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Disentangling the Interplay of the Sense of School Belonging and Institutional Channels in Individuals' Educational Trajectories

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Abstract

Accumulating evidence indicates that students' sense of school belonging has a substantial positive effect on educational attainment. At the same time, life-course and life-span developmental theories suggest that the benefits of a sense of school belonging could be weakened by the channelling effects of education systems that assign students to distinct educational tracks that lead otherwise similar students to quite different educational destinations. The current study analysed the extent to which the sense of school belonging predicted educational trajectories in a system that partially channels students into distinct tracks. It assessed educational trajectories as they relate to transitions at two critical junctures of the system—the transition from lower- to upper-secondary education, and from upper-secondary to tertiary (university) education. The study used data from a panel survey that followed participants from age 15 to 30 (n = 4986). Findings from structural equation models indicated that students with a stronger sense of school belonging were significantly more likely to continue in or transition into academic tracks, but that the benefits of students' sense of belonging were bounded by the system's channelling structure. While, for students in academic tracks, the sense of school belonging strongly predicted the probability of continuing in academic tracks, it only marginally predicted the probability of moving into academic tracks for those whose educational career began in more vocationally oriented tracks. Hence the sense of school belonging may influence academic trajectories only inasmuch as institutional structures allow it to, because these structures differentially enable and constrain such trajectories.

Keywords

Sense of belonging, educational attainment, tracking, prospective cohort study, life course

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Humans have a strong need to belong to a social group or community. Their need to belong underlies a wide range of behaviors, thoughts, and emotions. We interact with and rely on group members, imitate their practices, and learn from their behavior. Through interpersonal interaction and cooperation, we survive, develop, and grow. Hence, we are fundamentally motivated by a need to belong (Baumeister & Leary, 1995; Hagerty et al., 1996; Over, 2016). However, belonging—a "core social motive"—is not only a fundamental human need that must be fulfilled before other, less prepotent needs can be satisfied (Fiske, 2018; Maslow, 1943). Belonging also has a wide range of positive implications for psychological and behavioral adjustment, broad human functioning, and individual attainment in various domains.

This is particularly true in the school context, where a sense of belonging is an essential precondition for actively participating in class, engaging effectively in learning activities, coping with stress, and developing interpersonal skills and a positive attitude toward school and learning. A sense of belonging in school reflects the feeling of fitting into the school environment—a sense of being accepted, respected, included, and valued by peers and teachers (Goodenow & Grady, 1993). Students who feel that they belong in school typically identify with school practices, values, and objectives (Voelkl, 1996). They exhibit adaptive behavior, academic motivation, and emotional engagement in school (Appleton et al., 2006; Slaten et al., 2016; Walton et al., 2012). They also show greater academic interest and persistence. As a result, they perform better, which in turn may foster more academic educational careers (Murphy et al., 2020; Murphy & Zirkel, 2015; O'Keeffe, 2013; Strayhorn, 2018). By contrast, students who experience uncertainty about their belonging in school are less likely to take full advantage of the educational opportunities that are provided to them, and they perform more poorly (Allen & Kern, 2017; Morinaj et al., 2020). A low sense of belonging may lead to school disengagement, which has multiple adverse effects on a student's entire educational career, including dropout from school (Archambault et al., 2009; Finn, 1989; Hascher & Hadjar, 2018; Ma, 2003). In sum, there is evidence that a sense of school belonging has substantial positive effects on educational trajectories, which are typically regarded as universal. However, educational trajectories are also shaped by the structure of the education system, that is, the unique institutional conditions in which these trajectories unfold.

The significance of institutional contexts for developmental trajectories has been prominently recognized by life-course and life-span developmental theories (Baltes et al., 2006; Elder, 1998; Elder & Shanahan, 2006; Lerner & Damon, 2006). These theories suggest that the benefits of a sense of school belonging could be undermined by institutional constraints, most notably by the channeling effects of education systems that allocate students to distinct educational tracks, leading otherwise similar students to quite different educational destinations (Borghans et al.,

2019; Holm et al., 2013). Indeed, education systems worldwide assign students to different tracks according to their performance levels, with the aim of tailoring instruction to students' specific needs and skills (Hanushek & Wößmann, 2006; Ozer & Perc, 2020; Van de Werfhorst & Mijs, 2010). While this clustering of students in tracks is expected to enable maximum learning for all students, research suggests that once students embark on a given educational track, they are likely to follow some standard sequence of transitions through the system; hence, their educational trajectories become somewhat predictable (Breen & Jonsson, 2000; Dauber et al., 1996; Domina et al., 2017). Thus, the widespread view that a sense of school belonging generally promotes more successful educational trajectories may be inaccurate inasmuch as educational tracks structure how students progress through the education system and potentially constrain the benefits of a sense of belonging.

Life-course and life-span developmental theories also suggest that individual student characteristics, such as a sense of school belonging, may vary across educational contexts. These theories conceive of individuals and contexts as inextricably linked and as co-constitutive forces that are formed in relation to and by each other (Benner et al., 2008; Burger & Mortimer, 2021; Goyer et al., 2021; Schoon & Heckhausen, 2019). Some empirical evidence supports the idea that the sense of belonging is sensitive to the school environment and culture (Cemalcilar, 2010; Van Houtte & Van Maele, 2012; Vaz et al., 2015), indicating that it might also vary across educational tracks that provide quite distinct learning environments and unequal developmental contexts. Moreover, we may expect students' sense of school belonging and the educational tracks that they attend to jointly influence educational trajectories. That is, while a sense of school belonging may influence whether students pursue their education beyond compulsory schooling to tertiary education, we may also expect an interplay between the sense of belonging and educational tracks, such that any potential influence of students' sense of school belonging on their educational trajectories might vary as a function of the track that they attend.

With this in mind, the current study sought to analyze 1) whether the sense of school belonging differs between educational tracks; 2) whether the sense of school belonging predicts educational trajectories; and 3) whether educational tracks modify the influence that the sense of school belonging may have on educational trajectories, potentially setting lower and upper bounds for the strength of this influence. The study focused on the Swiss education system, which is a good case to understand the interplay between the sense of belonging and educational tracks because it sorts students into distinct educational tracks that have different academic requirements and provide either academically oriented or more vocationally oriented educational paths. Academically oriented tracks typically lead students quite directly into tertiary education, whereas vocationally oriented tracks tend to divert them away from universities and into the labor market. However, at the same time, the system is relatively open, offering multiple educational tracks through secondary and into tertiary education. It contains bridges between specific tracks, allowing students to follow qualitatively different and alternative paths to a given educational destination, meaning that educational trajectories may diverge but converge again

at later stages, as is typical in many education systems worldwide (Breen & Jonsson, 2000; Cedefop, 2012; Crul, 2013). Thus, despite its channeling structure, the Swiss education system offers a structure of opportunity for students to pursue different educational trajectories, that is, either direct trajectories along academic tracks or indirect trajectories from vocational tracks via academic tracks to tertiary education.

Sense of Belonging in School

The importance of a sense of belonging for a wide range of outcomes has been recognized in many disciplines, including psychology, educational science, sociology, and anthropology (Belanger et al., 2020; Brady et al., 2020; Cook et al., 2012; Good et al., 2012; Hernández et al., 2017; Hughes et al., 2015; Lambert et al., 2013; Levinson, 2005; May, 2011; Nikitin & Freund, 2018; Smerdon, 2002). Research has indicated that a strong sense of school belonging triggers adaptive learning behavior, persistent effort in schoolwork, expectations of academic success, and better academic performance (Allen et al., 2016; Anderman, 2002; Korpershoek et al., 2020; Marksteiner et al., 2019). All these aspects are conducive to successful educational careers. A sense of school belonging is vital for school engagement because it prevents feelings of futility, confusion, and disaffection (Sánchez et al., 2005). It also mitigates resistance toward and a lack of confidence and trust in the education system, reducing feelings of ambivalence and skepticism about the likelihood of succeeding in school (Finn & Zimmer, 2012; Osterman, 2000; Walton & Cohen, 2007). A sense of school belonging leads to identification with school, goal-directed learning, and adaptive behavior, all of which likely facilitate successful educational trajectories (Roeser et al., 1996; Walton & Cohen, 2011). Students who feel that they belong in school generally value school culture and may therefore be more likely to continue in education beyond compulsory schooling up to tertiary education (Yeager et al., 2016). In contrast, students with a low sense of belonging gradually disidentify from school. Because their basic need for belonging is not met, they have difficulty sharing school-related goals and are less likely to achieve academic success (Glasser, 1986; Schachner et al., 2019; Strayhorn, 2018; Voelkl, 1996; Walton & Cohen, 2011). Their behavioral and affective repertoire may include inattention, feelings of distrust and suspicion of school, deteriorating academic motivation, and alienation from school, with its attendant denigration of school values and school-related outcomes (Bottiani et al., 2017; Faircloth & Hamm, 2005; Freeman et al., 2007; Hascher & Hadjar, 2018; Sirin & Rogers-Sirin, 2004). For such students, school is an environment in which they feel awkward and out of place (Juvonen, 2006; OECD, 2017). Accordingly, they are likely to gradually disengage and ultimately withdraw from school (Archambault et al., 2009; Ostrove & Long, 2007).

