Origins, belonging, and expectations: assessing resource compensation and reinforcement in academic educational trajectories

Kaspar Burger [ID][1,2,3,4,*] and Nathan Brack[4]

[1]Center for Childhood and Youth Research, Department of Social Sciences, University of Luxembourg, University of Luxembourg, 2, place de l'Université, Esch-sur-Alzette L-4365, Luxembourg
[2]Department of Sociology, University of Zurich, Andreasstrasse 15, Zurich CH - 8050, Switzerland
[3]Social Research Institute, Institute of Education, University College London, 55-59 Gordon Square, London WC1H 0AL, United Kingdom
[4]Jacobs Center for Productive Youth Development, University of Zurich, Andreasstrasse 15, Zurich CH - 8050, Switzerland
*Corresponding author: Center for Childhood and Youth Research, Department of Social Sciences, University of Luxembourg, 2, place de l'Université, Esch-sur-Alzette L-4365, Luxembourg. +352 (0)46 66 44 9486.
Email: kaspar.burger@uni.lu; University of Zurich, Department of Sociology & Jacobs Center for Productive Youth Development, Andreasstrasse 15, Zurich CH - 8050, Switzerland. Email: kaspar.burger@jacobscenter.uzh.ch; University College London, Social Research Institute, Institute of Education, 55-59 Gordon Square, London WC1H 0AL, United Kingdom. E-mail: k.burger@ucl.ac.uk

Research has shown that socioeconomic and psychological resources may influence educational trajectories. There are still unanswered questions, however, about the unique roles of these resources and the interplay between them. We consider two such questions: First, how do major psychological resources—a sense of school belonging and optimistic future expectations— predict educational trajectories when controlling for the effect of socioeconomic resources? And, second, do these psychological resources compensate for lacking socioeconomic resources or do they reinforce the influence of socioeconomic resources on educational trajectories? We used data from a 15-year-long Swiss panel study ($N = 1989$) and investigated educational trajectories concerning individuals' transitions from lower-secondary to academic upper-secondary education, and from there to university. Findings indicated that both socioeconomic and psychological resources were significantly associated with individuals' probability of transitioning to academic upper-secondary education. We also uncovered some evidence of resource compensation between socioeconomic resources and future expectations, suggesting that optimistic expectations may buffer the adverse effect of scarce socioeconomic resources on educational attainment. Furthermore, we found that both the sense of school belonging and future expectations were significantly associated with individuals' probability of transitioning to university. Overall, we conclude that psychological resources play a critical role in academically oriented educational trajectories and that they may partly compensate for the effects of limited socioeconomic resources on these trajectories.

Key words: life course; education; inequality/social stratification.

Introduction

Research conducted across the globe shows that parental socioeconomic status has a pervasive impact on educational attainment (Bukodi and Goldthorpe 2013; Kallio, Kauppinen, and Erola 2016). Parents with an advantaged socioeconomic status tend to create a developmental environment conducive to the acquisition of skills and knowledge that benefit educational attainment (Duncan and Murnane 2011; Hart and Risley 2003; Lareau 2002). However, because research has predominantly focused on the effects of socioeconomic origin, it has partly overlooked the role that psychological resources may play in educational attainment processes (e.g., Mikkonen et al. 2021). Life-course and life-span developmental theories have suggested that major psychological resources—including a sense of belonging in school and optimistic future expectations—can serve as vital inner driving forces in individual educational trajectories (Bozick et al. 2010; Burger 2023). Young people who feel a sense of belonging in school typically identify with the values and objectives of their school, and they exhibit both socioemotional adjustment and cognitive engagement in school (Allen et al. 2021; Slaten et al. 2016). This has important longer-term implications for educational attainment (e.g., Murphy et al. 2020). Similarly, young people with optimistic future expectations tend to set ambitious goals for themselves and typically seek to achieve these goals. Their future expectations guide goal-directed behaviors and consequently influence educational attainment processes (e.g., Ou and Reynolds 2008). However, there are still unanswered questions about whether a sense of belonging in school and optimistic future expectations—both important psychological resources—predict individuals' educational trajectories when controlling for the influence of socioeconomic resources, and whether these psychological resources compensate for a lack of socioeconomic resources or even amplify the effect of socioeconomic resources on educational trajectories.

Life-course and life-span developmental theories have pointed to the possibility of resource compensation and resource reinforcement (Schoon and Cook 2021; Stienstra et al. 2021). The resource compensation hypothesis posits that the presence of one resource compensates for the absence of another, rendering the latter less harmful. Resource compensation processes occur when, for instance, young people with greater psychological resources experience less negative effects on their educational trajectories due to a lack of family socioeconomic resources than their peers with fewer psychological resources. In that case, psychological resources may serve as a substitute for scarce socioeconomic resources. In contrast, the resource reinforcement hypothesis (which has also been referred to as the resource multiplication hypothesis) posits that different resources boost each other's effects. The resource reinforcement process occurs when young people with greater socioeconomic resources derive greater benefits from psychological resources than those with fewer socioeconomic resources—or, more generally, if one resource reinforces the effect of another, yielding greater benefits for advantaged individuals (Erola and Kilpi-Jakonen 2017).

Understanding the interplay between socioeconomic and psychological resources in educational trajectories is especially important to inform policymaking and the design of interventions to prevent school failure and dropout. With this in mind, we pursued a two-fold aim. First, we examined the extent to which socioeconomic and psychological resources (a sense of belonging in school and optimistic future expectations) predicted educational trajectories, understood as educational transitions from lower- to academic upper-secondary education and from there to university. Second, we examined the interplay between socioeconomic and psychological resources, assessing whether resource compensation or reinforcement effects underpinned these educational trajectories.

