European Education

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/meue20

Learning Loss Due to School Change: A Cause for Major Concern?

Domenico Angelone, Chantal Oggenfuss & Stefan C. Wolter

To cite this article: Domenico Angelone, Chantal Oggenfuss & Stefan C. Wolter (2024) Learning Loss Due to School Change: A Cause for Major Concern?, European Education, 56:1, 66-76, DOI: 10.1080/10564934.2024.2323933

To link to this article: https://doi.org/10.1080/10564934.2024.2323933

Published online: 04 Mar 2024.

EUROPEAN EDUCATION
2024, VOL. 56, NO. 1, 66–76
https://doi.org/10.1080/10564934.2024.2323933

Routledge
Taylor & Francis Group

Learning Loss Due to School Change: A Cause for Major Concern?

Domenico Angelone[a], Chantal Oggenfuss[b], and Stefan C. Wolter[b,c]

[a]Swiss Coordination Centre for Research in Education; [b]SKBF; [c]University of Bern

ABSTRACT

We investigate the effect of changing schools on academic achievement. Using representative data on the educational trajectories of 17,000 Swiss lower secondary students and national assessment data at the end of compulsory schooling, we estimate the potential individual achievement gaps caused by a school change. While the overall effect is surprisingly small and statistically insignificant, we find a significant, but also small, negative effect for boys. These effects quickly diminish one year after the change.

Introduction

Previous research indicates that, on average, changing schools has a negative effect on students' educational attainment, although the evidence is mixed and rarely takes into account whether the change in school is exogenous. On the one hand, the older research available – see Mehana and Reynolds (2004) for a meta-analysis of studies from 1975 to 1994 – tends to be limited in its use of cross-sectional data and the inclusion of background variables. Consequently, the results of such research should be viewed as a correlation between school change and educational outcomes. On the other hand, much of the most recent research is based either on data from the United States or on data from the United Kingdom, where the school change rate is quite high at more than 20 percent. For example, Grigg (2012), Schwartz et al. (2017), Strand and Demie (2007), and Voight et al. (2012) report an overall negative association between school change and academic achievement. Other studies examine the relationship between school change and educational trajectories and find a higher risk of dropping out (Gasper et al., 2012; South et al., 2005).

Based on theoretical considerations, it is reasonable to expect the negative effects of changing school on student achievement. The most commonly used explanation for why changing schools negatively affects academic achievement is the loss of social capital (Coleman, 1988; Grigg, 2012; Pribesh & Downey, 1999). When students change schools, they lose the networks that have developed between parents, between students, and between parents and the school, as well as informal access to important information. The results of existing research provide evidence in this regard. Mobile students tend to have a smaller network and a less central position within their network (South et al., 2005). Changing schools can also have other negative effects on academic performance that have to do with school organization, teachers and learning processes, such as the use of a different curriculum, textbooks and other material or quite simply that the class is at a different part of the school curriculum, i.e., for example, has already gone through school content that the transferring student had not yet covered at the old school (e.g. Mehana & Reynolds, 2004; Rumberger, 2003).

CONTACT Chantal Oggenfuss chantal.oggenfuss@skbf-csre.ch SKBF, Aarau, Switzerland.

However, empirically, the effects of changing schools in the existing literature are either rather small, not always significant, or do not show a clear picture depending on the timing of the change during the student's school career or on the school subject measured (e.g., Voight et al., 2012). In particular, the effect is substantially reduced or disappears when systematic differences between changers and non-changers (e.g., social background, prior academic achievement) are taken into account. Furthermore, there is evidence that the effect of a school change is more relevant when the school change is associated with greater geographic distance. This finding is consistent with the hypothesis that the loss of the existing social network is more likely and the new learning environment may be more different from the previous environment with a growing geographical distance to the old place of schooling. In addition, most studies show, that the negative effects of changing schools tend to diminish over time as students and their parents can re-build the social capital, and students can adapt to the new learning environment.

