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»Should I Stay or Should I Go?« Prevalence and Predictors of Spatial Mobility among Youth in the Transition to Vocational Education and Training in Germany

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Abstract: Spatial mobility is an important means of tackling regional disparities and matching problems in education and labor markets, but it is also a source of individual social inequality as it is associated with higher socio-economic resources and returns; however, there is a paucity of research on the prevalence and predictors of spatial mobility among youth entering vocational education and training (VET). We examine the importance of (a) individual occupational orientations, (b) regional opportunity structures, and (c) social ties for the spatial mobility of youth in this early transition phase using longitudinal data from the German NEPS, which we combined with administrative geospatial data of German districts (NUTS-3). Our results show widespread spatial mobility among students entering the VET system: 16% are mobile within and 22% between regional labor markets. Multinomial logistic regression models show that, in addition to young people's occupational orientations (status aspirations; search duration) and social ties to friends, regional opportunity structures (general unattractiveness; person–environment mismatch) are crucial for youths' spatial mobility. This underscores the importance of spatial mobility given regional disparities to promote youths' access to VET and reduce regional mismatches in the VET market.

Keywords: regional disparities; spatial mobility; school-to-VET transitions; occupational orientations; geospatial data

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1. Introduction

Especially in countries such as Germany with a strong linkage between education and work, the transition from school to vocational education and training (VET) is crucial as it sets the course for youths' social positioning in the labor market and later life course (Allmendinger 1989; Konietzka 2002; Schoon 2021); however, the situation in the German training and labor market is characterized by strong regional disparities, which affect young people's chances of making a successful transition to VET and the ability of companies to meet their demand for skilled workers (Blossfeld 2017; Eberhard et al. 2018; Hillmert et al. 2017). Different regions face, to varying degrees, the problem of ensuring the supply of suitable training places for young people while filling vacant training places, which indicates a mismatch between regional supply and demand (Granato et al. 2018; Jost et al. 2019; Matthes et al. 2014).

Youths' spatial mobility is an important means of solving such regional disparities (Bogai et al. 2008; Herzer and Ulrich 2020; Matthes and Ulrich 2018). If students who cannot find a suitable training position in their home region are able or willing to start their VET in other regions, this can mitigate regional disparities and help young people make a successful transition into VET. In addition, mobility decisions are particularly important for young people who are about to enter the training or labor market, as they can have far-reaching consequences for their later career path, including occupational attainment,

and income, as well as general life satisfaction (Ganesch et al. 2019; Stawarz et al. 2022; Waibel 2019). Therefore, practitioners and policymakers need to gain insights into the drivers and barriers of spatial mobility to develop appropriate policies to regulate the VET market and reduce social inequalities in youths' transitions from school to VET.

Despite the crucial role that spatial mobility plays in successful transitions to VET, there is little research on its prevalence and antecedents, especially for the German context (for exceptions, see Eberhard et al. (2006) and Waibel (2019) or Magrini and Lemistre (2013) based on French data). Some aggregate data analyses for Germany show substantial region-specific spatial mobility patterns among VET students (Bogai et al. 2008; Herzer and Ulrich 2020; Jost et al. 2019); however, these studies lack the necessary foundation of individual-level data to analyze the determinants and mechanisms that guide young people's mobility decisions. Most national and international primary economic studies on spatial mobility using individual-level data look at the entire labor force or workforce and examine the reproduction of social inequalities manifested at the regional level through selective mobility focusing on common socio-economic factors and broad regional indicators (Détang-Dessendre et al. 2004; Granato et al. 2015; Lemistre and Magrini 2011; Reichelt and Abraham 2017; Windzio 2008).

This study investigates the prevalence and predictors of young people's spatial mobility during the transition from school to VET (including firm-based and school-based training) in Germany using representative longitudinal data from the National Educational Panel Study (Blossfeld and Roßbach 2019; NEPS Network 2021) combined with small-scale administrative geospatial data. We integrate general theories and previous evidence on the predictors of spatial mobility and migration in general to examine the case of spatial mobility of young people entering the VET market in Germany. We consider multiple indicators at different levels, including (a) individual occupational orientations, (b) refined measures of regional opportunity structures, and (c) social ties. In this way, our study provides a nuanced picture of which factors push young people starting VET to become spatially mobile and which bind them to their home regions.

2. Previous Research and Theorizing

Prevailing research explaining spatial mobility originates from neoclassical rational choice theory (RCT), which views job- or training-related mobility primarily as an economic cost–benefit decision and emphasizes monetary costs (e.g., moving costs) and benefits (e.g., higher earnings) that depend on socio-economic factors, such as financial resources or educational qualifications (Czaika 2015; Massey et al. 1993; Stark 1991).

Sociology has advanced such narrow approaches by also considering subjective orientations, non-monetary costs and benefits, and bridging individual decisions and actions at the microlevel with the socio-structural context at the macrolevel (Evans 2007; Kaufmann et al. 2004; Kroneberg and Kalter 2012). According to the theory of subjective expected utility (Esser 1999; Savage 1954), individuals decide to stay or move when their subjective expected utility can be maximized based on subjective evaluations, including monetary and non-monetary benefits and costs and expected probabilities of success, in accordance with individual orientations and the given opportunity structure (for applications, see: Cadwallader 1989; Kalter 1997; Sjaastad 1962; Windzio 2008).

The agency–structure debate (Evans 2002; Schoon and Heckhausen 2019; Shanahan 2000), prominent in the field of life course research, offers a similar perspective by arguing that the transition from school to VET depends on both the agency of individuals and the structural constraints they face. This perspective is reflected in the concept of motility (Kaufmann et al. 2004), which considers spatial mobility as a resource or potential that hinges on individuals' orientations, social ties, and structural opportunities and constraints. Both theoretical strands equally highlight the importance of *push factors*, such as individual orientations and regional opportunity structures as well as social *binding factors* for spatial mobility.

2.1. Push Factors of Spatial Mobility

2.1.1. Individual Occupational Orientations

Plenty of studies highlight monetary cost–benefit tradeoffs as a main driver of spatial mobility and show a positive relationship between job qualifications, monetary returns, and job search duration with spatial mobility (Détang-Dessendre and Molho 1999; Lemistre and Magrini 2011; Lemistre and Moreau 2009; Reichelt and Abraham 2017; Windzio 2004). Theoretically, individuals are more likely to become spatially mobile for their training or job if higher monetary benefits can be expected; moreover, for individuals without current employment, a longer job search duration is associated with opportunity costs, e.g., in the form of lost income or a threat of negative signaling (Barron 1975; Lippmann and McCall 1976).