The role of socioeconomic and psychological resources in educational trajectories

Parental socioeconomic status

The influence of family socioeconomic resources (or parental socioeconomic status) on educational attainment has been documented worldwide and across historical time (Chmielewski

2019; Skopek and Passaretta 2021). Socioeconomically advantaged parents create a beneficial developmental context for their children and interact with their children in ways that foster children's skills and educational achievement (e.g., Hart and Risley 2003). These parents may also use their socioeconomic resources to purchase additional learning materials and provide stimulating learning opportunities—for instance, in early childhood care and education programs, after-school tutoring, extra-curricular activities, and instructional holiday camps (Duncan and Murnane 2011). Moreover, socioeconomically advantaged parents may invest their resources to live in neighborhoods with better schools and more academically oriented student populations (Aikens and Barbarin 2008; Bischoff and Tach 2020). Typically, these parents are very familiar with the education system and are actively involved in their children's schooling (Benner, Boyle, and Sadler 2016), giving their children a leg up in the educational attainment process (Lareau 2002). Finally, parental socioeconomic status may impact children's educational attainment for reasons other than social processes; genetic factors may also play a role. Research in behavioral genetics has provided evidence that the effect of parental socioeconomic status on educational attainment is in part a product of individuals' genetic makeups (Cesarini and Visscher 2017).

Sense of belonging in school

A sense of belonging in school refers to a feeling of connectedness and of being respected, accepted, and included in the school environment (Goodenow and Grady 1993; Strayhorn 2018). It is a key requirement for participating in class, engaging in learning activities, and identifying with school values and objectives (Slaten et al. 2016; Voelkl 1996; Wong, Allen, and Gallo Cordoba 2022). Research has suggested that a sense of belonging in school is associated with self-regulatory skills, school engagement, and a positive attitude towards school (Murphy et al. 2020; Slaten et al. 2016). When students feel that they fit in at a school, they are likely to exhibit high levels of academic motivation (Faircloth and Hamm 2005), persistence (Hausmann, Schofield, and Woods 2007), and goal-oriented learning (Schachner et al. 2019). Consequently, students who feel a sense of belonging in school tend to outperform those without a sense of belonging (Roeser, Midgley, and Urdan 1996). Moreover, a sense of belonging in school prevents early school dropout and promotes educational attainment (Archambault et al. 2009; Burger 2023), even in relatively anonymous school environments (O'Keeffe 2013).

Future expectations

Future expectations reflect individuals' subjective evaluations of the likelihood that they will experience specific life events or achieve a certain status (Hitlin and Johnson 2015; Oettingen and Mayer 2002). Optimistic future expectations mean that individuals expect positive life-course outcomes and believe that good things will be abundant and bad things will be scarce (Peterson 2000). How individuals see their future plays an important role in their everyday decisions and behaviors (e.g., Staff et al. 2010). As such, future expectations direct goal-setting and goal-striving processes, including high levels of persistence (Burger and Mortimer 2021; Mello 2008). This has wide-ranging consequences for educational attainment processes (e.g., Schoon, Burger, and Cook 2021). Future expectations are also associated with psychological functioning, self-regulation, and socioemotional adjustment, implying that individuals with optimistic expectations will be more likely to flourish in life. Moreover, positive future expectations may protect individuals against the negative effects of setbacks and aid them in overcoming adversity (Wyman et al. 1993). Hence, optimistic future expectations may also be understood as a component of resilience, given that individuals with positive future expectations are likely to respond adaptively under conditions that could pose a threat to human functioning (Sulimani-Aidan 2017).

Resource compensation and reinforcement

Resource compensation and reinforcement processes refer to different types of interactions between different resources. More specifically, resource compensation means that, when another resource is present, the lack of a given resource has less severe consequences for educational

attainment processes than might otherwise be the case (Bernardi 2012; Stienstra et al. 2021). In that case, one resource replaces another one, taking on its functional role. Prior research has suggested that psychological resources can buffer the negative impact of scarce family socioeconomic resources on certain life-course outcomes. In a longitudinal study, Ng-Knight and Schoon (2017) found evidence of a resource substitution process in that an internal locus of control protected socially disadvantaged youth against economic inactivity and unemployment following the school-to-work transition. Moreover, in a laboratory experiment, Destin, Manzo, and Townsend (2018) found that bringing to mind a successful future identity (versus past identity) improved the performance on an academic test of some students from low socioeconomic status backgrounds.

By contrast, when resource reinforcement occurs, the effect of a given resource strengthens the effect of another resource on a given outcome. In that case, psychological resources are more beneficial for individuals from socioeconomically advantaged families than for their less-advantaged counterparts. Vice versa, if socioeconomic resources are scarce, psychological resources will have a limited influence on life-course outcomes (e.g., persistent goal-striving has a limited effect on socioeconomic status attainment in young adulthood, as shown by Kwon and Erola 2022). In the educational domain, this may be the case, for instance, when individuals from low socioeconomic groups face actual or perceived barriers to success. In such instances, psychological resources may be implicated in the dynamics underlying educational attainment processes, but this may apply more so for students from advantaged socioeconomic backgrounds than for those from disadvantaged ones (Brumley, Russell, and Jaffee 2019).

Researchers have investigated resource compensation and reinforcement processes with respect to different types of resources and various life-course outcomes (Erickson, McDonald, and Elder 2009; Erola and Jalovaara 2017; Gil-Hernández 2021; Lee and Mortimer 2021). What is unclear, however, is the extent to which academic educational trajectories are a result of resource compensation or reinforcement processes involving socioeconomic and psychological resources (a sense of belonging in school and optimistic future expectations).

The present study

Addressing the above-mentioned gaps in the literature, we used data from a 15-year-long panel survey to pursue two main aims. First, we examined the extent to which socioeconomic resources (parental socioeconomic status) and psychological resources (the sense of belonging in school and optimistic future expectations) predicted academically oriented educational trajectories as they relate to transitions at two key junctures of the education system: from lower-secondary to academic upper-secondary education and from there to university. Second, we investigated the interplay between socioeconomic and psychological resources, analyzing whether there was evidence of resource compensation or reinforcement underlying these educational trajectories. We addressed these questions for the Swiss education system, which assigns students to different educational tracks from lower-secondary level onward. This means it represents a prototypical example of formal between-school tracking (Terrin and Triventi 2023). The different educational tracks have distinct academic demands and are either academically oriented or more vocationally oriented. Here, we considered students who attended the academically oriented track (with more demanding academic requirements) at the lower-secondary level, when the panel survey began, and we traced their educational trajectories up to tertiary level.