A disadvantage of the existing literature – with a few notable exceptions – is usually that it cannot distinguish between school changes whose reasons are exogenous and those that are, for example, the result of inadequate academic performance at the old location or the expectation that the new school will be of better quality than the old school. The difference in the student's academic performance between the performance at the old school and the new school is therefore not the result of the change of school, but the cause of the change. Most previous studies, however, have neglected the issue of exogeneity (e.g. Gasper et al., 2012). In countries such as the United States and the United Kingdom, where most of these studies come from, the concept of free school choice is widespread. Therefore, in these countries, school change may be due to families choosing a better school or a learning environment that they perceive as more appropriate. Only a few studies try to correct for this, for example by including analyses of school quality[1] and these studies find that the negative effect of school change is lower for students who move to higher quality schools (Temple & Reynolds, 1999). Grigg (2012) used an educational structural reform that caused an external shock to the timing of school changes (but with limited control for time-varying factors, such as change of residence) and found that all types of changes were associated with lower achievement in the short run. In a more recent study Schwartz et al. (2017) looked at the effect of changing schools on academic achievement, using specific instrument sets, including information on whether the change occurred shortly before the end of the school year or whether the family had to leave their rented home due to the sale of the property. A negative effect on academic achievement was found only when the reason for the school change was exogenous. Otherwise, the change in school was found to have a positive effect, highlighting the importance of knowing whether the reason for the school change was independent of schooling or the consequence of schooling. Finally, in a longitudinal study in Switzerland, Stamm (2009) found that differences in academic achievement between children who changed schools and those who did not became statistically insignificant after controlling for baseline achievement and social factors. The study analyzed school changes within municipalities and between cantons. According to the author, changes within a municipality are often related to conflicts between parents and teachers and can therefore not be considered as exogenous events.

While the literature on school change and educational attainment is extensive, there are only a few studies that look at the effect heterogeneity, for example for gender. Those who do, do not find a clear pattern and do not address the issue of exogeneity (Howell, 2011; Strand & Demie, 2007).

Our main contribution to the research literature is twofold. First, by limiting the school changes to cases, where the new and the old school are located in different cantons (similar to states in the US, provinces in Canada or Länder in Germany). By excluding school changes

[1]The analysis by Hanushek et al. (2004), which relates to the strand of research that examines the effect of changing schools on nonmobile peers, also addresses the question of exogeneity by controlling for school quality.

within the same educational system, we can assume that the reasons for the school change are exogenous because if the school quality had been the reason for the school change, parents would try to change schools within a canton, staying in the same school system. Second, we examine whether changing schools is associated with differences in the impact on academic achievement, e.g. for boys and girls or also depending on the timing of the change or the distance between the old and the new school. For our study, we analyze national longitudinal administrative data combined with the national mathematics achievement test at the end of compulsory school in Switzerland.

Education System in Switzerland

In Switzerland, each of the 26 cantons largely determines its own education policy, resulting in considerable variation in cantonal education systems. These differences are rooted in historical, political, pedagogical, and financial choices, and have evolved over time. Until a few years ago, each canton set its own curriculum and determined its own school materials[2]. When children changed to a school in another canton, they encountered a very different educational environment. Despite the autonomy of the cantons, the admission requirements for post-compulsory education suggest that the cantons are expected to achieve similar goals at the end of compulsory schooling. Compulsory education lasts nine years in all cantons, excluding kindergarten. After six years of primary education, students are assigned to one of two or three different tracks in lower secondary education. Access to the baccalaureate schools, the academic schools that lead to a university entrance diploma, varies from canton to canton: In about half of the cantons, students can enter after primary school, while in others they are admitted after grade 8 or 9. In Switzerland, there is as a rule no free school choice for students attending the public school system, which more than 95% of the students do (SCCRE, 2018), but students are assigned to the school closest to where they live by the local school authorities. This principle applies to primary education and to a large extent to secondary education. However, there is an exception for students attending baccalaureate schools.

Important in the context of our study, is the fact that there is very little information on the overall quality of the education system in a canton and even less for individual schools. Even in cases, where student performance is measured regularly or sporadically with standardized test, this information is not accessible to the parents or the general public. School choices through the choice of the place of residence are therefore can only rely on proxy information such as the socioeconomic background of the neighborhood.

