

**The “Discovery” of Youth’s Learning Potential Early in the Life Course.
Project description, research questions, methods and design**

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*Project: “The “Discovery” of Youth’s Learning Potential
Early in the Life Course”*
(Funded by the Jacobs Foundation)

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Project information:

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In cooperation with

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Abstract

“Underachievement” is a well-established educational research field. However, both *longitudinal* and *interdisciplinary* studies on the interplay between individuals’ learning potential and educational attainment are rare, as are analyses of life course consequences of underachievement. This psychological, sociological, and economic longitudinal study aims to contribute to our knowledge of social disparities in the processes of discovering youths’ learning potential—and its development—in families, schools, and vocational training markets.

We are less interested in replicating well-researched variations in the achievement-ability-relationship *between* social classes. Instead, we focus on *within-group* differences, both during schooling (within social classes) and during transitions from school to vocational training and labor markets (within educational groups). Such intra-group differences would reveal whether underachievement of children from lower-class and higher-class families is generated by similar or different mechanisms, and whether the mechanisms common to all social classes differ in strength in generating underachievement.

Our unique data collection would allow us to investigate intra-group variance, even the crucial relationships between achievement, ability, and personality. In addition, a novel decomposition of family background will be coupled with a multidimensional life course approach examining interaction between youth and their siblings, partners, and parents.

1. General Introduction of the Project

Youths' skill development is crucial to supply skilled labor forces in knowledge-based societies. Simultaneously, learning skills foster individuals' life chances, social inclusion, and life-long learning. Despite worldwide educational expansion, many children still "underachieve" during schooling, demonstrating lower school performance than their measured general cognitive abilities—their learning potential—would predict. "Underachievement" represents resources lost both for societies and for individuals. Yet it also represents a fairness issue: Shouldn't all children have the best opportunities to develop their particular learning potentials?

We seek to determine the factors responsible for the failure to discover youths' learning potentials. We know that children from lower classes suffer greater risks to "underachieve" at school than children from higher classes—because of differences in educational aspirations, motivations, parents' and teachers' expectations and learning supports. Psychological and environmental factors and events also clearly affect children's underachievement risk. We also investigate the impact of youths' cognitive abilities, personality, and school attainment on access to vocational training and work.

Questions remaining include: What long-term consequences does underachievement have? Can vocational training "reverse" underachievement, through such mechanisms as workplace-based learning settings? Are the same factors responsible for succeeding/failing to discover children's learning potentials within social groups? If the goal is to effectively provide children with appropriate learning opportunities, answers to these questions about discovering youths' learning potential will help us to reach it.

2. Background

"Underachievement" is a well-established field of educational research. There are many cross-sectional, sociological and psychological studies on underachieving students. However, longitudinal and interdisciplinary analyses on the interplay between individuals' learning potentials and educational attainment as well as research on the consequences of underachievement later in life remain exceptions (e.g., Entwisle et al. 2005; Caspi et al. 1998; Sewell et al. 2001; Hauser/Sewell 1986). The research projects will combine sociological, psychological, and economic approaches with a longitudinal design to investigate social differences in the processes of discovering and developing youth's learning potential in (a) families and schools, and (b) vocational training and labor markets. We understand underachievement to result from

children's insufficient educational experiences and learning opportunities (Bempechat/Ginsburg 1989; Stern 2001b).

Research objective A: The discovery of youth's learning potentials in families and schools

Whereas most research on underachievement has focused on variations in the achievement-IQ-relationship *between* social classes, our research will examine *within-group* differences in this relationship. Therefore, our project's research questions are neither "Do IQ test scores vary by social class?" nor "Is there one general intelligence (*g*) or multiple intelligences?" nor "Does schooling increase IQ test scores?" For the latter, given that the SOEP respondents attended schools for at least 9 years, the IQ tests used do not presuppose knowledge that can only be acquired in particular school types (Stern 2001a; Ceci 1991). Such research questions have been often asked, and are still hotly debated in psychology (see Neisser et al. 1996; Ceci 1991, 1996). Of course, they are important questions to be addressed, given that underachievement is measured as the discrepancy between demonstrated school achievement and IQ test scores (as a surrogate for general cognitive abilities or learning potential).