Institutional Channels and Educational Trajectories

Almost all education systems allocate students to distinct educational tracks that differ in terms of academic requirements. This purposive clustering of students in classes within schools or in different types of schools is known as tracking, but it has also been referred to as ability grouping, sorting, or differentiation (Becker et al., 2012; Burger, 2016, 2019a; Chiu et al., 2017; Dockx et al., 2019). Advocates argue that tracking allows for effective and appropriately paced instruction that is ideally adapted to students' skills and needs, enabling maximum learning for all students. However, different educational tracks typically provide unequal learning environments and usually lead to different educational credentials (Breen & Jonsson, 2000; Burger, 2021; Pfeffer, 2008). Consequently, educational tracks may be conceived of as channels because they steer individuals and their educational trajectories in a given direction, opening up a specific set of educational opportunities and restricting others. Once students are on a given track, they are likely to progress through the system by following a standard sequence of transitions (Anderson et al., 2000), which eventually leads to a given educational destination. Thus, by channeling educational trajectories along distinct tracks, education systems put students on the path to distinct educational attainments, meaning that students end up on trajectories of relative advantage or disadvantage throughout their lives (Blossfeld et al., 2016; Domina et al., 2017; Oakes, 2005; O'Rand, 2006). Students in academic tracks frequently pursue trajectories that lead directly into tertiary education. In contrast, students in less academic tracks are either diverted away from academic destinations -- or they pursue indirect trajectories from vocationally-oriented tracks, via academic tracks, into tertiary education (Hillmert & Jacob, 2010; Holm et al., 2013).

Channeling structures are inherent in any education system, although channeling practices differ across systems (Eurydice, 2010; OECD, 2016; Triventi et al., 2020). Importantly, however, in most systems students can follow either direct or indirect trajectories to a given educational destination (Backes & Hadjar, 2017; Milesi, 2010; Tieben, 2011). Qualitatively different and alternative pathways exist, and therefore students' educational trajectories may diverge at some junctures, only to converge at a later stage (Breen & Jonsson, 2000). Yet relatively large proportions of a given student cohort typically follow direct trajectories—from an academic track at lower-secondary level into an academic track at upper-secondary level and ultimately into university, or conversely, from vocational tracks in secondary education directly into the labor market. In contrast, indirect trajectories usually involve a comparatively complex pattern of transitions between educational tracks (Crul, 2013; Roksa & Velez, 2012). Such indirect trajectories occur relatively infrequently (Berkemeyer et al., 2013; Jacob & Tieben, 2009). Nevertheless, some students avail of the option to take an indirect path from lower- to upper-secondary education (Oesch, 2017; Trautwein et al., 2008) and from upper-secondary to tertiary education (Hillmert & Jacob, 2010; Kost, 2013; Milesi, 2010). Thus, even though educational tracks have a channeling function, students can deviate from the main educational "channels" and move

along "by-channels" to a given educational destination instead (Denice, 2019; Feinstein & Peck, 2008; Makrinus et al., 2016; Pallas, 2003; Roksa & Velez, 2012).

The Interplay Between the Sense of Belonging in School and Institutional Channels

While institutional channels provide scaffolding for students, steering their educational trajectories in a given direction, life-course and life-span developmental theories suggest that educational trajectories are best understood as the result of the interplay between individuals and institutional constraints and opportunities (Elder & Shanahan, 2006). Hence, we may expect students' sense of school belonging and their educational tracks to jointly shape educational trajectories. Students with a stronger sense of school belonging may be more likely to remain in the education system for longer, pursuing their education beyond compulsory schooling up to tertiary education, whereas those with a weak sense of belonging might leave the system at an earlier stage (Archambault et al., 2009; Murphy et al., 2020; O'Keeffe, 2013). Such differences might be exacerbated by educational tracks that have a channeling function, minimizing the range of educational options that students have and partially locking them into a given trajectory. For instance, we might assume that, for academic-track students, a given level of sense of school belonging may exert a comparatively strong influence on their academic trajectories; the same may not be true in other, less academic, tracks. Hence, educational tracks might modify the influence that the sense of school belonging can exert on educational trajectories, possibly increasing or decreasing the strength of this influence or at least defining its limits.

The Swiss Education System: Institutional Structure and Educational Trajectories

The Swiss education system is an ideal case in which to examine the interplay between the sense of belonging and educational track due to its institutional tracking structure and the types of educational trajectories thus enabled. Specifically, the Swiss education system provides multiple, hierarchically differentiated tracks through secondary and into tertiary education (see Figure 1). Following comprehensive education in primary school, students are allocated to different tracks at lower-secondary level. These tracks differ in terms of their academic demands and are therefore referred to as low, intermediate, and high tracks. However, some students attend comprehensive, non-tracked lower-secondary schools that teach students of all ability and achievement levels together using a common curriculum. The upper-secondary level is divided into two main tracks: 1) the academic track (Gymnasium), which primarily prepares students for tertiary education, and 2) vocational education and training, which prepares students for entry into the labor market and for colleges of higher education. Finally, the tertiary level consists of conventional universities; universities of applied sciences and teacher education; and colleges of higher education, which provide an advanced level of professional education and training (SKBF, 2007).

Figure 1   Illustration of the main features of the Swiss education system

Primary level · Lower secondary level · Upper secondary level · Tertiary level

Primary level	Lower secondary level	Upper secondary level	Tertiary level
Grades 1 – 5/6	Grades 6/7 – 9	Grades 10 – 12/13	Following grade 12/13
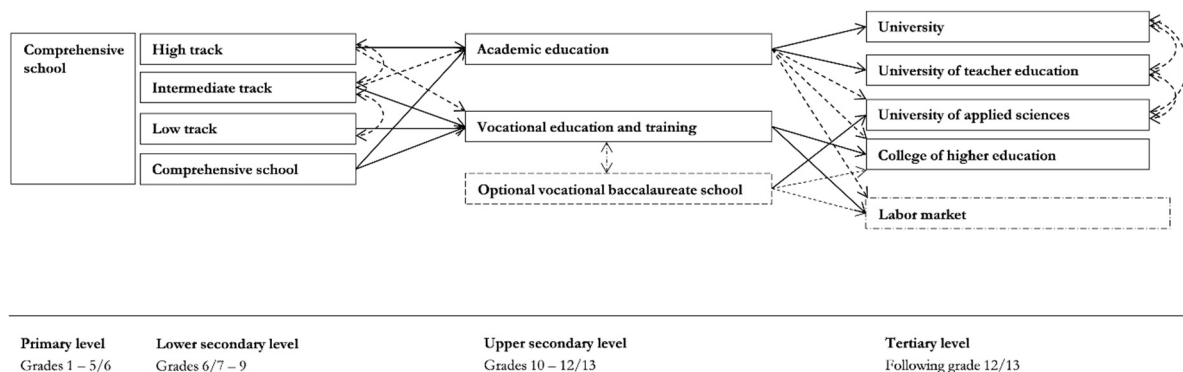
Primary school is comprehensive, instructing pupils of all performance and ability levels using a common curriculum. The lower-secondary level consists of different educational tracks, which vary in their academic demands (high, intermediate, and low) and comprehensive schools that use no formal tracking. The upper-secondary level is divided into academic education and vocational education and training. Typically, direct admission to the academic upper-secondary track requires successful completion of a high track at the lower-secondary level. Yet it is also possible to take indirect paths to the academic upper-secondary track. For example, students can transition from an intermediate to a high track before ultimately transitioning into the academic upper-secondary track. Solid arrows denote typical (widespread) educational trajectories. Dashed arrows represent rather atypical trajectories. Dashed curved double-headed arrows illustrate options to transition between tracks. These transition options are available to students who meet certain requirements or pass supplementary exams. Depending on the canton, primary school consists of either five or six grades. Lower-secondary education consists of three or four grades, up to grade nine. Upper-secondary education consists of three or four grades. Note that while the structure of the system differs somewhat between and within subnational administrative units (cantons), the main features are identical in all parts of the country (SKBF, 2014; illustration adapted by author).

The tracking structure standardizes educational trajectories to some extent, partially channeling students along certain educational tracks through secondary education and into tertiary education (Meyer, 2018). However, because the system offers multiple, qualitatively different tracks to a given educational destination, the system allows for some variation in educational trajectories. For instance, while a significant proportion of students follow direct trajectories that take them along academic tracks into university (reflected by the solid arrows in Figure 1), students can also follow indirect trajectories and eventually end up in university, because the system allows students to switch tracks and deviate from direct paths. For instance, at the lower-secondary level, students may transition from an intermediate track to a high track; they can then transition into academic upper-secondary education. This means that students in a given track retain the opportunity to change their trajectories by completing additional programs. Thus, irrespective of the educational track that students initially attend, they can, in principle, pursue their educational careers up to university by following either direct or indirect trajectories, provided that they meet the respective academic requirements.

Study Aims and Hypotheses

Previous research has typically regarded the consequences of a strong sense of school belonging for educational outcomes as universal; possible variations in these consequences across contexts have received little attention. However, life-course and life-span developmental theories have challenged this assumption of universality and stressed the key significance of contexts. The suggestion here is that institutional structures also influence educational outcomes, potentially in conjunction with students' sense of school belonging. With this in mind, this study's main

aim was to assess whether educational tracks modify the potential influence exerted by the sense of belonging on educational trajectories. The study assessed educational trajectories at two critical transition junctures—from lower- to upper-secondary education tracks and from upper-secondary tracks to university—within a system that offers multiple tracks from lower-secondary school up to university. Because the sense of belonging may vary across contexts, the study initially analyzed the extent to which the sense of belonging differs between educational tracks. Overall, the study tested four hypotheses:

Hypothesis 1. The sense of school belonging differs between educational tracks.

Hypothesis 2a. Individuals with a greater sense of school belonging are more likely to transition into academic upper-secondary education than vocational education.

Hypothesis 2b. Individuals with a greater sense of school belonging are more likely to transition into university.

Hypothesis 3. The benefits of a sense of school belonging for educational trajectories vary as a function of the educational tracks that individuals follow.

Because the study looked at a 15-year period, it was able to consider individuals' likelihood of moving to university, regardless of whether they had previously followed a direct trajectory (from an academic track to university) or an indirect trajectory (from a vocational track via an academic track to university). The study considered enrolment at university after completion of upper-secondary education at any point over a period of up to ten years—from 2004 to 2014, when study participants were on average between 19.5 and 29.5 years old, that is, during the phase of life when virtually all university-bound students first enrolled in a university (BFS, 2015). Because the sense of school belonging may be associated with individual student characteristics (Chiu et al., 2016; Slaten et al., 2016), the study accounted for relevant individual-level factors -- sex, age, immigrant status, academic performance, and parental socioeconomic status.