Definition of School Change

In order to analyze the effects of school change on academic achievement, we define school change as changing to a school in a different canton. Since the allocation of school places during compulsory education is based on residence, and in the absence of comparative data on school quality, it is unlikely that students would change to another canton solely for better education. This allows us to consider the change of school to another canton as an exogenous event. This decision to exclude school changes within the same educational system is backed by previous research in Switzerland, that found that school changes within the system are often motivated by parental expectations that they will find better peers, better teachers or teachers better adapted to the needs of their child (Stamm, 2009). In those cases, the school changes would not be an exogenous event and not the empirical findings could not be interpreted as causal effects.

[2]The common curriculum for the French-speaking part of Switzerland was introduced in 2011. In the German-speaking cantons, the common curriculum was implemented between 2018 and 2020, depending on the canton.

Data

We use data from the first national student assessment in mathematics, called the Survey of the Attainment of Basic Competencies (ÜGK), and match this dataset with data on student enrollment in the Swiss education system. The ÜGK student assessment is part of a monitoring survey that aims to assess the attainment of basic educational competencies in primary and lower secondary school in Switzerland. In 2016, students in grade 9 were tested in mathematics. This assessment provides the first and only national data currently available on achievement at the end of compulsory schooling. The sample, which is representative of Switzerland, includes 22,423 students in grade 9 (average age 15.7) out of a population of approximately 85,000 students. Depending on the size of the canton, a complete survey was conducted; in the case of large cantons, a one-stage or two-stage sampling (taking into account schools and, if necessary, classes) was conducted (Konsortium, 2019). The register data on student enrollment, provided by the Swiss Federal Statistical Office, contain annual information on all students enrolled in any type of educational institution. The merged dataset allows us to follow the educational careers of students participating in the ÜGK back to the year 2012. Although the data go back to 2011, the first year of observation is incomplete due to gaps in data collection and is therefore excluded from this analysis. The longitudinal and individual data provide a rich set of information on sociodemographic characteristics as well as the canton of schooling and the canton of residence for each school year. These data allow us to identify the number of years since the change, as well as factors such as whether the student changed residence or only school, whether the change was to a neighboring canton, and whether there was a change of the language region. There is also information on the type of school (private vs. public or special education). For lower secondary school, we also know the track attended. This makes it possible to determine who attends the highest level (baccalaureate school).

In our analyses, we exclude students who changed to private or special schools. This exclusion is based on the assumption that such changes are typically made with the intention of finding a better learning environment or a more appropriate school, making these school changes endogenous events. We also exclude students attending a baccalaureate school. Since admission to these schools is regulated differently and the degree of cantonal selectivity varies, transfers to baccalaureate schools are also likely to be endogenous. Furthermore, we exclude students who have information gaps on their canton of schooling during the observation period from 2012 to 2016, which is essential for identifying the change in school cantons. After excluding these cases and deleting observations with missing values for canton of schooling, mathematics test scores, or control variables, we have a final analytic sample of 16,886 observations. The ÜGK dataset includes imputations to avoid significant loss of observations related to socioeconomic status[3], which we use in our analysis. A detailed overview of the excluded cases can be found in Table A1 (see Appendix). It is important to recognize that the nature of these omissions may not be entirely random and may be correlated with other variables. Considering that the exclusions related to missing information on control variables represent only about 3% of the total dataset, while the other observations were excluded for substantive reasons, we believe that the potential for introducing significant systematic bias into our analysis is negligible.

[3]The ÜGK index of socioeconomic status is a composite score based on the highest occupational status of the parents, the highest educational level of the parents, and the number of books in the household. The imputation technique in the ÜGK dataset follows the approach used in the OECD's Program for International Student Assessment (PISA). This method uses regression analysis on the available variables. The SES variable is marked as missing if more than one of its components is missing; for more details, see Pham et al. (2019).

Table 1. Patterns of change among students in Switzerland, descriptive statistics.