In some respects, our interest is similar—to investigate the relationship between individuals' educational attainment and general cognitive abilities (learning potential), and the factors that explain differences in the "discovery" of such learning potentials. However, our aim here is to explore the personal and environmental factors that are responsible for *intra-group* differences in the achievement-ability relationship. We seek to reveal whether *underachievement* (and, complementarily, *overachievement*) of children from lower-class and higher-class families is generated by similar or different mechanisms, and whether the mechanisms common to all social classes differ in the strength to which they enhance or inhibit the discovery of the learning potentials of children from different family backgrounds.

Meta-analyses have shown that the overall correlation between school performance and IQ-test scores is of medium to high strength; its size ranges from .34 to .51 (i.e., IQ test scores explain 12 to 26 percent of the differences in school performance) (Stern/Hardy 2004: 595). There is no assumption that ability and achievement would be perfectly correlated (Thorndike 1963), with two processes causing this "imperfection": "under-/overrating" of students by teachers and "hidden underachievement". The latter results from students who underachieve because the educational system (teachers) and parents do not recognize their potential (Ford 1996). "Being over- or underrated" evolves from teachers assigning marks and conferring the status of underachiever or overachiever onto students (Cheung/Rudowicz 2003; Troyna 1991).

According to our focus on intra-group differences, we will start by estimating the correlations between performance and learning potential for the different social classes. **Our baseline hypothesis is that the effect size of the correlation between performance and IQ test scores differs by social class.** There are two competing sub-hypotheses on the differences in the generating mechanisms of “un/discovered” learning potential for the various social classes.

Sub-hypothesis 1: The achievement-IQ-correlation is expected to be *higher* for children from lower-class background than for children from higher-class background.

The distribution of the personal and environmental factors influencing teachers’ perception of achievement and teachers’/parents’ encouragement of achievement (Baker et al. 1998; Reis/McCoach 2000), favors *children from higher social classes*. Therefore, for these children the correlation between achievement and learning potential should be affected not only by hidden underachievement, but also by being overrated (i.e., higher achievement than would be expected by IQ test scores). As a consequence, the achievement-IQ-correlation should be rather weak. Moreover, if for the majority of higher-class children the environmental and personal factors surpass a threshold level sufficient to encourage achievement or to be perceived as “achieving” by parents and teachers, the variation of achievement within the higher social classes should be rather small, especially compared to the (large) variation in these children’s learning potentials.

In contrast, for *children from lower social classes*, the correlation should be influenced mainly by hidden underachievement and being underrated, given an unfavorable distribution of achievement-enhancing factors. Both processes of “un-discovered” children’s learning potential should occur more frequently for lower-class children because they have a higher risk of falling below the threshold level. Yet, especially for those children with (very) low social resources, their general cognitive abilities—as their “only available” resource—may well be of paramount importance for achievement. Thus, although hidden underachievement and being underrated may affect children from lower social classes more often than those from higher classes, the two processes may still resemble the distribution pattern of children’s learning potential. In the lower classes, children scoring lower on IQ tests should have a higher risk that their learning potential will remain partially “undiscovered” than those with higher IQ test scores.

Competing **sub-hypothesis 2:** The achievement-IQ-correlation is expected to be *lower* for lower-class children than for higher-class children.

The underlying assumption here is that the social and school behavior of *lower-class children*, in part caused by their poor(er) environmental resources, generally inhibits the discovery of their learning potential, making differences in children’s potential “invisible” to a greater extent. By contrast, the social and school behavior of *higher-class children* may be advantageous for taking each child up to their achievement “limit”—and if “overrating” occurs, it may correspond to the distribution of IQ test scores.

To test these hypotheses and explore the mechanisms responsible for under/overachievement and under/overrating *within* social classes, we will consider several factors. They are known to influence the relationship between achievement and general cognitive abilities, but their interactions with social class are, thus far, unknown. Table 1 (see below) does not claim to embrace all explanatory factors that previous research has demonstrated to affect school achievement. It presents a selection of explanatory factors to which we will pay special attention in our analyses. During the course of the project, we will specify further relevant factors. By including many of these factors as time-varying variables, we will also take the timing of events (changes in family and parental factors) on children’s attainment into account (as suggested by Haveman/Wolfe 1995; Ceci 1996).