While the general SEU model advocates that a range of different goals and preferences are decisive, especially for young people, job-related reasons are a key determinant for spatial mobility (Haldimann et al. 2021; Kalter 1997; Kaufmann et al. 2018; Lemistre and Magrini 2011). The frame selection model (Esser 1990) states that individuals do not consider an arbitrary number of attributes when evaluating alternative actions, but focus their decisions on primary goals based on their situational dominance. Following life-cycle models widely used in migration research (Chen and Rosenthal 2008; Détang-Dessendre et al. 2008; Wagner 1989) as well as the motility framework (Kaufmann et al. 2004), it can be assumed that for young people in transition from school to VET, their mobility decisions are primarily guided by their occupational orientations. As studies have shown that mobility can be seen as an instrumental decision (Haldimann et al. 2021; Kaufmann et al. 2004; Schlimbach et al. 2018; Waibel 2019), youths' occupational orientations constitute agentic push factors of becoming spatially mobile. Youths that aspire to occupations entailing a higher socio-economic status, such as IT specialists, industrial mechanics, or medical assistants, can expect higher benefits, e.g., in terms of monetary returns and social status, and thus have a higher motivation to achieve their aspired goals. As spatial mobility can function as an agentic choice to attain their aspirations, youths with higher status aspirations should be more likely to become spatially mobile for their VET. Similarly, youths with long search durations are faced with costs, such as lost income and increased difficulty finding a suitable training position. To circumvent these problems and increase the probability of a successful transition, they should be motivated to expand their search radius and also seek VET positions for which they have to become spatially mobile.

2.1.2. Regional Opportunity Structures

Because mobility decisions are decisions about places, refined SEU models emphasize the importance of spatial characteristics. Most notably, the push–pull paradigm (Lee 1966) and the concept of place utility (Wolpert 1965) assume that individuals' decisions to become spatially mobile are based on evaluations of regional characteristics. These regional characteristics can include various factors such as the economic or labor market situation, and also infrastructure and recreational opportunities that characterize the overall utility or attractiveness as a place to live, work, or study. For regions with a lower place utility, the unfavorable regional characteristics act as push factors increasing the likelihood of individuals to become spatially mobile into regions that are more attractive. The general idea that limited regional opportunity structures push individuals away is supported by many empirical studies using various regional indicators, which all show that spatial mobility flows from less favorable regions towards more favorable "escalator regions" (Bernard et al. 2023; Cadwallader 1989; Détang-Dessendre and Gaigné 2009; Fielding 1992; Kaufmann et al. 2018; Lemistre and Magrini 2011; Reichelt and Abraham 2017; Windzio 2008). Also in the context of young people's transition from school to VET, studies mostly based on aggregate data show that unfavorable regional conditions increase spatial mobility (Beicht and Eberhard 2009; Bogai et al. 2008; Herzer and Ulrich 2020; Jost et al. 2019); however, these studies tend to use broad measures of the regional structure and lack micro-founded explanations that consider youths' occupational orientations.

Still, place utility is not an objective measure but rather is based on subjective evaluations that depend on individual aspirations and corresponding probabilities of success given regional opportunities and constraints. Incorporating a social psychological perspective, Wolpert (1965) explains the underlying adaptation process: individuals consider alternative locations if the utility of the place of origin does not match their aspiration level and become spatially mobile if their aspirations are not or less likely achievable in their home region. Hence, youths from regions with a limited supply of suitable training positions matching their individual occupational orientations, e.g., youths from rural regions aspiring for a position in the event industry, should be more likely to become spatially mobile to evade their limited regional opportunities and find a suitable training position in regions that meet their aspirations.

In the same vein, person–environment fit theories (Edwards et al. 2002; Holland 1997) emphasize the importance of fit between individual characteristics (goals, interests, abilities) and environment characteristics (context, opportunities, offerings) for career choice, and assume that individuals search for a suitable environment that meets their needs. The resulting assumption that a mismatch between young people's aspired field of work and available regional opportunities increases spatial mobility is underscored by studies showing that students seeking an apprenticeship in Germany report the unavailability of their desired occupation in their home region as a main reason for their spatial mobility (Ulrich et al. 2006; Wolf et al. 2004). Furthermore, aggregate data analysis showed occupation-specific mobility patterns of VET students (Jost et al. 2019; Ulrich et al. 2006). This indicates that not only the regional training market situation in general but also uneven region-specific distributions of certain occupations that are particularly desirable are decisive structural push factors for spatial mobility.

2.2. Binding Factors of Spatial Mobility

While individual occupational orientations and unfavorable regional opportunity structures should increase spatial mobility as push factors, complementary theoretical approaches emphasize the importance of binding factors, most notably social ties, as barriers to spatial mobility. Migration theories stress the importance of the psychic costs of leaving familiar social networks, friends, and family members behind (Cadwallader 1989; Kalter 2000; Kaufmann et al. 2004; Mulder and Cooke 2009; Sjaastad 1962; Speare 1971). Social networks, e.g., family members they live with or friends they meet for recreational activities, are an important part of individuals' lives that are fostered by frequent contact and close proximity. As spatial mobility could weaken these social ties, they constitute important binding factors hindering the spatial mobility of individuals that are socially embedded in their home regions. In line with framing models (Esser 1990), individuals ascribing a high value to their social ties should be less likely to become spatially mobile.

Most studies that address social binding factors examine the role of partnership, marital status, and children on spatial mobility, as these studies focus on the spatial mobility of individuals in the workforce or labor force (Kaufmann et al. 2018; Lemistre and Magrini 2011; Reichelt and Abraham 2017; Rouwendal 1999; Wagner 1989; Windzio 2004); however, selected studies have also shown that, especially among adolescents, the unwillingness to leave family and friends behind leads to a lower willingness to be spatially mobile (Aaltonen 2021; Haldimann et al. 2021) and, among students seeking VET, the importance of social networks in the hometown is a major reason for not seeking a training position outside their home district (Wolf et al. 2004).

In contrast to youths' occupational orientations and regional opportunity structures as individual and structural push factors for spatial mobility, the binding role of social ties is theoretically located in terms of "structural freedom" (Haldimann et al. 2021; Rye 2011) as they can be understood as external constraints impeding mobility decisions, but also as agentic choices to stay rooted in familiar surroundings.

3. The Present Study

In the present study, we cast light on youths' spatial mobility in the transition from school to VET in Germany. We drew on recent longitudinal data from the NEPS covering school-leaving cohorts from 2011–2017 (N = 5537, 47% females, mean age 18 [SD 1.3]), merged with small-scale geospatial data. These data allow us to extend previous findings on adolescent spatial mobility by providing comprehensive regional and individual-level data with wide-ranging explanatory factors.

Our aim is twofold: First, we examine the prevalence of young people's spatial mobility within and between functional regional labor markets (RLMs; Kosfeld and Werner 2012) and compare the mean distances observed for these mobility types. Second, building on previous theorizing and research on the precursors of spatial mobility, especially among the total labor force or workforce, that mostly consider predictors at different levels separately, we examine the joint relevance of individual and structural push factors (occupational orientations and regional opportunity structures in the home district) and social binding factors. Moreover, compared to previous analyses, which often use broad measures of regional conditions, we map the regional opportunity structure comprehensively by using a measure for the regional place utility, indicating the general unattractiveness of the region, as well as a regional person–environment mismatch indicator to measure the individual opportunities for young people to realize their occupational aspirations in the region. Figure 1 gives an overview of the research design.