	Change of school	No change of school
N (analytical sample)	392	16,494
Change in residence	51%	<1 %
Change …		
To a neighboring canton	80%	
Not to a neighboring canton	20%	
Within the same language region	72%	
To another language region	28%	
Last change 1 year ago	40 %	
Last change 2 years ago	23 %	
Last change 3 years ago	37 %	

Descriptive Findings

In our analytical sample, 392 students (2.3%) changed schools across cantonal borders between 2012 and 2016. By way of comparison, we know from the official national statistics on the change of residence of the total resident population in Switzerland that in a given year 8% change the canton of residence (in the case of families, multiple counts are possible). However, most of these people changing their canton of residence are younger people who presumably do not yet have children at school (FSO, 2023). The difference between the two mobility rates shows that parents with school-age children generally try to avoid a change of canton and it is therefore very unlikely that the change will take place because of their children's school situation. In the case of a change of school, most students changed to a neighboring canton (80%) and most changes were within the same language region (72%). For 40% of the students, the change of school took place one year before the assessment. 23% changed two years before and about one third changed three years before Table 1.

In terms of the most important individual characteristics, students in Switzerland who have changed schools differ little from students who have not changed schools (see Appendix Table A2). We find no statistically significant differences between changers and non-changers in terms of mathematics achievement, gender, migrant background, or school track attended. The differences between the two groups are that students who changed schools tend to have a statistically significant higher socioeconomic status[4], although the effect size of this difference is very small, and they are more likely to speak a language at home that differs from the school language.

Empirical Strategy

First, we empirically test whether the assumption that students' school changes can be considered as exogenous holds. To do this, we estimate a linear regression model for the average mathematics achievement at the school level (by canton and school type) to analyze whether student changers tend to attend a school with a higher or lower average mathematics achievement than the schools attended by non-changers. ÜGK mathematics achievement is reported in logits (ranging from −5.709 to 5.211 at the individual level), and we use weighted likelihood estimates for all our calculations. We control for the student composition of the school in terms of sociodemographic and socioeconomic characteristics and include the same variables at the individual level.

[4]This difference is plausible for at least two reasons: Firstly, people with a higher socioeconomic status are more likely to work in occupations where changes of employer are also more likely to involve a major geographical move, such as moving to another canton. Secondly, such changes are associated with greater costs, which in turn are more likely to be affordable for people with a higher socioeconomic status. However, looking only at the students who have changed the cantons, our data show that people with higher socioeconomic status do not undertake greater distance than those with lower socioeconomic status.

Second, for our main analysis, we estimate the individual learning gap caused by a school change. To calculate this potential achievement gap of a school change we need to estimate the counterfactual outcome if the change had not taken place and the student had remained in her or his old school. Based on the model of the predictors of academic achievement in each canton, we estimate the counterfactual academic achievement of the students in the canton where they were enrolled before the change of school. This allows us to estimate the potential academic achievement in the canton for students with certain characteristics if they had not changed schools. In this estimation process, we use the information of all available important variables on academic achievement, applied separately for each canton (Morgan & Winship, 2014; see for similar approaches Lemons et al., 2014; Mueller & Wolter, 2014). Then we use this counterfactual outcome scenario to compare with the actual achievement after the change of school. The use of clustered standard errors allows us to deal with within-school correlations and ensures robustness against potential data heterogeneity and misspecification. This allows us to focus directly on the effects of our variables and provides a clearer interpretation. It is particularly appropriate for our analysis because our research question does not primarily focus on school-level effects or the hierarchical structure of the data (Bauer et al., 2020).

In a further step, we estimate the linear regression model using bootstrap resampling to analyze the heterogeneous effects of gender on the learning gap of the changers. In this model, we take into account other variables that are related to the change and that, according to previous research, could affect the learning gap in different ways, namely simultaneous change of residence, geographical information about the change (neighboring canton and language region), and time since the change. We also control for socioeconomic status, migration background, and language spoken.

Results

In this section, we present our empirical results, looking first at the linear regression model for average mathematics achievement at the school level, and second at the average learning gap after a school change; finally, we present the heterogeneous effect of gender on the learning gap of changers.

Do Changers Tend to Go to Better Schools?