Research objective B: The discovery of youth’s learning potential in vocational training and labor markets

With respect to school-to-work transitions, we seek to scrutinize differences between educational groups in the processes of discovering individuals’ learning potential in vocational training and labor markets. The unanswered question here is whether the impact of school attainment (e.g., certificates), general cognitive abilities, personality, and social resources on *access* to vocational training or work places¹ is equal for all educational groups, or whether the impact and the strength of these factors are different for less-educated and higher-educated youths. Thus, examining the achievement-ability-relationship for the transition into the labor force, we shift from intra-group differences in terms of social classes to intra-group differences in terms of educational groups.

There is an ongoing debate between and among sociologists and economists on the relative impact of certificates and abilities on labor market success. Whereas economists—basing their arguments mainly on human capital and signaling theory—conceptualize educational attainment as an indicator of (train)*ability*, sociologists emphasize that recruitment processes rely

¹ Due to the data used (panel design) the ultimate impact of school and vocational education and general cognitive abilities on labor market placement can only begin to be studied (see Table 2 below).

first and foremost on *credentials* (cf. Solga 2005). Similar arguments exist with respect to access to apprenticeships (vocational training markets) in Germany.

Recent literature in economics and social psychology has investigated the importance of individuals' cognitive abilities, personality, credentials, and other social resources in determining socioeconomic success and unemployment (e.g., Heckman/Masterov 2004; Caspi et al. 1998). Economic findings show a negligible effect of cognitive ability measures on log-earnings (Zax/Rees 2002; Harrison 2004). On the other hand, the correlation between IQ test scores and success in vocational or academic education seems to be reasonable ($r = .44$) (Stern/Hardy 2004: 595). In addition, IQ scores correlate with various measures of job performance ($r = .54$) (Hunter 1983). So the findings are not uniform, with some suggesting that general cognitive abilities matter above and beyond educational credentials, while other factors show merely weak impact. Yet these are overall correlation estimates. Just as with the achievement-ability-relationship for schooling, existing research has paid little attention to within-group differences. Examining intra-group differences, may resolve the on-going debate and show that sociologists and economists are neither right nor wrong, but that we find *differently structured recruitment and job search processes* for more and less qualified persons in bifurcated training and labor markets.

Applying the attraction-selection-attrition model (Schneider et al. 1998) in a wider sense, we assume that attraction and selection processes play a crucial role for access to training and jobs: (1) people are more likely to enter social spheres that are attractive to their personality, motivations, and interests (*job search processes*), and (2) people are selectively recruited for jobs and apprenticeships on the basis of various factors, among them educational attainment, cognitive abilities, and personality traits (*recruitment processes*) (cf. also Plomin/Spinath 2004).² In the following, we specify the achievement-ability-relationship for these two processes with respect to members of *different educational groups*.

With respect to intra-group differences in training and job *search strategies and behavior*, we have to take into account that in the group of *less-educated youths*, underachievers and youths being underrated should be more frequently found than in the higher-educated group, and conversely, that overachievers and youths being overrated are more likely to be in the higher-educated group. Now, psychological research suggests that intelligence and personality should influence job search processes: "Because intelligence is associated with problem-solving and skill acquisition, individual differences in general cognitive abilities may affect the ability to find (and retain) a job (Barnett & Depinet 1991)" (Caspi et al. 1998: 427; cf. also Judge et al. 1999).

² Attrition is less central to the project. It means that people leave or are released from jobs and training when they "do not fit in" but assuming that they had access to these opportunities in the first place.

Hence, if youth—regardless of school attainment—receive a “second” chance to have their learning potential “discovered” through their training and job search behavior, underachieving (less-educated) youths may eventually transfer to “achievement trajectories”. In contrast, the job searches of (higher-educated) overachievers or overrated youth—if that is caused by favorable personality traits, motivations, and the like—should rather resemble the job search of higher-educated youths who had not overachieved in school. The comparison of these group-specific hypotheses shows that general cognitive abilities could have differential impact on the vocational training and job search of less and higher-educated groups.

For *recruitment processes*, school attainment is supposed to be more important than cognitive abilities because indicators of school attainment (like school grades and certificates) are used in admission procedures of academic institutions, vocational education, and by employers (Entwisle et al. 2005; Neisser et al. 1996; Phillips/Chin 2003; Reis/McCoach 2000). Significant correlations between IQ test scores and socio-economic success may be explained thus: The individual with “higher test scores is likely to get more schooling, and hence to be better credentialed when s/he enters the workplace”—and that is why IQ test scores predict occupational status (Neisser et al. 1996: 82).

