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**When patience pays off - evidence on
cultural determinants of post-compulsory
education achievement**

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When patience pays off - evidence on cultural determinants of post-compulsory education achievement

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Abstract

This study empirically demonstrates the influence of culturally different values for long-term orientation and patience on the educational progress of migrants in the post-compulsory education system in Switzerland. Using longitudinal PISA data from Switzerland, we show individual differences according to the migrants' country of origin for several outcomes, such as time to graduation, choice of academic education, and entry into tertiary education. Heterogeneity analyses show that this cultural transmission often differs according to the student's position in the achievement distribution and, in some cases, for women and second-generation migrants.

Keywords: Time preference, patience, long-term orientation, educational trajectories

JEL classification: D91, I21, I23,

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1 Introduction

Differences in time preferences, patience or a stronger long-term orientation (LTO) play an important role in microeconomic analysis to explain human behavior and in empirical research, at least since the early work on time preference by the psychologist Mischel (e.g. Mischel & Ebbesen, 1970). Time preference plays a particularly important role in explaining educational outcomes, educational decisions and educational trajectories, as investments in human capital are time intensive. Individual time preference, or the ability to forgo time and work towards longer-term goals, not only plays a role at those points in the educational career where one can freely decide whether to make another investment, for example a high school diploma or a college degree, and thus forgo further years of income and leisure time, but also because in the educational production process the decision must be made anew every day as to whether or not to forgo leisure time and study for an exam, for example. Furthermore, time preference is an interesting non-cognitive skill, especially in the context of educational decisions, because it is malleable and therefore could be improved with appropriate interventions (Ertac and Allan, 2018).

Numerous studies have shown that differences in individual time preference are quite good predictors of differences in competencies, success, or failure in educational careers (e.g. De Paola and Gioia, 2017; Golsteyn et al., 2014; Sutter et al., 2018). Differences in time preferences not only explain individual differences in educational outcomes, they can also, as recent research shows, explain differences between countries (Hanushek et al., 2021 and a replication of this study by de Gendre et al., 2021), differences between students of different cultural backgrounds but in the same school system (Figlio et al., 2018) and, more recently, regional differences educational outcomes within countries (Hanushek et al., 2023).

The finding that cultural traits or patterns can play such an important role in non-cognitive skills and especially in patience and LTO is certainly related to the fact that recent research

shows that such non-cognitive skills are passed on from parents to children (see Brenoe and Epper, 2022 and Zumbuehl et al., 2021). So, if parents from one cultural area with particularly high or low values in LTO migrate to another cultural area and pass on their attitudes to their children there, then it is possible that these values from the country of origin now also have an influence on educational trajectories and educational progress in the destination country.

In this study, we examine the influence of values in LTO and patience in the country of origin on the educational trajectory of young people with a migration background in Switzerland after compulsory schooling. Switzerland is a good illustrative example for this question because it not only has a very high proportion of pupils with a migrant background, but also a high diversity of countries of origin.

2 Data, Empirical Strategy and Hypotheses

We combine data from the 2012 national PISA test with administrative data on educational trajectories (full list of descriptives in Table A1 in the Appendix). This longitudinal PISA dataset has three advantages. First, the 2012 survey had a large oversampling, with over 13,000 students tested, which is roughly one seventh of this age cohort. Secondly, merging PISA data with the administrative educational history data guarantees that we have no sample attrition, as is the case with survey data. Third, with the PISA data we can not only use a rich set of control variables, regarding the socio-economic background of the parents, but also control for school performance at the end of compulsory schooling.

As explanatory variables, we use both the national values for long-term orientation (LTO) from the World Value Survey (Hofstede et al., 2010) and those for patience from the Global Preferences Survey (Falk et al., 2018). Although these values from two different sources correlate highly (Pearson's correlation coefficient = 0.868 in our main sample), the use of both

variables allows us to examine whether our results are robust to changes in the question, the concepts and the survey methodology of time preferences.

Of the original sample of 13377 students in the merged PISA-longitudinal data set, 2089 students have a foreign nationality.¹ Of these 2089 students, 212 come from countries for which no LTO scores are available and 199 from countries for which no patience scores are available. Although there would potentially be data on 75 countries with LTO values and patience values for 92 countries, the analyses are only carried out based on 51 countries because, due to the nature of the sample, many nationalities are not present in the analytical sample.

In our empirical analysis, we examine four different outcomes on which time preference may potentially have an influence and we perform heterogeneity analyses in terms of students' gender, whether students are first- or second-generation migrants and their PISA score at the age of 15.