The results of the linear regression model show three important results. We do not find a relationship between school change and average mathematics achievement at the school level. The coefficient is negative but not statistically significant at about −0.048 (se = 0.028). As expected, the school composition variables (average SES, proportion of girls, proportion of migrants, proportion of foreign language speakers) all have a significant effect on the average school achievement. In addition, as expected, the individual characteristics do not have a statistically significant effect. These results lead us to conclude that school changers do not choose better schools; therefore, we interpret this as further evidence that school changes are indeed an exogenous event (Appendix Table A3).

Average Learning Gap after a Change: Not a Cause for Major Concern

Using the estimations of all important variables on academic achievement separately for each canton and then calculating the individual difference between the estimated achievement (had the student not changed the canton and school) and the observed achievement, we find an average learning gap of −0.064 logits (se = 0.055). This equals a reduction in the mathematics scores of only 0.05 SD for school changers (see Figure 1). This learning gap is not statistically different

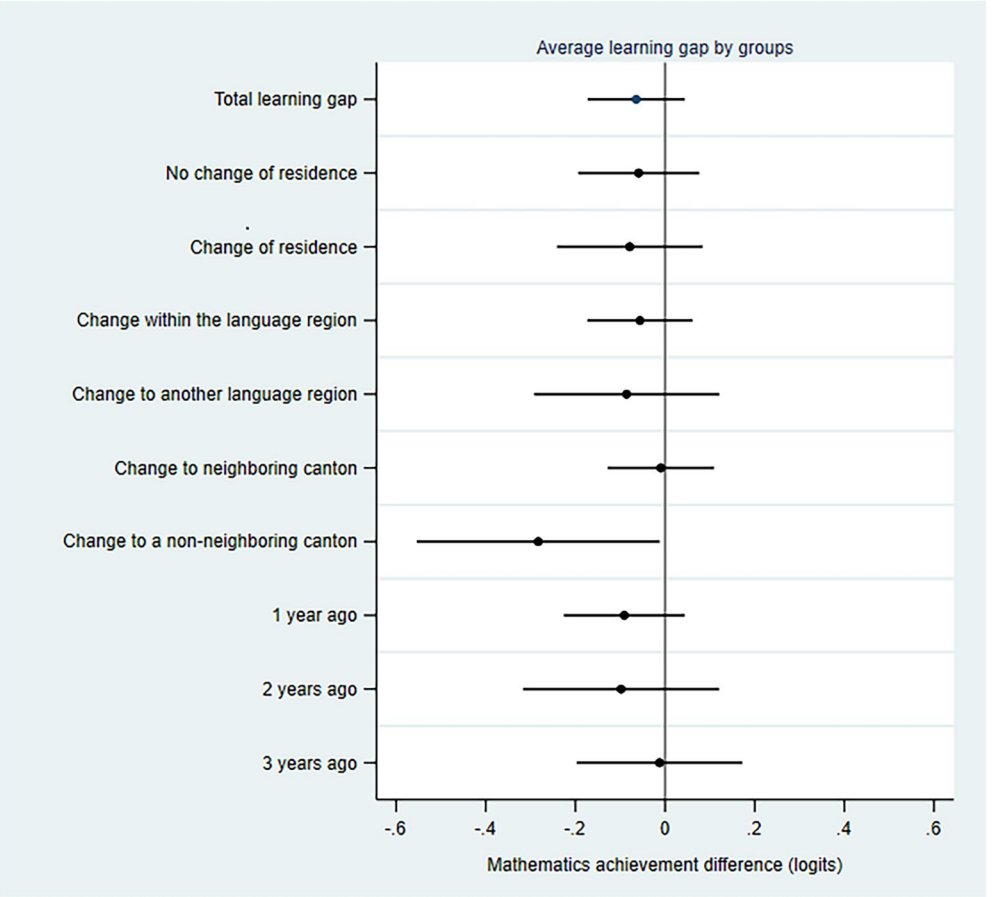

Figure 1. Average learning gap by groups, mathematics achievement difference in logits (using bootstrap resampling).

from zero (95% confidence interval). Although, we cannot exclude the possibility that we do not find a statistical significance due to the small sample size and the associated large confidence interval (compared to large samples, which result in smaller confidence intervals), the effect sizes would still be very small. The only statistically significant result that we find concerns the geographical distance of the school change. When the change of school is over a larger distance (not to a neighboring canton), we see a decrease of student achievement of − 0.281 logits (se = 0.138). Finally, also in line with previous literature, we see a reduction of the learning gap the longer the change took place before the time of the performance test.