Methods
Data and sample

We used data from the panel survey TREE (Transitions from Education to Employment, 2016a) to analyze a subsample of 1,989 students. These students attended the academically oriented educational track at the lower-secondary school level at age 15 (in 2000). The dataset contained information on whether these students had enrolled at a university at any point up to age

30 (by 2014). We chose this subsample because we sought to understand how socioeconomic and psychological resources—and their interplay—predicted academically oriented educational trajectories. The Swiss education system enables both academically and vocationally oriented educational trajectories from the lower-secondary school level onwards. Following completion of comprehensive primary school, students are assigned to tracks with distinct academic requirements, ranging from basic to extended, at the lower-secondary school level. Track allocation occurs as a result of student performance, teacher recommendations, and parental preferences (student performance is the primary track allocation criterion, with teacher recommendations and parental preferences playing a secondary role, although their significance varies across different subnational administrative units; Buchmann et al. 2016; EDK n.d.; Neuenschwander et al. 2012). The different educational tracks at the lower-secondary school level facilitate either pre-vocationally oriented or more academically oriented educational trajectories. At the upper-secondary level, the two major tracks are the vocationally oriented and the academically oriented tracks, that is, vocational education (which prepares students primarily for entering the labor market) versus academic education (which prepares students primarily for higher education at the tertiary level). In this study, we did not consider students who attended more vocationally oriented educational tracks at the lower-secondary school level, because these students were pursuing trajectories that would likely lead to vocational education at the upper-secondary and tertiary levels (Becker and Hecken 2009; Burger 2021). The tracking system has a channeling function, diverting these students away from academically oriented educational trajectories. Although the system offers various indirect pathways and allows students to switch between tracks and thereby pursue nonstandard trajectories, only small proportions of each student cohort move from pre-vocationally oriented tracks to academic education at upper-secondary and tertiary levels. Consequently, we focused on students who attended the academically oriented track at the lower-secondary level so that we did not confound the channeling effects of the tracking system with the effects of socioeconomic and psychological resources (see also Karlson 2015). The original TREE study cohort from which we drew the analytic subsample initially consisted of 6343 individuals. It was based on the Swiss Program for International Student Assessment (PISA) from the year 2000, which selected a representative sample of students in a two-stage stratified procedure, with schools as the primary sampling units and students as the secondary sampling units (BFS, 2008). At the time, study participants were 15.5 years old on average and they were enrolled in the last grade of lower-secondary school. Between 2001 and 2007, the TREE panel (i.e., PISA follow-up) surveys were conducted annually, and additional surveys took place in the years 2010 and 2014 (Gomensoro and Meyer 2017; see also Supplementary Material Part A).

Measures

The following sections describe all the measures. Table 1 provides descriptive statistics and the proportion of missing values. Table 2 shows the correlations among the measures.

Academic education

Our first outcome was a dichotomous indicator of students' educational track attendance at the upper-secondary level at around age 17, measured in 2002 (0 = vocational education; 1 = academic education). Vocational education combined education in specialized schools with work-based training in corporations. Academic education, in contrast, was offered in baccalaureate schools, which prepared students for tertiary education in universities and for other types of tertiary education, such as in universities of applied sciences and teacher education; although, students could also opt to embark on vocational pathways once they complete academic upper-secondary education.

University attendance

Our second outcome was a dichotomous variable capturing whether students ever enrolled in a university at the tertiary level (0 = never enrolled at a university; 1 = attended university in at

Table 1. Descriptive statistics.

Measures	Collected in	Mean	SD	Min	Max	Missing values
Education						
Academic education	2002	0.637				5.3%
University attendance	2004–2014	0.466				0.0%
Sense of belonging						
Outsider	2000	3.633	0.645	1.000	4.000	0.6%
Belong	2000	2.906	0.900	1.000	4.000	1.2%
Awkward	2000	3.387	0.762	1.000	4.000	0.9%
Proud	2002	3.021	0.763	1.000	4.000	17.1%
Liking	2002	2.948	0.740	1.000	4.000	16.9%
Keep going	2002	3.382	0.773	1.000	4.000	17.3%
Parental socioeconomic status	2000	56.427	15.852	16.000	90.000	7.9%
Future expectations	2000	63.213	16.411	16.000	90.000	22.8%
Control variables						
Male	2000	0.411				0.0%
Age	2000	15.469	0.614	13.750	19.000	0.2%
First-generation immigrant	2000	0.096				0.5%
Reading skills	2000	561.087	71.389	268.79	884.49	0.0%
Parental involvement	2000	2.441	1.182	1.000	5.000	0.9%

Note: Descriptive statistics of all study variables based on nonimputed data (n = 1989). SD = standard deviation. Parental involvement refers to parental involvement in children's education, reflecting the frequency with which parents worked with the child on schoolwork.

Table 2. Correlation matrix.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2	0.630***													
3	0.068**	0.050*												
4	0.128***	0.109***	0.406***											
5	0.094***	0.065**	0.484***	0.421***										
6	0.112***	0.151***	0.040	0.008	0.052*									
7	0.127***	0.173***	0.067**	0.146***	0.119***	0.503***								
8	0.307***	0.295***	0.051*	0.106***	0.070**	0.463***	0.473***							
9	0.241***	0.205***	0.011	0.051*	0.018	0.027	0.032	0.129***						
10	0.394***	0.342***	0.044	0.086***	0.107***	0.091**	0.113***	0.186***	0.152***					
11	−0.092***	0.000	−0.000	−0.001	0.012	−0.049*	−0.069**	−0.013	0.042	0.068**				
12	−0.113***	−0.105***	0.039	0.155***	−0.006	−0.071**	−0.014	−0.075**	−0.092***	−0.058*	0.058*			
13	−0.011	−0.019	−0.019	−0.043	−0.020	−0.034	0.013	0.007	0.007	0.052*	0.014	0.051*		
14	0.349***	0.307***	0.037	0.188***	0.052*	−0.033	0.083***	0.126***	0.155***	0.156***	−0.122***	0.008	−0.154***	
15	0.003	0.004	0.030	0.029	−0.003	0.075*	0.055*	0.039	0.156***	−0.012	−0.041	−0.091***	−0.079***	−0.069**