Data and Methods

Sample

Data were taken from the TREE (Transitions from Education to Employment) survey, an ongoing panel study investigating educational and labor market trajectories beginning in the last year of lower-secondary education in Switzerland (TREE, 2016).[1] The data used here are publicly available and completely de-identified. The current study is part of a project that received approval of the Institutional Review Board of the University of Minnesota ([Micro-, Meso-, and

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[1] The TREE panel survey is a social science data infrastructure primarily funded by the Swiss National Science Foundation and located at the University of Bern (Distribution: data service, FORS, Lausanne).

Macro-Level Determinants of Educational Inequalities: An Interdisciplinary Approach], IRB ID: 00004882, 11/07/2018).

The original sample consisted of 6343 adolescents who participated in the Program for International Student Assessment (PISA) in the year 2000, when the participants were enrolled in the last year of lower-secondary school. In PISA, a two-stage stratified sampling procedure was used to select a nationally representative sample of students (OECD, 2015). In the first step, schools were selected with probabilities proportional to the size of the student population (primary sampling units). In the second step, students were selected at random within schools (secondary sampling units).

The present study used data covering the entire observation period from 2000 to 2014. From 2001 to 2007, the TREE panel waves were conducted at annual intervals (t_1 to t_7). Two additional waves took place in 2010 and 2014 (t_8 and t_9). Because I sought to examine educational trajectories up to the university level, I restricted the sample to the participants who reported whether or not they had been enrolled at a university during any of the panel waves. This resulted in an analytic sample of 4986 participants in the first wave. The analytic sample and the original sample were very similar with respect to key sociodemographic characteristics. Relative to the original sample, the analytic sample comprised slightly fewer men (43.8% vs. 45.8%), slightly fewer first-generation immigrants (12.9% vs. 14.3%), and individuals who exhibited slightly better academic performance, as indicated by the PISA reading score (M = 520.0, SD = 85.1; vs. M = 510.0, SD = 89.0; specifically, the difference in academic performance amounted to 0.10 SD). The two samples were virtually identical in terms of parental socioeconomic status (measured on the standard international socio-economic index scale: M = 51.0, SD = 16.3; vs. M = 50.4, SD = 16.3), and in terms of participants' age in the year 2000 (M = 15.5, SD = 0.6; vs. M = 15.5, SD = 0.7).

Measures

Data were collected by means of written questionnaires (waves 1 to 4) and a combination of questionnaires and computer-assisted telephone interviews (waves 5 to 9). Data collection typically took place between April and June in each wave. All measures used here are presented in what follows. Table 1 indicates the year in which these measures were collected and summarizes the descriptive statistics (based on non-imputed data); Table 2 reports the zero-order correlations.

Table 1   *Descriptive statistics*

Variable	Measured in	M	SD	Min.	Max.	N
Male	2000	0.44		0	1	4986
Age	2000	15.50	0.64	11.83	19.00	4974
First-generation immigrant	2000	0.13		0	1	4962
Academic performance (reading)	2000	519.97	85.12	27.60	884.49	4982
Socioeconomic status (SES)	2000	51.00	16.25	16.00	90.00	4614
Lower-secondary education	2000					4984
High track		0.40		0	1	
Intermediate track		0.32		0	1	
Low track		0.22		0	1	
No tracking		0.06		0	1	
Sense of belonging t_0	2000					
I feel like an outsider		3.61	0.69	1	4	4928
I feel like I belong		2.99	0.89	1	4	4893
I feel awkward, out of place		3.37	0.80	1	4	4899
Upper-secondary education	2002					4640
Vocational education		0.60		0	1	
Academic education		0.34		0	1	
Other education		0.06		0	1	
Sense of belonging t_2	2002					
Proud of my school		2.96	0.75	1	4	3920
Like to be at school		2.89	0.80	1	4	3932
Want to keep going to school		3.21	0.86	1	4	3887
Tertiary education	2004-2014					4986
University		0.26		0	1	

Note: N refers to the number of observations present in the dataset. First-generation immigrant signifies individuals born abroad. "Other education" refers to activities as described in the Measures section. Note that all study participants were first surveyed when they attended grade 9, in the year 2000. At that time, 82.5% of the participants were between 14 and 16 years of age.

Table 2   Zero-order correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
2	.056**																	
3	.004	.121**																
4	-.129**	-.122**	-.247**															
5	.007	-.135**	-.142**	.293**														
6	-.043**	-.036*	-.079**	.394**	.271**													
7	.002	.020	-.040**	-.007	-.036*	-.555**												
8	.046**	.043**	.135**	-.429**	-.248**	-.438**	-.366**											
9	.003	-.042**	.005	-.044**	-.057**	-.205**	-.172**	-.135**										
10	-.006	.008	-.067**	.069**	.003	.029*	-.001	-.026	-.014									
11	.007	.104**	-.047**	.080**	.002	-.077**	.145**	-.006	-.115**	.382**								
12	.033*	-.008	-.032*	.075**	.006	.017	.030*	-.044**	-.017	.467**	.396**							
13	.110**	.155**	.004	-.333**	-.286**	-.440**	.218**	.261**	.029*	-.005	.005	-.026						
14	-.079**	-.209**	-.054**	.419**	.342**	.512**	-.240**	-.316**	-.039**	.031*	.006	.047**	-.882**					
15	-.070**	.099**	.099**	-.151**	-.095**	-.115**	.029*	.094**	.019	-.054**	-.023	-.042**	-.305**	-.181**				
16	-.059**	-.082**	.007	.013	.028	.074**	-.068**	-.022	.016	.041*	.017	.058**	-.156**	.161**	-.015			
17	-.080**	-.092**	.037*	.085**	.047**	.060**	-.027	-.030	-.022	.040*	.088**	.077**	-.181**	.188**	-.022	.541**		
18	-.030	-.110**	-.003	.170**	.133**	.176**	-.039	-.125**	-.082**	.025	.057**	.051**	-.301**	.329**	-.099**	.503**	.544**	
19	-.016	-.174**	-.065**	.373**	.307**	.392**	-.154**	-.266**	-.039**	.027	.024	.035*	-.621**	.711**	-.141**	.157**	.187**	.291**

Note. 1 = Male; 2 = Age; 3 = First-generation immigrant; 4 = Academic performance (reading); 5 = Socioeconomic status (SES); 6 = High track; 7 = Intermediate track; 8 = Low track; 9 = No tracking; 10 = Sense of belonging to: outsider; 11 = Sense of belonging to: belong; 12 = Sense of belonging to: awkward; 13 = Vocational education; 14 = Academic education; 15 = Other education; 16 = Sense of belonging t2: proud; 17 = Sense of belonging t2: like to be at school; 18 = Sense of belonging t2: want to keep going; 19 = University. Pearson coefficients are provided for correlations between continuous variables, point-biserial coefficients for correlations that include a dichotomous variable, and Phi coefficients when two dichotomous variables are involved.

* p < .05, ** p < .01.

Sense of Belonging

To capture sense of belonging at the lower-secondary school level, three items from the PISA survey (year 2000) were used, beginning with "My school is a place where…" and ending with the statement "I feel like an outsider (or left out of things)," "I feel like I belong," and "I feel awkward and out of place." Respondents assessed the items on a four-point rating scale ranging from 1 (strongly agree) to 4 (strongly disagree). Where necessary, responses were reverse coded for the purpose of the analysis (Cronbach's α = .67).

To assess sense of belonging at the upper-secondary school level, I used three items from the TREE survey (year 2002): "I am proud of my school," "School is a place where I want to go," and "I want to keep going to school." Respondents assessed the items on a four-point rating scale ranging from 1 (not at all true) to 4 (entirely true) (Cronbach's α = .77).

Educational Track at the Lower-Secondary Level

The lower-secondary school tracks differ in terms of their academic demands (basic to advanced). Here, they are termed the low, intermediate, and high track. In addition, there are some comprehensive schools that do not use any formal tracking and instead instruct students of diverse ability and achievement levels together, using a common curriculum. The four school track types were dummy coded, with comprehensive schools serving as the reference category. This made it possible to compare educational transition probabilities between individuals in comprehensive schools and tracked schools. Because comprehensive schools exist alongside formally tracked schools in 14 out of 26 cantons, there was no systematic confounding of track type and cantons in the analysis. However, it is important to note that most students are assigned to a tracked school, with only a minority attending comprehensive non-tracked schools (SKBF, 2007). The present sample reflects these proportions, with 40% of study participants attending a high track, 32% an intermediate track, 22% a low track, and 6% a comprehensive non-tracked school.

Educational Track at the Upper-Secondary Level

At the upper-secondary level, I distinguished between three education types: (1) the academic track (Gymnasium), which prepares students for tertiary education; (2) the vocational track, which combines education in specialized colleges with firm-based training with immediate practical utility and thus prepares students for labor market entry and for colleges of higher education; and (3) other education, which refers to short-term activities, including language courses, internships, and preparatory courses for academic or vocational education; this category also includes individuals who were not in education, employment, or training.

The indicator of upper-secondary education was recoded into a dummy variable, with the reference category being the vocational education group, because this group represented the majority (59.8%) of the study participants. The analysis used data from the 2002 panel wave, because these data reflected participants' upper-secondary education type more accurately than the 2001 data (Coradi Vellacott & Wolter, 2004). In 2002, 94.1% of the study participants were either in academic upper-secondary education or in a vocational education program (i.e., one of the two major educational tracks at the upper-secondary level). By contrast, in 2001, only 83.3% of the study participants were in one of these two main educational tracks, with 16.7% pursuing "other" educational activities. Importantly, 95% of the study participants who were in vocational education in 2002 were still in vocational education in 2003 ($r = .85$), and 96% of the participants who were in academic education in 2002 were still pursuing academic education in 2003 ($r = .97$), suggesting that the data from the 2002 wave represented participants' upper-secondary education most accurately.