The Negative Effect is Concentrated on Boys

The average learning gap by gender shows a statistically significant negative effect of school change for boys in contrast to girls. The learning gap is −0.229 (se = 0.075) and corresponds to a decrease of 0.16 SD in mathematics scores. Given the sample size and the implications for the confidence interval, this can be considered particularly robust, although the effect size is small.

Looking further at the results of the linear regression on the learning gap, gender has a different impact on the learning gap also when controlling for variables related to the change, such as simultaneous change of residence, geographical information about the change, and time since the change, as well as individual sociodemographic and socioeconomic characteristics (see Table 2).

Table 2. Predictors of the learning gap after a change of school.

Linear regression	
Male	*Reference*
Female	0.322**
	(0.104)
Variables on the change:	
Change of residence	0.099
	(0.141)
Change not to a neighboring canton	−0.279*
	(0.130)
Change to another language region	−0.103
	(0.193)
Change 1 year ago	*Reference*
Change 2 years ago	−0.014
	(0.164)
Change 3 years ago	0.123
	(0.138)
Sociodemographic and socioeconomic variables:	
SES	−0.029
	(0.163)
Migration background	−0.039
	(0.133)
Does not speak the school language	0.155
	(0.197)
N	392

Bootstrap standard errors in parentheses. $^{*}p < .05$, $^{**}p < .01$.

The learning gap due to the school change between girls and boys differs by 0.322 logits (se = 0.104). This corresponds to a score difference of 0.25 SD. The other predictors related to the change of school do not show a statistically significant relationship, again with the exception of students changing to a non-neighboring canton.

Conclusion

In this paper we analyze the impact of a school change on student achievement in mathematics at the end of compulsory schooling in Switzerland. In doing so, we contribute to existing literature on the impact of school changes on student achievement in at least three ways. First by only considering school changes that can be considered as exogenous events and therefore to be the cause and not the consequence of academic achievement. Second, we conduct the analysis in a country that is characterized by a virtually complete absence of information on school quality and performance, i.e. where it is very difficult for parents to strategically gain an advantage by changing schools. And third, by analyzing the effects separately for boys and girls, uncovering significant gender-specific differences in the impacts of school changes on student achievement.

Overall, we do not find a statistically significant relationship between changing schools and academic achievement. As in previous studies, we see a tendency for the effect of changing schools to diminish over time and a larger effect when the change is to a more distant canton rather than a nearby canton. Regarding the heterogeneous effect by gender, we find that changing schools has a negative effect only for boys, and this effect is statistically significant and significant in magnitude.

We can only speculate as to the reasons for the different effects on academic performance for boys and girls. In the psychological research literature, there is evidence that girls can integrate more quickly into a new environment, which could explain the difference found between the sexes (Von Salisch et al., 2014). Further reasons may include differences in socioemotional skills, also due to the fact that boys and girls are biologically the same age at the time of the test, but are at different points in their psychological and physiological development. We can also not

exclude gender related differences in the support systems at home and at school, in the societal expectations for boys and girls and the role of friendships and social networks (Lessard & Juvonen, 2022). Whatever the reasons for these differences are, the findings suggest that it may be beneficial to sensitize educators and practitioners to gender differences in school transitions. By understanding gender dynamics, educators could tailor their approaches more effectively to ensure a supportive educational environment for all students.