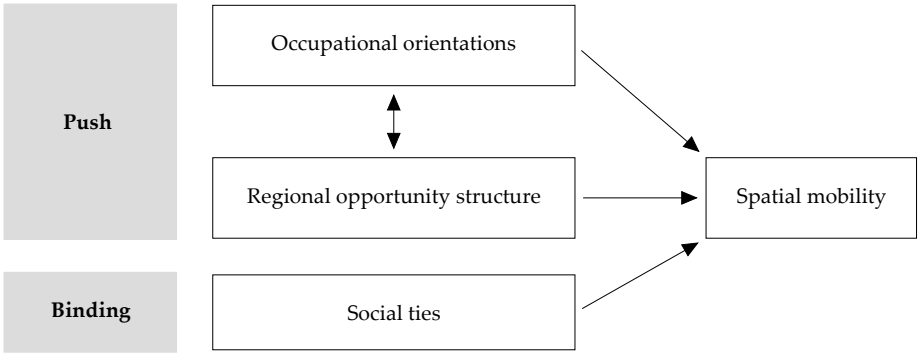

Figure 1. Graphical representation of the research design.

Regarding *occupational orientations*, we expect that youth with higher status aspirations (H1) and longer search duration (H2) are more likely to become spatially mobile. With respect to the *regional opportunity structure*, the probability of youths' spatial mobility will increase with higher general unattractiveness of the region (H3) and with higher regional person–environment mismatch (H4). In contrast to those push factors, binding factors of *social ties* are hypothesized to reduce the likelihood of becoming spatially mobile, including participation in groups or organizations (H5), higher satisfaction with family (H6), and higher satisfaction with friends (H7).

Our hypotheses relate to possible influences of predictors on spatial mobility in general. We exploratively examine whether the predictors play a role in where youth are spatially mobile, within or across RLMs. This contrasts with approaches that focus on how far spatial mobility occurs regardless of how accessible places are beyond mostly arbitrarily chosen thresholds. RLMs represent functionally closed regions that correspond to travel-to-work areas combining agglomeration centers with their hinterland based on empirically observed migration patterns and thus consider spatial infrastructures that direct mobility flows (Kosfeld and Werner 2012). Hence, our results will also be relevant for research on the delineation of such functional regions, as they promise to reveal whether and in what respects RLMs are also functionally closed for youth seeking VET.

4. Materials and Methods

4.1. Data

We used prospectively collected longitudinal data from the German NEPS, Starting Cohort Grade 9 "School and Vocational Training: Educational Pathways of Students in Grade 9 and Higher" (Blossfeld and Roßbach 2019; NEPS Network 2021), which allowed us to analyze the mobility behavior of youth in the transition from school to VET by providing regional identifiers at the small-scale district level (NUTS-3 regions) for both the place of VET and the place of school, which usually corresponds to the place of residence, and which we hence use as a proxy for place of residence. At the same time, the data contain in-depth information on young people's occupational orientations and social ties and can be merged with regional data to map regional opportunity structures.

The data comprise a large and representative sample of 14540 9th graders at German secondary schools. The first survey was administered in the classroom in ninth grade using paper-and-pencil interviewing (PAPI) in fall 2010, followed by a second survey in ninth grade in spring 2011. From tenth grade onward, subsequent surveys took place annually in the classroom using PAPI. Respondents who had left the general school system were interviewed twice a year and later annually (from wave 7) using computer-assisted telephone interviewing (CATI). We used data from wave 1 to wave 12 (i.e., 2010–2019) (NEPS 2021).

From the initial sample, we analyzed all students who started their first fully qualifying VET after leaving the general school system (N 5537). Students who started tertiary education or other educational programs were excluded. The processing time for entering VET covers a maximum of 24 months after completing general schooling. Students who started their VET after this period were excluded to ensure a comparable sample. Our sample consists of school-leaving cohorts from 2011 to 2017. Table 1 shows the descriptive statistics of all relevant variables for the analysis sample; we describe the measures in the next subsection.

Table 1. Descriptive statistics of all variables.

		Mean or %	SD	Min	Max	N
Dependent variable	Mobility					
	no mobility	61.75				3419
	within RLMs	16.40				908
	between RLMs	21.85				1210
Individual occupational orientations	Status aspirations					
	low	34.39		11.56	35.33	1610
	medium	34.77		35.70	52.72	1628
	high	30.84		53.15	88.70	1444
	Search duration					
	1st year	80.46				4455
	2nd year	19.54				1082
Regional opportunity structure	General unattractiveness					
		10.80	27.93	−65.64	148.94	5537
	Person–environment mismatch					
		−8.90	4.39	−40.11	−0.27	4655

Table 1. *Cont.*

		Mean or %	SD	Min	Max	N
Social ties	Participation in organization/group					
	yes	67.73				3572
	no	32.27				1702
	Satisfaction with family					
	low	32.32		0	7	1736
	medium	34.30		8	9	1842
	high	33.38		10	10	1793
	Satisfaction with friends					
	low	37.89		0	8	2035
	medium	25.97		9	9	1395
	high	36.14		10	10	1941
Controls	Gender					
	male	53.40				2955
	female	46.60				2579
	Immigration					
	German	78.12				4267
	immigrant	21.88				1195
	Educational qualification					
	high	24.60				1356
	medium	51.68				2849
	low	23.79				1308
	Age	18.44	1.28	14	23	5497
	Parental SES					
	low	33.81		11.74	36.92	1660
	medium	33.10		37.22	56.00	1625
	high	33.10		56.03	88.96	1625
	Region					
	South	37.37				2069
	Central	30.32				1679
	North	17.84				988
	East	14.47				801
	Residential relocation					
	yes	25.10				1262
	no	74.90				3766

4.2. Measures

4.2.1. Dependent Variable

As with any spatial analysis, which spatial delineations are used to define spatial units and the mobility between them is crucial. Following previous studies for the German context (Bogai et al. 2008; Reichelt and Abraham 2017), we drew on the established concept of RLMs (Kosfeld and Werner 2012) to operationalize the spatial mobility of youth entering VET. In contrast to purely administrative regions such as districts (NUTS-3), whose boundaries are politically and historically determined, functional RLMs represent a more accurate scope of action for job-related mobility decisions, as they consider that economic activities are concentrated in centers and attract apprentices and workers from surrounding areas (Wicht et al. 2020). The delineation of RLMs is based on the commuting patterns of the

total labor force in Germany and combines the original 401 districts into 141 labor market regions as depicted in Figure 2.