University Enrollment

A binary variable was used to evaluate whether a participant had ever attended a university between 2004 and 2014 (the first study participants transitioned into university in 2004). Although it would have been interesting to investigate trajectories up to university graduation, I did not analyze university graduation because this latter variable had a large proportion of missing values. Around the turn of the millennium, the university dropout rate among students who started university was 13.5% (BFS, 2012). That means that most TREE survey participants who reported attending a university in a given panel wave were likely to ultimately graduate from university.

Control Variables

The study controlled for the following sociodemographic characteristics: Sex (0 = female, 1 = male), age (in years), immigrant background (0 = born in Switzerland, 1= born abroad), and parental socioeconomic status, measured using the standard international socio-economic index of occupational status (ISEI) scale (Ganzeboom et al., 1992). Moreover, the PISA reading score was used as a proxy for academic performance. Reading literacy was measured among all study participants. It captured three major facets of literacy: retrieving information from reading material, interpreting the reading material, and reflecting upon and evaluating this material (Adams & Wu, 2002). All these variables were assessed when the panel survey began, in the year 2000, when the study participants were in grade 9.

Data Analyses

Missing Data

Missing data represent a challenge in most longitudinal research and potentially limit the generalizability of findings. In the analytic sample, the percentage of missing data (item nonresponse) ranged from 0 to 31.7% and amounted to 5.6% on average across items and waves. Table 1 reports the number of nonmissing observations for each study variable (complete N = 4986). In order to adjust the estimation of model parameters to the presence of missing data and minimize bias, I used multiple imputation, which replaces missing values with imputed data based on observed data. This approach enables a more precise estimation of parameters while preserving the variability and associations among study variables and it is therefore considered an ideal method for dealing with missing data (Graham, 2009; Sinharay et al., 2001). Twenty-five imputations were generated, each based on five iterations, using the Multivariate Imputation by Chained Equations (MICE) package version 2.46.0 in the R computing environment (van Buuren & Groothuis-Oudshoorn, 2011). Thus, 25 plausible values were produced for each missing value in order to account for the uncertainty associated with missing data (Lang & Little, 2018). The MICE algorithm imputes continuous and binary data, employing predictive mean matching and logistic regression imputation methods, respectively. Rubin's rule (1987) was applied to pool the point estimates and standard errors across the imputed data sets.

Analytic Strategies

Analysis of variance was performed to assess whether the sense of school belonging differed between distinct educational tracks (Hypothesis 1). Structural equation modeling was used to assess whether individuals with a greater sense of school belonging were more likely to move into academic upper-secondary education rather than vocational education (Hypothesis 2a), whether these individuals were more likely to move into university (Hypothesis 2b), and whether the benefits of a sense of belonging for academic trajectories varied as a function of the educational track that individuals followed (Hypothesis 3).

Structural equation models have noteworthy strengths, such as the ability to simultaneously estimate multiple outcomes and also assess residual correlations. Furthermore, because these models use latent constructs, which are measured by multiple indicators, they minimize any bias associated with measurement error (Little, 2013). The present study estimated nonlinear probability structural equation models, because the key outcomes were dichotomous variables. These models produce average marginal effects that reflect the conditional average change in the probability of an outcome associated with a one-unit increase in a given predictor. The results were also expressed as predicted probabilities, which allow for a substantive interpretation of the coefficient estimates and effect sizes.

The structural equation models were estimated in R version 3.5.0, using lavaan version 0.6-3 (Rosseel et al., 2018). These models considered that students were nested in specific educational tracks, computing cluster-robust standard errors. The WLSMV estimator was used, which employs diagonally weighted least squares (DWLS) to calculate model parameters and a mean- and variance-adjusted test statistic to generate cluster-robust standard errors. In the structural equation models, I estimated path coefficients between variables with a temporal order and estimated residual correlations to evaluate the relationships between variables measured contemporaneously.

Statistical power depends on multiple factors, including the type of statistical model estimated, the distributions of variables included in a given model, proportions of missing values, and where applicable the number of indicators used per latent variable and residual variances (Wolf et al., 2013). However, the identification of significant coefficients and tendencies toward low standard errors of coefficient estimates in multiple prior analyses using the TREE study sample or subsamples thereof (Combet & Oesch, 2019; Keller et al., 2020; Laganà et al., 2014; Mueller & Schweri, 2015; Samuel & Burger, 2020; Tjaden & Scharenberg, 2017) indicated that the current sample is sufficiently large for a broad range of statistical analyses, including the structural equation models estimated here. Moreover, I calculated the root mean square error (RMSEA)-based power to reject a null hypothesis if it is indeed false, using power4SEM (Jak et al., 2020). For the full structural equation model including all variables, with df = 58 (see Table 3), an RMSEA value associated with H0 (RMSEA = .05) and an RMSEA value associated with H1 (RMSEA = .01), sample size (n = 4986), and an alpha level (α = .05), I was left with a power of 1. Thus, if in the population the RMSEA is .01, the probability of correctly rejecting a null hypothesis of RMSEA $\geq$ .05 equals 1. For a power of 0.8, the minimum sample size needed would have been n = 245, suggesting that the current study was very well powered (for details about the power analysis, see Jak et al. (2020)). [2]

Model fit was determined by evaluating the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis Index (TLI), because the sensitivity of these indices to model misspecification differs (Hu & Bentler, 1998). RMSEA is an absolute fit index estimating how far the hypothesized model is from a perfect model, whereas the CFI and TLI are incremental fit indices that compare the fit of the hypothesized model with that of a baseline, worst fitting, model. Furthermore, I report the chi-square (χ_2) and degrees of freedom, although the χ_2 statistic should not be interpreted as the main criterion of model fit, because it is affected by small differences in the covariance structures of large samples (Marsh et al., 1988). While the practice of using fixed cut-off points to evaluate model fit has been contested (e.g.,

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[2] More specifically, I calculated the RMSEA-based power to reject a hypothesis of not-close fit in favor of a hypothesis of close fit. When calculating the power of a test of not-close fit, the null hypothesis (H$_0$) will be that the model does not fit closely (RMSEA $\geq$ .05), and the alternative hypothesis (H$_1$) model will be that the model has close fit, for which MacCallum et al. (1996) propose using (RMSEA = .01).

Chen et al. 2008), especially in the case of nonlinear probability models (Xia & Yang, 2019), many scholars agree that acceptable fit is typically indicated by CFI > .90, TLI > .90, and RMSEA < .08 (Kline, 2016; McDonald & Ho, 2002; Steiger, 2007).

Results

Descriptive Results: Links between Individual Characteristics and the Sense of Belonging

To begin with, Model 1 was estimated to describe how the sense of belonging was related to individual student characteristics (see Table 3). This model suggests that, at the lower-secondary level, the sense of school belonging (at t_0) was significantly stronger among older students, native-born Swiss students, and better-performing students. At the upper-secondary level, the sense of school belonging (at t_2) was significantly stronger among females, younger students, first-generation immigrants, better-performing students, and those from higher-socioeconomic-status families. Moreover, note that the sense of school belonging at t_2 was positively related to the sense of belonging at t_0 (all associations significant at $p < .05$ at least).

Hypothesis 1: Sense of Belonging in Different Educational Tracks

Addressing Hypothesis 1, the analysis of variance revealed that the levels of self-reported sense of belonging varied significantly between lower-secondary school tracks, $F(3, 4955) = 16.09$, $p < .000$. Post-hoc analyses using the Scheffé significance criterion indicated that the average level of sense of belonging was higher in the intermediate track ($M = 3.28$, $SD = .61$) than in the high and low tracks and in non-tracked comprehensive schools (high track: $M = 3.20$, $SD = .61$; low track: $M = 3.18$, $SD = .62$; comprehensive schools: $M = 3.04$, $SD = .62$; all $p < .000$). However, the violin plots in Figure 2 show that the distributions of the sense of belonging overlapped considerably across tracks, revealing both substantial within-track variation and between-track overlaps in those distributions.

Moreover, the analysis of variance indicated significant differences in the sense of belonging between different tracks at upper-secondary level, $F(2, 3959) = 164.85$, $p < .000$. Scheffé post-hoc analyses suggested that, on average, students in the upper-secondary academic track exhibited a stronger sense of belonging ($M = 3.26$, $SD = .57$) than their counterparts in vocational and other education, respectively ($M = 2.88$, $SD = .68$ and $M = 2.72$, $SD = .71$, respectively; both $p < .000$). The violin plots in Figure 3 illustrate these mean differences while also showing the overlaps in the distributions of sense of belonging between tracks.