Like all empirical studies, this study also has certain limitations and gaps. These include, firstly, the fact that we can only analyze the effect of a change of school on academic performance for the subject of mathematics, as standardized performance data for a sample covering the whole country is not available at the time of the study. We must therefore currently work on the assumption that the results with mathematics also have external validity for other school subjects. However, it should be added that mathematics is a highly selective school subject, which is of great importance for further educational careers and in which men also show better test performance than women (OECD, 2023). If we can identify gender-specific effects, especially for boys in mathematics, then it can be assumed that there would probably also be similar effects for subjects such as languages, in which boys tend to perform below average. Secondly, we only have performance data at the time after the change of school and no individual performance data before the change of school. The latter would have helped us to check whether there are specific selection effects that would call into question our assumption of the exogeneity of the school change. Even if academic performance data prior to the school change had been available, the counterfactual, namely the student's performance if he or she had not changed schools, would also have had to be estimated and could not have been observed. Thirdly, and especially with regard to the gender-specific differences in the performance effects of changing schools, the timing of the measurement is crucial. Effects at the age of around 15, at a time when many boys are still in the puberty phase, may not be generalizable to other points in their school career. Future studies should therefore certainly be extended to other phases of the school career and age groups.

Disclosure statement

The authors report that there are no competing interests to declare.

ORCID

Chantal Oggenfuss http://orcid.org/0000-0003-0320-9259

References

Bauer, D. J., McNeish, D. M., Baldwin, S. A., & Curran, P. J. (2020). Analyzing nested data: Multilevel modeling and alternative approaches. In A. G. C. Wright & M. N. Hallquist (Eds.), *The Cambridge handbook of methods in clinical psychology* (pp. 426–443). University Press.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94*, S95–S120. https://doi.org/10.1086/228943

FSO [Federal Statistical Office]. (2023). *Home moves* https://www.bfs.admin.ch/bfs/de/home/statistiken/bau-wohnungswesen/wohnungen/umzuege.html

Gasper, J., DeLuca, S., & Estacion, A. (2012). Switching schools: Revisiting the relationship between school mobility and high school dropout. *American Educational Research Journal*, *49*(3), 487–519. https://doi.org/10.3102/0002831211415250

Grigg, J. (2012). School enrollment changes and student achievement growth: A case study in educational disruption and continuity. *Sociology of Education*, *85*(4), 388–404. https://doi.org/10.1177/0038040712441374

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2004). Disruption versus Tiebout improvement: The costs and benefits of switching schools. *Journal of Public Economics*, *88*(9-10), 1721–1746. https://doi.org/10.1016/S0047-2727(03)00063-X