Note: 1 = Academic education; 2 = University attendance; 3 = Belonging: Outsider; 4 = Belonging; Belong; 5 = Belonging: Awkward; 6 = Belonging: Proud; 7 = Liking; 8 = Belonging: Keep going; 9 = Parental socioeconomic status; 10 = Future expectations; 11 = Male; 12 = Age; 13 = First-generation immigrant; 14 = Reading skills; 15 = Parental involvement. The table shows the Pearson-like correlations among all study variables, that is, the product-moment correlation between two continuous variables, the point-biserial correlation between a continuous and a dichotomous variable, and the phi-coefficient between two dichotomous variables. * $P < .05$; ** $P < .01$; *** $P < .001$

least one panel wave up to age 30). We only considered enrollment in conventional universities and did not include universities of applied sciences or universities of teacher education.

Parental socioeconomic status

We used parental socioeconomic status as an indicator of family socioeconomic resources and considered parents' standing on the Standard International Socio-Economic Index of Occupational Status (ISEI) scale (Ganzeboom, De Graaf, and Treiman 1992), the most widely-used scale assessing socioeconomic status in Western societies (Connelly, Gayle, and Lambert 2016). This measure was assessed when the study participants were 15 years old, in the year 2000. We considered the score of the higher-status parent.

Sense of belonging in school

Students' sense of belonging in lower-secondary school was measured using a scale of three items that were assessed at age 15, in the year 2000. The items began with "My school is a place where..." and ended with the claim: "I feel like an outsider (or left out of things)," "I feel like I belong," and "I feel awkward and out of place" (PISA 2000). The response options were 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. Negatively worded statements were reverse coded so that higher values corresponded to a greater sense of belonging in school (Cronbach's alpha = 0.69). Students' sense of belonging in upper-secondary school was measured using a scale of three items that were assessed at age 17, in the year 2002: "I am proud of my school," "My school is a place I like to be at," and "I want to keep going to this school" (TREE 2016b). The response options were 1 = not at all true, 2 = hardly true, 3 = moderately true, and 4 = exactly true (Cronbach's alpha = 0.73). While it would have been ideal to have had the same scale at both measurement points, both operationalizations of the construct relied on items that have been used effectively to measure the sense of belonging in school (Goodenow and Grady 1993; Korpershoek et al. 2020; Demanet and Van Houtte 2012; Holt and Espelage 2003; Chiu et al. 2016).

Future expectations

Students' future expectations were operationalized as the socioeconomic status that students expected to have in the future, assessed on the ISEI scale. At age 15, study participants were asked about the job they expected to have around the age of 30. Their responses were converted into a score on the ISEI scale.

Control variables

In order to mitigate potential confounding effects, we controlled for several covariates that were collected as part of the PISA assessment at age 15, in the year 2000: sex (0 = female; 1 = male), age (in years), first-generation immigrant status (0 = born in Switzerland; 1 = born abroad), and reading skills, which served as a rough proxy for cognitive ability and were assessed using the PISA reading test score. This score reflected three different literacy skills—retrieving information from reading material, interpreting the material read, and reflecting on what was read (Adams and Wu 2002). Finally, we also controlled for parental involvement in the respondents' education, given that parental involvement (i.e., helping the child with schoolwork) is part of the strategies that socioeconomically advantaged parents often use to compensate for lower levels of psychological resources of their child and to boost their child's educational attainment. Specifically, we used an indicator that captured the frequency with which mothers and fathers (or guardians) worked with their child on schoolwork. Responses were collected on a five-point scale (1 = never, 2 = a few times per year, 3 = once a month, 4 = several times per month, 5 = several times per week). To obtain a measure of parental involvement, we parceled the item by computing the mean for mothers and fathers; in single-parent families, the measure was obtained from the residential parent (sensitivity analyses that do not control for parental involvement corroborate our findings; see Supplementary Material Tables S5-S6).

Data analyses
Missing data treatment

Like many other longitudinal studies, there were missing data in the TREE survey. Overall, 6.5% of the data entries were missing across items and waves. Missingness could be predicted using several variables that we incorporated in our regression models. Thus, we estimated our models based on the missing-at-random assumption (MAR). Principled missing data handling should be preferred over conventional strategies such as listwise or pairwise deletion or mean substitution when missingness is related to observed variables (Little et al. 2014), as was the case in the present study. We thus treated missing data using MICE (multiple imputation by chained equations), an iterative algorithm that replaces missing values based on observed data using regression techniques and predictive mean matching (van Buuren 2018). The MICE algorithm replaces missing values with plausible imputed values, with each imputed value including a random component whose magnitude corresponds to the extent to which other variables in the model fail to estimate its true value. Multiple imputation retains the variance in the data and correlations among variables and enables more accurate estimations of model parameters and validity maximization. It is consequently a standard method to minimize the estimation bias associated with missing data (Baraldi and Enders 2020; Lang and Little 2018; Graham 2009). However, since the true values always remain unknown, the imputation process comes with some uncertainty, which is reflected in larger standard errors. We generated m = 50 imputed datasets. After fitting the models described below for each of the imputed datasets, we pooled the coefficient estimates and their respective standard errors according to Rubin's (1987) rule.

Analytic strategy

We fit linear probability models to estimate the extent to which socioeconomic resources (parental socioeconomic status) and psychological resources (the sense of belonging in school and optimistic future expectations) predicted educational trajectories in terms of individuals' probabilities of transitioning to academic upper-secondary education and to university. Although both outcomes were dichotomous, we preferred the linear probability model over logistic regression, because the coefficients are directly interpretable and typically yield almost the same results as logistic regression (Hellevik 2009). This particularly holds true when the estimated probabilities are moderate rather than extreme, that is, between approximately 20% and 80% (Long 1997), as in our case. We standardized the continuous predictors to make their effects comparable in their magnitude.