Figure 2 *Violin plots of the distribution of self-reported sense of belonging in different lower-secondary school tracks*
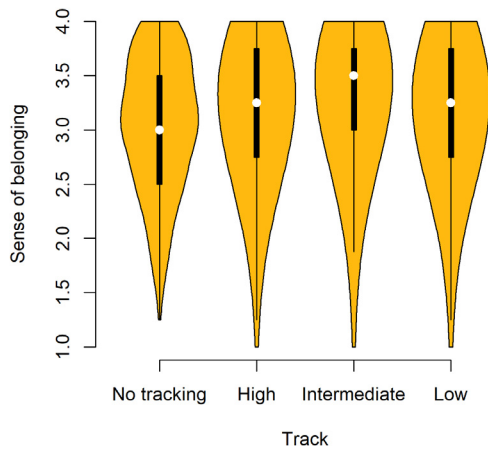
Figure 3 *Violin plots of the distribution of self-reported sense of belonging in different types of upper-secondary education*
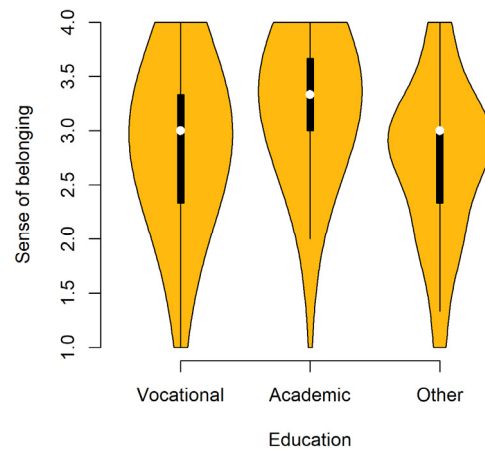
The white dots represent the median; the black bars represent the interquartile range; the endpoints of the thin black lines represent values at Q3 + 1.5 * IQR and Q1 − 1.5 * IQR, respectively; the endpoints of the plot represent the maximum and minimum values in the data.

Hypotheses 2a and 2b: Sense of Belonging and Educational Trajectories

Structural equation modeling was used to test Hypotheses 2a and 2b that students' sense of school belonging is associated with their likelihood of moving into academic upper-secondary education and university (see Model 2). The model accounted for educational track attendance and observable potential confounders (sex, age, immigrant status, academic performance, and parental SES). Path coefficients are reported in Table 3. Factor loadings, residual correlations, and goodness-of-fit measures are reported in Table 4.

Model 2 confirms Hypotheses 2a and 2b. It reveals that the sense of belonging at t_0 was significantly positively related to students' probability of transitioning into academic upper-secondary education and that the sense of belonging at t_2 was significantly positively related to the probability of transitioning into university ($p < .05$ and $p < .001$, respectively; note that I only report p-values here because the absolute magnitude of the nonlinear probability model coefficients cannot be interpreted meaningfully (Breen et al., 2018).

Table 3   *Results from the structural equation models*

Outcome	Predictor	Model 1 Coefficient	SE	Model 2 Coefficient	SE
Lower-secondary level					
Sense of belonging t_0	Male	.063	.039	.063	.044
	Age	.087**	.030	.087*	.034
	First-generation immigrant	-.166**	.059	-.167*	.066
	Academic performance	.001***	.000	.001***	.000
	SES	-.001	.001	-.001	.001
Upper-secondary level					
Academic education	Male			-.026	.014
	Age			-.106***	.011
	First-generation immigrant			.097***	.021
	Academic performance			.001***	.000
	SES			.005***	.000
	Sense of belonging t_0			.017*	.008
	Lower-secondary level [a]				
	High track			.255***	.031
	Intermediate track			-.104***	.031
	Low track			-.109**	.032
Other education	Male			-.039***	.008
	Age			.028***	.007
	First-generation immigrant			.033**	.013
	Academic performance			-.000***	.000
	SES			-.000	.000
	Sense of belonging t_0			-.010*	.005
	Lower-secondary level [a]				
	High track			-.030	.018
	Intermediate track			-.002	.018
	Low track			.003	.019
Sense of belonging t_2	Male	-.111**	.037	-.108*	.042
	Age	-.148***	.029	-.154***	.033
	First-generation immigrant	.178**	.057	.174**	.065
	Academic performance	.001**	.000	.000	.000
	SES	.003**	.001	.002	.001
	Sense of belonging t_0	.087***	.022	.090***	.025
	Lower-secondary level [a]				
	High track			.225*	.093
	Intermediate track			.052	.093
	Low track			.049	.097
Tertiary level University					
University	Male			.043***	.011
	Age			-.022*	.009
	First-generation immigrant			.011	.018
	Academic performance			.001***	.000
	SES			.002***	.000
	Sense of belonging t_0			-.000	.007
	Sense of belonging t_2			.032***	.007
	Upper-secondary level [b]				
	Other education			-.004	.024
	Academic education			.532***	.014

Note: Regression coefficients with cluster-robust standard errors (SE). Because the central outcomes are dichotomous variables, unstandardized coefficients are reported. Probit coefficients are given for dichotomous outcomes. Note that only the sign and statistical significance of these coefficients can be interpreted substantively; their absolute magnitude cannot be interpreted meaningfully (Breen et al., 2018). [a] Reference = Comprehensive non-tracked schools. [b] Reference = Vocational education. Academic performance was measured using the PISA reading score.
* p < .05, ** p < .01, *** p < .001 (two-tailed tests).

Table 4   Factor loadings, residual correlations, and model fit measures

Latent construct	Indicators	Model 1 Factor loading	Model 2 Factor loading
Sense of belonging t_0	I feel like an outsider	.668***	.668***
	I feel like I belong	.579***	.580***
	I feel awkward, out of place	.697***	.697***
Sense of belonging t_2	Proud of my school	.693***	.690***
	Like to be at school	.772***	.757***
	Want to keep going to school	.635***	.652***
Residual correlation between	**and**	**Coefficient**	**Coefficient**
First-generation immigrant	Male	.004	.004
	Age	.120***	.120***
	Academic performance	-.247***	-.247***
	SES	-.149***	-.149***
Male	Age	.056**	.056**
	Academic performance	-.128***	-.128***
	SES	.006	.006
Age	Academic performance	-.121***	-.121***
	SES	-.133***	-.133***
Academic performance	SES	.290***	.290***
Sense of belonging t_0	High track		-.049*
	Intermediate track		.072***
	Low track		.011
Sense of belonging t_2	Other education		-.003
	Academic education		.192***
Academic education	Other education		-.103***
Number of cases, fit indices			
N		4986	4986
$\chi^2(df)$		159.96 (28)	448.80 (58)
CFI		.972	.955
TLI		.955	.916
RMSEA		.031	.037
[90% confidence interval]		[.026, .035]	[.034, .040]

Note: The factor loadings are standardized estimates from models identified by constraining all factor variances to be 1.0. They are based on standardized manifest and latent (exogenous and endogenous) model variables. 'Academic education' and 'other education' are binary variables for which point-biserial residual correlations are reported. Academic performance was measured using the PISA reading score. Residual correlations represent associations between contemporaneously measured variables. Using conventional cut-off criteria to evaluate model fit, the fit measures indicate that both models exhibit a very good fit with the empirical data.

** p < .05, ** p < .01, *** p < .001.*

In addition to addressing Hypotheses 2a and 2b, the model yielded the following results. Considering transitions from lower- to upper-secondary education, I not that relative to students in comprehensive non-tracked lower-secondary schools, students in the high track were more likely to subsequently transition into academic upper-secondary education than vocational education ($p < .001$). In contrast, students from intermediate and low tracks were less likely to transition into academic upper-secondary education ($p < .001$ and $p < .01$, respectively). Considering transitions from the upper-secondary level to university, students in academic upper-secondary education were significantly more likely than those from vocational education to transition into university at any time over a ten-year period, when they were between the ages of 19.5 and 29.5 years ($p < .001$). There was no significant difference in the probabilities of transitioning into university between those in vocational education and those in other education.[3] Furthermore, Model 2 also shows that the sense of belonging at t_0 was significantly associated with the sense of belonging at t_2 ($p < .001$), indicating relative stability over time. The sense of belonging at t_0 was not significantly associated with the probability of transitioning into university. In addition, focusing on the covariates, I note that the likelihood of transitioning into academic upper-secondary education was significantly higher for younger students, students who were first-generation immigrants, and students who exhibited better academic performance (all $p < .001$), but that the likelihood did not differ significantly for students from different socioeconomic backgrounds. The likelihood of transitioning into university was significantly higher for male students, younger students, students who exhibited better academic performance, and students from socioeconomically advantaged backgrounds (all $p < .05$ at least).

Figure 4 visually depicts the paths of Model 2. Significant paths are represented by solid arrows. Nonsignificant paths are represented by dashed arrows.[4]

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[3] For the sake of completeness, Appendix A provides an overview of the percentages of students who transitioned from a given track at the lower-secondary level to a given track at the upper-secondary level, and from there into university.

[4] Although Figure 4 does not depict residual correlations, they were estimated in the model (see Table 4). The residual correlations in Model 2 provide further support for Hypothesis 1. Relative to students from comprehensive non-tracked lower-secondary schools, those from intermediate tracks reported a higher sense of belonging at t_0, whereas those from high tracks reported a lower sense of belonging at t_0. Moreover, students in academic upper-secondary education reported a stronger sense of belonging at t_2 than their counterparts in vocational education (all $p < .05$ at least). Note also that Appendix B provides information on how lower-secondary track attendance predicted the sense of belonging in upper-secondary education.