However, this line of reasoning overlooks differences between higher and lower educational groups. For the growing group of *higher-educated persons*, one could hypothesize a two-step recruitment process. While the first step is based on certificates creating a (smaller) pool of “acceptable” applicants, the final selection is then driven by expected (train)abilities. In contrast, for the shrinking group of *less-educated (especially least-educated) persons*, recruitment may be structured solely as a one-step procedure based on certificates due to a shared belief of employers that, nowadays, less-educated youths are “not (yet) trainable” and “non-employable” (Solga 2002, 2005: Ch. 5.2.2). Such entirely credential-based recruitment processes would restrict opportunities to discover the learning potential of (less-educated) underachievers. Therefore, the training and employment chances of underachievers could resemble the chances of low-achievers. The two-step recruitment processes for the higher-educated group, in contrast, would suggest a differentiation of the training/employment chances of overachievers, on the one hand, and higher-educated youths who have a “corresponding” learning potential, on the other.

According to these hypotheses, the finding that IQ test scores predict occupational success in complex jobs better than in less complex jobs (Gottfredson 1986) may suggest that differences in general cognitive abilities have a larger impact on recruitment chances of higher-educated youths than of less-educated ones.

Thus far, it has been very difficult to base this tenacious debate between sociologists and economists on serious empirical ground because the major datasets available worldwide only provide information on educational degrees achieved, but not on general cognitive abilities (and/or personality traits). Based on the psychological items used in the project and by virtue of our interdisciplinary collaboration, we will seek to reveal the causal mechanisms by which educational attainment, general cognitive abilities, personality traits, parental and other resources produce differential outcomes in vocational training, unemployment, and labor market placement.

(2) Methods

The exceptional richness of the data to be analyzed will enable us to investigate intra-group variations—even in the achievement-ability-*and-personality* relationship. The collected data will provide novel opportunities to decompose “family background” into *specific* factors of influence and reflect a genuine life course approach with respect to each respondent’s own life course and its interdependence with the life courses of her or his parent(s), sibling(s) and (if applicable) partner.

Measuring individuals’ learning potential: For at least three years (2006, 2007, 2008), the German Socio-economic Panel Study (SOEP) team will collect data on general cognitive abilities of 17-year-olds, i.e., the respondents who participate in the SOEP for the first time. In 2006, 500 respondents at ages 18 and 19 years will take the IQ tests as well. This enables us to start our second research objective already in 2008. In 2008, the available sample size will be around 1,250 cases (see Table 2). IQ test scores are fairly stable during development. Individuals’ rank position in the scale of general cognitive abilities is rather stable over the life course (Neisser et al. 1996; Breslau et al. 2001)—especially if so-called fluid intelligence components are considered, which are far less influenced by learning opportunities and acculturation based on education (cf. Cattell 1987). Therefore, measuring (primarily) fluid intelligence components at age 17 seems to be an efficient and valid data collecting strategy to support the research interests stated above.

To assess survey participants’ general cognitive abilities, the well-established German *Intelligence Structure Test 2000 Revised (IST-2000R)* developed by Amthauer et al. (2001), will be administered. It draws on those intelligence components that have consistently been found in different models of intelligence structure: (a) verbal, (b) numerical, and (c) figural abilities (cf. Cattell 1987). Because of testing-time restrictions, the participants will take one subtest of each content area: verbal analogies, arithmetic operators, and matrices. This selection measures *fluid* intelligence and enables us to combine the three tests as a measure of *general reasoning*

abilities. A successful pilot-study with 230 survey participants was conducted in 2005 (Solga et al. 2005).