For both outcomes, we fit a series of models. First, Model 0 included parental socioeconomic status and the covariates but omitted the psychological resources, whereas Model 1 contained all the main predictors and the covariates. These models allowed us to assess the unique (main) effects of the predictors. Second, we extended the model, adding the two-way interactions between the main predictors—parental socioeconomic status, students' sense of belonging in school, and their future expectations—one by one (Model 2) and all together (Model 3). This enabled us to determine the interplay between socioeconomic and psychological resources, that is, to assess whether there was evidence of resource compensation or reinforcement underlying educational trajectories (psychological resources could have compensated for a lack of family socioeconomic resources but might also have magnified the effects of socioeconomic resources on academically oriented educational trajectories). In Model 4, we added the three-way interaction between the main predictors. This model allowed us to gauge the interplay between the socioeconomic and psychological resources under investigation comprehensively, as it revealed whether a given two-way interaction varied across the levels of a third variable. For instance, future expectations might have only been associated with academically oriented educational trajectories when students felt a strong sense of belonging in school; this interplay between psychological resources might, in turn, have depended on family socioeconomic resources (e.g., it might have been more evident among students from socioeconomically advantaged families).

Finally, we visualized the statistically significant interactions using graphical representations to render them intuitively interpretable.

Importantly, considering the ongoing controversy regarding the best methods for estimating interaction effects in models with binary outcomes (Domingue et al. in press; Mize 2019; Rohrer and Arslan 2021), we also replicated all models using a logistic specification as a robustness test (see Supplementary Material). We used the statistical software R (R Core Team 2021) to analyze data and visualize results. Replication materials are provided on GitHub (see Data Availability Statement).

Results
Socioeconomic and psychological resources in the transition to academic upper-secondary education

The models reported in Table 3 allow us to assess the extent to which socioeconomic resources and psychological resources predicted individuals' probability of transitioning to academic upper-secondary education under *ceteris paribus* conditions. Model 0 indicates that a 1 SD increase in parental socioeconomic status was associated with an increase of 8.9 percentage points in the probability of transitioning to academic upper-secondary education ($p < .001$). Furthermore, Model 1 shows that a 1 SD increase in the sense of belonging in school was associated with an increase of 3.1 percentage points in the probability of transitioning to academic upper-secondary education ($p < .01$), and a 1 SD increase in future expectations was associated with an increase of 15.7 percentage points in that probability ($p < .001$). It is worthwhile noting that students' future expectations were more strongly associated with their transition probability than parental socioeconomic status was ($F = 142.3$, $df = 1980$, $p < .001$), and students' sense of belonging in lower-secondary school was the weakest of the three predictors, being significantly weaker than parental socioeconomic status ($F = 28.4$, $df = 1980$, $p < .001$). Models 2 and 3 in Table 3 allowed us to assess whether there was evidence of resource compensation or reinforcement underlying the transition to academic upper-secondary education. We only identified one significant two-way interaction, between parental socioeconomic status and students' future expectations ($\beta = -.025$, $p = .018$, see Model 2). The negative sign suggests that the association between students' future expectations and their transition probability was stronger among students from lower socioeconomic backgrounds, providing evidence supporting the resource compensation hypothesis. The three-way interaction was nonsignificant ($\beta = -.007$, $p = .470$), indicating that the interaction between parental socioeconomic status and students' future expectations did not depend on students' sense of belonging in lower-secondary school (see Model 4, Table 3). Finally, figure 1 visualizes the significant interaction between parental socioeconomic status and students' future expectations. It shows students' probability to transition to academic upper-secondary education as a function of parental socioeconomic status (represented on the horizontal axis) and students' future expectations (represented by the solid, dashed, and long dashed lines). The figure illustrates that future expectations predicted the probability of transitioning to academic upper-secondary education more powerfully among students of lower socioeconomic origins than among those of higher socioeconomic origins. Specifically, among students whose parents had a relatively low socioeconomic status (a score of 40.6, representing the mean—1 SD), the transition probabilities were estimated to increase by 36 percentage points (from 40% to 76%) as future expectations changed from comparatively low (mean—1 SD, solid line) to comparatively high (mean + 1 SD, dashed line). In contrast, among students whose parents had a relatively high socioeconomic status (a score of 72.3, representing the mean + 1 SD), the transition probabilities were estimated to increase by a smaller amount—27% percentage points (from 60% to 87%)—as students' future expectations changed from comparatively low (mean—1 SD, solid line) to comparatively high (mean + 1 SD, dashed line). Note, however, that our findings were partly sensitive to the model specification as they were not fully corroborated when we used logistic rather than linear probability models (see Supplementary Material Table S3 and figures S3-S7).

Table 3. Regression coefficients from linear probability models predicting the transition to academic upper-secondary education.

Predictor	Model 0		Model 1		Model 2		Model 3		Model 4	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Male	−0.059**	0.021	−0.086***	0.020	−0.087***	0.020	−0.086***	0.020	−0.087***	0.020
Age	−0.050***	0.010	−0.045***	0.010	−0.044***	0.010	−0.044***	0.010	−0.044***	0.010
First-generation immigrant	0.080*	0.034	0.046	0.032	0.046	0.032	0.047	0.032	0.046	0.032
Reading skills	0.157***	0.010	0.129***	0.010	0.129***	0.010	0.130***	0.010	0.130***	0.010
Parental involvement	−0.005	0.010	−0.003	0.010	−0.002	0.010	−0.002	0.010	−0.002	0.010
Parental socioeconomic status (SES)	0.089***	0.011	0.070***	0.010	0.072***	0.010	0.071***	0.010	0.072***	0.010
Future expectations (FEX)			0.157***	0.011	0.155***	0.011	0.155***	0.011	0.155***	0.011
Sense of belonging in lower-sec. school (SOB)			0.031**	0.010	0.031**	0.010	0.031**	0.010	0.032**	0.010
SES*FEX					−0.025*	0.010	−0.023*	0.011	−0.024*	0.011
SES*SOB							−0.015	0.010	−0.014	0.010
FEX*SOB							−0.004	0.010	−0.004	0.011
SES*FEX*SOB									−0.007	0.010
Intercept	0.649***	0.013	0.664***	0.013	0.667***	0.013	0.668***	0.013	0.668***	0.013
AIC	2369.78	9.07	2095.08	22.14	2089.14	23.064	2089.79	22.96	2090.92	22.95
BIC	2414.54	9.07	2151.03	22.14	2150.68	23.064	2162.523	22.96	2169.25	22.95