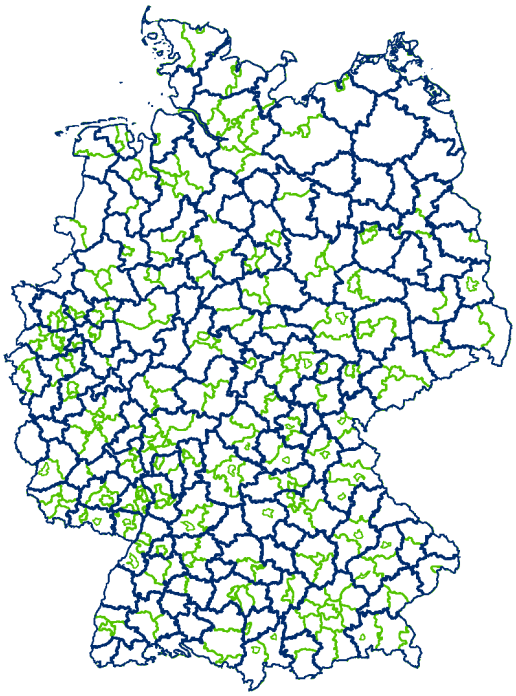

Figure 2. — German districts (NUTS-3) and — regional labor markets (RLMs).

We distinguished between spatial mobility within and between RLMs. Non-mobile youths (i.e., school leavers that entered VET in their home district) formed the reference group. While spatial mobility within RLMs is defined as entering VET in a district that differs from the home district but is in the same RLM, spatial mobility between RLMs occurs when the RLM of the home region differs from the RLM of VET. In contrast to distance approaches (e.g., Beicht and Eberhard 2009; Détang-Dessendre and Molho 1999; Lemistre and Moreau 2009) for mapping spatial mobility, which are often based on arbitrary thresholds (e.g., distances between origin and destination > 50 km), our approach considers meaningful horizons of action based on observed commuting relationships between administrative regions as based on information about the total labor force.

4.2.2. Focal Independent Variables

Individual occupational orientations. We captured young people's occupational orientations with two measures. As a first measure, *status aspirations*, the social status associated with students' realistic occupational aspirations were used. Realistic occupational aspirations (also called occupational expectations) refer to the specific occupations students expect to achieve in the future given their perceived opportunity structure, including individual resources and external constraints (Rojewski 2005). To map the social status of the aspired occupation, we used the International Socio-Economic Index from 2008 (ISEI; Ganzeboom 2010), which NEPS assigned to the occupations mentioned by students via the International Standard Classification of Occupations (International Labor Office 2012). The ISEI is an established continuous measure of occupational stratification based on information about required educational qualifications and expected incomes. The original variable was expressed in a 10–90 metric with higher values indicating higher socio-economic status. To ease interpretation, and because the relationship with spatial mobility is not linear, terciles were used, with low-status aspirations forming the reference group. We used the last measurement before youths left the general education system. As a second measure, *search duration*, we considered time spent searching for a VET position. We distinguished

between young people who found a VET position in the first year after completing general schooling (reference group) and those who started training only in the second year after completing general schooling.

Regional opportunity structure. We used two indicators to measure the structural conditions at the regional level of the home district: the general unattractiveness of a region and the regional person–environment mismatch; we used regional data from the year in which young people left general schooling. To measure *general unattractiveness*, we considered the local commuter balance as a measure of the home region's general attractiveness as a place to live, work, or train. It is based on the employment statistics of the Federal Employment Agency (BA) and is defined as the difference between the number of commuters in and out, normalized to the total labor force and multiplied by 100 (BBSR 2022). To ease interpretation, we used the inverted measurement of the commuter balance, so higher values indicate higher general unattractiveness of the region.

To map regional *person–environment mismatch* as an indicator for the individualized regional opportunity structure, we combine information on youths' individual occupational aspirations and the prevalence of corresponding occupations in their home region. Both the occupational aspirations of young people and the occupations prevalent in their home region are categorized by occupational segments based on the Classification of Occupations in Germany (KldB 2010; Paulus and Matthes 2013). Occupational segments represent an aggregation of occupations into 14 occupational groups according to occupational similarity and distinctiveness in terms of occupational tasks, skills, and knowledge at the 2-digit level of the KldB 2010, e.g., manufacturing, social and cultural services, or business-related services (Matthes et al. 2015). To map the prevalence of the occupational segments aspired to by youth in their home region, we used administrative regionalized occupational data on the share of employees in the respective occupational segment at the district (NUTS-3) level provided by the BA (BA 2022). A higher regional share of employees in the aspired occupational segment indicates a higher prevalence of the occupations aspired to by youths in their home region, and hence, a better match between person and environment. To ease interpretation, as with the general unattractiveness indicator, we use the inverted share of the aspired occupational segment in the home district, so higher values represent a lower prevalence of the aspired occupational segment, and hence, a higher regional person–environment mismatch.

Social ties. We captured the social ties of youth that can bind them to their home region using three measures. The first measure was youths' *participation in an organization or group*, such as a voluntary aid organization, sports club, or religious group. Respondents could specify multiple organizations. The variable was coded as one if youths participated in at least one of the organizations and zero if they did not participate in any organization. The second two measures were *satisfaction with family* and *satisfaction with acquaintances and friends*, both measured on a scale of ten from 1 (completely dissatisfied) to 10 (completely satisfied). Because both variables are highly left-skewed, and to facilitate interpretation, we used terciles, with low-satisfaction youth as the reference groups. In all three cases, we drew on the measurement that was temporally closest to leaving school.

4.2.3. Control Variables

Gender. We distinguished between the two majority gender groups: female and male students (reference category). No other category was given to measure gender.

Age. Age at the end of general schooling was determined using information on the date of birth and school leaving cohort.

Immigration. The variable is based on information on students' country of birth and the country of birth of students' parents (Kristen et al. 2016). Youths with a migration background comprise those who have immigrated to Germany themselves or at least one whose parents have immigrated to Germany. Youths without a migration background form the reference group.

Educational qualification. We used the highest school leaving qualification attained before entering VET, distinguishing between low (basic secondary education certificate (Hauptschulabschluss) or no school leaving certificate), medium (secondary education certificate (Mittlere Reife)), and high (university entrance certificate (Fachhochschulreife/Abitur)) educational qualifications.

Parental socio-economic status. As for occupational status aspirations, the variable was measured by the highest ISEI from 2008 (Ganzeboom 2010) associated with parents' occupation. Due to the multimodal distribution, we used terciles, with low parental socioeconomic status as the reference group.

Areas. We distinguish four large regions, combining German federal states (Frick and Goebel 2008), Central, North, East, and South as the reference category.

Relocations. We identified residential moves based on a comparison of information on the NUTS-3 region of primary or secondary residence at the end of general education with that at the beginning of VET.