Measuring personality traits and risk aversion: The SOEP will also collect data on personality traits of the tested 17-year-olds, based on the five-factor model of personality. We will use a short version of the Big Five Inventory (NEO-FFI) (Lang et al. 2001; Benet-Martínez/John 1998; Borkenau/ Ostendorf 1993; cf. John/Srivastava 1999; Gerlitz/Schupp 2005). Although personality traits may change due to specific life experiences, such changes, if they occur, “make us more of who we already are” (Roberts et al. 2003: 592). Therefore, personality measures at age 17 can also be used in our analyses on school attainment before that age. Furthermore, measures on parents’ personality traits (using the same inventory) collected in 2005 are also available. Test-takers will also answer a question on risk-aversion (measures of parents’ risk behavior, using the same question, were collected in 2004), which has been shown to be a valid predictor of actual risky behavior in an experimental validation study (Dohmen et al. 2005).

Measuring parents’ cognitive potential: Also starting in 2006, two very short questions (each completed within 90 seconds) on cognitive potential of adult panel participants will be administered; among them will be the parents of the (ca. 200) tested 17-year-olds. The first test is on *word fluency* (“Tiere-Nennen-Aufgabe”/BASECog, cf. Lindenberger/Baltes 1995); the second test is on *speed* (“Zeichen-Zahlen-Test”/HAWIE-R, cf. Tewes 1994). The evaluation of the reliability and validity of those ultra short tests has shown robust results (Lang 2005).

Information on school attainment, family background and much more: Beside these tests, the 17-year-old participants will answer a standardized questionnaire “Youth” with 98 questions on grades achieved in the last school year, school certificate (if applicable), educational intensions, relationship to parents and parents’ interest in children’s school achievement, leisure time use, job expectations, etc. Finally, through parental participation in the waves conducted prior to the tests, the SOEP provides a variety of data on the 17-year-olds’ social environment during childhood, including siblings’ educational biographies.

Determining underachievement: As the dependent variable of the first research objective, we will classify the respondents into three distinct groups: underachieving, correspondingly achieving and overachieving individuals—based on the regression approach (Reis/McCoach 2000). For each social class (low, middle, high), we will then estimate separate regression models on this dependent variable to reveal similar and different mechanisms leading to the discovery of children’s learning potentials. Finally, with a pooled model (including all

classes), we will examine differences in the varying strength of common mechanisms, estimated by interaction effects.

(3) Expected results

Utilizing the full richness of the SOEP data, we seek to progress beyond statistical controls for so-called *unobserved heterogeneity* and to specify those personal and environment factors that are responsible for the discovery of individuals' learning potential (cf. Caspi et al. 1998: 445; Solga 2005: 171). Thereby, we aim to contribute to research on social disparities in educational participation and attainment as well as in later employment chances. The findings of the two research objectives will provide new insights in the social processes of discovering individuals' learning potentials. When studied within a life-course framework and within a joint research project combining several disciplinary perspectives, this investigation will also reveal interrelationships between experiences in schools, vocational training, and labor markets. Moreover, our group-specific analyses on the chances of discovery of individuals' learning potential during childhood and adolescence would provide an empirical foundation for *group-specific* intervention proposals of innovative education and social policies.