Note: Models 0 and 1 include main effects; Model 2 additionally includes the significant two-way interaction that we found when we entered the two-way interactions one by one; Model 3 includes all two-way interactions; Model 4 additionally includes the three-way interaction (for a visualization of the results from that model, see Supplementary Material figure S1). All continuous variables were standardized. SE = standard error. * P < .05; ** P < .01; *** P < .001.
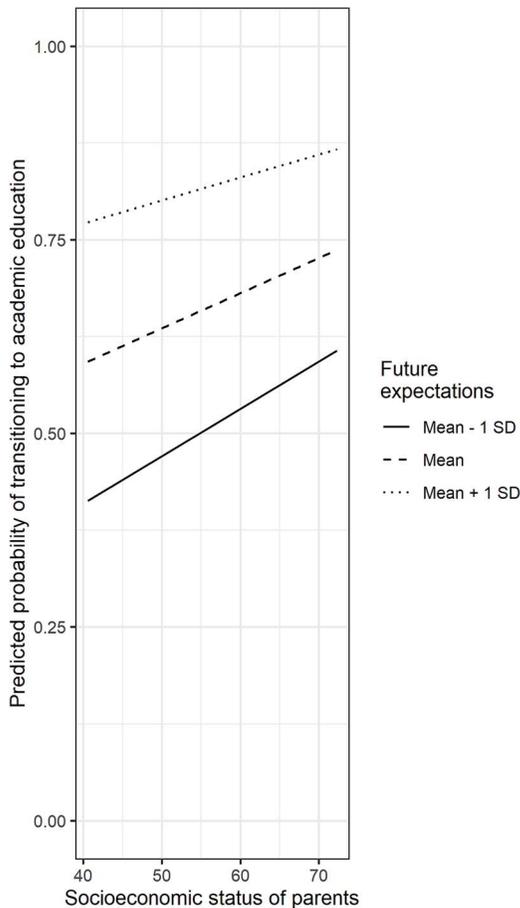
Figure 1. Predicted probability of individuals' transition to academic upper-secondary school as a function of parental socioeconomic status and students' future expectations, derived from model 2 (i.e., the analyses include all covariates).

Socioeconomic and psychological resources in the transition to university

The models in Table 4 allow us to assess the extent to which socioeconomic resources and psychological resources predicted individuals' probability of transitioning to university under *ceteris paribus* conditions. First, we note that parental socioeconomic status was very weakly— and mostly not significantly—associated with the probability of transitioning to university when controlling for the covariates (see Models 0–4). It is important to note, however, that parental socioeconomic status was significantly and somewhat more strongly associated with individuals' probability of transitioning to university when we did not control for students' track attendance in upper-secondary education (see Supplementary Material Table S1). That suggests that the benefits of parental socioeconomic status for educational attainment were bounded by the channeling structure of the education system. The educational tracks have a sorting function, channeling students into specific educational trajectories. Once students embark on a given educational track, they are likely to follow a certain path, following a set of transitions that typically lead to a given educational destination. Consequently, the students who entered the academic education track at upper-secondary level had a comparatively high probability of

subsequently transitioning to a university regardless of parental socioeconomic status. With this in mind, it is noteworthy that students' future expectations and their sense of belonging in upper-secondary school significantly predicted their probability of transitioning to university, even when controlling for educational track attendance. Model 1 shows that a 1 SD increase in the sense of belonging in school was associated with an increase of 5.6 percentage points in the probability of transitioning to university ($p < .001$), and a 1 SD increase in future expectations was associated with an increase of 4.0 percentage points in that probability ($p < .001$). Notably, the predictive power of students' sense of belonging in school was significantly stronger than that of students' future expectations ($F = 24.9$, $df = 1979$, $p < .001$) (see also Supplementary Material Table S2). Furthermore, Model 2 in Table 4 allowed us to evaluate whether there was evidence of resource compensation or reinforcement underlying the transition to university. This model found evidence of a significant two-way interaction between students' sense of belonging in school and their future expectations ($\beta = .021$, $p = .033$). This indicates that the association between the sense of belonging in school and the probability of transitioning to university was stronger among students with more optimistic future expectations. Given that this interaction was only significant when added to the model individually, we must interpret it cautiously, although an ANOVA difference test revealed that adding only this two-way interaction to Model 1 brought about a significant model improvement ($\chi^2 = 4.594$, df = 1978, $p = .033$). Finally, the three-way interaction in Model 3 was nonsignificant ($\beta = -.011$, $p = .250$), indicating that the interaction between students' sense of belonging in school and their future expectations did not vary by parental socioeconomic status (see Table 4). Figure 2 visualizes the significant interaction between students' sense of belonging in school and their future expectations. It depicts students' probability of transitioning to university as a function of their sense of belonging in upper-secondary school and their future expectations, providing a further measure of the magnitude of effects and enabling an intuitive interpretation of the results. It is important to note, however, that our findings were partly sensitive to the model specification (for details, see the Supplementary Material Table S4 and figure S8).

Discussion

Adopting a life-course and life-span developmental perspective, we examined the degree to which two important psychological resources—the sense of belonging in school and optimistic future expectations—were able to predict educational trajectories over and above the influence of socioeconomic resources. Moreover, we assessed whether psychological resources moderated the effects of socioeconomic resources on educational trajectories, predicated on the assumption that resource compensation or reinforcement mechanisms might be implicated in the dynamics underlying educational trajectories. We measured educational trajectories in terms of educational transitions from lower-secondary to academic upper-secondary education, and from there to university.