4.3. Analytic Strategy

We estimated multinomial logistic regression models (Wright 1995) in Stata 17 (StataCorp 2021) to examine the role of youths' (a) individual occupational orientations, (b) regional opportunity structures, and (c) social ties for spatial mobility in the transition from school to VET, both within and between regional labor markets, compared with no mobility. We estimated average marginal effects (AME; Mood 2010) for each type of mobility as well as non-mobility. These indicate by how many percentage points the probability of both types of mobility and non-mobility will change when the predictor variable increases by one unit.

In order to account for the clustering of observations within regional labor markets, we used a Huber–White sandwich estimator to obtain cluster-robust standard errors (Williams 2000). To deal with missing values in the predictor variables, we applied multiple imputations (Little and Rubin 2002). We used sequential imputation through chained equations to create 20 data sets. The imputation model includes all variables in our analysis models. The extent of missing values can be seen in Table 1. Most cases can be attributed to item non-response, and the largest proportion of missing values is in the variable measuring occupational aspirations (about 15%). The missing values in this variable can be predicted very well in particular by educational qualification, which we control for in the imputation and analysis model.

We included gender, immigration, educational qualification, age, parental socioeconomic status, and area as control variables to rule out the possibility that differences in the estimated probabilities of mobility and non-mobility were partly due to differences in these variables. As a robustness check, we additionally estimated a model in which we include residential relocations as a covariate, as they may confound the relationship between social ties and spatial mobility. The results did not differ substantially from those presented below and can be found in Table A1 (logit coefficients) and Table A2 (average marginal effects) in Appendix A. The syntax for replicating the analyses and the regional data used is publicly accessible (Hoffmann and Wicht 2023).

5. Results

5.1. Prevalence of Spatial Mobility

Table 2 shows substantial spatial mobility among youth transitioning from school to VET; around 16% become mobile within and nearly 22% even between RLMs. Looking at the average Euclidean distances between the centers of the home and target districts (NUTS-3) for each mobility category, substantial differences could be observed: for mobility within RLMs, the mean distance is 21 km, and the maximum distance is 69 km; and for mobility between RLMs, the mean distance is 98 km, and the maximum is almost 780 km. That is, spatial mobility between RLMs entails on average longer distances than spatial mobility within RLMs.

Table 2. Distribution of spatial mobility.

Spatial Mobility	N	%	Euclidean Distance between Home and Target District (Nuts-3) in km			
			Mean	SD	Min	Max
no mobility	3419	61.75	0.00	0.00	0.00	0.00
within RLMs	908	16.40	20.90	10.75	1.64	69.33
between RLMs	1210	21.85	98.11	113.15	10.62	779.21
Total	5537	100.00	24.87	66.12	0.00	779.21

However, there is also some overlap in the possible distances between home and target districts among the spatial mobility categories, including distances ranging between 10.62 km (min between mobility) and 69.33 km (max within mobility). This may be attributed partly to so-called "border effects," i.e., youth living in districts close to the RLMs border are more likely to enter a different RLMs than those living more distant from the border.

5.2. Predictors of Spatial Mobility

Figure 3 shows the average marginal effects (AMEs) for no mobility and spatial mobility within and between RLMs regressed on the predictor variables while controlling for possible confounder variables. All continuous predictor variables are *z*-standardized to allow comparisons of the regression coefficients. Thus, the regression parameters express changes in probabilities by standard deviations for these variables. The full regression results for the models with and without control variables can be found in Table A1 (logit coefficients) and Table A2 (AMEs) in Appendix A.

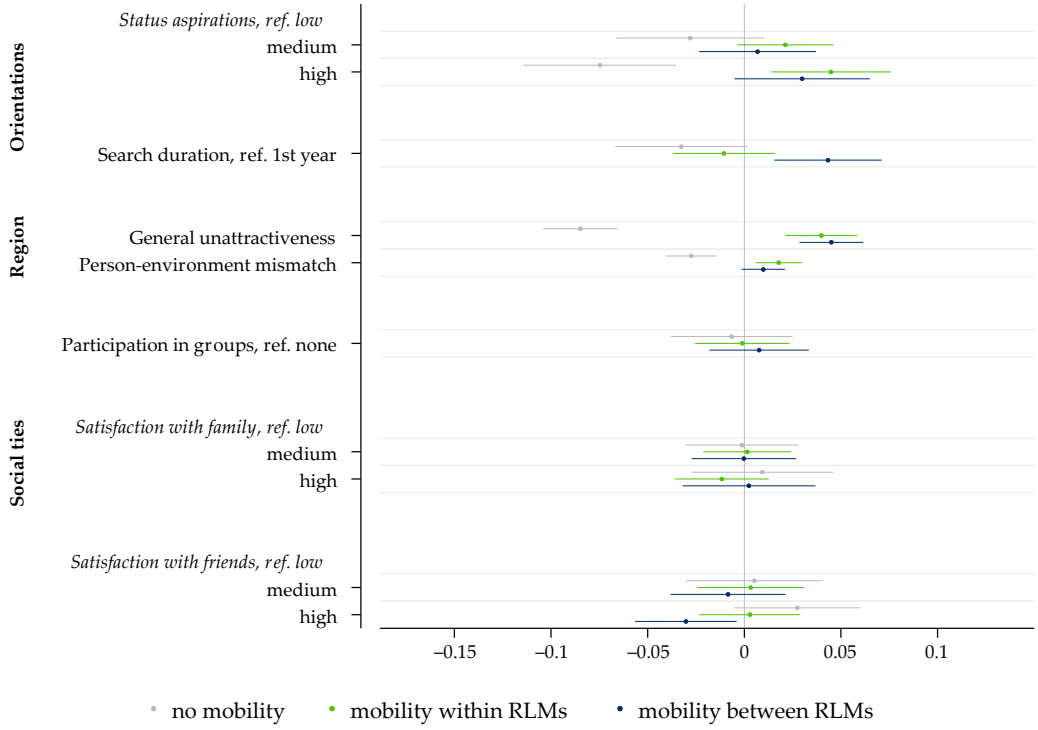

Figure 3. AMEs of spatial mobility and no mobility.

Point estimates are given with 95% confidence intervals. Continuous variables are *z*-standardized. Gender, immigration, educational qualification, age, parental socio-economic status, and area are controlled.

Individual occupational orientations. Our results show that medium status aspirations compared to low status aspirations are not associated with individuals' mobility behavior at entry into the first VET, while high status aspirations compared to low status aspirations predict spatial mobility within RLMs. For youths with high status aspirations relative to low status aspirations, the probability of not becoming spatially mobile decreases by seven percentage points, and the probability to become spatially mobile within RLMs increases by four percentage points. Therefore, the postulated push factor of *status aspirations* on spatial mobility (H1) can be partly confirmed for students with high status aspirations and mobility within RLMs. In contrast, the assumed push factor of *search duration* on spatial mobility (H2) can only be confirmed for mobility between RLMs. Young people who have been looking for a VET position for more than a year are four percentage points more likely to be mobile between RLMs than students who started their VET in the first year after leaving general schooling.