The four different outcomes are, firstly, whether students have completed their post-compulsory education on time or not. 35.6 percent of students have a delay in their education, either because they must repeat school years or because they change their education. Our hypothesis is that students with a low time preference, i.e. more patience or a stronger LTO, invest more in their education and therefore complete it on-time more often. Secondly, whether students graduated four years after the expected graduation year, which depends on their upper secondary education type. Although only 8.1 percent of the analytical sample failed to do so, it could well be that impatient individuals with a low LTO fail more often. Third, we examine the question of whether more patient students are more likely to choose academic general education (baccalaureate) over vocational education. The hypothesis here is that while the former with

¹ There are also students with Swiss nationality who have a migration background and are now listed in the statistics as Swiss students due to naturalization. However, as we do not know the country of origin of the parents of these students, we cannot include them in the analysis.

general education only just get the entry ticket to higher education, in other words, such education usually only makes sense if you are willing to stay in education until almost 25, students who choose vocational education can enter the labor market after three or four years and thus have a much shorter investment horizon.² Finally, we examine the question of whether tertiary education was pursued after upper secondary level.³ Both general education and VET graduates can do this, even if they do not choose the same type of education at tertiary level. Here the hypothesis is straightforward, as training at tertiary level is associated with at least an additional 3 years of education and therefore patient students or those with a higher LTO should chose higher education more often.

3 Results

Table 1 shows the results from the linear regression for each of the four outcomes using LTO scores for models 1-3 and the scores for patience for models 4-6. The results for both measures of time preference are remarkably similar and, except for the outcome of obtaining a post-compulsory degree at all, highly significant. In terms of effect size, the influence on the probability of starting tertiary education, which 56 percent of the analytical sample did, stands out. One standard deviation in LTO or patience results in a change of 11.6-14.4 percent of a standard deviation in the outcome variable.

² The sample size is smaller here because we exclude a third possible form of education, the specialized baccalaureates, since a tertiary education is indeed often chosen, but is not mandatory.

³ Here the sample size is reduced again because we only include those students who were in the ability tracks at lower secondary level for whom a later tertiary education is at all realistic.

Table 1

	LTO WVS value			Patience		
	(1)	(2)	(3)	(4)	(5)	(6)
a) Outcome: Graduated on time						
Long Term Orientation	0.036*** (0.007)	0.038*** (0.009)	0.021*** (0.008)	0.026** (0.012)	0.029** (0.012)	0.020*** (0.005)
Observations	1877	1877	1877	1890	1890	1890
b) Outcome: Graduated 4 years after expected graduation year						
Long Term Orientation	0.014** (0.006)	0.006 (0.005)	0.005 (0.007)	0.017*** (0.004)	0.007 (0.005)	0.008 (0.005)
Observations	1877	1877	1877	1890	1890	1890
c) Outcome: Academic baccalaureate (vs. VET)						
Long Term Orientation	0.086*** (0.024)	0.013 (0.011)	0.019*** (0.006)	0.123*** (0.019)	0.041*** (0.010)	0.033*** (0.009)
Observations	1673	1673	1673	1681	1681	1681
d) Outcome: In tertiary education						
Long Term Orientation	0.102** (0.041)	0.062** (0.025)	0.058** (0.025)	0.134*** (0.033)	0.076*** (0.023)	0.072*** (0.024)
Observations	1241	1241	1241	1243	1243	1243
Controls	No	Yes	Yes	No	Yes	Yes
School location FE	No	No	Yes	No	No	Yes

Notes: OLS estimators with robust SE in brackets, clustered at the country of origin. Controls: Female; Age; Track in lower secondary school; Urbanity; Pisa scores (math, reading, science); Socioeconomic Index (ESCS). For all outcomes except c), the type of upper secondary education is also included as control. Specifications (3) and (6) also include FE for each municipality where the upper secondary school is located. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 2 shows the interaction for the outcome of graduating on time. Except for the PISA scores in the model using patience, none of them are significant. However, this is not the case for all outcomes. The effects of LTO and patience are significantly stronger for women and for students at the upper end of the PISA performance scale when it comes to the probability of pursuing an academic pathway at upper secondary level (see Table A2 in the Appendix). For the probability of entering tertiary education (see Table A3 in the Appendix), however, the

effect is stronger for 2nd generation migrants, but not for women but smaller for students at the upper end of the performance distribution.

Table 2 Graduated on time

	LTO WVS value			Patience		
	(1)	(2)	(3)	(4)	(5)	(6)
Long Term Orientation	0.027** (0.011)	0.034*** (0.012)	0.048*** (0.008)	0.019* (0.010)	0.026* (0.014)	0.046*** (0.008)
Female=1	0.108*** (0.024)			0.118*** (0.025)		
Female x LTO	0.022 (0.014)			0.018 (0.018)		
2nd Generation=1	0.055*** (0.016)			0.059*** (0.016)		
2nd Generation x LTO	0.004 (0.012)			0.004 (0.013)		
PISA ability	0.112 (0.077)			0.103 (0.074)		
PISA ability x LTO	0.018 (0.016)			0.033* (0.017)		
Observations	1877	1877	1877	1890	1890	1890

Notes: OLS estimators with robust SE in brackets, clustered at the country of origin. Controls: Female; Age; Track in lower secondary school; Urbanity; Pisa scores(math, reading, science); Socioeconomic Index (ESCS); Type of upper secondary education. * p<0.1, ** p <0.05, *** p <0.01.