First, the findings indicate that the sense of school belonging and future expectations did significantly predict individuals' educational trajectories, even when controlling for parental socioeconomic status (our indicator of family socioeconomic resources). That is, a sense of school belonging and optimistic future expectations may serve as independent psychological forces in students' educational pursuits, motivating goal-directed behaviors and thereby fostering educational attainment (e.g., Brumley et al. 2019; Hausmann et al. 2007). Indeed, a sense of belonging in school typically allows students to identify with the schools' values and mission (Slaten et al. 2016; Voelkl 1996), which sets the stage for school engagement and academically oriented educational trajectories. Similarly, optimistic future expectations seem to guide individuals through life, helping them to persist in the face of setbacks and mitigating the impact of negative experiences. This consequently makes higher educational attainment more likely (Burger and Mortimer 2021; Ou and Reynolds 2008). It is particularly noteworthy that a sense of school belonging and optimistic future expectations (that is, psychological resources) significantly

Table 4. Regression coefficients from linear probability models predicting the transition to university.

Predictor	Model 0		Model 1		Model 2		Model 3		Model 4	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Academic education	0.607***	0.020	0.550***	0.022	0.551***	0.022	0.553***	0.022	0.552***	0.022
Male	0.072***	0.018	0.066***	0.018	0.068***	0.018	0.068***	0.018	0.068***	0.018
Age	−0.018*	0.009	−0.016	0.009	−0.017	0.009	−0.017	0.009	−0.017	0.009
First-generation immigrant	0.003	0.030	−0.004	0.030	−0.005	0.030	−0.005	0.030	−0.004	0.030
Reading skills	0.051***	0.010	0.050***	0.009	0.050***	0.009	0.050***	0.009	0.050***	0.009
Parental involvement	0.001	0.009	−0.002	0.009	−0.002	0.009	−0.002	0.009	−0.002	0.009
Parental socioeconomic status (SES)	0.021*	0.010	0.018	0.010	0.018	0.010	0.017	0.010	0.019	0.010
Future expectations (FEX)			0.040***	0.011	0.041***	0.011	0.042***	0.011	0.043***	0.011
Sense of belonging in upper-sec. school (SOB)			0.056***	0.009	0.058***	0.009	0.058***	0.009	0.059***	0.010
SES*FEX							0.013	0.010	0.013	0.010
SES*SOB							−0.001	0.009	−0.001	0.010
FEX*SOB					0.021*	0.010	0.020	0.010	0.019	0.010
SES*FEX*SOB									−0.011	0.009
Intercept	0.051**	0.017	0.091***	0.018	0.087***	0.019	0.083***	0.019	0.084***	0.019
AIC	1832.64	12.23	1772.81	12.59	1768.29	13.16	1769.27	12.98	1769.49	12.96
BIC	1883.00	12.231	1834.36	12.59	1835.43	13.16	1847.60	12.98	1853.42	12.96

Note: Models 0 and 1 include main effects; Model 2 additionally includes the significant two-way interaction that we found when we entered the two-way interactions one by one; Model 3 includes all two-way interactions; Model 4 additionally includes the three-way interaction (for a visualization of the results from that model, see Supplementary Material figure S2). All continuous variables were standardized. SE = standard error. * P < .05; ** P < .01; *** P < .001.
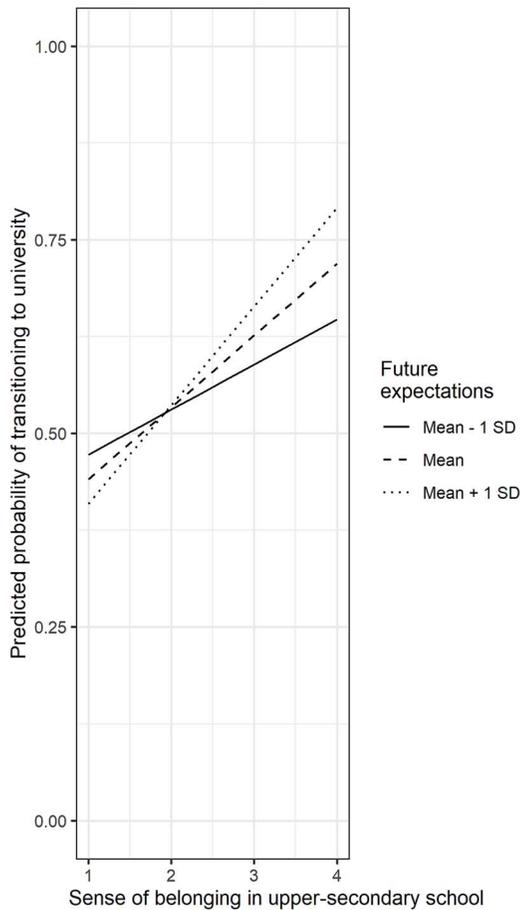
Figure 2. Predicted probability of individuals' transition to university as a function of students' sense of belonging in upper-secondary school and their future expectations, derived from model 2 (i.e., the analyses include all covariates).

predicted individuals' probabilities of transitioning to both academic upper-secondary education and university, whereas socioeconomic resources only predicted the transition to academic upper-secondary education but not the transition to university. This is likely because students who attended academic upper-secondary education constituted a relatively homogeneous group whose families possessed sufficient socioeconomic resources to enable them to pursue ambitious educational goals and follow academically oriented paths (Becker and Glauser 2018; Gomensoro and Meyer 2021).