Regional opportunity structure. Regional conditions turn out to be crucial push factors for spatial mobility. The *general unattractiveness* of the home district positively predicts all mobility types (H3). An increase in the home districts' general unattractiveness by one standard deviation decreases the probability of youths starting VET in their home region by eight percentage points. Accordingly, a one-standard-deviation increase in the general unattractiveness of home districts increases the probability of spatial mobility within RLMs by four percentage points and between RLMs by five percentage points. In addition, a *person–environment mismatch* in the home district raises the likelihood of becoming mobile, but only within RLMs (H4). However, the associations are lower than for the general unattractiveness of the home regions. A one-standard-deviation increase in the person–environment mismatch variable decreases the probability of not becoming mobile by three percentage points and increases the probability of becoming mobile within RLMs by two percentage points.

Social ties. Regarding possible binding factors, our results do not support the assumption that *participation in groups or organizations* (H5) and *satisfaction with family* (H6) reduce the likelihood of becoming spatially mobile; however, we found that adolescents' *satisfaction with friends* is a relevant binding factor (H7)—but only regarding mobility between RLMs. Compared to youth with low satisfaction with their friendships, highly satisfied youth are three percentage points less likely to be spatially mobile between RLMs. We found no such relationship for medium-satisfied youth compared to low-satisfied youth.

6. Discussion

6.1. Summary of Key Findings

We illuminated the prevalence of spatial mobility among youth in the transition from school to VET in Germany and the importance of underlying push and binding factors. First, in line with previous findings based on aggregate data (Bogai et al. 2008; Herzer and Ulrich 2020; Jost et al. 2019), our results revealed a substantial amount of spatial mobility of youth in the transition to VET: 16% become spatially mobile within and 22% between RLMs. Second, the findings support the assumptions of the SEU theory (Esser 1999; Kalter 1997) and the agency–structure debate (Evans 2007), showing the joint relevance of (a) individual occupational orientations, and (b) regional opportunity structure as agentic and structural push factors, as well as (c) social ties to friends as barriers to spatial mobility.

Regarding *occupational orientations*, our results showed that youths with high status aspirations and longer search durations are more likely to become spatially mobile for their VET; however, status aspirations only concern mobility within RLMs, and longer search duration mobility between RLMs. As presumed by the motility framework (Haldimann et al. 2021; Kaufmann et al. 2004), which views spatial mobility as a resource based on individuals' agentic motivation, our results support the notion that the decision to become spatially mobile can be seen as an instrumental decision to achieve their aspired goals and a successful transition into VET. This is also in line with previous research highlighting

status aspirations to be a key driver of status attainment (Nießen et al. 2022; Schoon and Parsons 2002).

Concerning *regional opportunity structures*, we complement previous research (Bogai et al. 2008; Cadwallader 1989; Herzer and Ulrich 2020; Lemistre and Magrini 2011; Windzio 2008) that used rather broad measures to capture the importance of regional characteristics for spatial mobility. Both general unattractiveness and person–environment mismatch turned out to be crucial predictors of spatial mobility, but in terms of effect sizes, associations are stronger for the general unattractiveness indicator, and person–environment mismatch only matters for mobility within RLMs. The fact that higher general unattractiveness of the home region pushes young people to become spatially mobile underscores the theoretical concept of place utility (Wolpert 1965) and the push–pull paradigm (Lee 1966). Furthermore, the fact that the mismatch between individuals' occupational aspirations and their regional availability is an important push factor, too, underlines the results of aggregate data analyses showing occupation-specific patterns of spatial mobility of VET students (Jost et al. 2019) and the theoretical notions of person–environment fit theory (Edwards et al. 2002; Holland 1997). This finding is of particular concern, as spatial mobility is regarded as an important solution to mitigate regional matching problems in labor and training markets.

In contrast to the confirmed push factors for spatial mobility, including individual occupational orientations and regional opportunity structures, our results do not offer clear support for the assumed binding factors of *social ties* for spatial mobility as shown by previous research (Aaltonen 2021; Haldimann et al. 2021). Only high satisfaction with friends is negatively related to youths' spatial mobility between RLMs. As mobility between RLMs entails longer mean distances, this indicates that the psychic costs of leaving friends show up only for longer distances, which may make it more difficult to retain contact from the subjective perspective of youth. The finding that family ties do not matter in predicting spatial mobility of youth entering VET is in line with life course research (Ryan and Lynch 1989) that emphasize that this stage in the lives of young adults is characterized by detachment from the parental home and the beginning of independent living.

Our explorative analyses differentiating spatial mobility within and between RLMs give new relevant insights, firstly, into whether RLMs also represent functionally closed VET markets and, secondly, which factors influence spatial mobility within and between them. The results revealed that the predictors relating to occupational aspirations (individual status aspirations and person–environment mismatch) only pertain to spatial mobility within RLMs. This indicates that RLMs may also represent functionally closed training markets capable of meeting VET students' occupational aspirations. On the other hand, spatial mobility between RLMs was related to youths' social ties to friends and regions' general unattractiveness. This implies that not occupation-related factors but rather, consistent with the concept of place utility (Wolpert 1965), the expected general quality of life is decisive for the decision to become spatially mobile into another RLM.

6.2. Limitations and Directions towards Future Research

The present study certainly has some limitations. Concerning predictor variables denoting regional opportunity structures, we focused on measures related to students' home regions. In line with the push–pull paradigm (Lee 1966), it could be fruitful to include measurements for the regional conditions of the destination region. This could further illuminate the underlying evaluations and comparisons guiding mobility decisions; however, this analysis is best conducted as part of future research with a restricted sample excluding the high amount of non-mobile students, as otherwise measures for students that stayed in their home region and students that became mobile in a similar region would be identical.

Another point that should be addressed in future studies is the limited support for the binding role of social ties, including satisfaction with family and participation in groups or

organizations. While life-cycle models (Ryan and Lynch 1989) can explain that the importance of families declines during the transition from school to VET, our result may also be due to weak measures of these social ties. The available measurements for satisfaction with family and with friends had little variation and were highly left-skewed. We used terciles to circumvent these problems; nonetheless, more precise and in-depth measurements of youths' social ties would be beneficial to assess their actual involvement, commitment, and interest in keeping their social ties more accurately. Regarding participation in any group or organization, a simple dummy variable was used. More in-depth information considering students' involvement in these organizations would have been beneficial but was not available in our data.

Lastly, our results supported the presumed relevance of youths' occupational aspirations as agentic push factors for spatial mobility. Future research should examine this relationship further and test how far spatially mobile youth are actually able to attain their occupational orientations. In a similar vein, research should investigate whether youth who have become spatially mobile stay in these regions after completing their VET or whether they return to their home regions. Moreover, as occupational orientations and mobility decisions can be seen as processes (Holland 1997; Kalter 1997), future research should also address the willingness of students to become mobile and whether changes over time can be observed. Especially, the question of how far students that live in unfavorable regions and are unable to find a suitable training position adapt their occupational aspirations or their willingness to become mobile seems to be an important topic for future research.