Figure 4   Path coefficients of the final structural equation model

Lower secondary level   Upper secondary level   Tertiary level
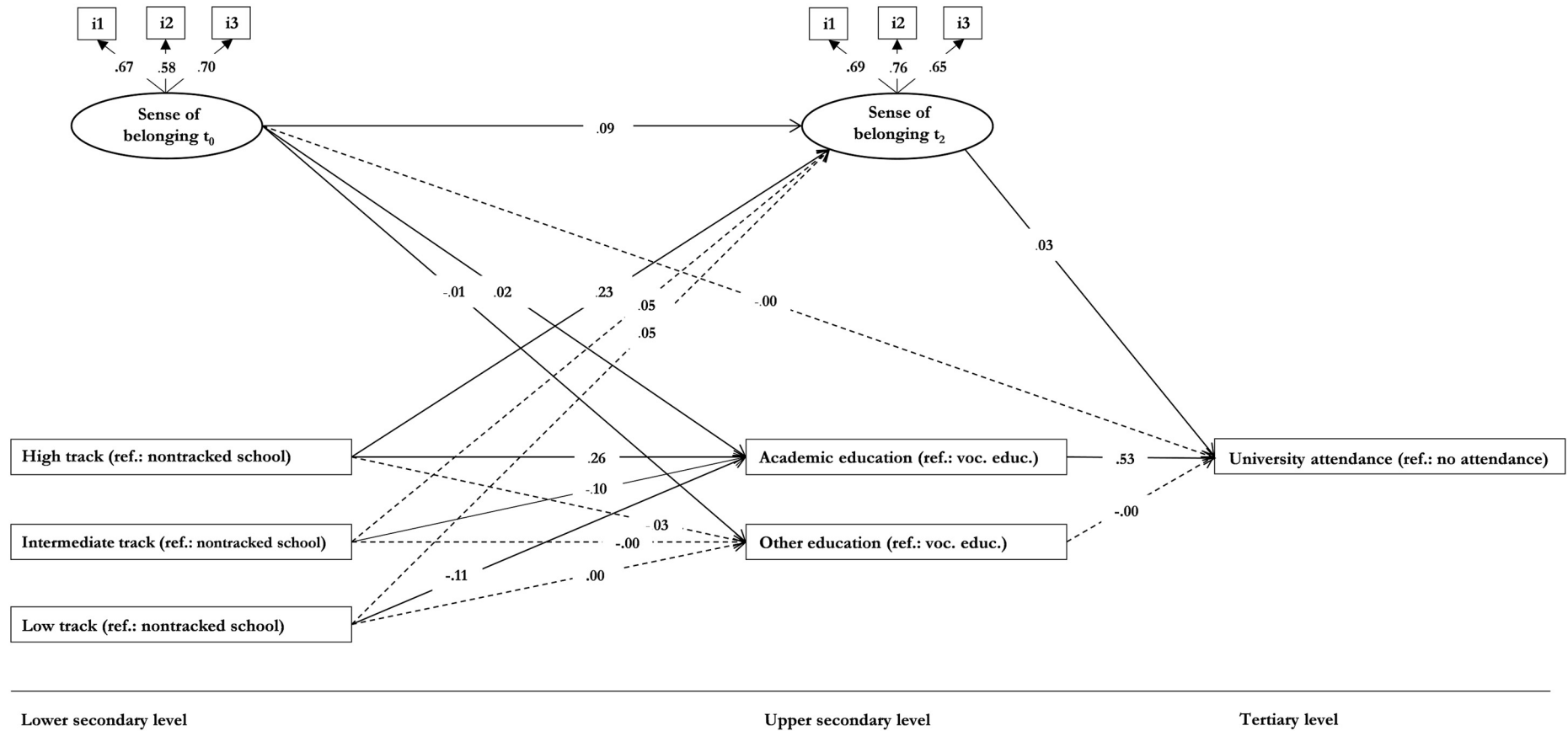
Note: The model controls for sex, age, first-generation immigrant status, academic performance (reading) and socioeconomic status.

As the central outcomes were dichotomous variables, unstandardized coefficients are reported. ref. = reference category; voc. educ. = vocational education.

Hypothesis 3: Interplay between the Sense of Belonging and Educational Tracks

Figures 5 and 6 show the results from Model 2 as predicted probabilities, illustrating the extent to which educational transition probabilities varied as a function of the sense of school belonging and educational track attendance. These figures allow a substantial interpretation of the findings and an estimation of the effect sizes. The predicted probabilities reflect the results for respondents with baseline characteristics on the binary variables and average values on continuous variables. They allow me to assess Hypothesis 3, which predicts that the benefits of the sense of school belonging vary as a function of the educational tracks that individuals follow. While comparisons across groups are complicated by the fact that group sizes differ, the 95% confidence intervals provide the estimated ranges of values that are likely to include the true transition probabilities in the respective populations.

Trajectories from Lower- to Upper-Secondary Education

Figure 5 shows that students from a high track were significantly more likely to transition into academic upper-secondary education than their counterparts from comprehensive non-tracked schools, intermediate tracks, and low tracks—irrespective of their sense of school belonging. However, in any given educational track, students with a stronger sense of belonging were more likely to transition into academic upper-secondary education. For instance, consider students who attended a high track at lower-secondary level. Students in this group with a particularly weak sense of school belonging (a score of 1.0) were estimated to have a 39% probability of transitioning into academic upper-secondary education. In contrast, those with a particularly strong sense of school belonging (a score of 4.0) were estimated to have a 59% transition probability. However, the role of the sense of belonging for this transition probability was almost negligible in the intermediate and low tracks, reflecting the fact that some students in those tracks were channeled away from academic upper-secondary education and into vocational education, almost independently of their sense of school belonging. However, for students from comprehensive non-tracked schools, the level of belonging was somewhat more strongly associated with the probability of transitioning into academic upper-secondary education, with predicted transition probabilities ranging from 15% to 35% depending on students' level of school belonging.

Figure 5   *Predicted probabilities of attending academic education at the upper-secondary level, as a function of lower-secondary track attendance and self-reported sense of belonging (with 95% confidence intervals)*
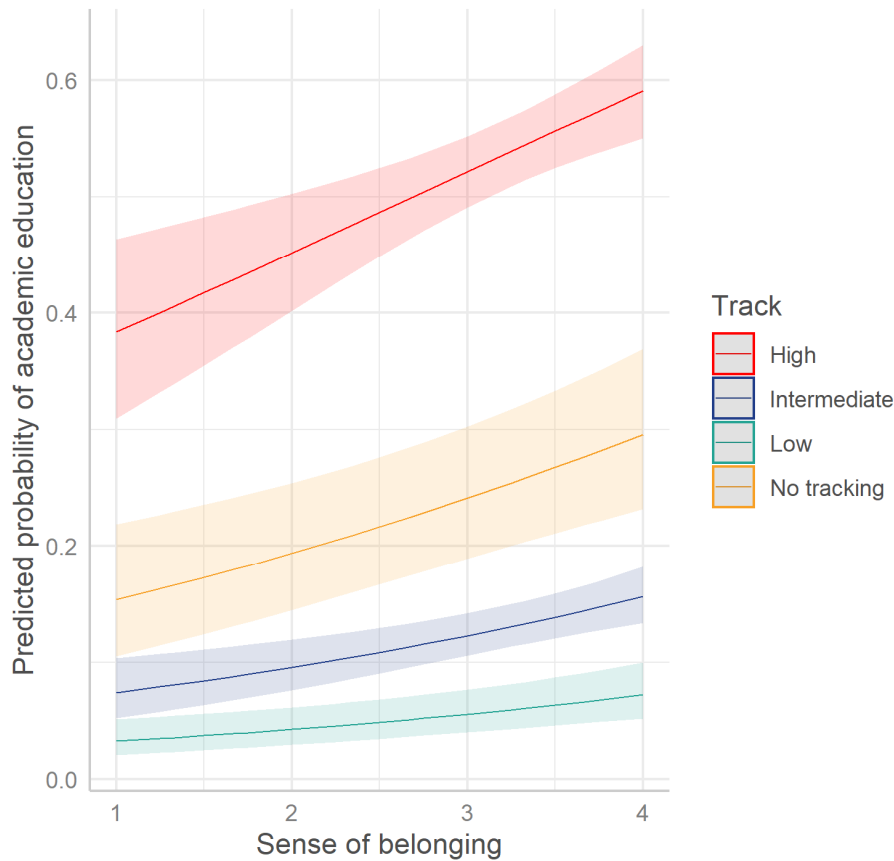

$N_{high\ track}$ = 1989 (red (top) line); $N_{intermediate\ track}$ = 1578 (blue line (third from top)); $N_{low\ track}$ = 1118 (green (bottom) line), $N_{no\ tracking}$ = 297 (yellow line (second from top)).

When comparing students with equivalent levels of sense of belonging across different educational tracks, we see that those who reported the *strongest* possible sense of belonging in a high track were 8.4 times more likely to transition into academic upper-secondary education than their counterparts in a low track (59% vs. 7%). Moreover, they were almost 2.0 times more likely to transition into academic upper-secondary school than their counterparts in comprehensive schools (30%) and 3.9 times more likely than their counterparts in an intermediate track (15%). Further inspection of Figure 5 indicates that high-track students with the *weakest* possible sense of belonging were, on average, still more likely to transition into academic upper-secondary education (38%) than those with the *strongest* possible sense of belonging in comprehensive non-tracked schools (30%), intermediate tracks (15%), and low tracks (7%). Taken together, these results provide evidence in support of Hypothesis 3, showing that the benefits of a sense of belonging for academic trajectories varied considerably as a function of the educational tracks that individuals followed.

Trajectories from Upper-Secondary Education to University

Figure 6 shows how the probabilities to transition into university varied by the sense of belonging and educational track attendance. First, note that students who had attended an academic upper-secondary track were much more likely to transition into university than those who had pursued vocational or other education, regardless of their level of belonging. Furthermore, if we compare students with an average-level sense of belonging (a score of 3.0), we see that those from the academic upper-secondary track had a predicted probability of subsequently transitioning into university of 60%, whereas those from vocational tracks and other types of education had a predicted probability of 4% and 8%, respectively. Another central finding is that the sense of belonging played a very important role in students' probability of transitioning into university—but only for those students who pursued academic upper-secondary education.

