88*	[0.44]
Highest parental occupational status (ISEI-08), std.	0.53**	[0.16]
Gender, ref. male	5.27***	[0.41]
Migration background, ref. none	-0.57	[0.40]
Reasoning, std.	0.27	[0.18]
Global self-esteem, std.	0.20	[0.16]
Legal age, ref. underage	0.32	[0.40]
Search duration, ref. VET position in first year after general schooling	-0.25	[0.41]
Large areas of Germany, ref. South		
Central	0.24	[0.35]
North	-0.77	[0.47]
East	-1.23	[0.63]
Constant	39.44***	[0.63]
Largest FMI	0.20	
Average RVI	0.09	

Notes: Generalized linear regression models; Cluster robust S.E.; N(RLM) 137, N(districts) 350 N(persons) 5828; 50 imputations.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: NEPS, Starting Cohort Grade 9

(doi:10.5157/NEPS:SC4:14.0.0); authors' calculations.



Figure A1. Delineation of functional regional labor markets (RLMs) and administrative districts (NUTS-3). Note: Black lines indicate RLM boundaries, while grey lines denote administrative districts. © GeoBasis-DE/BKG, 2025

Data availability

The individual-level data required to replicate the above findings are available as a scientific use file from the Research Data Centre of the Leibniz Institute for Educational Trajectories (LifBi) (doi:10.5157/NEPS:SC4:14.0.0). Additionally, the regional data on commuter balance is publicly available in the Indicators and Maps of Spatial and Urban Development (INKAR, Edition 2022), published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) (<https://www.inkar.de>). Data on the regional average ISEI of new training contracts are publicly accessible through the “DAZUBI” repository of the Federal Institute for Vocational Education and Training (<https://www.bibb.de/de/1866.php>).

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