7. Conclusions

This study gives new insights into the prevalence and predictors of spatial mobility of youth in the transition from school to VET. Our findings are especially relevant for practitioners and policymakers as spatial mobility is an important means to mitigate regional disparities in the German labor and training market and facilitate youths' successful transitions into VET, but it may also reproduce social inequalities. Extending literature on mobility in general, our results highlight that youths' mobility decisions are particularly contingent on push factors of their agentic motivation and the structural constraints they face. Hence, spatial mobility can be, on one hand, a *possibility* to achieve occupational aspirations and a successful transition into VET, and on the other hand, a *necessity* to compensate for unfavorable regional opportunity structures and poor chances on the training market.

As our results suggest that RLMs represent functionally closed training markets meeting youth's occupational needs, spatial mobility within them can indeed be seen as an important means for youth to realize their aspirations and mitigate regional inequalities within them. Hence, practitioners and policymakers should support youths who are willing to become spatially mobile through mobility-enhancing measures. These could include special incentives to ease commuting, such as job tickets that reduce the costs of public transportation, or even providing cars for commuting apprentices with driver's licenses; however providing affordable housing options, such as dormitories for VET students, could also enable youths to move to the location of their VET. Above all, policymakers should ensure that spatial mobility is feasible for everybody to circumvent social inequalities.

On the other hand, our results reveal that youths becoming spatially mobile between RLMs are rather pushed by the high general unattractiveness of their home region and long search durations. In this case, practical implementations should first aim to make living in these regions more attractive, especially for VET students. This can include intercompany training centers in structurally weak regions, expansion of infrastructures to improve the accessibility of training opportunities, but also incentives such as discounts for cultural or recreational facilities in the region, which are already common for university students. Secondly, offers should be provided that aim at supporting youths that are unsuccessful in finding a suitable training position in their home region. Here, e.g., counseling services of an employment agency could either recommend consideration of alternative occupa-

tional fields in the home region or encourage the option to seek VET in another region with more favorable opportunities on the training market. While the implementation of such mobility-enhancing policies seems promising, it is also important to conduct further research evaluating the extent to which such measures are actually helpful in supporting youths' mobility decisions and successful transitions into VET.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Predictors of spatial mobility within and between RLMs (logit coefficients).

	Model 1			Model 2			Model 3		
Outcome: Mobility within RLMs, ref. no mobility									
Orientations									
Status aspirations (ref. low)									
medium	0.32	***	[0.10]	0.19	+	[0.11]	0.20	+	[0.11]
high	0.61	***	[0.11]	0.42	***	[0.12]	0.38	**	[0.13]
Search duration: (ref. 1st year)	−0.01		[0.11]	−0.00		[0.11]	0.02		[0.11]
Region									
General unattractiveness (std.)	0.38	***	[0.09]	0.41	***	[0.08]	0.49	***	[0.08]
Person–environment mismatch (std.)	0.17	***	[0.05]	0.16	***	[0.05]	0.15	**	[0.05]

Table A1. *Cont.*

	Model 1			Model 2			Model 3		
Social Ties									
Participation in organization/group (ref. no)	0.06		[0.09]	0.01		[0.10]	0.03		[0.10]
Satisfaction with family (ref. low)									
medium	0.01		[0.09]	0.01		[0.09]	0.03		[0.09]
high	−0.11		[0.10]	−0.09		[0.10]	−0.05		[0.10]
Satisfaction with friends (ref. low)									
medium	−0.01		[0.11]	0.01		[0.11]	−0.01		[0.11]
high	−0.09		[0.11]	−0.04		[0.11]	−0.04		[0.11]
Controls									
Gender (ref. male)				0.07		[0.09]	0.00		[0.09]
Immigration (ref. natives)				−0.36	***	[0.11]	−0.30	**	[0.11]
Educational qualification (ref. high)									
medium				−0.11		[0.15]	−0.12		[0.15]
low				−0.19		[0.20]	−0.24		[0.20]
Age (std.)				0.18	**	[0.06]	0.14	*	[0.07]
Parental SES (ref. low)									
medium				−0.02		[0.11]	−0.02		[0.11]
high				0.14		[0.11]	0.10		[0.11]
Area (ref. South)									
Central				−0.72	**	[0.23]	−0.61	**	[0.22]
North				−0.31		[0.20]	−0.29		[0.20]
East				−0.64	*	[0.30]	−0.66	*	[0.30]
Residential relocation (ref. no)							1.34	***	[0.11]
Constant	−1.62	***	[0.16]	−1.06	***	[0.24]	−1.37	***	[0.25]
Outcome: Mobility between RLMs, ref. no mobility									
Orientations									
Status aspirations (ref. low)									
medium	0.31	**	[0.10]	0.09		[0.11]	0.12		[0.12]
high	0.70	***	[0.10]	0.28	*	[0.11]	0.20		[0.13]
Search duration: (ref. 1st year)	0.28	**	[0.09]	0.26	**	[0.09]	0.31	**	[0.10]
Region									
General unattractiveness (std.)	0.31	***	[0.05]	0.38	***	[0.05]	0.52	***	[0.05]
Person–environment mismatch (std.)	0.11	**	[0.04]	0.10	**	[0.04]	0.07	+	[0.04]
Social Ties									
Participation in organization/group (ref. no)	0.07		[0.08]	0.05		[0.09]	0.08		[0.09]
Satisfaction with family (ref. low)									
medium	0.04		[0.09]	0.00		[0.09]	0.04		[0.10]
high	−0.05		[0.11]	−0.01		[0.11]	0.08		[0.13]
Satisfaction with friends (ref. low)									
medium	−0.07		[0.10]	−0.05		[0.10]	−0.10		[0.11]
high	−0.29	**	[0.09]	−0.20	*	[0.09]	−0.22	*	[0.10]
Controls									
Gender (ref. male)				0.07		[0.08]	0.00		[0.09]
Immigration (ref. natives)				−0.24	**	[0.09]	−0.15		[0.10]
Educational qualification (ref. high)									
medium				−0.69	***	[0.11]	−0.70	***	[0.13]
low				−0.87	***	[0.14]	−0.96	***	[0.16]
Age (std.)				0.18	***	[0.05]	0.13	*	[0.06]
Parental SES (ref. low)									
medium				−0.13		[0.09]	−0.14		[0.10]
high				0.02		[0.10]	−0.04		[0.11]
Region (ref. South)									
Central				−0.48	**	[0.16]	−0.32	+	[0.16]
North				−0.49	**	[0.18]	−0.48	**	[0.18]
East				0.15		[0.18]	0.07		[0.16]
Residential relocation (ref. no)							2.33	***	[0.24]
Constant	−1.35	***	[0.11]	−0.39	+	[0.22]	−1.14	***	[0.24]
Observations	5537			5537			5537		
FMI (max.)	0.20			0.23			0.25		
RVI (avg.)	0.09			0.08			0.10		

Notes: + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; standard errors in brackets; cluster robust SE; 20 imputations; N (districts) 349; N (regional labor markets) 137; N (persons) 5537.