Figure 6   *Predicted probabilities of attending university within a period of up to ten years after completion of upper-secondary education, as a function of the type of upper-secondary education pursued and self-reported sense of belonging (with 95% confidence intervals)*
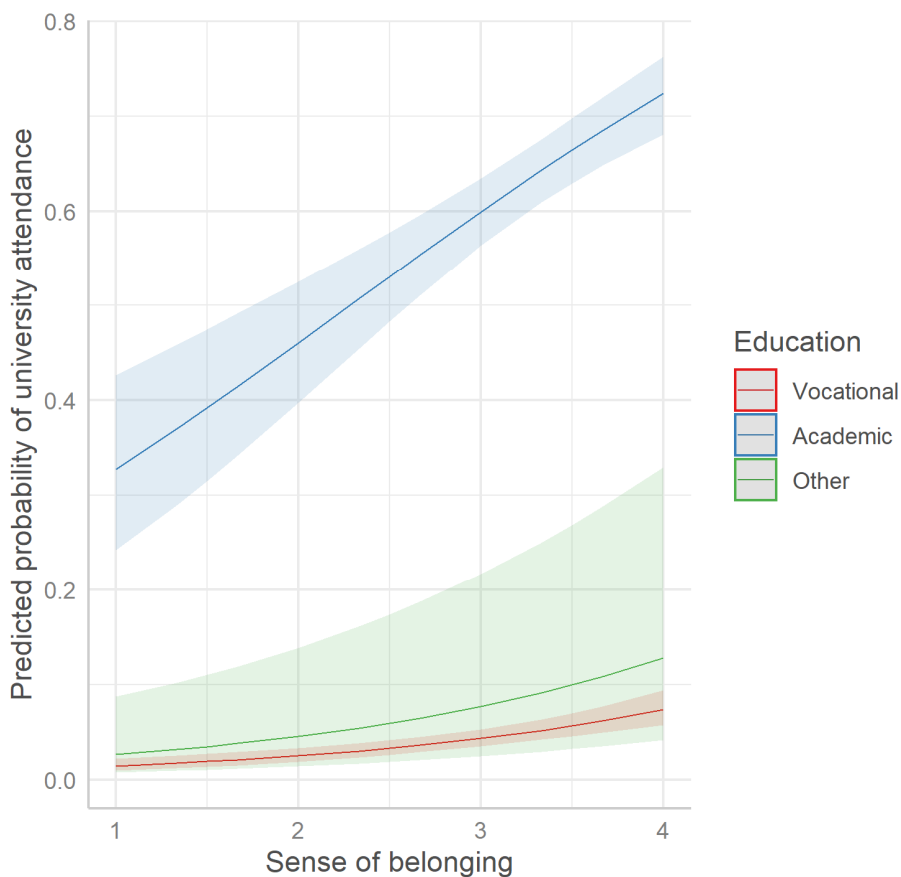
N *academic education* = *1591 (blue (top) line);* N *vocational education*= *2776 (red (bottom) line);* N *other education* = *273 (green (middle) line).*

Their transition probabilities were estimated to range from 33% to 73% as a function of the level of school belonging. In contrast, among students who had pursued vocational or other education, the probability of transitioning into university was low almost irrespective of their sense of school belonging. It ranged from roughly 2% to 7% for those in vocational education, and from 3% to 13% for those in other education, depending on their level of belonging. These results further support Hypothesis 3, postulating that the benefits of a sense of belonging for academic trajectories would vary as a function of the educational tracks that individuals follow.

Discussion

This study analyzed the extent to which educational trajectories result from an interplay between individuals' sense of school belonging and the channeling structure of educational tracks in an education system that offers multiple, qualitatively different tracks leading to a given educational destination. The study was informed by a growing body of evidence suggesting that the sense of school belonging generally promotes academic attainment (Finn, 1989; Murphy et al., 2020; O'Keeffe, 2013; Slaten et al., 2016). It was also guided by life-course and life-span developmental theories claiming that individuals and contexts are inextricably linked, challenging assumptions about the universality of the benefits of psychological resources for attainment processes and stressing that individuals and institutional contexts jointly contribute to individual attainment (Baltes et al., 2006; Elder & Shanahan, 2006; Lerner & Damon, 2006). Against this background, the study examined whether the sense of school belonging differed between educational tracks; whether that sense of belonging was associated with individuals' probability of further following or transitioning into academic tracks; and whether the implications of the sense of belonging were contingent upon the educational tracks that individuals attended.

The findings provide some support for Hypothesis 1, showing that the sense of school belonging differed between educational tracks. The largest difference was between students in academic and vocational upper-secondary tracks, with those in the academic track reporting higher levels of sense of belonging on average. This is consistent with prior findings indicating that students in vocational schools perceive lower levels of belonging than their counterparts in academic schools (Smerdon, 2002; Van Houtte & Van Maele, 2012), potentially because students in vocational schools suffer from status deprivation as a result of being on a less academic path (Berends, 1995). However, it is critical to note that there was considerable variation in the sense of belonging within different educational tracks and that the distributions of the sense of belonging overlapped substantially between tracks, highlighting that a simplistic focus on mean-level differences is clearly misleading.

The findings also supported Hypotheses 2a and 2b, showing that students with a stronger sense of school belonging were significantly more likely to transition into academic upper-secondary education and ultimately into university. For instance, regarding students from a high track at

the lower-secondary level, recall that those with the weakest possible sense of belonging had an estimated 39% probability of subsequently transitioning into academic upper-secondary education. In contrast, those with the strongest possible sense of belonging were estimated to have a 59% transition probability. Similarly, among students in academic upper-secondary education, the estimated probabilities of transitioning into university ranged from 33% to 73%, depending on how strong the sense of school belonging was. Thus, how individuals moved through the education system partly depended on the extent to which they felt that they belonged in that system. These findings strengthen theory and prior evidence suggesting that a strong sense of school belonging fosters successful educational careers (Allen et al., 2016; Anderman, 2002; Korpershoek et al., 2020; Marksteiner et al., 2019).

However, while the sense of belonging mattered, educational tracks also structured educational trajectories to a considerable extent. These tracks influenced both individuals' likelihoods of pursuing academic or vocational trajectories as well as their likelihoods of ultimately enrolling at a university; they likewise moderated the effect that the sense of belonging had on the respective transition probabilities. These findings are in line with Hypothesis 3, stating that the benefits of a strong sense of belonging for educational trajectories are constrained by institutional structures. Students with equivalent levels of belonging exhibited quite different likelihoods of moving into academic upper-secondary and university education, depending on the educational paths they previously followed. For instance, students with a particularly strong sense of belonging in a high track were over eight times more likely to move into academic upper-secondary education than their counterparts in a low track who reported identical levels of belonging (59% vs. 7%), even when controlling for observable potential confounders (sex, age, immigrant status, academic performance, and parental socioeconomic status). Similarly, students with a strong sense of belonging in academic upper-secondary education were estimated to be roughly nine times more likely than their counterparts in vocational education to ever make it into a university over a ten-year period following completion of upper-secondary education (73% vs. 8%).

These results illustrate an essential principle of life-course and life-span developmental theories that is relevant to social-psychological theory building—that institutional structures open up and constrain opportunities unevenly (Heckhausen, 2018; Pfeffer, 2008). They also corroborate findings that education systems provide unequal opportunities to students in different tracks (Burger, 2016; Domina et al., 2017; Hanushek & Wößmann, 2006). Hence, they confirm findings from the United States and Germany suggesting that individuals who took nontraditional routes through secondary education had a significantly reduced likelihood of transitioning into university (Hillmert & Jacob, 2010; Milesi, 2010). The current study also shows that students on academic paths were more likely than those on vocational paths to further pursue their academic trajectories; for them, the sense of school belonging was much more strongly associated with their likelihood of continuing along an academic trajectory than for their counterparts in vocational paths. This challenges the view that the sense of school belonging is a psychological

resource that is universally beneficial for educational outcomes across contexts. Thus, we may conclude that, largely independently of their sense of school belonging, individuals follow pathways that are carved out by the system. Institutional constraints inherent in the system limit deviations from those pathways, steering individual trajectories to specific destinations. This finding confirms life-course and life-span developmental theories (Heckhausen & Buchmann, 2019; Schoon & Heckhausen, 2019; Steinhoff & Buchmann, 2017) and should be considered in social psychological research: Clearly, psychological resources alone are not sufficiently powerful to overcome structural obstacles to academic attainments. The sense of school belonging was strongly related to the probability of transitioning into academic upper-secondary education among students in an academic track, but it was only marginally related to that probability among students in vocational tracks. Thus, individual psychological resources may influence attainment only when opportunity structures allow it (Evans, 2007; Shanahan et al., 1997) and their impact on educational trajectories is likely comparatively negligible for those who are progressing within education systems that strongly channel such trajectories.

However, the current study also suggests that while the sense of school belonging cannot unleash its full effects in some institutionalized pathways, a lack of sense of school belonging is consistently associated with a decreased likelihood of moving along academic paths. When children feel uncertain about belonging in school, they do not take full advantage of the educational opportunities provided to them and are consequently less likely to transition into or follow academic tracks. A low sense of belonging was associated with a reduced likelihood of following an academic trajectory among students in any educational track. The implication for psychologists, educationalists, and policymakers is clear: It is crucial to reduce alienation from school to help students who feel out of place benefit more from available learning opportunities and reach their full academic potential (Cheryan et al., 2009; Hascher & Hadjar, 2018; Murphy & Zirkel, 2015; Walton & Cohen, 2011; Yeager & Walton, 2011). This can be achieved by creating a supportive and caring school environment, where acceptance and inclusion are promoted, students' diverse views and backgrounds are embraced as a resource (Schachner et al., 2019), students' right to participate is guaranteed (Burger, 2017, 2019b), discriminatory behavior is sanctioned, and hence a feeling of group membership and of being valued is fostered (O'Keeffe, 2013).[5]

Limitations and Recommendations for Further Research

Although this study has several noteworthy strengths—including the simultaneous analysis of multiple outcomes, the 15-year observation span, and the estimation of the relative importance of individuals' sense of school belonging for educational trajectories when considering the channeling effects of the institutional structure—the following limitations need to be acknowledged.

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[5] For a discussion of the links between individual-level characteristics and sense of belonging in school, see Appendix C.