Second, we found some evidence of a resource compensation effect between socioeconomic origin and future expectations in individuals' transition to academic upper-secondary education. Future expectations were more strongly related to the probability of transitioning to academic upper-secondary education among students of lower socioeconomic origins than among those of higher socioeconomic origins. Hence, future expectations potentially offset a lack of socioeconomic resources, buffering the adverse impact of a disadvantaged socioeconomic background on educational attainment. This finding is consistent with previous evidence indicating that lofty future expectations are particularly beneficial for students from disadvantaged social backgrounds; they disproportionately boost their educational performance (Destin, Manzo, and

Townsend 2018) and potentially their educational attainment (Schoon et al. 2021). At the same time, the resource compensation effect between socioeconomic origin and future expectations can be interpreted in terms of compensatory advantage (Bernardi 2014; Bernardi and Grätz 2015), meaning that students from socioeconomically advantaged backgrounds were protected to some extent against the negative consequences of pessimistic future expectations (as the adverse effect of pessimistic expectations on educational attainment was less powerful for students from advantaged families than for those from disadvantaged families). However, it should be noted that robustness tests using a logistic model specification yielded evidence that only partially supported the resource compensation hypothesis (see Supplementary Material figures S3-S7 and Table S3). Moreover, we did not find evidence of a resource compensation (or compensatory advantage) effect between socioeconomic origin and the sense of belonging in school, indicating the need to distinguish between different types of psychological resources. Furthermore, we found some, albeit inconclusive, evidence indicative of a resource reinforcement effect between the sense of belonging in school and future expectations in students' probability to transition to university. Students with a greater sense of belonging in school might derive more benefit from optimistic expectations than those with a weaker sense of belonging. This implies that a given psychological resource could amplify the advantage bestowed on individuals who already possess some other psychological resource. While prior research has shown that the combined influence of multiple psychological strengths constitutes an important foundation for adaptive and effective human functioning as well as for goal-striving processes (Burger and Strassmann Rocha 2024; Vaillant 2012), the current study's findings are novel in that they indicate potentially mutually reinforcing (i.e., multiplicative) effects of such resources (but see also the robustness analyses in the Supplementary Material, Table S4 and figure S8; moreover, see Supplementary Material Part C).

This study is not without limitations and suggests promising avenues for future research. First, although we employed a panel design and accounted for observable potential confounders, the study yields results consistent with, but not unambiguously demonstrating, causal links between individuals' socioeconomic and psychological resources and their educational trajectories. We cannot rule out reciprocal effects between psychological resources and educational trajectories. An intensive longitudinal study design with closely spaced observations would allow researchers to analyze (bi-)directional links more accurately. Furthermore, a field experiment in which psychological strengths were actively manipulated might also enable researchers to identify causal effects. However, given the ethical challenges and the practical difficulties that such an experiment would pose, the present study's naturalistic design and the use of longitudinal observational data are valuable in understanding educational trajectories under real-world conditions. Second, the scales measuring individuals' sense of belonging in lower- and upper-secondary education relied on different items that represented slightly different aspects of belongingness. Although both scales used items that were employed in previous studies (Chiu et al. 2016; Goodenow and Grady 1993; Korpershoek et al. 2020), we encourage replications that use identical scales across measurement points. We also note, however, that both the scales and the items were positively correlated across measurement time points; hence, we believe that the results are not specific to the operationalization of the constructs. Third, we estimated educational transition probabilities as a function of socioeconomic and psychological resources, controlling for a standardized measure of academic performance to minimize potential confounding effects. This performance measure was, however, collected at just one single time point, when study participants were around 15 years old. Similarly, future expectations were also only measured at this time point. We look to future research to assess academic performance and future expectations repeatedly over the course of schooling to better account for their roles in educational trajectories. Finally, parental socioeconomic status and future expectations were assessed using the single-item ISEI scale. This scale represents the most frequently used single indicator of individuals' socioeconomic position in society (Connelly, Gayle, and Lambert 2016). It has been cross-validated against various other indices of socioeconomic position and is

widely used in the social sciences (Ganzeboom, De Graaf, and Treiman 1992; Hauser and Warren 1997). Nonetheless, in the future, it would be ideal to measure socioeconomic status and future expectations using a multi-item scale that encompasses indicators of educational attainment, occupational standing, and income.

Conclusion

This study investigated the extent to which socioeconomic and psychological resources are involved in the dynamics underlying educational trajectories. The findings confirmed evidence suggesting that both socioeconomic and psychological resources shape academically oriented educational trajectories, although the predictive power of these resources may differ across distinct stages in an educational career. Moreover, we found evidence, albeit not entirely conclusive, suggesting that future expectations may mitigate the negative impact of a lack of socioeconomic resources on academically oriented educational trajectories. Young people with optimistic future expectations may be better insulated against the disadvantages that individuals from low socioeconomic-status families face, or these future expectations might help them to recover more easily from setbacks, allowing them to continue striving for higher educational attainment when confronted with difficulties associated with socioeconomic constraints. In conclusion, this study highlights the unique roles and the interdependencies of socioeconomic and psychological resources in educational trajectories. Its findings should raise awareness among practitioners and policymakers that interventions designed to promote educational attainment will likely only prove useful if they consider social and psychological dimensions—and their interplay—within a comprehensive intervention framework.

About the authors

Kaspar Burger is currently an Associate Professor at the Center for Childhood and Youth Research, University of Luxembourg. He is also an Honorary Associate Professor at the Social Research Institute, University College London. His main research interests focus on education, social inequalities, and the life course. His scholarly work has appeared in journals such as *Advances in Life Course Research, European Sociological Review*, and *Social Science Research*.

Nathan Brack is a Data Scientist at Sotomo, a private research institute specializing in public opinion polls and social research. Formerly, he was a scientific collaborator at the Jacobs Center for Productive Youth Development, University of Zurich. He holds a MSc in mathematics from ETH Zurich and has a keen interest in the social sciences and quantitative methodology.

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Supplementary material

Supplementary material is available at *Social Forces* online.

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Conflicts of interest

None declared.

Data availability

The data used in this study are publicly available at SWISSUbase and can be accessed at doi.org/10.23662/FORS-DS-816-7. Materials and analysis code for this study are available on GitHub at https://github.com/nathanbrack/AcademicEducation-SwitzerlandTREE.

Ethics

All analyses in the present study were performed on anonymous data. Any information presented here is reported such that the study participants cannot be identified. All procedures performed in the original study were in accordance with the ethical standards of the institutions involved in data collection.

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