4 Conclusion

This study adds to the handful of studies that demonstrate the strong influence that the cultural transmission of non-cognitive skills, such as time preference, can have on educational outcomes and trajectories. Differences in post-compulsory educational trajectories can be partially explained for students with very different migration backgrounds but within the same education system. There are interesting heterogeneities in the strength of the effect of LTO and patience

on educational outcomes and choices. Finally, the persistence of this cultural transmission is demonstrated by the finding that these effects are very similar for first- and second-generation migrants.

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Declarations

Disclaimer

During the preparation of this work, the authors used DeepL to make grammatical and style changes. We used this tool only to improve the readability of the text. After using the tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Availability of data and materials

The data supporting this study's findings are available from the Swiss Federal Statistical Office. However, restrictions apply to the availability of these data, and therefore, the data are not publicly available.

Competing interests

None

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Appendices (supplementary material):

Table A1 Descriptive statistics

	Mean	StDev	Min	Max
Graduated on time	0.645	0.479	0	1
Graduated 4 years after expected year	0.918	0.275	0	1
Chose baccalaureate (vs. VET) in tertiary education	0.24	0.427	0	1
Long Term Orientation	0	1	-2.9	2.2
Patience	0	1	-1.7	2.1
Female	0.518	0.5	0	1
Age in 2022	25.881	0.752	24	29
Basic track	0.348	0.476	0	1
Mixed track	0.125	0.331	0	1
Advanced track	0.527	0.499	0	1
Urbanity: Urban	0.698	0.459	0	1
Urbanity: Intermediate	0.198	0.399	0	1
Urbanity: Rural	0.104	0.306	0	1
First Up. Sec. Education: none	0.019	0.138	0	1
First Up. Sec. Education: 2-year VET	0.05	0.219	0	1
First Up. Sec. Education: 3-year VET	0.481	0.5	0	1
First Up. Sec. Education: 4-year VET	0.146	0.353	0	1
First Up. Sec. Education: Specialized Baccalaureate	0.089	0.285	0	1
First Up. Sec. Education: Academic Baccalaureate	0.214	0.41	0	1
PISA score, mathematics	-0.457	0.952	-3.4	2.9
PISA score, reading	-0.414	0.983	-4.1	2.6
PISA score, science	-0.517	0.958	-3.4	2.5
PISA ESCS socioeconomic status	-0.331	0.856	-2.9	2.7
Observations	1964			

Notes: Because the LTO WVS values and the Patience values are not available for the same countries, the number of observations in the descriptive table is larger than in the results tables above, as we have included here the observations of both samples. The PISA scores were standardized in the whole sample (together with the Swiss nationals); therefore, the means of the foreigners only are below zero.

Table A2 Academic baccalaureate vs VET

	LTO WVS value			Patience		
	(1)	(2)	(3)	(4)	(5)	(6)
Long Term Orientation	-0.014 (0.011)	0.006 (0.018)	0.026* (0.015)	0.016 (0.014)	0.044** (0.016)	0.060*** (0.016)
Female=1	0.017 (0.022)			0.007 (0.024)		
Female x LTO	0.054*** (0.012)			0.048*** (0.013)		
2nd Generation=1		-0.052* (0.029)			-0.052* (0.027)	
2nd Generation x LTO		0.016 (0.029)			-0.005 (0.023)	
PISA ability			0.086** (0.041)			0.056 (0.042)
PISA ability x LTO			0.025*** (0.008)			0.039*** (0.011)
Observations	1673	1673	1673	1681	1681	1681

Notes_ OLS estimators with robust SE in brackets, clustered at the country of origin. Controls: Female; Age; Track in lower secondary school; Urbanity; Pisa scores (math, reading, science); Socioeconomic Index (ESCS). * p <0.1, ** p <0.05, *** p <0.01.

Table A3 In tertiary education

	LTO WVS value			Patience		
	(1)	(2)	(3)	(4)	(5)	(6)
Long Term Orientation	0.075*** (0.028)	0.032 (0.025)	0.057** (0.026)	0.073** (0.028)	0.052* (0.027)	0.070*** (0.024)
Female=1	0.009 (0.032)			0.005 (0.025)		
Female x LTO	-0.023 (0.015)			0.005 (0.016)		
2nd Generation=1		0.008 (0.018)			0.001 (0.018)	
2nd Generation x LTO		0.050*** (0.014)			0.036** (0.014)	
PISA ability			0.129*** (0.039)			0.091** (0.041)
PISA ability x LTO			-0.027* (0.015)			-0.035** (0.015)
Observations	1241	1241	1241	1243	1243	1243

Notes: OLS estimators with robust SE in brackets, clustered at the country of origin. Controls: Female; Age; Track in lower secondary school; Urbanity; Pisa scores (math, reading, science); Socioeconomic Index (ESCS); Type of upper secondary education. * p<0.1, ** p<0.05, *** p<0.01.