First, the latent constructs measuring the sense of belonging in lower- and upper-secondary education relied on different indicators, reflecting somewhat distinct facets of the sense of belonging. Although both the indicators and the constructs were positively correlated (Tables 2 and 3), it would have been ideal to have had identical measures as this would have achieved greater comparability across measurement points. However, it is important to note that measurement equivalence was not a prerequisite for the present analyses because they were not intended to test (developmental) continuity or change in the sense of school belonging (Putnick & Bornstein, 2016). Sense of belonging always relates to a particular context. Students' school context at lower-secondary level differed from their school context at upper-secondary level. Thus, even if sense of belonging had been measured with the exact same scale at both time points, it was not to be expected that students with a strong sense of belonging in lower-secondary school necessarily also exhibited a strong sense of belonging in upper-secondary school. The central aim of this study was to assess whether sense of belonging in a given school context predicts specific educational transition probabilities; not whether sense of belonging remains invariant across time (although the models estimated a path from sense of belonging at t0 to sense of belonging at t2).

Second, the ideal time point to measure sense of belonging during upper-secondary education was in 2002, when most students pursued either academic or vocational upper-secondary education, rather than interim options. However, individuals' sense of belonging in upper-secondary education fluctuated to some extent between 2001 (when the first study participants started upper-secondary education) and 2004 (when the first participants transitioned into university). Further analyses indicated that latent variables that captured the sense of belonging in three separate panel waves (2001, 2002, and 2003) were moderately to strongly positively correlated ($r_{t1-t2} = .543$, $r_{t2-t3} = .627$, and $r_{t1-t3} = .450$). Hence, the sense of belonging was comparatively stable over time.

Third, among students in vocational education, the sense of school belonging was not significantly associated with the probability of subsequently enrolling in university. While this may be a consequence of the education system's channeling effects, it is also possible that, for these students, a strong sense of school belonging amounted to identifying strongly with their vocational education, which did not prepare them for an academic career and thus could not necessarily be expected to predict the probability of a subsequent transition into university. However, because students in vocational tracks retain the opportunity to embark on an academic track, as occurred in some cases considered in this study, it was nonetheless important to examine the extent to which their sense of school belonging was related to their probabilities of later switching to an academic path.

Fourth, this study used a standardized measure of academic performance reflecting student achievement levels in the last grade of lower-secondary education (measured at t0). The TREE survey does not provide a standardized measure of academic performance during primary and/or

upper-secondary education. Ideally, future research should evaluate academic performance repeatedly over the course of schooling. This would allow researchers to assess the extent to which academic performance predicts educational transition probabilities at different stages of an educational career. Furthermore, this would enable researchers to examine performance growth in the different educational paths and whether there are reciprocal associations between academic performance and the sense of school belonging.

Fifth, educational attainment is partly heritable (Cesarini & Visscher, 2017; Domingue et al., 2015; Donnellan et al., 2021; Okbay et al., 2016). Thus, genetics could explain some of the differences in educational transition probabilities between distinct groups of students. The present study could not determine the relative importance of genetic and environmental influences because it did not use genetically informative data. Ideally, future research should assess the relative, joint, or potentially interactive influences of genetic inheritance and environments on educational transition probabilities.

Sixth, this study used a longitudinal design and controlled for observable confounders in order to create exchangeable comparison groups. The findings provided robust evidence consistent with—but not unambiguously establishing—causal associations between the sense of belonging and institutional structures on the one hand and educational transition probabilities on the other. A large-scale randomized field experiment would allow researchers to estimate causal effects more accurately. However, because such an experiment would present important ethical challenges, the value of longitudinal observational data is substantial, especially in light of the comparatively greater ecological validity of findings resulting from a nationally representative sample (only students who were schooled at home or abroad were not included in the sample). Hence, although race/ethnicity was not assessed in the Swiss PISA survey, as is typical for quite many panel studies in the European context, the findings can be generalized to the cohort of individuals who completed compulsory schooling in the year 2000.

Seventh, educational transition probabilities vary, both between and within cantons. Although there is no systematic confounding of track type and subnational administrative units in the analyses (with 14 cantons using tracked schools alongside comprehensive non-tracked schools and 12 cantons using only tracked schools), future research should collect fine-grained, region-specific data. However, given that I identified significant differences in transition probabilities between participants from comprehensive schools and their counterparts from a tracked school system, it can be assumed that these differences were indeed practically meaningful, especially in view of the restricted statistical power of the analyses.

Finally, this study analyzed trajectories in terms of transitions into upper-secondary education and university. It would be interesting to also assess educational trajectories across students' entire educational careers. Thus, where available, researchers could use population-wide longitudinal register data and analytic strategies such as sequence analysis or event history analysis to

advance our understanding of entire educational trajectories from early childhood into adulthood.

Conclusions

How students progressed through the education system depended in part on whether they felt that they belonged in that system. A stronger sense of school belonging was associated with a higher probability of moving along or transitioning into academic tracks. Yet the benefits of a strong sense of school belonging were restricted by the institutional structure. While a sense of belonging mattered substantially for academic trajectories among students who had already embarked on an academic path earlier in their educational career, it mattered much less for those who were following less academic tracks. The education system partially channelled educational trajectories in diverging directions and hence modified the influence that the sense of school belonging could have on academic trajectories. This laid an important foundation for later life-course inequalities. Students who initially followed non-academic tracks were much less likely to pursue their education up to university, even when they had otherwise similar individual-level characteristics. Overall, the findings are consistent with life-course and life-span developmental theories suggesting that developmental outcomes are associated with both individual and contextual characteristics and further showing that education systems enable and constrain academic trajectories differentially for students on different paths. The findings also indicate that psychological resources may only benefit students to the extent that educational institutions provide opportunity structures within which the influence of those resources can take effect. The implication for social psychology is clear: we need to consider variations in the benefits of the sense of school belonging across institutional contexts and should continue to work towards a nuanced understanding of the circumstances in which that sense of belonging will yield benefits for later life outcomes.

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Appendices

Appendix A: Distinct Trajectories Through the Education System

Table A1 presents the percentages of students who transitioned from a given track at the lower-secondary level into a given type of upper-secondary education (academic, vocational, or other), and from a given type of upper-secondary education into university. The table also reports the percentages of students whose educational trajectory led them from a given track at the lower-secondary level up to university. The main findings here are twofold. First, we note that individuals attending a high track at the lower-secondary level were much more likely to transition to academic upper-secondary education (63.7%) than those from an intermediate track (17.8%) or low track (5.6%) or those from a comprehensive non-tracked school (26.6%). Second, the findings indicate that students from a high track had a much greater likelihood to pursue their educational career up to university (46.6%) than those from intermediate tracks (15.7%), low tracks (4.0%), or comprehensive non-tracked schools (18.9%).

Table A1   Percentages of students pursuing distinct educational trajectories

	Upper secondary education			Tertiary level
	Academic	Vocational	Other	University
Lower secondary level				
High track	63.7	33.7	2.6	46.6
Intermediate track	17.8	75.3	6.9	15.7
Low track	5.6	84.3	10.1	4.0
Comprehensive school	26.6	65.6	7.7	18.9
Upper secondary level				
Academic education				69.5
Vocational education				3.8
Other education				1.5

Note: Percentages of students who (1) transitioned from a specific lower-secondary-level track into a given type of education at the upper secondary level; and (2) from a given type of education at the upper secondary level into university; and (3) whose educational trajectory led from a specific lower-secondary-level track to university.

These are descriptive results. However, it is important to note that the academic performance levels of study participants overlapped significantly between different lower-secondary-school tracks, providing suggestive evidence that track attendance partially influences transition probabilities. Although analyses of variance and Scheffé-adjusted post-hoc analyses revealed that, on average, students in high tracks performed better than students in intermediate and low tracks and students in non-tracked comprehensive schools, the performance distributions overlapped substantially across these four track types. There was an area of common support including 96.4% of all cases of the current sample, with the overlap in performance distributions across all

track types varying between a score of 269 (lowest performance in high tracks) and a score of 662 (highest performance in low tracks). While it would be possible to run the analyses on a truncated sample that excludes those 3.6% of cases which had no performance overlap across tracks to create a subsample with highly comparable cases regarding academic performance across all tracks (and hence to mimic a randomized experiment to some degree), the findings presented here are based on all cases from the analytic sample. This is because the goal was not merely to assess students' likelihood of transitioning into a given type of upper-secondary education, but also to assess their likelihood of ever enrolling at a university following completion of upper-secondary education. For this more complex analysis, which included multiple endogenous variables, it was appropriate to use the whole analytical sample.

Appendix B: How Attendance in a Lower-Secondary Track Predicted Sense of Belonging in Upper-Secondary Education

Although it was not the central focus of the study, the model also considered whether attending a given lower-secondary school track predicted the sense of belonging in a given upper-secondary school track (because the sense of belonging might be a consequence of the academic culture in a specific lower-secondary school track). The results indicated that students who had attended a high track at the lower-secondary level reported a significantly greater sense of belonging in upper-secondary education than those from comprehensive non-tracked schools. There were no significant differences in the sense of belonging in upper-secondary education between those who previously attended intermediate or low tracks and those from comprehensive non-tracked lower-secondary schools.

Appendix C: How Individual-Level Characteristics Were Related to Sense of Belonging in School

Individual-level characteristics were associated with sense of belonging in school. Sense of belonging was significantly stronger among better-performing students, both in lower- and in upper-secondary education. By contrast, the extent to which sense of belonging was related to other individual-level characteristics depended on the measurement time point. In compulsory lower-secondary education, sense of belonging in school was significantly stronger among older and native students. However, in post-compulsory upper-secondary education, it was significantly stronger among females, first-generation immigrants, younger students, and those from socioeconomically more privileged families. This suggests that it was sensitive to the educational environment that students were in, which confirms prior evidence that the sense of belonging varies as the educational context changes (Allen & Kern, 2017; Bottiani et al., 2017; Cemalcilar, 2010; Vaz et al., 2015).

References to Appendices

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