Table 1: Explanatory factors for the achievement-IQ-relationship

| Explanatory factors (independent variables) | Mediating process leading to a discrepancy between achievement and learning potential | Studies |
|--|--|---|
| Psychological factors: | | |
| Personality type | Children's cognitive development, effort & perception of achievement by teachers and parents | Hart et al. (2003), Entwisle et al. (2005) |
| External locus of control | Less effort Avoidance of coping in adequate ways with learning failure | Ford/Thomas (1997), Rosenbaum (1998), Bernard (1997) Aspinwall/Taylor (1992) |
| Risk aversion | Differences in job search behavior | Bonin et al. (2006) |
| Health status | Motivation and absenteeism | Mortimer (1994), Rutter et al. (1970) |
| Family background: | | |
| Unemployment | Shortage of resources & encouragement | Jencks et al. (1994) |
| Family income and poverty | Economic resources & (parental) role modeling | Mortimer et al. (1986), Becker & Tomes (1986), Mayer (1998) |
| Family structure (single parenthood, number of siblings) | Shortage of material and immaterial resources | Blake (1981) |
| Households' cultural capital, & parental attention to children's school attainment | Parents' educational aspirations for their children & perception of behavior ("ability to fit in" based on the "social repertoire" of appearance, manner, speech style) | Bourdieu (2000) |
| Siblings' educational attainment | Parents' educational aspirations for their children & encouragement of achievement | Sieben et al. (2001) |
| Mother's labor force participation | Opportunities of interchange & stimulation | Huston/Rosenkrantz Aronson (2005) |
| Households' social capital | Parental school involvement | Coleman (1988), Lareau (2000), Diewald/Schupp (2004) |
| Parents' divorce | Critical events during cognitive development and schooling & loss of informal social control | Walper (1988), Walper/Schwarz (1999), Sampson/Laub (1994) |
| Parental characteristics | | |
| Parents' well-being & life satisfaction | Interference with parent-child-relationship and parenting ability | Onatsu-Arvilommi (2003) |
| Parents' cognitive potential ("fluency" and "speed" of cognitive processes) | Parents' cognitive potential to discover their children's learning potential - or indicating: heritability, - and/or cumulative legacy of growing up in a similar environment) | Plomin/Spinath (2004) Breslau et al. (2001), Ceci (1996) |
| Parents' risk aversion | Differences in parents' educational aspiration for their children | Breen/Goldthorpe (1997) |
| School factors | | |
| Secondary school type attended | Encouragement of external/internal attributions of academic achievement | Cheung/Rudowicz (2003) |
| Teachers' expectations on children's performance | Teachers' encouragement, children's classroom success, & teachers' recommendation for secondary school placement (for Germany) | Entwisle et al. (2005), Ditton et al. (2005) |
| Pupils' achievement in primary school (e.g., grade retention) | Teacher's recommendation for secondary school placement | Cheung/Rudowicz (2003), Ditton et al. (2005) |

Table 2: Schedule for pursuing the research goals and survey implementation

| Data collection (in Fall each year) | Before 2006 | Febr. – May 2006 | 02 – 05 2007 | 02 – 05 2008 | 02 – 05 2009 | 02 – 05 2010 | 02 – 05 2011 | 2012+ |
|--|-------------|------------------|--------------|--------------|--------------|--------------|--------------|-----------|
| Childhood (e.g., kindergarten, school career, parents' employment careers, household structure history) – reported by parents – | | | | | | | | |
| Measuring cognitive abilities | | | | | | | | |
| Birth cohort 1987 (250 respondents) | → | Age 18/19 | Age 19/20 | Age 20/21 | Age 21/22 | Age 22/23 | Age 23/24 | Age 24/25 |
| Birth cohort 1988 (250 respondents) | → | Age 17/18 | Age 18/19 | Age 19/20 | Age 20/21 | Age 21/22 | Age 22/23 | Age 23/24 |
| Birth cohort 1989 (250 respondents) | → | Age 16/17 | Age 17/18 | Age 18/19 | Age 19/20 | Age 20/21 | Age 21/22 | Age 22/23 |
| Birth cohort 1990 (250 respondents) | | | Age 16/17 | Age 17/18 | Age 18/19 | Age 19/20 | Age 20/21 | Age 21/22 |
| Birth cohort 1991 (250 respondents) | | | | Age 16/17 | Age 17/18 | Age 18/19 | Age 19/20 | Age 20/21 |
| First-time participants (questionnaire “Youth”) – self-reported – | | ↓ | ↓ | ↓ | | | | |
| Adulthood (regular panel participation) (e.g., vocational education, employment, health, family formation) – self-reported – | | | | | ↓ | ↓ | ↓ | ↓ |

Age distribution at time of measuring cognitive abilities (etc.)

16 years old = about 375 respondents

17 years old = about 500 respondents

18 years old = about 250 respondents

19 years old = about 125 respondents

TOTAL: 1.250 respondents

The German Socio-Economic Panel Study (SOEP)

The German Socio-Economic Panel Study (SOEP) of the German Institute for Economic Research (DIW) is a wide-ranging representative longitudinal study of private households in Germany. The same private households, persons, and families have been surveyed annually since 1984. In 1984, 5,921 households containing 12,290 respondents participated in West Germany; in 1990, 2,179 households with 4,453 respondents were surveyed in East Germany. In the 1990s, the SOEP was extended by an Immigrant Sample (1994/95), a Supplementary Sample (1998), and an Innovation Sample (2000). The SOEP covers information on household composition, child development, education and training, occupational and family biographies, employment and professional mobility, earnings, health, allocation of time, personal satisfaction, personal values, preferences and expectations, and GeoCode-data for analyses by region.

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