Howell, T. C. (2011).). *The impact of student mobility, gender, and title I status on measures of school accountability*. Appalachian State University.
Konsortium, Ü. G. K. (2019). *Überprüfung der Grundkompetenzen. Nationaler Bericht der ÜGK 2016: Mathematik 11. Schuljahr* [Verification of the attainment of basic competencies. National report of the ÜGK 2016: Mathematics 11th school years]. EDK and SRED. https://doi.org/10.18747/PHSG-coll3/id/386
Lemons, C. J., Fuchs, D., Gilbert, J. K., & Fuchs, L. S. (2014). Evidence-based practices in a changing world: Reconsidering the counterfactual in education research. *Educational Researcher*, *43*(5), 242–252. https://doi.org/10.3102/0013189X14539189
Lessard, L. M., & Juvonen, J. (2022). The academic benefits of maintaining friendships across the transition to high school. *Journal of School Psychology*, *92*, 136–147. https://doi.org/10.1016/j.jsp.2022.03.005
Mehana, M., & Reynolds, A. J. (2004). School mobility and achievement: A meta-analysis. *Children and Youth Services Review*, *26*(1), 93–119. https://doi.org/10.1016/j.childyouth.2003.11.004
Morgan, S. L., & Winship, C. (2014). *Counterfactuals and causal inference*. University Press.
Mueller, B., & Wolter, S. C. (2014). The role of hard-to-obtain information on ability for the school-to-work tranistion. *Empirical Economics*, *46*(4), 1447–1471. https://doi.org/10.1007/s00181-013-0709-2
OECD [Organisation for Economic Cooperation and Development]. (2023). *PISA 2022 results (Volume I): The state of learning and equity in education*. OECD.
Pham, G., Helbling, L., Verner, M., Petrucci, F., Angelone, D., & Ambrosetti, A. (2019).). *ÜGK - COFO - VECOF 2016 results: Technical appendices*. PHSG and SRED.
Pribesh, S., & Downey, D. B. (1999). Why are residential and school moves associated with poor school performance? *Demography*, *36*(4), 521–534. https://doi.org/10.2307/2648088
Rumberger, R. W. (2003). The causes and consequences of student mobility. *The Journal of Negro Education*, *72*(1), 6–21. https://doi.org/10.2307/3211287
SCCRE [Swiss Coordination Centre for Research in Education]. (2018). *Swiss Education Report 2018*. SCCRE.
Schwartz, A. E., Stiefel, L., & Cordes, S. A. (2017). Moving matters: The causal effect of moving schools on student performance. *Education Finance and Policy*, *12*(4), 419–446. https://doi.org/10.1162/edfp_a_00198
South, S. J., Haynie, D. L., & Bose, S. (2005). Student mobility and school dropout. *Social Science Research*, *36*(1), 68–94. https://doi.org/10.1016/j.ssresearch.2005.10.001
Stamm, M. (2009). Mobile Kinder. Empirische Ergebnisse zum Zusammenhang von ausserplanmässigem Schulwechsel und Schulleistung [Mobile children. Empirical results on the relationship between unscheduled school changes and academic achievement]. *Journal of Childhood and Adolescence Research*, *4*(3), 397–412.
Strand, S., & Demie, F. (2007). Pupil mobility, attainment and progress in secondary school. *Educational Studies*, *33*(3), 313–331. https://doi.org/10.1080/03055690701423184
Temple, J. A., & Reynolds, A. J. (1999). School mobility and achievement: Longitudinal findings from an urban cohort. *Journal of School Psychology*, *37*(4), 355–377. https://doi.org/10.1016/S0022-4405(99)00026-6
Voight, A., Shinn, M., & Nation, M. (2012). The longitudinal effects of residential mobility on the academic achievement of urban elementary and middle school students. *Educational Researcher*, *41*(9), 385–392. https://doi.org/10.3102/0013189X12442239
Von Salisch, M., Zeman, J., Luepschen, N., & Kanevski, R. (2014). Prospective relations between adolescents' social-emotional competencies and their friendships. *Social Development*, *23*(4), 684–701. https://doi.org/10.1111/sode.12064

Appendix A

Table A1. Overview of the excluded cases.

Description of cases	Number of cases, in brackets in percent
ÜGK dataset merged with register data	22,423
Students with gaps or less than 3 years of observation	−1,367 (6%)
Attended a school for children with special needs or a private school for 1 or more years	−1,008 (4%)
Attending a baccalaureate school	−2,379 (10%)
Missing data for control variables such as migration background, language, canton, school type	783 (3%)
Analytical sample	16,886

Table A2. Effects on school change.

Linear regression	
Mathematics test score	−0.000
	(0.001)
SES	0.003*
	(0.001)
Male	*Reference*
Female	0.001
	(0.002)
Native	*Reference*
Migration background	0.000
	(0.003)
Speaks the school language	*Reference*
Speaks a foreign language, not the school language	0.030**
	(0.007)
Other control variables:	
Canton	x
School track	x
N	16,886

Robust standard errors in parentheses. *$p < .05$, **$p < .01$.

Table A3. Linear regression results on the average school achievement by schools.

Linear regression	
No school change	*Reference*
School change	−.048
	(0.028)
SES (individual)	0.000
	(0.005)
SES school average	0.326**
	(0.19)
Male (individual)	*Reference*
Female (individual)	−0.002
	(0.009)
Proportion of female students (school level)	−0.365**
	(0.052)
Native (individual)	*Reference*
Migration background (individual)	0.002
	(0.011)
Proportion of students with migration background (school level)	−0.342**
	(0.034)
Speaks the school language (individual)	*Reference*
Speaks a foreign language, not the school language (individual)	0.005
	(0.018)
Proportion of students speaking a foreign language (school level)	−0.305**
	(0.059)
Other control variables:	
Canton	x
School track	x
N	16,886

Robust standard errors in parentheses. *$p < .05$, **$p < .01$.