Table A2. Predictors of no mobility and spatial mobility within and between RLMs (AMEs).

	Model 1			Model 2			Model 3		
Orientations									
Status aspirations: medium (ref. low)									
no mobility	−0.07	***	[0.02]	−0.03		[0.02]	−0.03		[0.02]
within RLMs	0.03	***	[0.01]	0.02	+	[0.01]	0.02	+	[0.01]
between RLMs	0.04	**	[0.01]	0.01		[0.02]	0.01		[0.01]
Status aspirations: high (ref. low)									
no mobility	−0.15	***	[0.02]	−0.07	***	[0.02]	−0.05	**	[0.02]
within RLMs	0.06	***	[0.01]	0.04	**	[0.02]	0.04	**	[0.02]
between RLMs	0.10	***	[0.02]	0.03	+	[0.02]	0.01		[0.02]
Search duration: 2nd year (ref. 1st year)									
no mobility	−0.04	*	[0.02]	−0.03	+	[0.02]	−0.03	*	[0.02]
within RLMs	−0.01		[0.01]	−0.01		[0.01]	−0.01		[0.01]
between RLMs	0.05	***	[0.01]	0.04	**	[0.01]	0.04	**	[0.01]
Region									
General unattractiveness (std.)									
no mobility	−0.08	***	[0.01]	−0.08	***	[0.01]	−0.09	***	[0.01]
within RLMs	0.04	***	[0.01]	0.04	***	[0.01]	0.04	***	[0.01]
between RLMs	0.04	***	[0.01]	0.05	***	[0.01]	0.05	***	[0.01]
Person–environment mismatch (std.)									
no mobility	−0.03	***	[0.01]	−0.03	***	[0.01]	−0.02	**	[0.01]
within RLMs	0.02	**	[0.01]	0.02	**	[0.01]	0.02	**	[0.01]
between RLMs	0.01	*	[0.01]	0.01	+	[0.01]	0.00		[0.01]
Social Ties									
Participation in organization/group (ref. no)									
no mobility	−0.01		[0.02]	−0.01		[0.02]	−0.01		[0.01]
within RLMs	0.01		[0.01]	−0.00		[0.01]	−0.00		[0.01]
between RLMs	0.01		[0.01]	0.01		[0.01]	0.01		[0.01]
Satisfaction with family: medium (ref. low)									
no mobility	−0.01		[0.02]	−0.00		[0.02]	−0.01		[0.01]
within RLMs	−0.00		[0.01]	0.00		[0.01]	0.00		[0.01]
between RLMs	0.01		[0.01]	−0.00		[0.01]	0.00		[0.01]
Satisfaction with family: high (ref. low)									
no mobility	0.02		[0.02]	0.01		[0.02]	−0.00		[0.02]
within RLMs	−0.01		[0.01]	−0.01		[0.01]	−0.01		[0.01]
between RLMs	−0.00		[0.02]	0.00		[0.02]	0.01		[0.02]
Satisfaction with friends: medium (ref. low)									
no mobility	0.01		[0.02]	0.01		[0.02]	0.01		[0.02]
within RLMs	0.00		[0.01]	0.00		[0.01]	0.00		[0.01]
between RLMs	−0.01		[0.02]	−0.01		[0.02]	−0.01		[0.01]
Satisfaction with friends: high (ref. low)									
no mobility	0.05	**	[0.02]	0.03	+	[0.02]	0.03		[0.02]
within RLMs	−0.00		[0.01]	0.00		[0.01]	0.00		[0.01]
between RLMs	−0.04	**	[0.01]	−0.03	*	[0.01]	−0.03	*	[0.01]
Controls									
Gender (ref. male)									
no mobility				−0.02		[0.02]	−0.00		[0.02]
within RLMs				0.01		[0.01]	0.01		[0.01]
between RLMs				0.01		[0.01]	−0.00		[0.01]
Immigration (ref. native)									
no mobility				0.06	***	[0.02]	0.04	**	[0.02]
within RLMs				−0.04	**	[0.01]	−0.03	**	[0.01]
between RLMs				−0.03	*	[0.01]	−0.01		[0.01]
Education: medium (ref. low)									
no mobility				0.10	***	[0.02]	0.08	***	[0.02]
within RLMs				0.01		[0.02]	0.02		[0.02]
between RLMs				−0.12	***	[0.02]	−0.10	***	[0.02]

Table A2. *Cont.*

	Model 1	Model 2			Model 3		
Education: high (ref. low)							
no mobility		0.13	***	[0.03]	0.12	***	[0.03]
within RLMs		0.01		[0.03]	0.01		[0.03]
between RLMs		−0.14	***	[0.03]	−0.13	***	[0.02]
Age (std.)							
no mobility		−0.04	***	[0.01]	−0.02	*	[0.01]
within RLMs		0.02	*	[0.01]	0.01		[0.01]
between RLMs		0.02	**	[0.01]	0.01	+	[0.01]
Parental SES: medium (ref. low)							
no mobility		0.02		[0.02]	0.02		[0.02]
within RLMs		0.00		[0.01]	0.00		[0.01]
between RLMs		−0.02		[0.01]	−0.02		[0.01]
Parental SES: high (ref. low)							
no mobility		−0.02		[0.02]	−0.01		[0.02]
within RLMs		0.02		[0.01]	0.02		[0.01]
between RLMs		−0.00		[0.02]	−0.01		[0.01]
Area: Center (ref. South)							
no mobility		0.13	***	[0.03]	0.09	***	[0.03]
within RLMs		−0.08	*	[0.03]	−0.07	*	[0.03]
between RLMs		−0.05	+	[0.03]	−0.02		[0.02]
Area: North (ref. South)							
no mobility		0.09	**	[0.03]	0.07	**	[0.02]
within RLMs		−0.03		[0.03]	−0.02		[0.03]
between RLMs		−0.06	*	[0.03]	−0.05	*	[0.03]
Area: East (ref. South)							
no mobility		0.03		[0.04]	0.05		[0.03]
within RLMs		−0.09	*	[0.04]	−0.09	*	[0.03]
between RLMs		0.05	+	[0.03]	0.04		[0.02]
Residential relocation (ref. no)							
no mobility					−0.41	***	[0.02]
within RLMs					0.06	***	[0.02]
between RLMs					0.35	***	[0.02]
Observations	5537	5537			5537		
FMI (max.)	0.18	0.22			0.24		
RVI (avg.)	0.09	0.08			0.10		

Notes: + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; standard errors in brackets; cluster robust SE; 20 imputations; *N* (districts) 349; *N* (regional labor markets) 137; *N* (persons) 5537.

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